N83447.AR.000738
NAS FORT WORTH
5090.3a

PRELIMINARY ASSESSMENT REPORT FOR MILITARY MUNITIONS RESPONSE PROGRAM FEBRUARY 2015 NAS FORT WORTH TX
2/1/2015
RESOLUTIONS

MILITARY MUNITIONS RESPONSE PROGRAM

BASEWIDE PRELIMINARY ASSESSMENT REPORT

NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH, TEXAS

Revision: 1

Prepared for:

Department of the Navy
Naval Facilities Engineering Command,
Southeast Building 135 North, P.O. Box 30
Jacksonville, Florida 32212

Prepared by:

Resolution Consultants
A Joint Venture of AECOM & ENSAFE
1500 Wells Fargo Building
440 Monticello Avenue
Norfolk, Virginia 23510

Contract Number N62470-11-D-8013
CTO JM24

February 2015

MILITARY MUNITIONS RESPONSE PROGRAM

BASEWIDE PRELIMINARY ASSESSMENT REPORT

NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH, TEXAS

Revision: 1

Prepared for:

Department of the Navy
Naval Facilities Engineering Command, Southeast
Building 135 North, P.O. Box 30
Jacksonville, Florida 32212

Prepared by:

Resolution Consultants
A Joint Venture of AECOM & ENSAFE
1500 Wells Fargo Building
440 Monticello Avenue
Norfolk, Virginia 23510

Contract Number N62470-11-D-8013
CTO JM24

February 2015

CLEAN Task Order Manager
Brad Jackson

Reviewed By
Michael Ervine, Sr. Technical Advisor

Table of Contents

1.0 Introduction 1-1
1.1 Installation Summary and Purpose of PA Report 1-1
1.2 PA Objectives and Tasks 1-2
1.2.1 PA Objectives 1-2
1.2.2 PA Tasks 1-2
1.3 Report Organization 1-3

2.0 Installation Setting and Characteristics 2-1
2.1 Location and Setting 2-1
2.2 History 2-1
2.3 Physical and Environmental Setting 2-2
2.3.1 Climate and Meteorology 2-2
2.3.2 Topography 2-3
2.3.3 Geology 2-3
2.3.4 Hydrology 2-4
2.3.5 Hydrogeology 2-4
2.3.6 Current and Potential Future Land and Resource Uses 2-4
2.4 Biological Resources 2-5
2.4.1 Vegetation 2-6
2.4.2 Wildlife 2-6
2.4.3 Protected Species 2-6
2.5 Ordnance Operations and Installation Overview 2-8

3.0 DATA COLLECTION 3-1
3.1 Internet Research 3-1
3.2 Historical Offsite Records 3-1
3.3 Historical Documents 3-4
3.4 Interviews with Base Personnel 3-12
3.5 Historical Aerial Photographs 3-15
3.6 Site Reconnaissance 3-17

4.0 PRELIMINARY ASSESSMENT DATA EVALUATION 4-1
4.1 Descriptions of Potential MRAs and MMRP Eligibility 4-1
4.2 Identification of MRAs 4-3

5.0 CONCEPTUAL SITE MODELS 5-1
5.1 Building 1-162B, Former Pistol Range 5-1
5.1.1 MEC Pathway Analysis 5-5
5.1.2 MC Pathway Analysis 5-5
5.1.3 Risk Analysis 5-5
5.2 Building 1342, Former Pistol/M-60 Range 5-7
5.2.1 MEC Pathway Analysis 5-11
5.2.2 MC Pathway Analysis 5-11
5.2.3 Risk Analysis 5-11
5.3 Building 1340, Former Rifle Range 5-13
5.3.1 MEC Pathway Analysis 5-17
5.3.2 MC Pathway Analysis 5-17
5.3.3 Risk Analysis 5-17

5.4 Buildings 3-157 — 3-161, Former Skeet Range 5-19
5.4.1 MEC Pathway Analysis 5-23
5.4.2 MC Pathway Analysis 5-23
5.4.3 Risk Analysis 5-23
5.5 Former Skeet Range North.....5-25
5.5.1 MEC Pathway Analysis 5-29
5.5.2 MC Pathway Analysis 5-29
5.5.3 Risk Analysis 5-29

6.0 Conclusions and Recommendations 6-1

7.0 References 7-1

Figures

Figure 1-1 Installation Location Map 1-2
Figure 4-1 Location of Potential MRAs.....4-2
Figure 5-1 Conceptual Site Model — Building 1-162B, Former Pistol Range 5-4
Figure 5-2 MC Exposure Pathway Analysis — Building 1-162B, Former Pistol Range....5-6
Figure 5-3 Conceptual Site Model — Building 1341, Former Pistol/M60 Range 5-10
Figure 5-4 MC Exposure Pathway Analysis — Building 1341, Former Pistol/M60 Range 5-12
Figure 5-5 Conceptual Site Model — Building 1340, Former Rifle Range.....5-16
Figure 5-6 MC Exposure Pathway Analysis — Building 1340, Former Rifle Range 5-18
Figure 5-7 Conceptual Site Model — Buildings 3-157 — 3-161, Former Skeet Range .5-22
Figure 5-8 MC Exposure Pathway Analysis — Buildings 3-157 — 3-161, Former Skeet Range 5-24
Figure 5-9 Conceptual Site Model – Former Skeet Range North..... 5-28
Figure 5-10 MC Pathway Analysis – Former Skeet Range North..... 5-30

Tables

Table 2-1 Current and Potential Future Land Uses 2-5
Table 2-2 Wetland Status of Survey Sites.....2-6
Table 2-3 Summary of Known or Potential Special Status Species 2-7
Table 2-4 General Information for NAS JRB Fort Worth 2-8
Table 3-1 List of Searched Repositories.....3-1
Table 3-2 1976 List of Buildings Potentially Associated with Munitions or Explosives . 3-10
Table 3-3 Sited Explosive Locations at NAS JRB Fort Worth 3-11
Table 3-4 Interview Summary for Base Personnel 3-11
Table 4-1 Summary of Potential MRAs associated with NAS JRB Fort Worth 4-4
Table 5-1 CSM Information Profile — Building 1-162B, Former Pistol Range 5-1
Table 5-2 CSM Information Profile — Building 1341, Former Pistol/M60 Range.....5-7
Table 5-3 CSM Information Profile — Building 1340, Former Rifle Range 5-13
Table 5-4 CSM Information Profile — Buildings 3-157 — 3-161, Former Skeet Range 5-19
Table 5-5 CSM Information Profile – Former Skeet Range North 5-25

Appendices

(Included on CD-ROM)

Appendix A	Logbooks
Appendix B	Documents and Records
Appendix C	Installation Maps
Appendix D	Historical Aerial Photographs

List of Acronyms

°F	degrees Fahrenheit
ft^2	square feet
AAF	Army Air Force
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
ALCM	Air Launch Cruise Missile
BASH	Bird Aircraft Strike Hazard
BEBS	*Basewide Environmental Baseline Survey*
bgs	below ground surface
BRAC	Defense Base Closure and Realignment Commission
CALA	Combat Aircraft Loading Area
CDC	Child Development Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	conceptual site model
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DON	Department of Navy
DRMO	Defense Reutilization and Marketing Services
EOD	Explosive Ordnance Disposal
ESO	Explosives Safety Officer
ESQD	Explosives Safety Quantity-Distance
ESA	Explosive Safety Arc
FW	Fighter Wing
GSA	General Services Administration
HE	high explosive
HF	high frequency
IAS	Initial Assessment Study
lbs	pounds
LMAFP	Lockheed Martin Air Force Plant
JRB	Joint Reserve Base
MC	munitions constituents
MCL	Maximum Contaminant Level
MD	munitions debris
MEC	munitions and explosives of concern
mm	millimeters

MMRP	Military Munitions Response Program
MPPEH	Materials Potentially Presenting an Explosive Hazard
MRA	munitions response area
MRP	Munitions Response Program
msl	mean sea level
NARA	National Archives and Records Administration
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NEESA	Naval Energy and Environmental Support Activity
NEW	net explosive weight
NFA	No Further Action
NIRIS	Navy Installation Restoration Information Solution
NOSSA	Navy Ordnance Safety and Security Activity
OB	open burn
OD	open detonation
P2	Pollution Prevention Management Plan
PA	Preliminary Assessment
RCRA	Resource Conservation and Recovery Act
RG	Record Group
RSL	Ready Service Locker
SAC	Strategic Air Command
SELs	Sited Explosive Locations
SOW	statement of work
SWFLANT	Strategic Weapons Facility Atlantic
SWMU	Solid Waste Management Unit
TANG	Texas Air National Guard
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
USACE	United States Army Corp of Engineers
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
WMM	waste military munitions
Work Plan	Resolution Consultants. *Plan of Action/Cost Estimate Munitions Response Program Basewide Preliminary Range Assessment, Naval Air Station Fort Worth, Joint Reserve Base, Fort Worth, Texas.* 27 June 2012.
WSA	Weapons Storage Area

EXECUTIVE SUMMARY

The Department of Defense has established the Military Munitions Response Program (MMRP), under the Defense Environmental Restoration Program, to address munitions and explosives of concern (MEC) and munitions constituents (MC) at "other than operational" military ranges and other sites. Closed and transferring military ranges and sites not located on an operating range are considered "other than operational."

This report represents a Preliminary Assessment (PA) for Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, in Tarrant County, Texas. Applicable Department of Defense, United States Navy, and United States Environmental Protection Agency guidance for conducting and documenting PAs were followed and modified, where appropriate, to address unique aspects of MEC and MC. This basewide PA was conducted to identify areas within NAS JRB Fort Worth that may have been impacted by MEC or releases of MC that are eligible for inclusion in the MMRP.

The Installation was established in 1932 and it was known as Tarrant Field from 1932 to 1943 and Fort Worth Army Air Field from 1943 to 1948. The Strategic Air Command assumed control of the Installation in 1946, and the Base served as headquarters for the Eighth Air Force. The Base was renamed Carswell Air Force Base (AFB) in 1948. As part of the Defense Base Realignment and Closure (BRAC) Act of 1990, a BRAC Commission closed Carswell AFB on September 30, 1993. The 1993 BRAC Commission recommended the realignment of several military reserve and guard units from NAS Dallas, Texas; NAS Glenview, Illinois; and NAS Memphis, Tennessee to Carswell AFB (Department of Navy 2005). NAS JRB Fort Worth was established and commissioned on October 1, 1994 as the first JRB in the United States. The current mission of NAS JRB Fort Worth is to provide joint training capabilities and resources to enable War Fighter readiness.

Ordnance reportedly associated with NAS JRB Fort Worth included small arms and rifle rounds such as 9 millimeter (mm), shotgun shells, .38 caliber, .45 caliber, 5.56mm, 7.62mm, .50 caliber, and 20mm. Additionally, 105mm High Explosive (HE) projectiles, 2.75-inch M229 HE rockets, M57 hand grenades, M103 bombs, aircraft flares, launchers for aircraft ejection seats, smoke signals, and various rockets, missiles, and bombs are associated with the F-16 and F-18 aircraft. Because ordnance operations occurred, MEC and MC could potentially be present at NAS JRB Fort Worth. As a result, a statement of work (SOW) was developed to describe the scope of PA data collection and evaluation services to assess the potential presence and locations of MEC and MC at NAS JRB Fort Worth and if potentially impacted areas are MMRP-eligible. This SOW, the primary objective of which was to collect sufficient data to identify munitions response areas (MRAs) eligible for inclusion under the MMRP, was detailed in the *Plan of Action/Cost Estimate Munitions Response Program Basewide Preliminary Range Assessment, Naval Air Station Fort Worth, Joint Reserve Base Fort Worth, Texas* (Work Plan) prepared by Resolution Consultants, dated 27 June 2012. Furthermore, this PA serves to offer a determination if MMRP-eligible MEC and/or MC sites (if identified) pose a threat to human health or the environment.

During data collection efforts, the Resolution Consultants team interviewed NAS JRB Fort Worth personnel and reviewed databases, historical documents, and records maintained at on-base and off-base repositories. Reviews of historical aerial photographs were also conducted to identify areas where munitions and explosives were formerly and/or presently managed. Based on the collective findings of the data collection process, the following potential MRAs were identified at NAS JRB Fort Worth and are grouped as follows:

- Alert Pad, External Storage Pad, Taxiway 180 Aircraft Parking Apron, Building 192B (CALA Taxiway), and Building 196E (CALA and RED LABEL, Aircraft Explosive Cargo Area or Suspect Cargo Area, Jammed Gun Area, Arm/Dearm Area, and Hung Ordnance)

- Building 1050 (Aircrew Survival Equipment), Building 1347 (Small Arms Training), Building 1403 (Rooms 117 & 118 Egress Shop), Building 1411 (Room 112 Production Control & Room 114 Float Shop), Building 1428 (Squadron Arms/Secure Central Control), and Building 1615 (Arm & Inatr Bldg./Training Special Weapons)

- Building 1-162B, Former Pistol Range

- Building 1341, Former Pistol/M60 Range

- Building 1340, Former Rifle Range

- Building 1345, Indoor Small Arms Range

- Building 1346, Former Mobile Pistol Range/Indoor Small Arms Range

- Building 1628 Room 3, Building 1630 Room 7, Building 1643, Building 1648 Rooms 04 and 104, Building 1649 Room 115, and Building 1650 Room 134; 301st Fighter Wing Explosive Licensed Facilities

- Buildings 3-157 through 3-161, Former Skeet Range

- Buildings 3351, 3352, 3356, 3368, 3369, and 3370 through 3388, Northern Weapons Storage Area

- Building 4159 and Building 4162, Ready Service Magazine, and Bird Aircraft Strike Hazard Ready Service Locker

- Building 4210 (Missile Assembly Facility) and Buildings 4220 through 4257, Air Launch Cruise Missile Storage Area

- Building 1672, Building 1675, and Building 4175, Texas Air National Guard Explosive Licensed Facilities

- Former Off-Site Weapons Storage Area

- Former Skeet Range North

- Future Explosive Ordnance Disposal Range — Open Burn/Open Detonation Are

Potential MRAs were screened for MMRP eligibility based on Defense Environmental Restoration Program criteria: 1) the release occurred prior to 30 September 2002; 2) the release is not associated with a Formerly Used Defense Site, operational range, active munitions demilitarization facility, or active waste military munitions treatment or disposal unit operated after

30 September 2002; and 3) the "site" was not identified or included in the Navy's Risk Management Information System, prior to 30 September 2000.

Based on the findings of the comprehensive dataset and pursuant to MMRP eligibility criteria, five MRAs were identified by the Navy as requiring further investigation under the MMRP. These include:

- Building 1-162B, Former Pistol Range
- Building 1341, Former Pistol/M60 Range
- Building 1340, Former Rifle Range
- Buildings 3-157 through 3-161, Former Skeet Range
- Former Skeet Range North

Conceptual Site Models for these four MRAs are provided in Section 5. The Navy recommends "no further investigation" under the MMRP for the remaining potential MRAs; however, if the status of a potential MRA changes to "closed" or "inactive," the potential MRA should be re-evaluated for MMRP eligibility.

Risks to human health and the environment for exposure to MC-contaminated media are considered to be high for Buildings 3-157 through 3-161 (Former Skeet Range) and the Former Skeet Range North, whereas risks to human health and the environment from MC-contaminated media are considered moderate for Building 1-162B (Former Pistol Range), Building 1341 (Former Pistol/M60 Range), and Building 1340 (Former Rifle Range). Additional investigation is recommended to determine if MC is present, quantify the degree of MC contamination in site media, and to determine if MC pathways are complete for the five identified MRAs.

1.0 INTRODUCTION

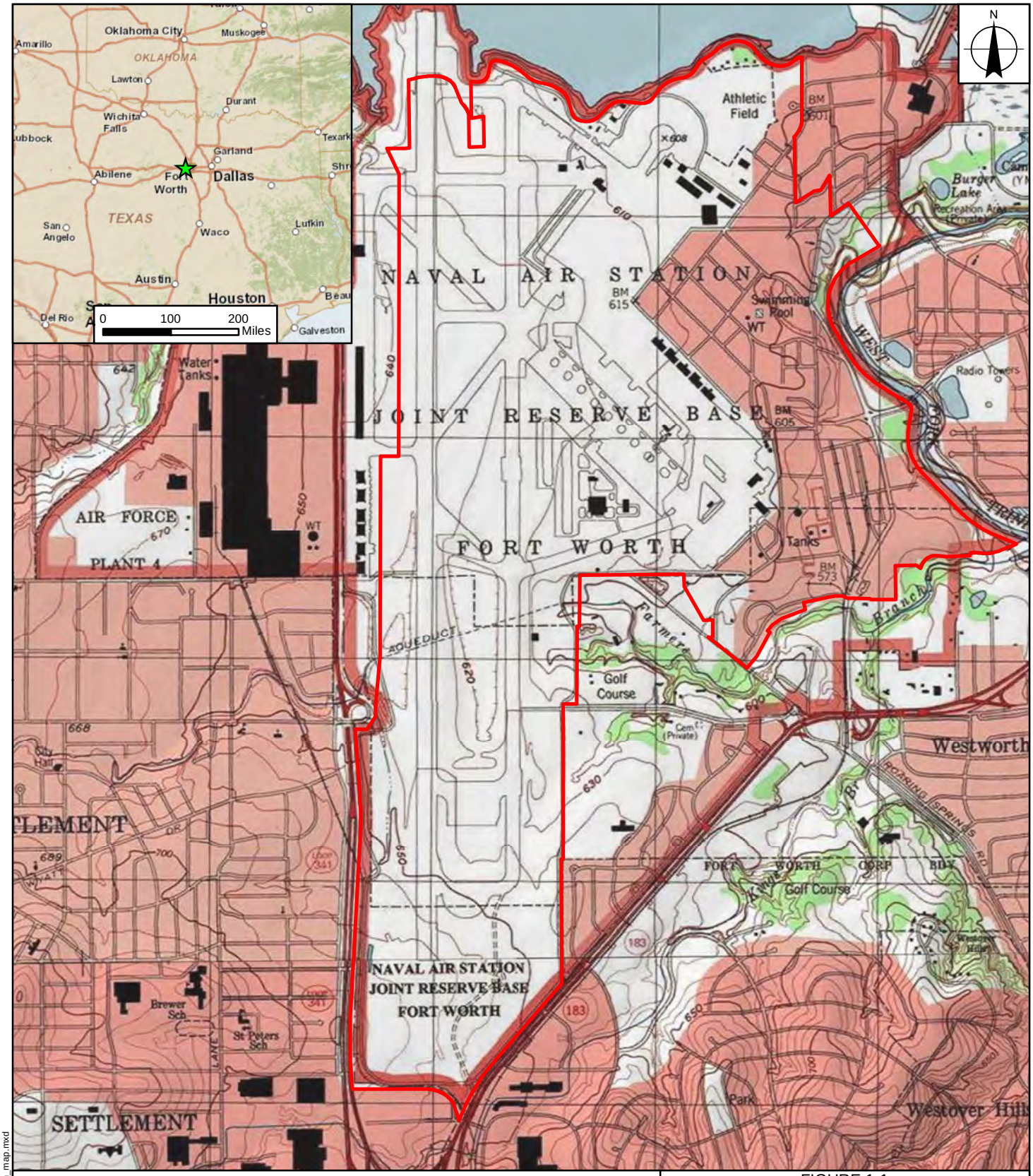
This report describes the activities, procedures, and findings of a munitions Preliminary Assessment (PA) conducted for Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth, Texas. This basewide PA was conducted to identify areas within NAS JRB Fort Worth that may have been impacted from releases of munitions and explosives of concern (MEC) or munitions constituents (MC). During the PA, a data collection team interviewed NAS JRB Fort Worth personnel, reviewed documents within on-base and off-base repositories, and reviewed historical aerial photographs to identify areas where munitions and explosives reside and are presently managed and to assess each area for potential releases of MEC and MC. This PA report provides the framework for identifying munitions response areas (MRAs) (i.e., areas recommended for further investigation) eligible for inclusion in the MMRP under the Defense Environmental Restoration Program (DERP).

This report was prepared by Resolution Consultants on behalf of Naval Facilities Engineering Command (NAVFAC) Southeast under contract task order number JM24 of the Comprehensive Long-Term Environmental Action Navy IV program, contract number N62470-11-D-8013. This document was prepared in accordance with the *Navy Munitions Response Program Guidance* (Department of Navy [DON] 2005a), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan in Title 40 of the Code of Federal Regulations, Part 300.

1.1 Installation Summary and Purpose of PA Report

NAS JRB Fort Worth is located approximately eight miles west of downtown Fort Worth in Tarrant County, Texas (DON 2005), and encompasses approximately 2,000 acres (Figure 1-1). NAS JRB Fort Worth was established on 1 October 1994 as the first JRB in the United States. Prior to being designated as NAS JRB Fort Worth, the Installation was known as Carswell Air Force Base (AFB) from 1948 to 1994.

Ordnance reportedly associated with NAS JRB Fort Worth included small arms and rifle rounds such as 9 millimeter (mm), shotgun shells, .38 caliber, .45 caliber, 5.56mm, 7.62mm, and .50 caliber. Additionally, 20mm, 105mm high explosive (HE) projectiles, 2.75-inch M229 rockets, M57 hand grenades, M103 bombs, aircraft flares, launchers for aircraft ejection seats, smoke signals, rockets, missiles, and bombs are associated with F-16 and F-18 aircraft.



Legend

- Installation Location
- Installation Boundary

0 2,000 4,000 Feet

Site boundary is from Tetra Tech.

FIGURE 1-1
SITE LOCATION MAP
NAVAL AIR STATION
JOINT RESERVE BASE
FORT WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: B. HAMBY	DATE: 10/29/2013
DRAWN BY: MSENNE	TASK ORDER NUMBER: JM24

X:\Navy\NAS_JRB_Fort_Worth\site_location_map.mxd

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013; Copyright:© 2013 National Geographic Society, i-cubed

Because ordnance operations occurred, MEC or MC could potentially be present at NAS JRB Fort Worth. As a result, a statement of work (SOW) was developed to describe the scope of PA data collection and evaluation services to assess the potential presence and locations of MEC and MC at NAS JRB Fort Worth. The SOW, the primary objective of which was to collect sufficient data to identify munitions response areas (MRAs) eligible for inclusion under the MMRP, was detailed in the *Plan of Action/Cost Estimate, Munitions Response Program Basewide Preliminary Range Assessment, Naval Air Station Fort Worth Joint Reserve Base, Fort Worth, Texas*, prepared by Resolution Consultants, dated 27 June 2012.

1.2 PA Objectives and Tasks

The goal of the PA is to identify MRAs eligible for inclusion in the MMRP. In order to meet the goal of the study, the PA SOW identified specific objectives, data collection, and evaluation tasks required to determine whether further investigation is warranted for areas within NAS JRB Fort Worth.

1.2.1 PA Objectives

The following PA objectives were developed in the SOW (NAVFAC Southeast 2012):

- Describe the characteristics of NAS JRB Fort Worth
- Identify areas within NAS JRB Fort Worth where munitions were managed or disposed
- Identify MRAs
- Develop a conceptual site model (CSM) for each identified MRA
- Determine if MMRP-eligible MEC and/or MC sites (if identified) pose a potential threat to human health or the environment

1.2.2 PA Tasks

The PA was conducted to provide the necessary data to satisfy the objectives outlined above. Data were acquired by implementing the tasks identified in the SOW which included:

- Reviewing documents acquired from on-base and off-base repositories
- Conducting interviews with NAS JRB Fort Worth personnel
- Reviewing historical aerial photographs
- Performing a site reconnaissance, if required

Follow-on data evaluation tasks included:

- Evaluating PA data and developing conclusions
- Evaluating MMRP eligibility

The activities, procedures, and findings associated with these tasks are described in this PA report.

1.3 Report Organization

This PA report is organized as follows:

Section 1: Introduction — Describes the purpose of the PA report, presents a brief installation summary, and identifies the PA goal as well as objectives and tasks

Section 2: Installation Setting and Characteristics — Provides a brief description of the installation's location, setting, and history as well as physical and environmental settings

Section 3: PA Activities and Findings — Describes data collection efforts, sources of data, and pertinent information acquired

Section 4: PA Data Evaluation — Identifies and describes potential MRAs and identifies MRAs eligible for the MMRP

Section 5: Conceptual Site Model — Provides a CSM for each MRA based on information gathered to date

Section 6: Conclusion and Recommendations — Summarizes comprehensive findings and presents recommendations moving forward

Section 7: References — Provides a comprehensive list of references used in preparation of this report

The following supporting information is included as appendices on a compact disc:

- Appendix A: Logbooks
- Appendix B: Documents and Records
- Appendix C: Installation Maps
- Appendix D: Historical Aerial Photographs

2.0 INSTALLATION SETTING AND CHARACTERISTICS

2.1 Location and Setting

The setting and characteristics of NAS JRB Fort Worth are described below.

Source: Google Earth Aerial Imagery

NAS JRB Fort Worth occupies approximately 2,000 acres in north central Tarrant County, Texas (DON 2005). NAS JRB Forth Worth is approximately eight miles west of downtown Fort Worth and is bordered to the north by Lake Worth, to the east by the Trinity River, and to the south by State Highway 183. It shares a common aircraft runway with the Lockheed Martin Air Force Plant (LMAFP) 4 to the west.

2.2 History

The property the installation currently occupies was originally developed by the adjoining LMAFP 4 as an unpaved landing field referred to as the Tarrant Field Aerodome. The Army Air Force (AAF) was in the process of negotiating a contact with the Fort Worth Chamber of Commerce to construct an AAF training base when the Japanese attacked Pearl Harbor on 7 December 1941. Base construction was authorized in January 1942, and in June 1942, the unfinished field was assigned to the AAF Training Command and later assigned to the Gulf Coast Army Air Field Training Command (AFCEE 1993). The Installation's mission was to train B-17 and other pilots to fly the B-24 Liberator. The Installation was designated as Fort Worth Army Air Field in 1943. By the end

of November 1945, 32 B-29s were assigned to the field for peacetime operational training (AFCEE 1993).

The Strategic Air Command (SAC) assumed control of the installation in 1946 and the Base served as headquarters for the Eighth Air Force. The Base was renamed Carswell AFB in 1948, and at that time, the Seventh Bomb Wing was the host unit. In 1951, Headquarters Nineteenth Air Division was located at Carswell AFB where it remained until September 1988 (DON 2005). The Seventh Bomb Wing had its first B-36 aircraft reassigned in January 1958. In February 1958, the 4123rd Strategic Wing received Carswell AFB's first B-52 Bomber (B-52). In June 1965, the Seventh Bomb Wing participated in the first B-52 bombing mission over Vietnam. For ten years, Carswell-based operations were affected by the Vietnam conflict, and at times, flying and support activities were devoted almost exclusively to augmenting SAC forces in the Western Pacific and Southeast Asia. By November 1983, the last B-52 "D" aircraft had left Carswell AFB and the entire bomber fleet was changed to the new B-52 "H" model bomber (AFCEE 1993). The Air Combat Command assumed control of the Base in 1992 with the disestablishment of SAC (DON 2005).

As part of the Defense Base Realignment and Closure Act of 1990, a Base Closure and Realignment Commission closed Carswell AFB on 30 September 1993. The 1993 Commission recommended the realignment of several military reserve and guard units from NAS Dallas, Texas; NAS Glenview, Illinois; and NAS Memphis, Tennessee, to Carswell AFB (DON 2005). NAS JRB Fort Worth was commissioned on 1 October 1994 as the first JRB in the United States. Tenant Commands at NAS JRB currently include Air Force, Army, Marine Corps, Navy, and the Texas Air National Guard. The current mission of NAS JRB Fort Worth is to provide joint training capabilities and resources to enable War Fighter readiness.

2.3 Physical and Environmental Setting

The following sections provide general information on the physical and environmental setting at NAS JRB Fort Worth, including climate, topography, geology, hydrology, hydrogeology, land use, cultural and natural resources, and biological resources.

2.3.1 Climate and Meteorology

The Tarrant County area is subtropical with mild to moderate winters and hot, humid summers. This region receives approximately 30 inches of rainfall per year. The majority of this rainfall occurs between the months of April and October. The month of January is typically the coldest month of the year with an average temperature of 45 degrees Fahrenheit (°F). July and August are typically the hottest months of the year with an average temperature of 86°F (DON 2005). Severe thunderstorms with wind speeds of 65 knots and hail storms are common (USAF 1993).

2.3.2 Topography

NAS JRB Fort Worth is located within the Grand Prairie section of the Central Lowlands Physiographic Province (USAF 1993). This physiographic province of Texas is normally a broad, gently sloping terrace.

The topography of the area surrounding the Base consists of low relief plains that are broken by meandering courses of streams and rivers (DON 2005). The area is characterized by broad terrace surfaces sloping gently eastward, interrupted by westward-facing escarpments. The topography of the Installation is relatively flat, with elevations ranging from 550 feet above mean sea level (msl) in the east to 690 feet above msl in the southwest (USAF 1993).

2.3.3 Geology

The geology in the vicinity of NAS JRB Fort Worth is described as undifferentiated Paleozoic rocks overlain with Lower Cretaceous sedimentary formations. The Lower Cretaceous formations are overlain with younger fluvial and alluvium deposits believed to be from the periodic flooding of the Trinity River over the past one million years. There are seven geological formations beneath the Installation, listed from youngest to oldest: Quaternary alluvium and fluvial terraces; five Lower Cretaceous formations (Goodland Limestone, Walnut Formation, Paluxy Formation, Glen Rose Formation, and Twin Mountain Formation); and, undifferentiated Paleozoic rocks (DON 2005).

The U.S. Department of Agriculture Natural Resources Conservation Service has classified soil at NAS JRB Fort Worth as 75 percent urban land. Urban lands are areas that are 85 to 100 percent covered with structures, including office buildings, airports, and paved surfaces. Soil classified as urban land has been altered to a state such that determination of the soil in the area cannot be accomplished (DON 2005). Approximately 85 percent of the surface area of NAS JRB Fort Worth is paved (building foundations, roads, runways, parking lots, etc.) and the remainder consists of mowed/managed grasses for the airfield runways and taxiways U.S. Army Corp of Engineers ([USACE] 1997).

Soils in the area of NAS JRB Fort Worth are usually clayey soils on nearly level to gently sloping uplands or are deep loamy soils on level to sloping stream terraces that are susceptible to erosion. Permeability of the soil at the Installation is characterized as low to moderately low, which results in rapidly forming sheet flow runoff (DON 2005).

2.3.4 Hydrology

No surface water bodies are located on NAS JRB Fort Worth. Lake Worth, which borders the northern portion of the Installation, is a 3,500-acre lake that was constructed in 1914 by the USACE. A dam is located at the southeast end of Lake Worth (USACE 1997). The West Fork of the Trinity River extends north to south along the eastern boundary of the Installation.

Storm water runoff across the Installation is collected and discharged to the Trinity River via Lake Worth, by storm sewer drainage conveyances or by flowing into Farmers Branch Creek and then into the West Fork of the Trinity River (DON 2005).

2.3.5 Hydrogeology

There are five major hydrogeologic units located beneath NAS JRB Fort Worth that make up the Trinity Aquifer. The units are described as an upper zone of perched water in alluvial terrace deposits, an aquitard in the Goodland, Limestone, and Walnut Formations; an aquifer in the Paluxy Formation; an aquitard in the Glen Rose Formation; and, an aquifer in the Twin Mountains Formation (DON 2005).

These aquifers consist of limestone, sands, clays, gravels, and conglomerates. Their combined freshwater saturated thickness averages approximately 600 feet in North Texas. The Trinity Aquifer is one of the most extensive and highly used groundwater resources in Texas. Although its primary use is for municipalities, it is also used for irrigation, livestock, and other domestic purposes, according to information provided by the Texas Water Development Board.

Historically, groundwater pumped from an alluvium strata located near the Trinity River was used for irrigation and residential purposes. However, due to pollution concerns caused by storm water runoff, use of this groundwater source was deemed unsafe and uneconomical for production. Currently, NAS JRB Fort Worth receives all of its water from the City of Fort Worth (DON 2005).

2.3.6 Current and Potential Future Land and Resource Uses

The current and potential future land use of the Installation and the land use of areas surrounding the Installation are provided in Table 2-1.

Table 2-1
Current and Potential Future Land Use

Current Land Use		Surrounding Land Use		Future Land Use	
X	Residential	X	Residential	X	Residential
X	Industrial	X	Industrial	X	Industrial
X	Commercial	X	Commercial	X	Commercial
	Agricultural		Agricultural		Agricultural
X	Recreational	X	Recreational	X	Recreational
	Other:		Other:		Other:

Current land and water zoning at NAS JRB Fort Worth is for military, industrial, municipal, training, recreational, and residential uses. Land uses on NAS JRB Fort Worth are grouped into four general categories based on operational needs and the level of maintenance required (DON 2005). These categories include:

- Improved Grounds — All manicured lawns, recreational fields, landscape planting, parade grounds, and areas maintained for security reasons. Approximately 420 acres of the Installation are classified as "Improved."

- Semi-Improved Grounds — Areas of the Installation in which development and maintenance provides an erosion resistant vegetative cover, weed and brush control, and fire control. Airfield areas immediately adjacent to runways, taxiways, apron shoulders, clear zones, safety zones, and restricted areas are included in this category. Approximately 720 acres of the Installation are classified as "Semi-Improved."

- Unimproved Grounds — Areas that are unpaved or not included in the aforementioned categories. Approximately 50 acres of the Installation are classified as "Unimproved."

- Other — Areas that are occupied by buildings, parking areas, roads, and other hard surfaces that prevent growth of vegetation. Approximately 796 acres of the Installation are classified as "Other."

Approximately 400 acres of the Installation remain native grassland (DON 2005).

2.4 Biological Resources

Regional conditions and land management practices combine to support habitat with relatively low diversity and limited wildlife resources at NAS JRB Fort Worth. Areas within NAS JRB Fort Worth are not considered critical habitat.

2.4.1 Vegetation

Vegetation in the area of NAS JRB Fort Worth consists predominantly of Bermuda and St. Augustine grasses. Oaks, mesquite, and juniper tree species are also present at the Installation.

The USACE completed a *Wetland Inventory* of NAS JRB Fort Worth in 1997. Five areas within the Installation boundary were inspected to determine their wetland status. These areas are listed in Table 2-2.

Table 2-2
Wetland Status of Survey Sites

Areas	Wetland Status	NWI Classification	Area (acres)
Blast Site	non-jurisdictional site	Not Applicable	0.4
Jennings Drive	non-jurisdictional site	Not Applicable	0.03
Lake Worth	Waters of the U.S.	Lacustrine, unconsolidated bottom	3,560 (total acreage)
West Farmers Branch	Waters of the U.S.	Riverine, unconsolidated bottom and/or rock bottom	0.5
Trinity River Seep	Jurisdictional wetland	Palustrine emergent	1.3

Note:
Table referenced from the 1997 *Wetland Inventory, Naval Air Station Fort Worth, Joint Reserve Base* (USACE 1997).

Non-jurisdictional sites are either areas that do not meet all three requirements of a wetland (hydrology, soil, and vegetation), or wetlands which do not fall under regulatory control. Waters of the U.S. are classified as any territorial open water, navigable waterway, or permanent or intermittent waterway or lake.

2.4.2 Wildlife

According to information obtained from the Texas Parks and Wildlife Department (TPWD), the predominant fish species in Lake Worth are white crappie; largemouth, spotted, and white bass; and catfish. Mammals expected to inhabit the Installation include opossum, raccoon, striped skunk, several species of rodents, whitetail deer, red fox, coyote, bobcat, rabbit, and armadillo. Upland game birds include quail, turkey, dove, pheasant, duck, geese, and cranes. Common reptiles include various species of lizard, snake, and turtle.

2.4.3 Protected Species

The U.S. Fish and Wildlife Service and the TPWD have identified eight birds, two mammals, three reptiles, and two vascular plants as rare, threatened, or endangered in Tarrant County (DON 2005).

These species are listed in Table 2-3. No rare, threatened, or endangered species have been found on NAS JRB Fort Worth (DON 2005).

Table 2-3
Summary of Known or Potential Special Status Species

Common Name	Scientific Name	Resident Status	Federal Status	State of Texas Status
Plants				
Auriculate False Foxglove	*Tomanthera auriculata*	Unlikely	—	—
Glen Rose Yucca	*Yucca necopina*	Unlikely	—	—
Birds				
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	Possible Migrant	—	Threatened
Henslow's Sparrow	*Ammodramus henslowii*	Unlikely/Unlikely Migrant	—	—
Bald Eagle	*Haliaeetus leucocephalus*	Possible Migrant	Proposed Delisting/Threatened	Threatened
Interior Least Tern	*Sterna antillarum*	Unlikely	Endangered	Endangered
Migrant Loggerhead Shrike	*Lanius ludovicianus migrans*	Unlikely	—	—
Mountain Plover	*Charadrius montanus*	Possible Migrant	—	—
Western Burrowing Owl	*Athene cunicularia hypugaea*	Unlikely	—	—
Whooping Crane	*Grus Americana*	Possible Migrant	Endangered	Endangered
Reptiles and Amphibians				
Timber/Canebrake Rattlesnake	*Crotalus horridus*	Unlikely	—	Threatened
Texas Horned Lizard	*Phrynosoma cornutum*	Unlikely	—	Threatened
Texas Garter Snake	*Thamnophis sirtalis annectens*	Possible Migrant	—	—
Mammals				
Black-tailed Prairie Dog	*Cynomys ludovicianus*	Unlikely	Candidate	—
Plains Spotted Skunk	*Spilogale putorius interrupta*	Possible Resident/Possible Migrant	—	—

Note:
Table referenced from the 2005 *Integrated Natural Resources Management Plan* (DON 2005).
— = Not Applicable

Due to the lack of a suitable habitat, the bird species have a low to moderate potential for occurrence in the vicinity of the Installation (DON 2005). Additionally, there is no suitable habitat or food source for the Texas Horned Lizard on the Installation (DON 2005).

The Canebrake Rattlesnake has some potential for existing; however, this species prefers swamps, floodplains, upland pine and deciduous woodlands, riparian zones, and dense ground cover. It will most likely not inhabit the Installation since these habitats are not available (DON 2005).

2.5 Ordnance Operations and Installation Overview

Ordnance reportedly associated with NAS JRB Fort Worth included small arms and rifle rounds such as 9mm, shotgun shells, .38 caliber, .45 caliber, 5.56mm, 7.62mm, and .50 caliber. Additionally, 20mm, 105mm HE projectiles, 2.75 M229 HE rockets, M57 hand grenades, M103 bombs, aircraft flares, launchers for aircraft ejection seats, smoke signals, rockets, missiles, and bombs are associated with F-16 and F-18 aircraft. Nuclear weapons were reportedly once stored at NAS JRB Fort Worth. Explosive Ordnance Disposal (EOD) related items such as co-explosives and counter charges are anticipated to be stored at the Installation for future EOD use. Building 1345, the Indoor Small Arms Range, is an active firing range maintained by NAS JRB Fort Worth. Fighter training (bombing and gunnery activities) is conducted at Falcon Range in Oklahoma, which is owned by the USAF.

General information for NAS JRB Fort Worth is summarized in Table 2-4:

Table 2-4
General Information for NAS JRB Fort Worth

Installation Name	Naval Air Station JRB Fort Worth
Installation Location	Fort Worth, Texas
U.S. EPA Region	Region 6
Lead Organization	NAVFAC Southeast
Installation Description	
Approximate area of Installation	Approximately 2000 acres
Latitude/Longitude	32°46’18.89” N Latitude and 97°26’8.96” W Longitude
Installation Status/Years of Operation	Tarrant Field (1932 to 1943); Fort Worth Army Air Field (1943 to 1948); Fort Worth Air Base (1948); Carswell Air Force Base (1948 to 1994); and NAS JRB Fort Worth (1994 to Present)

Note:
U.S. EPA = United States Environmental Protection Agency

3.0 DATA COLLECTION

During the PA data collection efforts, information was obtained from internet research, review of records maintained in offsite historical archives and at NAS JRB Fort Worth, review of historical aerial photographs, and from interviews with NAS JRB Fort Worth personnel. Resolution Consultants' data collection site visit was accomplished in accordance with the Work Plan prepared by Resolution Consultants, dated 27 June 2012. Copies of field logbooks are included in Appendix A.

3.1 Internet Research

Internet research was conducted to familiarize the data collection team with NAS JRB Fort Worth. Specifically, the Installation's website was reviewed to obtain pertinent information on the background and mission. The Air Force Real Property Agency Administrative Record website was also researched and contained various environmental reports associated with the Installation from the mid-1980s until 2012. Documents retrieved from the Administrative Record website are discussed in Section 3.3.

3.2 Historical Offsite Records

The data collection team requested and reviewed pertinent historical records maintained by the National Archives and Records Administration (NARA), the Washington National Records Center, NAVFAC, and the Navy Ordnance Safety and Security Activity (NOSSA). Select pre-1942 records are maintained in NARA Archives I in Washington D.C. Generally, records dated subsequent to 1942 are stored in the NARA Archives II facility in College Park, Maryland. NARA's Cartographic Branch and Still Pictures Branch are also located at the Archives II facility. NARA also maintains select records for NAS JRB Fort Worth at the regional branch in Fort Worth, Texas. Table 3-1 identifies the repositories that were searched:

Table 3-1
List of Searched Repositories

Repository Name	Location	Date of Contact	Point of Contact	Phone Number
National Archives I	700 Pennsylvania Avenue NW Washington, DC 20408	2 April 2013	Chris Killillay	202.357.5013
National Archives II	8601 Adephi Rd College Park, Maryland 20740	2 April 2013	Nathaniel Patch	301.837.1977

Table 3-1
List of Searched Repositories

Repository Name	Location	Date of Contact	Point of Contact	Phone Number
National Archives at Fort Worth	1400 John Burgess Drive Fort Worth, Texas 76140	1 April 2013	Barbra Rust	817-551-2054
Washington National Records Center	1000 Navy Pentagon, Room 4A514A Washington, DC 20350-1000	13 August 2013	Matthew D. Staden	703-695-9996
NOSSA	Naval Ordnance Safety and Security Activity N464234 Steve's Way, Ste 124 Indian Head, Maryland 20640-5058	27 August 2013	Sherry McCahill	301-744-5628
NIRIS	NAVFAC Portal Website	13 August 2013	Chad Tripp	843-884-0029
Air Force Civil Engineer Center BRAC Administrative Record	Air Force Real Property Agency Administrative Record Web site	13 August 2013	—	—
Public Works Department	Building 1215, NAS JRB Fort Worth, Texas	11 July 2013	Robert Myer	817.782.6474

Notes:

—	=	Not Applicable
JRB	=	Joint Reserve Base
BRAC	=	Defense Base Closure and Realignment Commission
NAS	=	Naval Air Station
NAVFAC	=	Naval Facilities engineering Command
NIRIS	=	Navy Installation Restoration Information Solution
NOSSA	=	Navy Ordnance Safety and Security Activity

Resolution Consultants contacted each of the offsite archive entities and requested any and all files regarding NAS JRB Fort Worth from the following record groups (RGs):

- RG 018 — Army Air Force
- RG 023 — Coast and Geodetic Survey, 1807-1967 (cartographic records)
- RG 038 — Records of the Office of Naval Operations

- RG 057 — United States Geological Survey, 1839-2002 (cartographic records)
- RG 071 — Records of the Bureau of Yards and Docks, 1784-1963 (cartographic records, still photographs)
- RG 074 — Records of the Bureau of Ordnance, 1818-1967
- RG 080 — General Records of the Department of the Navy, 1804-1958 (still photographs)
- RG 181 — Records of the Office of Naval Districts and Shore Establishments, 1784-1981
- RG 313 — Records of Naval Operating Forces, 1894-1997
- RG 340 — Office of the Secretary of the Air Force
- RG 341 — Headquarters U.S. Air Force
- RG 342 — U.S. Air Force Commands, Activities, and Organizations
- RG 346 — Naval Ordnance Systems Command
- RG 385 — Naval Facilities Engineering Command, 1948-1999 (cartographic records)
- RG 428 — General Records of the Department of the Navy, 1947-2004

In response to the request for records, Mr. Chris Killillay, NARA I Archives Search Specialist, stated that NARA I does maintain RG 038, 071, 074, 080, 181, 313, and 346 prior to 1942; however, the records are associated with the DON which would not pertain to the Installation since it was not under Navy command until 1994. Based on this information, Resolution Consultants researchers did not conduct research at the Archive I facility.

Resolution Consultants researchers visited the National Archives II in College Park, Maryland, and the National Archives in Fort Worth, Texas. Based on the research that was conducted, no useful information beyond what was obtained during the site visit was found.

Additionally, NOSSA was contacted regarding any range surveys conducted at NAS JRB Fort Worth. The range survey is discussed in Section 3.3. The Washington National Records Center was contacted regarding documents available from the above listed record groups; however, a response was not received. The Naval Installation Restoration Information System's NAVFAC Portal Web site was also researched for documents pertaining to NAS JRB Fort Worth; no useful documents were found.

3.3 Historical Documents

Historical documents acquired that were determined to pertain to the management and/or disposal of munitions or explosives at NAS JRB Fort Worth are listed below:

- 1951 Base Layout Map (SAC 1951)
- 1984 *Installation Restoration Program Records Search* (CH2M HILL 1984)
- 1987 Site Plan (SAC 1987)
- 1993 *Basewide Environmental Baseline Survey* (USAF 1993)
- 2000 *Navy Closed, Transferred, Transferring, Active, and Inactive Range Survey* (Navy 2000)
- 2002 *Hazardous Waste Management Plan* (ITC 2002)
- 2006 *After Action Report, Offsite Weapons Storage Area, Explosive Ordinance Disposal Range/Ordinance Removal/Clearance at the Former Carswell AFB, Texas* (Earth Tech 2006)
- 2006 *Pollution Prevention Management Plan* (EnSafe 2006)

In addition, the following records were acquired:

- 1958 Additional Runway Grading & Railroad Spur Relocation Map (COE 1958)
- 1976 Existing Building Schedule (USAF 1976)
- 1991 Base Map (DON 1991)
- 2004 Facility Map, Explosive Safety Arcs (DON 2004)
- 2011 Facility Map, Explosive Safety Arcs (NAVFAC 2011)

- 2012 Facility Map, Explosive Safety Arcs (NAVFAC 2012)
- 2012 Installation Layout Map (NAVFAC 2012)
- 2013 Facility Map, Explosive Safety Arcs (NAVFAC 2013)
- 2013 Facility Managers List (DON 2013)

Findings associated with each of these documents are summarized in the following subsections. Documents and records are provided in Appendix B, and installation maps are provided in Appendix C.

1951 Base Layout Map

The 1951 Base Layout Map identifies the locations of a Pistol Range and a Skeet Range. The Pistol Range, identified as Building 1-162B, is shown approximately 700 feet west of the main gate entrance on Knights Lake Road. The Pistol Range is approximately 150 feet long by approximately 200 feet wide, and contains a firing tunnel located on the east side of the range, whereas the north, west, and south sides of the range appear to contain berms.

The Skeet Range is located in the northern portion of the installation, approximately 650 feet northwest of the intersection of First Street and Second Street, immediately west of the Radio High Frequency (HF) Receiver, and approximately 800 feet south of Lake Worth. The Skeet Range is shown as two half circles approximately 250 feet wide, which suggests that the skeet range consisted of two firing stations oriented toward the northwest. The Skeet Range is likely identified as Buildings 3-157 through 3-161. Although speculative, Buildings 3-157 through 3-159 are likely towers whereas Buildings 3-160 and 3-161 may have been shotgun, ammunition, and/or clay pigeon storage/issue points.

1984 Installation Restoration Program Records Search

The *Installation Restoration Program Records Search* was developed to implement a Department of Defense (DoD) policy to identify and fully evaluate suspected problems associated with past hazardous material disposal sites on DoD facilities (CH2M HILL 1984). The report details the Weapons Storage Area (WSA) located approximately five miles west of the Installation. The WSA was constructed in 1956 and consists of 247 acres of land surrounded by an additional 264 acres of easement (CH2M HILL 1984). Ordnance related facilities located at the WSA included two munitions inspection shops, 16 ordnance storage buildings (including 11 storage igloos), and an EOD range. Prior to 1975, the EOD range was active; however, since 1975 it has only been used for training. The explosive limit at the time was five pounds (lbs). Burning at the range was not

permitted and a specific burial site for inert ordnance did not exist. The range was periodically graded and any scrap material was consequently buried in the process (CH2M HILL 1984).

1987 Site Plan

The Project Title section of the Site Plan states "Remove Lead from Rifle Ranges." The site plan contains drawings of the Indoor Pistol Range (Building 1346) and the Pistol/M-60 Gun Range (Building 1341). Text within the drawing states "remove top 24 inches of existing sand and replace with new sand" at the Indoor Pistol Range and "remove 36 inches of existing sloped top soil (12-feet x 50-feet x 3-feet) and replace with new top soil" at the Pistol/M-60 Gun Range. Based on the soil removal dimensions of the M-60 Gun Range, only a small portion of the overall berm surface was targeted for removal. A report that describes the removal activities or planned removal activities was not identified.

1993 Basewide Environmental Baseline Survey

The *Basewide Environmental Baseline Survey* (BEBS) was conducted to document the physical condition of Carswell AFB resulting from the storage, use, and disposal of hazardous substances and petroleum products. The BEBS is required by DoD before any property can be sold, leased, transferred, or acquired (USAF 1993). The BEBS was conducted in December 1993 following the closure of Carswell AFB in September 1993.

The BEBS indicated that Carswell AFB had operated an EOD proficiency range since the late 1950s. The range is located at the off-base WSA, approximately five miles west of the Installation.

Two small arms firing ranges were located in the southeastern portion of the Installation. The Rifle Range (Building 1340) consists of three earthen berms forming an open rectangle containing several rows of wooden baffles. Building 1346 is an indoor range that encompasses approximately 3,800 square feet (USAF 1993).

Three WSAs were used by the Installation. The off-base WSA, described briefly above, consisted of 11 concrete igloos and numerous munitions maintenance facilities. The second WSA is located on the north end of the Installation near Lake Worth and consists of 16 storage igloos and support facilities. The third WSA is the Air Launch Cruise Missile (ALCM) Storage Area located in the central flight line area and consists of 25 concrete igloos, a 68,000-square-foot missile assembly facility (Building 4210), and support facilities (USAF 1993).

The BEBS indicated that the EOD range was to be cleared of all unexploded ordnance (UXO). All ordnance accumulated since the range was closed was to be properly packaged and transported for use by other Air Force units. Both firing ranges were to remain in operation for use by the 301st Fighter Wing (FW) military and law enforcement personnel (USAF 1993).

The BEBS categorized properties into one of seven categories. The indoor firing range was considered a Category 2, areas where only storage of hazardous substances or petroleum products has occurred, but no releases, disposal, or migration from adjacent areas has occurred. The EOD range and the outdoor firing range were considered Category 7 properties due to the potential for soil contamination. Category 7 properties are areas that are unevaluated or require additional evaluation. The document indicated that "All ordnance will be removed from the offsite WSA and the WSA located in the central flight line. The northern WSA will be utilized to support 301st FW operations."

2000 Navy Closed, Transferred, Transferring, Active, and Inactive Range Survey

The *Navy Closed, Transferred, Transferring, Active, and Inactive Range Survey* was prepared to gather data about ranges on the Installation to satisfy a number of regulatory, DoD, and fiscal requirements regarding ranges. The survey describes three ranges: the Mobile Pistol Range, the Outdoor Pistol Range, and the Outdoor Rifle Range. The survey classified the Mobile Pistol Range as active, as used for training, and as a Small Arms Range (.50 caliber and under). The Mobile Pistol Range was used by NAS JRB Fort Worth Weapons Department, NAS JRB Fort Worth Security, Naval Criminal Investigation Service, VFA-201 Strike Fighter Squadron, and REDCOM-11 Naval Reserve Unit. The survey indicates the Mobile Pistol Range was established in March of 1996. The range averaged 450 pounds of expended ammunition (9mm and 12 gauge only) annually. The survey stated the range did not have a regular range clearance maintenance schedule nor has it undergone any type of investigation, cleanup, or response action for UXO.

The Outdoor Pistol Range is listed as inactive. Small arms ammunition was reportedly used (.50 caliber and under); however, the types of small arms ammunition used at the range was not provided. The survey indicated the Outdoor Pistol Range was constructed in the mid-1950s and was last used in August 1999. According to the survey, 10 barrels of metal collected from the range has been recycled through a local Defense Reutilization and Marketing Services (DRMO). The range was reportedly last used by federal and local law enforcement personnel.

The Outdoor Rifle Range is listed as closed as of August 1996. Small arms ammunition was reportedly used (.50 caliber and under). The survey indicated the Outdoor Rifle Range was

constructed in the mid-1950s, and the range was reportedly last used by NAS JRB Fort Worth Security Forces and USAF. No investigations for UXO have been conducted at the Outdoor Rifle Range according to the survey.

Although building numbers were not listed in the report, it is believed that the Mobile Pistol Range is Building 1346, the Pistol/M-60 Range is Building 1341, and the Rifle Range is Building 1340. No additional information regarding the Former Pistol Range or the Former Skeet Range was provided in the report.

2002 Hazardous Waste Management Plan

The *Hazardous Waste Management Plan* describes the waste munitions procedures observed at NAS JRB Fort Worth in 2002. All waste munitions at NAS JRB Fort Worth were reportedly held in munitions bunkers managed by Station Weapons prior to shipment for reworking or disposal. The waste military munitions (WMM) were shipped to military-owned EOD facilities at Fort Hood in Killeen, Texas, or Dyess AFB in Abilene, Texas. Any WMM which could not be shipped off-base due to safety or security reasons were used for disposal training purposes by the EOD team from Fort Hood. All EOD activities performed at NAS JRB Fort Worth were strictly for training purposes only, and as such, were exempt under Resource Conservation and Recovery Act hazardous waste regulations (ITC 2002).

2006 After Action Report

The *After Action Report* describes the methods and procedures used to locate, identify, and remove MEC from the EOD range located at the Former Off-Site WSA. According to the *After Action Report*, an EOD team from Hill AFB cleared approximately 58.5 acres of the WSA in 1995. The following items were recovered:

- One 105mm HE projectile
- One 3-inch HE projectile
- One M229 2.75-inch HE warhead
- One M57 hand grenade
- 50 cubic yards of soil containing expended aircraft starter cartridges
- Ten M55A2 20mm target practice projectiles
- Two tons of ordnance scrap metal

In addition, 12 potential munitions anomalies were investigated and screened for Materials Potentially Presenting an Explosive Hazard (MPPEH). Six of the 12 areas were determined to be munitions pits, some as deep as 20 feet below ground surface (bgs).

The report also stated that Carswell AFB began operation of the WSA EOD range in the late 1950s to dispose of unserviceable ammunition, pyrotechnics, and explosives; and the range was also used by EOD personnel for training. Disposal operations at the EOD range ceased in 1980.

During clearance operations in 2005 and 2006, Earth Tech identified 1,185 items as munitions debris (MD) and 15 items as MPPEH. These 15 items are listed below:

- Nine 20mm HE projectiles
- One 20mm Armor Piercing Tracer projectile
- Three M103 bomb nose fuzes
- One 40mm grenade cartridge
- One signal illumination flare

Other MD items identified during the 2005 and 2006 clearance include:

- Mild Detonating Cord Shield
- Two concrete-filled M117 general purpose bombs
- Eight civilian flameless dust grenades
- .50 caliber rounds
- Aircraft flares
- Starter cartridge igniters
- Empty 20mm projectile

During the range clearance operations, eighteen soil samples were collected and submitted for laboratory analysis of explosive compounds. It was reported that no explosive compounds were detected above laboratory method detection limits.

2006 Pollution Prevention Management Plan

The *Pollution Prevention (P2) Management Plan* was developed to focus on eliminating the use of unnecessary or environmentally unsound material or processes. As part of the plan, Work Centers throughout the Installation were audited for their P2 participation. The plan indicated that lead

shot and bullets were captured by shredded rubber tires inside Building 1345, Indoor Small Arms Range. The lead shot, bullets, and brass casings were transported to the DRMO for recycling.

1958 Additional Runway Grading and Railroad Spur Relocation Map

The Additional Runway Grading and Railroad Spur Relocation Map shows the Pistol Range in the southern portion of the Installation labeled as Building 1-162B. The Skeet Range identified in the 1951 Base Layout Map is not shown, although buildings (likely housing) are now present in the area formerly occupied by the Radio HF Receiver. The Rifle and Pistol/M-60 Ranges in the southeast portion of the Installation are not shown on the map, although a road terminates at the approximate location of these ranges.

1976 Existing Building Schedule

The 1976 Existing Building Schedule describes the intended use of each building. The following buildings listed in Table 3-2 are potentially associated with munitions or explosives based on "use" listed in the Facility Index (USAF 1976).

Table 3-2
1976 List of Buildings Potentially Associated with Munitions or Explosives

Building Number	Use	Year Built	Floor
1340	Small Arms System	1963	Soil
1346	Range, Small Arms	1956	Concrete
1347	Small Arms Training	1949	Wood
1428	Squadron Arms/Secure Central Control	1942	Concrete
1615	Arm & Inatr Bldg./Training Special Weapons	1943	Concrete
3351 and 3352	Stor, Mv-Cub Mag	1963	Not Applicable
3370	Stor Mag Ag	1960	Not Aplicable
3371-3382	Storage Igloos 1-12	1951	Concrete

1991 Base Map

The 1991 Base Map shows the layout of the Installation and building number designations. The Rifle and Pistol/M-60 Ranges in the southeastern portion of the Installation are labeled as Buildings 1340 and 1341, respectively. The Mobile Pistol Range, Building 1346, is also present in the southeastern portion of the Installation. Building 1345, Indoor Small Arms Range, is not shown on the map.

2004 Facility Map

The Rifle and Pistol/M-60 Ranges (Buildings 1340 and 1341), Indoor Small Arms Range (Building 1345), and the Mobile Pistol Range (Building 1346) are shown in the southeastern portion of the Installation. No other ranges are shown on the map.

2011, 2012, and 2013 Facility Map Explosive Safety Arcs

The Explosive Safety Arc (ESA) maps provide a list of Sited Explosive Locations (SELs) and the location of each area within the Installation. The following buildings listed in Table 3-3 are SELs according to the maps.

Table 3-3
Sited Explosive Locations at NAS JRB Fort Worth

Building Number	Use
External Storage Pad	External Storage Pad
Alert Area	Alert Area
192B	CALA Taxiway
196E	CALA and RED LABEL (Aircraft Explosive Cargo Area) or Suspect Cargo Area, Jammed Gun Area, Arm/Dearm Area, and Hung Ordnance
1044	Unknown (*only shown on the 2012 map with an Explosive Safety Quantity Distance of 100 feet)
1050	Aircrew Survival Equipment
1403	Rooms 117 & 118 Egress Shop
1411	Room 112 Production Control
1411	Room 114 Float Shop
1628, 1629, 1630, 1643, 1648, 1649, & 1650	AF 301st FW Explosive Licensed Facilities (Egress Canopy Storage, Weapons Loading, Gun Shop, Egress Shop, Air Crew Flight Equipment, Air Crew Flight Equipment Maintenance)
1672, 1675, & 4175	Texas Air National Guard Explosive Licensed Facilities (Security Forces Armory, Munitions Storage, and Survival Kits)
3351 & 3352	Multi Bay Storage Building
3356	Bomb Build-Up Bay, TP Ammo Storage Bay, Maintenance Storage Building
3368 and Addition	Rocket Assembly and Shipping/Receiving
3369	Storage Building
3371-3378 3381, 3383-3388	Storage Igloos
4159	Ready Service Magazines
4162	BASH Ready Service Locker

The 2011 Facility Map shows the Rifle and Pistol/M-60 Ranges (Buildings 1340 and 1341), Indoor Small Arms Range (Building 1345), and the Mobile Pistol Range (Building 1346) in the southeastern portion of the Installation. The 2013 ESA Map lists Building 1345 as the Small Arms Range but does not show the Rifle, Pistol/M-60, and Mobile Pistol Ranges.

3.4 Interviews with Base Personnel

Base personnel were interviewed regarding past and present management of munitions and explosives at NAS JRB Fort Worth. A summary of personnel interviewed is provided in Table 3-4 below:

Table 3-4
Interview Summary for Base Personnel

Personnel Name	Position	Date of Interview	Phone Number
Jack Jersey	Environmental Protection Specialist	9 July 2013	—
Dennis Statler	NAS JRB Fort Worth Air Field Manager	9 July 2013	817-782-7689
Randy Varner	NAS JRB Fort Worth Deputy Environmental Director	9 July 2013	817-782-6475
Chief Master Sargent Nielson	Air Force Flight Chief	10 July 2013	817-782-7851
Dan Montrose	EOD Personnel	10 July 2013	817-782-7861
Gregory Eckelbecker	NAS JRB Fort Worth Explosives Safety Officer	10 July 2013	817-782-5334
Phil Epps	-	10 July 2013	817-782-5444
Mike Bevell	NAS JRB Fort Worth Human Resources	10 July 2013	817-782-7858
Robert Meyer	NAS JRB Fort Worth Environmental Director	11 July 2013	817-782-6474

Excerpts of pertinent information obtained from each of the interviewed personnel regarding potential munitions use and storage are summarized below:

Jack Jersey

- Mr. Jersey has been working at NAS JRB Fort Worth for approximately 23 years.
- Open detonation of seven flares from a crashed airplane occurred once at the end of the runway. An excavation was conducted and the flares were placed inside to be detonated. He was not sure of the time frame.

Dennis Statler

- Mr. Statler has been the Airfield Manager for NAS JRB Fort Worth since 2006.
- Bunkers located in the center of the airfield were formerly used to store nuclear weapons and munitions. Nuclear weapons are no longer stored at NAS JRB Fort Worth and the bunkers are now used for general purpose storage.
- Gun ranges are located along the southeast corner of the Installation.
- The Air Force owns one bombing range, designated as Falcon Range in Oklahoma. The Navy also uses this range.

Randy Varner

- Building 1340 was a small arms range that had been remediated by the Air Force.
- Building 1345 is the indoor pistol range.
- Buildings 3379 and 3380 were munitions bunkers that have been demolished within the past seven years.
- Solid Waste Management Unit (SWMU) 59 is the WSA Waste Accumulation Area which is located off-base approximately five miles west of the Installation.
- SWMU 65 WSA Disposal site is also located offsite.

Chief Master Sergeant Nielson

- Chief Master Sergeant Nielson has been stationed on NAS JRB Fort Worth for approximately six years.

- Common munitions on the Installation include: small arms, grenades, missiles, EOD items, flares, and ejection seat rockets.

- EOD teams from other Bases are periodically called to NAS JRB Fort Worth to remove and dispose of munitions.

Dan Montrose

- Mr. Montrose has been stationed at NAS JRB Fort Worth for approximately two years.

- NAS JRB Fort Worth's EOD Team was activated on 1 April 2013.

- The Fort Hood EOD team previously handled EOD incidents for the Navy at NAS JRB Fort Worth.

- EOD personnel disposed of two 20mm rounds by detonation at the proposed open burn/open detonation (OB/OD) location. The proposed OB/OD area is located within a triangular-shaped parcel of land circumscribed by Taxiway A 194, Parallel Taxiway 197, and an east-to-west oriented parking apron that includes nearby Building 4160.

- EOD munitions items (co-explosives and counter charges) are stored in bunkers.

Gregory Eckelbecker

- Mr. Eckelbecker has been located at NAS JRB Fort Worth for four years and has been the Explosives Safety Officer for two years.

- The bunkers on the north end of the Installation were installed between 1951 and the 1970s.

- No EOD events have been recorded at NAS JRB Fort Worth since 2004.

- Future Installation plans include portions of the gun ranges to be used as EOD training areas.

Phil Epps

- Mr. Epps has been located at NAS JRB Fort Worth since 1994.
- Rifle/pistol range has not been used since 1994. Lead shot was excavated and removed from this area in 1995.

Mike Bevell

- Mr. Bevell has worked at NAS JRB Fort Worth for 19 years.
- Different types of small arms were fired at the rifle/pistol range.
- The Air Force collected soil samples from the ranges for laboratory analysis after lead shot was removed, but he was not aware of any field sampling reports or laboratory results.

Robert Meyer

- Mr. Meyer has worked at NAS JRB Fort Worth since 1996.
- Outdoor ranges are considered closed, but he does not have the closure documentation.
- Munitions bunkers are located at the north side of the runway. Additional bunkers are located in the center of the airfield and were previously used for storage of munitions. Currently, these bunkers are used as offices and for miscellaneous storage.
- An enclosed trailer, formerly located in the southeast corner of the Installation, served as an indoor shooting range. The indoor range was removed approximately two years ago and the spent casings and lead shot were removed for recycling.

3.5 Historical Aerial Photographs

Historical aerial photographs from 1942, 1963, 1968, 1970, 1978, 1979, and 1984 were reviewed to identify ranges and/or temporal changes of areas that may have been potentially impacted by MEC or MC. The following is a summary of observations:

- **1942:** The aerial depicts the eastern portion of the Installation, which shows an aircraft parking apron, taxiways, and a runway. Numerous buildings, including hangers and barracks, are present near the airfield and in the northern portion of the Installation. A square-shaped parcel of land is located near the southeast corner of the Installation.

The area appears to be grass with a tree line along the northern and western edges. A wide wavy-shaped feature, appearing to be a berm is present along the southern and eastern edges of the area; however, there is not enough evidence to suggest that this feature is a range. No other features that resemble a range could be observed in this aerial.

- **1963, 1968, and 1970:** These aerials depict the northern portion of the Installation. The Former Skeet Range North is visible during each time period with the two firing line positions directed toward the south. The area located south of the Former Skeet Range North appeared to be used for recreational purposes and housing during these time periods. Buildings 3-157 through 3-161, Former Skeet Range was not present on these photographs.

- **1978:** The aerial depicts the entire Installation. The Rifle Range is visible in the southeastern portion of the Installation; however, the presence of the Pistol/M-60 Range could not be verified.

- **1979:** The aerial depicts the northern portion of the Installation. Features associated with the Former Skeet Range North are no longer visible.

- **1984:** The aerial depicts only the southeast portion of the Installation. Building 1340, Rifle Range; Building 1341, Pistol/M-60 Range; and Building 1346, Mobile Pistol Range, are all visible. The Rifle Range includes a covered firing station and a series of rafters circumscribed by a large berm on the north, east, and south side. Immediately north of the Rifle Range is the Pistol/M-60 Range. The range includes a covered firing station with four "tubes" extending to the east; no baffles were observed. The soil within the bermed area appears to have a homogeneous coloring (white to gray and no vegetation present), and potential construction debris is located immediately west of the covered firing stations which suggests that this range was recently constructed or upgraded. Building 1346 is shown inside of Range Road northwest of Buildings 1340 and 1341. Two-thirds of Building 1346 is not covered by a roof, exposing a series of rafters. The construction characteristics of Building 1346 suggest that the building was not a mobile range. Building 1345, Indoor Small Arms Range, is not present.

These as well as other Installation aerials not described above are provided in Appendix D.

3.6 Site Reconnaissance

A site reconnaissance was performed on 11 July 2013 to document current site conditions of five former ranges. The site reconnaissance was conducted at the Former Skeet Range (Buildings 3-157 through 3-161), the Former Skeet Range North, the Former Pistol Range (Building 1-162B), the Former Rifle Range (Building 1340), and the Former Pistol/M-60 Range (Building 1341). The following key features were observed in these areas during the site reconnaissance:

- Building 3320, the Child Development Center (CDC), and recreational grounds to the north presently occupy the location of the Former Skeet Range. Building 3320 is located in the approximate area of the two skeet range shooting stations. Softball fields, a running track, and a soccer/football field were observed north and northwest of the CDC, and likely occupy the area where lead shot may have been spread down range.

- A recreational skate park and the parking lot for Building 3341, the Services Flight Building, presently occupy the location of the Former Skeet Range North. These structures are in the approximate locations of the two skeet range shooting stations. Softball fields, a running track, and a soccer/football field were observed south and southeast, and likely occupy the area where lead shot may have been spread down range. The Navy Lodge Fort Worth, Building 3350, is currently located immediately adjacent and to the southwest of the former firing lines.

- The area immediately west of Building 1145's (Teen Center and Auto Hobby Shop) parking lot appears to be the location of the Former Pistol Range. This area was observed to be the side of a grass vegetated knoll, which gently slopes downgradient toward the parking lot of Building 1145. The slope topography was observed to be slightly elevated on the north and south sides indicating that these areas may have been part of the berm surrounding the former Pistol Range. The center of the range was likely backfilled with soil and graded prior to redevelopment. The top of the knoll is a flat, paved surface currently used as a vehicle/boat storage area.

- The Former Rifle and Pistol/M-60 Ranges both face toward the east. The Former Rifle Range is approximately 450-feet long and approximately 250-feet wide. An earthen berm, approximately 20 feet tall at its highest point, borders the range to the north, east, and south. The Former Pistol/M-60 Range lies immediately north of the Former Rifle Range and shares a portion of the Former Rifle Range's northern berm. The Former Pistol/M-60

Range is approximately 125-feet long and 150-feet wide. A chain link fence was observed across the top of both ranges which continues around the Installation boundary. Both ranges are currently undeveloped and are sparsely vegetated with grasses.

4.0 PRELIMINARY ASSESSMENT DATA EVALUATION

PA findings were evaluated to identify MRAs by screening potential MRAs for eligibility in the MMRP. The evaluation was performed in a three-step process:

1. Identify and describe potential MRAs within NAS JRB Fort Worth where munitions or explosives have been managed or disposed.

2. Determine which potential MRAs are eligible for the MMRP.

3. Identify MRAs (i.e., areas recommended for further investigation).

The following section provides the framework for identifying MRAs.

4.1 Descriptions of Potential MRAs and MMRP Eligibility

Data collected during the PA, described in Section 3.0, was compiled and evaluated to identify potential MRAs. The locations of potential MRAs are depicted on Figure 4-1, and a summary and conclusion for each potential MRA are presented in Table 4-1. In addition, potential MRAs were screened for MMRP eligibility based on the following DERP criteria (DoD 2001):

1. A release[1] occurred prior to 30 September 2002.

2. The release is not associated with Formerly Used Defense Sites, an operational range, active munitions demilitarization facility, or active WMM treatment or disposal unit that operated after 30 September 2002.

3. The site was not identified or included in the Navy's Risk Management Information System prior to 30 September 2000.

[1] According to CERCLA Section 101(22), a release is defined as "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant), but excludes (A) any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons, (B) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine, (C) release of source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, if such release is subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under section 170 of such Act, or, any release of source byproduct, or special nuclear material from any processing site designated under section 7912(a)(1) or 7942(a) of this title, and (D) the normal application of fertilizer."

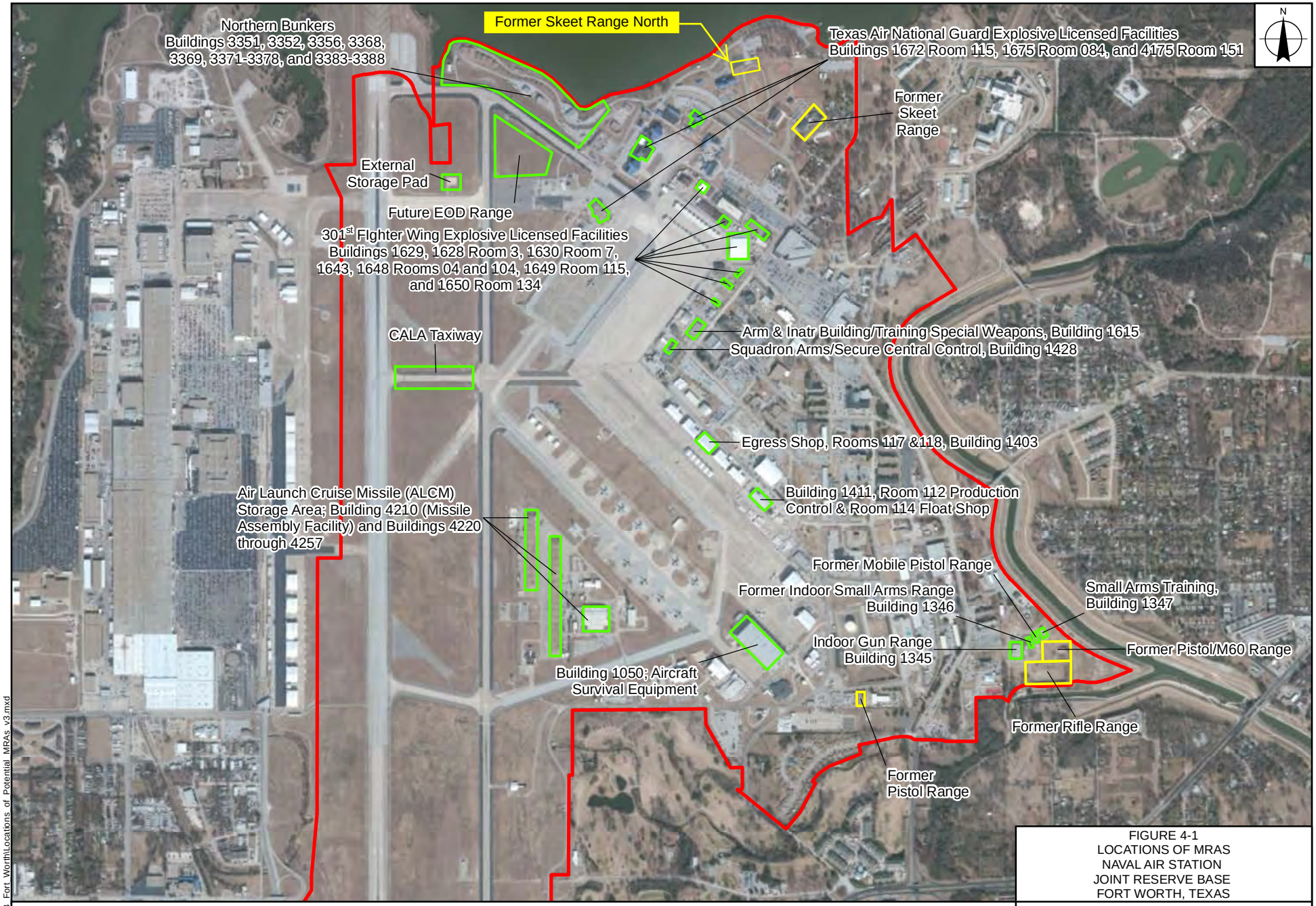


FIGURE 4-1
LOCATIONS OF MRAS
NAVAL AIR STATION
JOINT RESERVE BASE
FORT WORTH, TEXAS

Legend

- MRA Boundary
- Potential MRA Boundary
- Installation Boundary

- Potential MRAs Not Identified on this Figure: Alert Pad, Former Off-Site WSA
- Site Boundary is from Tetra Tech.

0 1,500 3,000 Feet

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: B. HAMBY	DATE: 2/20/2014
DRAWN BY: BLIPSCOMB	TASK ORDER NUMBER: JM24

X:\Navy\NAS_JRB_Fort_Worth\Locations_of_Potential_MRAs_v3.mxd

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Potential MRA designations **eligible** for the MMRP include:

- Closed, Transferring, or Transferred Ranges
- Areas that may potentially contain MC or MEC in soil and/or groundwater
- Areas where munitions or explosives were stored or managed that may have resulted in a release to the environment

Potential MRA designations **not eligible** for the MMRP are considered exempt from further investigation and include:

- Active ranges
- Active facilities
- Buildings and areas where munitions and explosives were stored that likely did not result in a release to the environment. Such areas are typically paved and were intended for the storage of munitions and/or explosives (i.e., bunkers, storage facilities, lockers, etc.).

4.2 Identification of MRAs

Based on an evaluation of the PA findings regarding the potential MRAs described in Section 4-1 above, the following areas are eligible for the MMRP and are considered MRAs:

- Building 1-162B, Former Pistol Range
- Building 1341, Former Pistol/M60 Range
- Building 1340, Former Rifle Range
- Buildings 3-157 through 3-161, Former Skeet Range
- Former Skeet Range North

The locations of these potential MRAs are shown in Figure 4-1.

Table 4-1
Summary of Potential MRAs Associated with NAS JRB Fort Worth

Alert Pad, External Storage Pad, Taxiway 180 Aircraft Parking Apron, Building 192B (CALA Taxiway), and Building 196E (CALA and RED LABEL, Aircraft Explosive Cargo Area or Suspect Cargo Area, Jammed Gun Area, Arm/Dearm Area, and Hung Ordnance)

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Within aircraft taxiways, areas adjacent and east of the runway	~ 3 acres	Unknown to present	Active	Storage Area	No (not eligible bullet #2 and #3)

Summary of Activities Performed and History

ESAs were shown around these areas in the 2011, 2012, and 2013 ESA maps. Each area is constructed with a concrete floor being associated with the runway taxiways.

Building 1050 (Aircrew Survival Equipment), Building 1347 (Small Arms Training), Building 1403 (Rooms 117 & 118 Egress Shop) & Building 1411 (Room 112 Production Control & Room 114 Float Shop), Building 1428 (Squadron Arms/Secure Central Cntl), and Building 1615 (Arm & Inatr Bldg./Training Special Weapons)

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Located throughout the Installation	50 ft^2 to 185,493	~1950 to present	Active	Storage Area	No (not eligible bullet #2 and #3)

Summary of Activities Performed and History

ESAs were shown around these areas in the 2011, 2012, and 2013 ESA maps. These areas are rated for small amounts (less than 50 lbs.) of explosives. The 1976 Building Inventory shows each building was constructed with a concrete floor.

Building 1-162B; Former Pistol Range

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Southern portion of Installation , south of Hercules Road, and west of the Action Youth Zone Building (Building 1145)	30,000 ft^2	~1940s to ~1960s	Inactive, demolished	Range	Yes (eligible bullet # 1, #2 and #3)

Summary of Activities Performed and History

The Former Pistol Range was first identified on the 1951 Base Layout Map. The firing line was located on the eastern portion of the range and earthen berms were on the north, west, and south sides. The range is also shown in the 1958 Additional Runway Grading & R.R. Spur Relocation Map, but not shown on the 1969 Gas Map of the Installation. None of the base personnel interviewed were aware of this range or activities conducted at this location. During the site reconnaissance, hummocky terrain was observed on the north and south sides of what is thought to be the central portion of the range, suggesting the range was backfilled with soil during surrounding area development. The Former Pistol Range was not mentioned in the Navy's 2000 *Closed, Transferred, Transferring, Active, and Inactive Range Survey.*

Building 1341; Former Pistol/M60 Range

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Southeastern portion of the Installation, Southeast of Range Road Circle	30,000 ft^2	~1985 to 1999	Inactive	Range	Yes (eligible bullet # 1, #2 and #3)

Table 4-1
Summary of Potential MRAs Associated with NAS JRB Fort Worth

Summary of Activities Performed and History

The earliest account of the Former Pistol/M-60 Range was a 1984 aerial photograph. The 1993 BEBS stated that the range was constructed in 1985; however, the 2000 Range Survey stated that the range was constructed in the 1950s. The range's firing position was to the east and was surrounded by approximately 20-foot high earthen berms on the north, east, and south. The surface area of the range is approximately 150-feet by 200-feet. The 1987 Site Plan lists the range and Building 1341 as the M-60 Gun Range. The 1984 aerial photograph shows four cylindrical objects extending to the east from Building 1341. The 1987 Site Plan shows the firing stations were 12 feet long and the cylindrical objects extended 24 feet beyond the firing stations. Targets were placed 8 feet beyond the cylindrical objects.

The 1987 Site Plan prescribed the removal of the top 36 inches of soil for an area measuring 12-feet by 50-feet by 3-feet along the east berm. Mr. Epps stated the Outdoor M-60 Range has not been used since 1994 and residual lead shot was removed from the range in 1995. Mr. Bevell stated the USAF collected soil samples from the range after the lead shot was removed, but he was not aware of any field sampling reports or analytical results. Mr. Meyer stated the range is considered closed but he does not have any official closure documentation. According to the 2000 Range Survey, the range is listed as inactive and classified as a Small Arms Range (.50 caliber and under). The range survey also stated 10 drums of metal collected from the range has been recycled through the local DRMO and that the range was used by Federal and local law enforcement personnel when it was active.

Building 1340; Former Rifle Range

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Southeastern portion of Installation, Southeast of Range Road Circle	112,500 ft^2	Mid-1950s to 1996	Closed	Range	Yes (eligible bullet # 1, #2 and #3)

Summary of Activities Performed and History

The Former Rifle Range is situated due south of the Former Pistol/M-60 Range (Building 1341). The Former Rifle Range surface area is approximately 450-feet by 250-feet, and was equipped with firing stations on the west side while earthen berms were on the north, east, and south sides. A 1965 project plan for the Rifle Range indicated that it was constructed with a covered firing station, eight overhead baffles and four ground baffled. According to the 2000 Range Survey, the Former Rifle Range was considered closed as of August 1996 and was classified as a Small Arms Range (.50 caliber and under) while in operation. The range was reportedly last used by NAS JRB Fort Worth Security Forces and USAF.

Although speculative, a range may have been present in the area occupied by the Former Rifle Range, Former Pistol/M-60 Range, and the immediate vicinity of these two ranges. Based on the 1942 aerial photograph, a square shaped parcel of land appears to be grass with a tree line along the northern and western edges. A wavy-shaped feature is present along the south and east edges of the area. The feature is relatively wide and may potentially be a berm. Lines of evidence that suggest this feature may be a range include: 1) other features that may potentially resemble a range were not identified on the 1942 aerial photograph; 2) characteristics of this feature (berm, cleared area, well defined boundaries, well maintained grass, located in a non-developed area of the Installation) may resemble a range; and 3) this portion of the Installation has been used as for small arms training since the ~mid-1950s. Despite these lines of evidence, there is not sufficient information to identify this feature as a range.

Building 1345; Indoor Small Arms Range

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Southeastern portion of the Installation , inside of Range Road Circle	17,000 ft^2	Early 2000s to present	Active	Range	No (not eligible bullets #1, #2, and #3)

Table 4-1
Summary of Potential MRAs Associated with NAS JRB Fort Worth

Summary of Activities Performed and History

The Indoor Small Arms Range was constructed in 2001 or 2002, based on aerial imagery. The 2006 P2 describes the Indoor Small Arms Range as a 20-lane small arms training facility. Lead shot is captured in shredded rubber tires. Periodically the lead shot and metal casings are removed and delivered to the DRMO for recycling. This range is currently used by military personnel for training.

Building 1346; Former Mobile Pistol/ Indoor Small Arms Range

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Southeastern portion of the Installation, inside of Range Road Circle	3,800 ft^2	1956 to ~2002	Inactive, demolished	Range	No (not eligible bullet #1 and #3)

Summary of Activities Performed and History

Mr. Meyer stated an enclosed trailer formerly located in the southeast corner of the Installation served as an indoor shooting range. The indoor range was removed approximately two years ago and the spent casings and lead shot were removed and recycled. The 1976 Existing Building Schedule lists Building 1346 as the Small Arms Range. The schedule indicated it was constructed in 1956 and contained a concrete foundation. A 1987 cross section of the Indoor Small Arms Range shows that lead shot would impact a steel plate at the end of the range and then drop into a sandbox, located below the floor of the range. No information regarding the depth or construction of the sandbox was provided. Based on Google Earth Aerial Imagery, the range was removed sometime between 2001 and 2002. The Navy's 2000 *Closed, Transferred, Transferring, Active, and Inactive Range Survey* listed the Former Indoor Small Arms Range as the Mobile Small Arms Range.

According to the Navy's 2000 Range Survey, the Mobile Pistol Range was used by NAS JRB Fort Worth Weapons Department, NAS JRB Fort Worth Security, Naval Criminal Investigation Service, VFA-201 Strike Fighter Squadron, and REDCOM-11 Naval Reserve Unit. The survey states the Mobile Pistol Range was established in March of 1996. The range averaged 450 pounds of ordnance annually from 9mm and 12 gauge ordnance. The survey stated the range did not have a regular range clearance maintenance schedule nor had it undergone any type of investigation, cleanup, or response action of UXO. The range type was listed as a mobile range as opposed to a land range, indicating the range was not on the surface.

Although speculative, the Mobile Pistol Range may have been used as a replacement to the Indoor Small Arms Range (Building 1346). According to the 1976 Existing Building Schedule, Building 1346 contained a concrete floor and was identified as a small arms range. Mobile ranges were not commonly used in the mid-1900s and the 1984 aerial photograph depicts Building 1346 as a range but the features of the building are not characteristic of a mobile range. Building 1346 (Indoor Small Arms Range) was likely demolished, and the Mobile Pistol Range ("new" Building 1346) was used to replace the range. This theory is further supported by the 2004 Facility Map, Explosive Safety Arcs (DON 2004) which shows Building 1346 approximately 100 feet southeast from its original location on the opposite side of Range Road. This mobile range likely became obsolete when Building 1345 (Indoor Small Arms Range) was constructed.

Table 4-1
Summary of Potential MRAs Associated with NAS JRB Fort Worth

Buildings 1628 Room 3, 1630 Room 7, 1643, 1648 Rooms 04 and 104, 1649 Room 115, and 1650 Room 134; 301st Fighter Wing Explosive Licensed Facilities

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Northern portion of NAS JRB Fort Worth, east of Taxiway 185 and north of North Apron 160	Buildings are 4,000 ft^2 to 60,000 ft^2	~1960s to present	Active	Storage Area	No (not eligible bullet #2 and #3)

Summary of Activities Performed and History

According to the 2011, 2012, and 2013 ESA Maps, the 301st FW maintains six buildings that are considered SELs. The description of the buildings/rooms is: Egress Canopy Storage, Weapons Loading, Gun Shop, Egress Shop, Air Crew Flight Equipment, and Air Crew Flight Equipment Maintenance.

The 2006 P2 indicates that activities within Building 1648 are associated with general maintenance of the weapons systems on the F-16 aircraft. Equipment includes Alternate Mission Equipment, pylons, ejectors, and laser guided equipment. Building 1628 Room 3, The Egress Shop, performs maintenance and repairs of ACES-2 ejector seats for F-16 and F-15 aircraft. When the explosive devices are replaced, they are placed in the Munitions Storage Area and delivered back to the manufacturer.

Buildings 3-157 through 3-161, Former Skeet Range

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Northern portion of Installation, north of Captain's Row and east of Sesame Street. Currently occupied by the Child Development Center (Building 3320) and recreational facilities	140,000 ft^2	Unknown to Mid-1950s	Inactive, demolished	Range	Yes (eligible bullet # 1, #2 and #3)

Summary of Activities Performed and History

The Skeet Range is located in the northern portion of the installation, approximately 650 feet northwest of the intersection of 1st Street and 2nd Street, immediately west of the Radio H.F. Receiver, and approximately 800 feet south of Lake Worth. The Skeet Range is shown as two half circles approximately 250 wide, which suggests that the skeet range consisted of two firing stations oriented toward the northwest. The Skeet Range is likely identified as Buildings 3-157 through 3-161. Although speculative, Buildings 3-157 through 3-159 are likely towers whereas Buildings 3-160 and 3-161 may have been shotgun, ammunition, and/or clay pigeon storage/issue points.

Buildings 3351, 3352, 3356, 3368, 3369, and 3370 — 3388; Northern Weapons Storage Area

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Northern boundary of Installation, north of airfield and located along Lake Fort Worth	15 acres	1951 to Present	Active	Storage Area	No (not eligible bullets #2, and #3)

Table 4-1
Summary of Potential MRAs Associated with NAS JRB Fort Worth

Summary of Activities Performed and History

The bunkers along the northern boundary of the Installation serve as the main munitions storage area for NAS JRB Fort Worth. According to the 1976 Existing Building Schedule, Buildings 3371 through 3382 were constructed in 1951. Each building is 318 square feet and is finished with a concrete floor, walls, and roof. Buildings 3351, 3352 and, 3356 were constructed in 1963. According to Mr. Varner, Buildings 3379 and 3380 were demolished within the past seven years.

Building 4210 (Missile Assembly Facility) and Buildings 4220 through 4257; Air Launch Cruise Missile Storage Area

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Within Central flightline area of Installation	~8 acres	1980s to present	Active	Storage Area	No (not eligible bullet #2 and #3)

Summary of Activities Performed and History

The ALCM Storage Area is located within the central flightline area of the Installation and consists of 25 concrete igloos, a 68,000-square-foot missile assembly facility (Building 4210), and support facilities (USAF 1993). Mr. Statler stated the concrete igloos located in the center of airfield were formerly used to store nuclear weapons and munitions. Nuclear weapons are no longer stored within the igloos, which are now used as offices and non-munition material storage. Buildings 4210 and 4220 through 4257 are constructed with concrete floors and the area surrounding each building is paved.

Buildings 1672, 1675, and 4175; Texas Air National Guard Explosive Licensed Facilities

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Northern portion of Installation, adjacent to Aircraft Parking 166 and Taxiway 185	47,500 to 16,800 ft^2	2000s to present	Active	Storage Area	No (not eligible bullet #2 and #3)

Summary of Activities Performed and History

The 2011, 2012, and 2013 ESA maps show TANG 1672, 1675, and 4175 as SELs. According to the 2006 P2, TANG security services are located in Building 4175. Also, routine cleaning of small arms weapons occurs in the building. Room 115 in Building 1672 is used as the Security Forces Armory. Rooms 084 and 086 in Building 1675 contain survival kits. All three buildings have concrete flooring and the area surrounding each building is paved.

Former Off-Site Weapons Storage Area

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
Approximately 5 miles west of the Installation	247 acres	~1950 -1980	Inactive	Storage Area/Range	No (not eligible bullet #2 and #3)

Summary of Activities Performed and History

The 1993 BEBS indicates that Carswell AFB has operated an EOD proficiency range at this location since the late 1950s. The Off-Site WSA consisted of 11 concrete igloos and numerous munitions maintenance facilities. The Off-Site WSA became inactive in 1993 when Carswell AFB was closed. The BEBS states that the EOD range will be cleared of all UXO. All ordnance accumulated since the range was closed will be properly packaged and transported for use by other AF units (USAF 1993). The BEBS categorized properties into one of seven categories. The EOD range was considered Category 7 property due to the likelihood of soil contamination. Category 7 properties are areas that are unevaluated or require additional evaluation.

Table 4-1
Summary of Potential MRAs Associated with NAS JRB Fort Worth

According to the 2006 After Action Report, an EOD team from Hill AFB cleared approximately 58.5 acres of the WSA in 1995. The following items were recovered:

- One 105mm HE projectile
- One 3-inch HE projectile
- One M229 2.75-inch HE warhead
- One M57 hand grenade
- 50 cubic yards of soil containing expended aircraft starter cartridges
- Ten M55A2 20mm target practice projectiles
- Two tons of ordnance scrap metal

In addition, 12 potential munitions anomalies were investigated and screened for MPPEH. Six of the 12 areas were determined to be munitions pits, some as deep as 20 feet bgs.

The report also indicated that Carswell AFB began operation of the Off-Site WSA EOD range in the late 1950s to dispose of unserviceable ammunition, pyrotechnics, and explosives. The range was also used by EOD personnel for training. Disposal operations at the EOD range ceased in 1980.

During the 2005 and 2006 clearance performed by Earth Tech, 1,185 items were identified as munitions debris and 15 items were identified as MPPEH:

- Nine 20mm HE projectiles
- One 20mm Armor Piercing Tracer projectile
- Three M103 bomb nose fuzes
- One 40mm grenade cartridge
- One signal illumination flare

Other MD items located during the 2005 and 2006 clearance include:

- Mild Detonating Cord Shield
- Two concrete-filled M117 general purpose bombs
- Eight civilian flameless dust grenades
- .50 caliber rounds
- Aircraft flares
- Starter cartridge igniters
- Empty 20mm projectile

Eighteen soil samples were collected and submitted for laboratory analysis of explosive compounds. No explosive compounds were detected above laboratory detection limits. The After Action Report certified that “all detectable explosive hazards have been removed from the project site and that the site is suitable for residential use.”

On 15 February 2007, the Texas Commission on Environmental Quality (TCEQ) issued a No Further Action Letter regarding the cleanup of the Off-site WSA.

Table 4-1
Summary of Potential MRAs Associated with NAS JRB Fort Worth

On 10 April 2007, the U.S. EPA issued a letter to the USAF stating their concurrence that the Off-Site WSA is suitable for land transfer.

Former Skeet Range North

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
North portion of Installation. South of Meandering Drive.	140,000 ft^2	Early 1960s – Mid 1970s	Inactive, demolished	Range	Yes (eligible bullets # 1, #2 and #3)

Summary of Activities Performed and History

The Former Skeet Range North is located in the northern portion of the Installation, along the north end of the running track, approximately 175 feet northeast of Navy Lodge Fort Worth and 450 south of Lake Worth. The Former Skeet Range North is shown as two half circles, approximately 250 feet wide, which suggests that the skeet range consisted of two firing stations oriented toward the south. Two ancillary buildings (less than 500 square feet each) are located north and southwest of the firing positions and may have been shotgun, ammunition, and/or clay pigeon storage/issue points.

Future EOD Range

Location	Approximate Area	Operational Dates	Status	Category	Eligible for MMRP (Yes/No)
North end of Installation runway, south of Taxiway A 193	8 acres	Unknown to present	Active	Range	No (not eligible bullets #1, #2 and #3)

Summary of Activities Performed and History

Mr. Montrose stated the NAS JRB Fort Worth EOD team was officially established on 1 April 2013. He recalled that EOD personnel disposed of two 20mm rounds by detonation at the proposed OB/OD location. The proposed OB/OD area is located within a triangular-shaped parcel of land circumscribed by Taxiway A 194, Parallel Taxiway 197, and an east to west oriented parking apron that includes nearby Building 4160. Mr. Eckelbecker stated he is in the process of converting this area to an official OB/OD Unit.

5.0 CONCEPTUAL SITE MODELS

The CSMs were developed following the suggested format presented in the *Conceptual Site Models Engineer Manual (EM 200-1-12*; USACE 2012) with revisions and additions to accommodate the unique aspects of each MRA. In the event that specific profile information is not available for the MRA, NAS JRB Fort Worth Installation information was used to supplement the CSM.

5.1 Building 1-162B, Former Pistol Range

The location of Building 1-162B, Former Pistol Range, is shown on Figure 4-1. The CSM is included in Table 5-1 and presented graphically on Figure 5-1.

Table 5-1
CSM Information Profile — Building 1-162B, Former Pistol Range

Profile Type	Information Needs	PA Findings
Facility Profile	MRA Name and Installation:	Building 1-162B, Former Outdoor Pistol Range
	EPA Region:	Region 6
	Lead Organization:	NAVFAC Southeast
	Installation Mission:	NAS JRB Fort Worth provides joint training capability and technical resources to enable Warfighter readiness.
	Location and Area:	Located along the southern boundary of the Installation, south of Hercules Road and west of the Action Youth Zone Building (Building 1145). The total surface area of the Former Pistol Range is approximately 30,000 ft^2.
	History:	The Former Pistol Range was first shown on the 1951 Base Layout Map. The firing line was located on the eastern portion of the range and earthen berms were on the north, west, and south sides of the range. The range is also shown in the 1958 Additional Runway Grading & R.R. Spur Relocation Map. The range is not shown on the 1969 Gas Map of the Installation. No base personnel interviewed were aware of this range or activities conducted at this location. During the site reconnaissance faint mounds were observed on the north and south sides of the grassy area possibly suggesting the range was filled in with dirt prior to redevelopment. The Former Pistol Range was not mentioned in the Navy's 2000 *Closed, Transferred, Transferring, Active, and Inactive Range Survey.*
	Status:	Inactive, potentially present
MEC and MC Profile	Potential Source Areas:	The potential source locations include the firing stations, berms, and the area circumscribed by the berms and firing station.
	Types of Munitions and Explosives:	Due to the nature of pistol range operations, MEC is assumed to not be present. Small arms ammunition was likely used, and these items are not considered MEC.

Table 5-1
CSM Information Profile — Building 1-162B, Former Pistol Range

Profile Type	Information Needs	PA Findings
	MEC Density and Distribution:	Due to the nature of pistol range operations, MEC is assumed to not be present. Small arms ammunition was likely used, and these items are not considered MEC; therefore, the density and distribution of MEC is not applicable.
	MEC Depth:	Due to the nature of pistol range operations, MEC is assumed to not be present. Small arms ammunition was likely used, and these items are not considered MEC; therefore, the depth of MEC is not applicable.
	MCs and Media:	Types of common small arms ammunition associated with a pistol range include .38 caliber, .45 caliber, and 9mm rounds; therefore, the primary MC is lead. MC are likely confined to surface and subsurface soils (including the berm) and potentially groundwater.
Release Profile	Migration Pathways:	The potential for MC leaching to groundwater is considered very low because Installation soils are primarily composed of clays which will limit leaching. The potential for surface water runoff of sorbed or aqueous phase MC is low because the grounds are vegetated with maintained grasses and due to the relatively dry climate.
Physical Profile	Climate and Meteorology:	The climate of NAS JRB Fort Worth is subtropical with mild to moderate winters and hot, humid summers. This region receives approximately 30 inches of rainfall per year. Severe thunderstorms with wind speeds of 65 knots and hail storms are common (USAF 1993).
	Surface Topography:	The Former Pistol Range gently slopes downgradient toward the east to a parking lot. The slope decreases by approximately 15 feet for each 100 linear feet. The area is covered by maintained grasses.
	Geology:	Soils in the area of NAS JRB Fort Worth are usually clayey soils on nearly level to gently sloping uplands, or are deep loamy soils on level to sloping stream terraces. Permeability of the soil at the Installation has been determined to be slow, to moderately slow, allowing storm water runoff to occur rapidly, without significant infiltration. The soil is susceptible to some erosion (DON 2005)
	Hydrology:	No surface water bodies are located on NAS JRB Fort Worth. Lake Worth borders the northern part of the Installation and the West Fork of the Trinity River runs from north to south along the eastern boundary of the Installation. Storm water runoff from the Installation is conveyed to the Trinity River by either collecting in Lake Worth from direct runoff or from storm drainage systems, or by flowing into Farmers Branch Creek and then being conveyed into the West Fork of the Trinity River, or by being collected by the storm sewer systems throughout the Installation and being piped to outflows that empty directly into the West Fork of the Trinity River (DON 2005).

Table 5-1
CSM Information Profile — Building 1-162B, Former Pistol Range

Profile Type	Information Needs	PA Findings
	Hydrogeology	There are five major hydrogeologic units located beneath NAS JRB Fort Worth. The units are described as an upper zone of perched water in alluvial terrace deposits, an aquitard in the Goodland, Limestone, and Walnut Formations; an aquifer in the Paluxy Formation; an aquitard in the Glen Rose Formation; and, an aquifer in the Twin Mountains Formation (DON 2005).
Land Use and Exposure Profile	Current land use:	Recreational
	Surrounding land use:	Industrial; Commercial; Residential; Recreational
	Future land use:	Industrial; Commercial; Residential; Recreational
	Accessibility:	The area can be access by any person gaining entry into the Installation. The area is not within a secured portion of the Installation.
	Potential Human Receptors:	Current and future human receptors include Installation personnel, contractors, and visitors. These groups fall into the following categories: current and future recreational users, future industrial workers, and future construction workers.
Ecological Profile	Vegetation:	Vegetation in the area of NAS JRB Fort Worth consists predominantly of Bermuda and St. Augustine grasses. Woody brush plants of oaks, mesquite, and juniper and woody areas of various oak tree species. The 1.3 acre Trinity River Seep site is considered a Jurisdictional Wetland on the Installation.
	Wildlife:	According to the TPWD the predominant fish species in Lake Worth are: white crappie; largemouth, spotted, and white bass; and catfish. Mammals expected to occur on the installation include opossum, raccoon, striped skunk, several species of rodents, whitetail deer, red fox, coyote, bobcat, rabbits, and armadillo. Upland game birds include quail, turkey, doves, pheasants, ducks, geese, and cranes. Common reptiles include various species of lizards, snakes, and turtles.
	Protected Species:	Protected species potentially present on the Installation include: Arctic Peregrine Falcon, Bald Eagle, Mountain Plover, Whopping Crane, Texas Horned Lizard, Texas Garter Snake, and Plains Spotted Skunk.

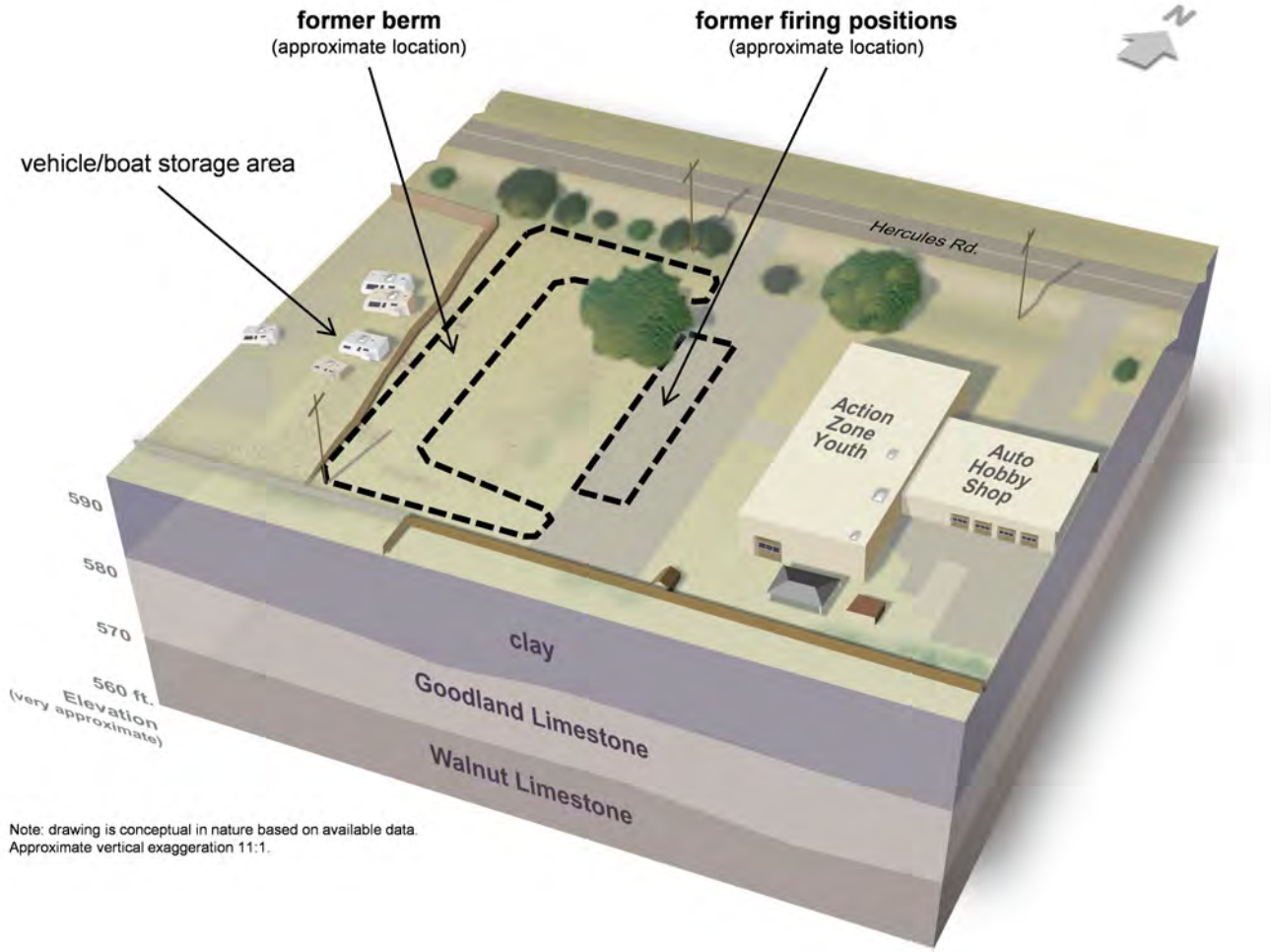


FIGURE 5-1
CONCEPTUAL SITE MODEL
BUILDING 1-162B, FORMER PISTOL RANGE
NAVAL AIR STATION JOINT RESERVE BASE
FORTH WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: B. HAMBY	DATE: 1/29/2014
DRAWN BY: AZIMMERMAN	TASK ORDER NUMBER: JM24

Service Layer Credits:

X:\NavyNAS_JRB_Fort_Worth\Fig5_1_CSM_building1162b.mxd

5.1.1 MEC Pathway Analysis

Due to the nature of pistol range operations, MEC is assumed to not be present. Small arms ammunition was likely used, and these items are not considered MEC; therefore a MEC pathway analysis is not applicable to the Former Pistol Range.

5.1.2 MC Pathway Analysis

The pathway analysis for MC is shown in Figure 5-2. Potential receptors include both human and ecological receptors. Potentially complete exposure pathways include:

- **Current and Future Recreational Users:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–2 foot bgs interval are potentially complete exposure pathways.

- **Future Industrial/Occupational Workers:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–2 foot bgs interval are potentially complete exposure pathways.

- **Future Excavation/Construction Workers:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–10 foot bgs interval and incidental ingestion and dermal contact with groundwater are potentially complete exposure pathways.

- **Ecological Receptors:** Incidental ingestion and dermal contact of surface soil from the 0-2 foot bgs interval and ingestion of plants/animals (surface soil) are potentially complete exposure pathways.

5.1.3 Risk Analysis

Risks to human health and the environment from exposure to MC-contaminated media are considered moderate. This determination is based on the potentially complete exposure pathways for current/future receptors to come into direct contact with lead-contaminated media. Site media is recommended for sample collection and analysis in a follow-on investigation to quantify the degree of lead contamination and determine if MC pathways are complete.

MC Exposure Pathway Analysis

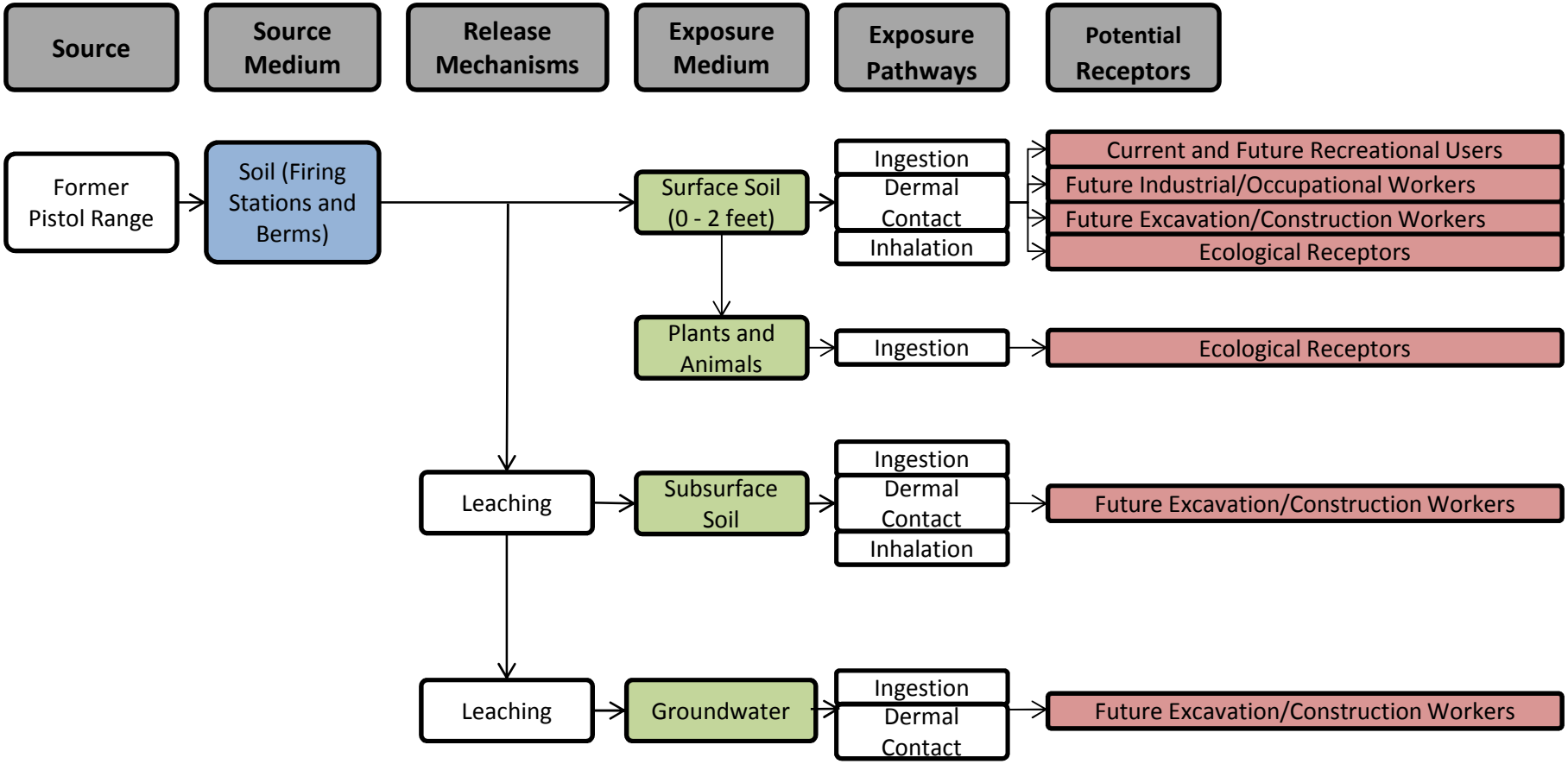


FIGURE 5-2
MC PATHWAY ANALYSIS
BUILDING 1-162B; FORMER PISTOL RANGE
NAVAL AIR STATION JOINT RESERVE BASE
FORTH WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

REQUESTED BY: B. HAMBY	DATE: 1/31/2014
DRAWN BY: NRINEHART	TASK ORDER NUMBER: JM24

Service Layer Credits:

X:\Navy\NAS_JRB_Fort_Worth\Fig5_2_MC_ExposurePath_FormerPistolRange.mxd

5.2 Building 1342, Former Pistol/M-60 Range

The location of Building 1341, Former Pistol/M-60 Range MRA, is shown on Figure 4-2. The CSM is included in Table 5-2 and presented graphically on Figure 5-3.

Table 5-2
CSM Information Profile — Building 1341, Former Pistol/M-60 Range

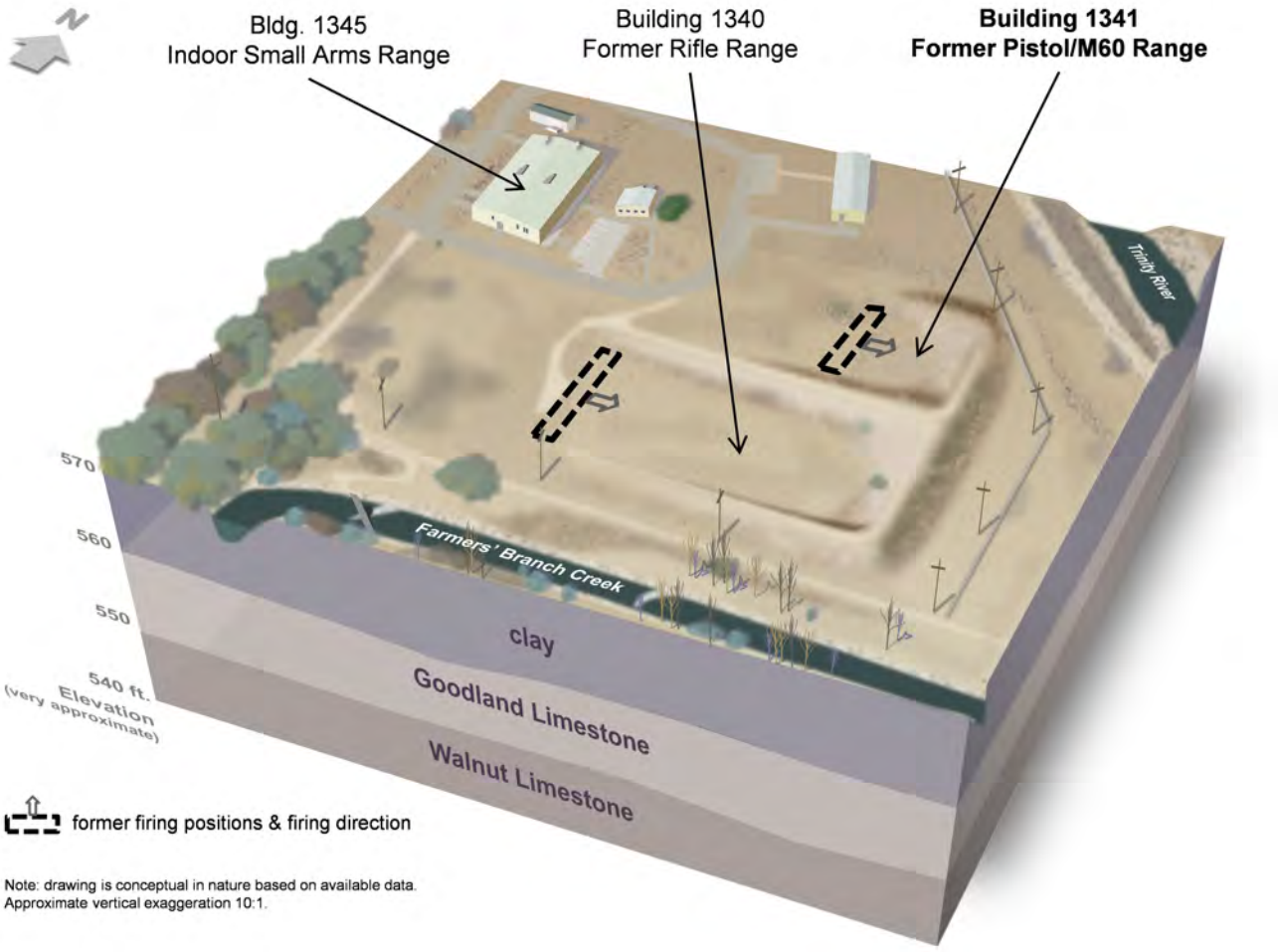
Profile Type	Information Needs	PA Findings
Facility Profile	MRA Name and Installation:	Building 1342, Former Pistol/M-60 Range
	EPA Region:	Region 6
	Lead Organization:	NAVFAC Southeast
	Installation Mission:	NAS JRB Fort Worth provides joint training capability and technical resources to enable Warfighter readiness.
	Location and Area:	Southeastern area, Southeast of Range Road Circle
	History:	The earliest document researched that showed the Pistol/M-60 Range was the 1984 aerial photograph. The range's firing position is to the east and it is surrounded by approximately 30 foot high earthen berms on the north, east, and south. The 1987 Site Plan lists the range and Building 1341 as the M-60 Gun Range. Building 1341 was the firing station for the range which consisted of four individual stations. The 1987 Site Plan calls for the removal of the top 36 inches of soil for an area of 12 feet by 50 feet by 3 feet along the east berm which was down range from the firing stations. Mr. Epps stated the range has not been used since 1994 and the lead shot was removed from the range in 1995. Mr. Bevell stated the USAF collected soil samples from the range after the lead shot was removed but stated he was not aware of any reports or analytical results. Mr. Meyer stated the range is considered closed but he does not have any official closure documentation. The Navy's 2000 Closed, Transferred, Transferring, Active, and Inactive Range Survey identified this range as the Indoor/Outdoor Pistol Range. According to the 2000 Range Survey, the range is listed as inactive and classified as a Small Arms Range (.50 caliber and under); however, exact ordnance used at the range was not reported. The range survey also stated 10 barrels of metal collected from the range has been recycled through a local DRMO and the range was used by Federal and local law enforcement personnel when it was active. The 2000 Range Survey did not mention any cleanup activities associated with the Former Pistol/M60 Range.
	Status:	Inactive
MEC and MC Profile	Potential Source Areas:	The potential source locations include the firing stations, berms, and the area circumscribed by the berms and firing station.

Table 5-2
CSM Information Profile — Building 1341, Former Pistol/M-60 Range

Profile Type	Information Needs	PA Findings
	Types of Munitions and Explosives:	Due to the nature of pistol/M-60 range operations, MEC is assumed to not be present. Types of common small arms ammunition used at small arms ranges include 9mm, 12 gauge, .38 caliber, .45 caliber, 5.56mm, 7.62mm, .50 caliber rounds. Because small arms ammunition was likely used, these items are not considered MEC.
	MEC Density and Distribution:	Due to the nature of pistol/M-60 range operations, MEC is assumed to not be present. Because small arms ammunition was likely used, these items are not considered MEC; therefore, the density and distribution of MEC is not applicable.
	MEC Depth:	Due to the nature of pistol/M-60 range operations, MEC is assumed to not be present. Because small arms ammunition was likely used, these items are not considered MEC; therefore, the depth of MEC is not applicable.
	MCs and Media:	Types of common small arms ammunition associated with the range may include 9mm, 12 gauge, .38 caliber, .45 caliber, 5.56mm, 7.62mm, .50 caliber rounds; therefore, the primary MC is lead. MC are likely confined to surface and subsurface soils (including the berm) and potentially groundwater.
Release Profile	Migration Pathways:	The potential for MC leaching to groundwater is considered very low because Installation soils are primarily composed of clays which will limit leaching. The potential for surface water runoff of sorbed or aqueous phase MC is low because the grounds are vegetated with maintained grasses and due to the relatively dry climate.
Physical Profile	Climate and Meteorology:	The climate of NAS JRB Fort Worth is subtropical with mild to moderate winters and hot, humid summers. This region receives approximately 30 inches of rainfall per year. Severe thunderstorms with wind speeds of 65 knots and hail storms are common (USAF 1993).
	Surface Topography:	The area surrounding the Pistol/M-60 Range is relatively flat and featureless. There is a slight dip toward West Farmer Branch to the south.
	Geology:	Soils in the area of NAS JRB Fort Worth are usually clayey soils on nearly level to gently sloping uplands, or are deep loamy soils on level to sloping stream terraces. Permeability of the soil at the Installation has been determined to be slow, to moderately slow, allowing storm water runoff to occur rapidly, without significant infiltration. The soil is susceptible to some erosion (DON 2005)

Table 5-2
CSM Information Profile — Building 1341, Former Pistol/M-60 Range

Profile Type	Information Needs	PA Findings
	Hydrology:	No surface water bodies are located on NAS JRB Fort Worth. Lake Worth borders the northern part of the Installation and the West Fork of the Trinity River runs from north to south along the eastern boundary of the Installation. Storm water runoff from the Installation is conveyed to the Trinity River by either collecting in Lake Worth from direct runoff or from storm drainage systems, or by flowing into Farmers Branch Creek and then being conveyed into the West Fork of the Trinity River or by being collected by the storm sewer systems throughout the Installation and being piped to outflows that empty directly into the West Fork of the Trinity River (DON 2005).
	Hydrogeology	There are five major hydrogeologic units located beneath NAS JRB Fort Worth. The units are described as an upper zone of perched water in alluvial terrace deposits, an aquitard in the Goodland, Limestone, and Walnut Formations; an aquifer in the Paluxy Formation; an aquitard in the Glen Rose Formation; and, an aquifer in the Twin Mountains Formation (DON 2005).
Land Use and Exposure Profile	Current land use:	Industrial
	Surrounding land use:	Industrial
	Future land use:	Industrial
	Accessibility:	The area is patrolled regularly due to its close proximity to the Indoor Small Arms Range, Building 1345. However, access to the area is not restricted.
	Potential Human Receptors:	Current and future human receptors include Installation personnel, contractors, and visitors. These groups fall into the following categories: current and future industrial workers and future construction workers.
Ecological Profile	Vegetation:	Vegetation in the area of NAS JRB Fort Worth consists predominantly of Bermuda and St. Augustine grasses. Woody brush plants of oaks, mesquite, and juniper and woody areas of various oak tree species. The 1.3 acre Trinity River Seep site is considered a Jurisdictional Wetland on the Installation.
	Wildlife:	According to the TPWD the predominant fish species in Lake Worth are: white crappie; largemouth, spotted, and white bass; and catfish. Mammals expected to occur on the installation include opossum, raccoon, striped skunk, several species of rodents, whitetail deer, red fox, coyote, bobcat, rabbits, and armadillo. Upland game birds include quail, turkey, doves, pheasants, ducks, geese, and cranes. Common reptiles include various species of lizards, snakes, and turtles.
	Protected Species:	Protected species potentially present on the Installation include: Arctic Peregrine Falcon, Bald Eagle, Mountain Plover, Whopping Crane, Texas Horned Lizard, Texas Garter Snake, and Plains Spotted Skunk.



Note: drawing is conceptual in nature based on available data.
Approximate vertical exaggeration 10:1.

FIGURE 5-3
CONCEPTUAL SITE MODEL
BUILDING 1341, FORMER PISTOL/M60 RANGE
NAVAL AIR STATION JOINT RESERVE BASE
FORTH WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: B. HAMBY	DATE: 1/29/2014
DRAWN BY: AZIMMERMAN	TASK ORDER NUMBER: JM24

X:\NavyNAS_JRB_Fort_Worth\Fig5_3_CSM_building1341.mxd

5.2.1 MEC Pathway Analysis

Due to the nature of Pistol/M-60 Range operations, MEC is assumed to not be present. Small arms ammunition was likely used, and these items are not considered MEC; therefore a MEC pathway analysis is not applicable to the Former Pistol/M-60 Range.

5.2.2 MC Pathway Analysis

The pathway analysis for MC is shown in Figure 5-4. Potential receptors include both human and ecological receptors. Potentially complete exposure pathways include:

- **Current and Future Industrial/Occupational Workers:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–2 foot bgs interval are potentially complete exposure pathways.

- **Future Excavation/Construction Workers:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–10 foot bgs interval and incidental ingestion and dermal contact with groundwater are potentially complete exposure pathways are potentially complete exposure pathways.

- **Ecological Receptors:** Incidental ingestion and dermal contact of surface soil from the 0-2 foot bgs interval and ingestion of plants/animals (surface soil) are potentially complete exposure pathways.

5.2.3 Risk Analysis

Risks to human health and the environment from exposure to MC-contaminated media are considered moderate. This determination is based on the potentially complete exposure pathways for current/future receptors to come into direct contact with lead-contaminated media. Site media is recommended for sample collection and analysis in a follow-on investigation to quantify the degree of lead contamination and determine if MC pathways are complete.

MC Exposure Pathway Analysis

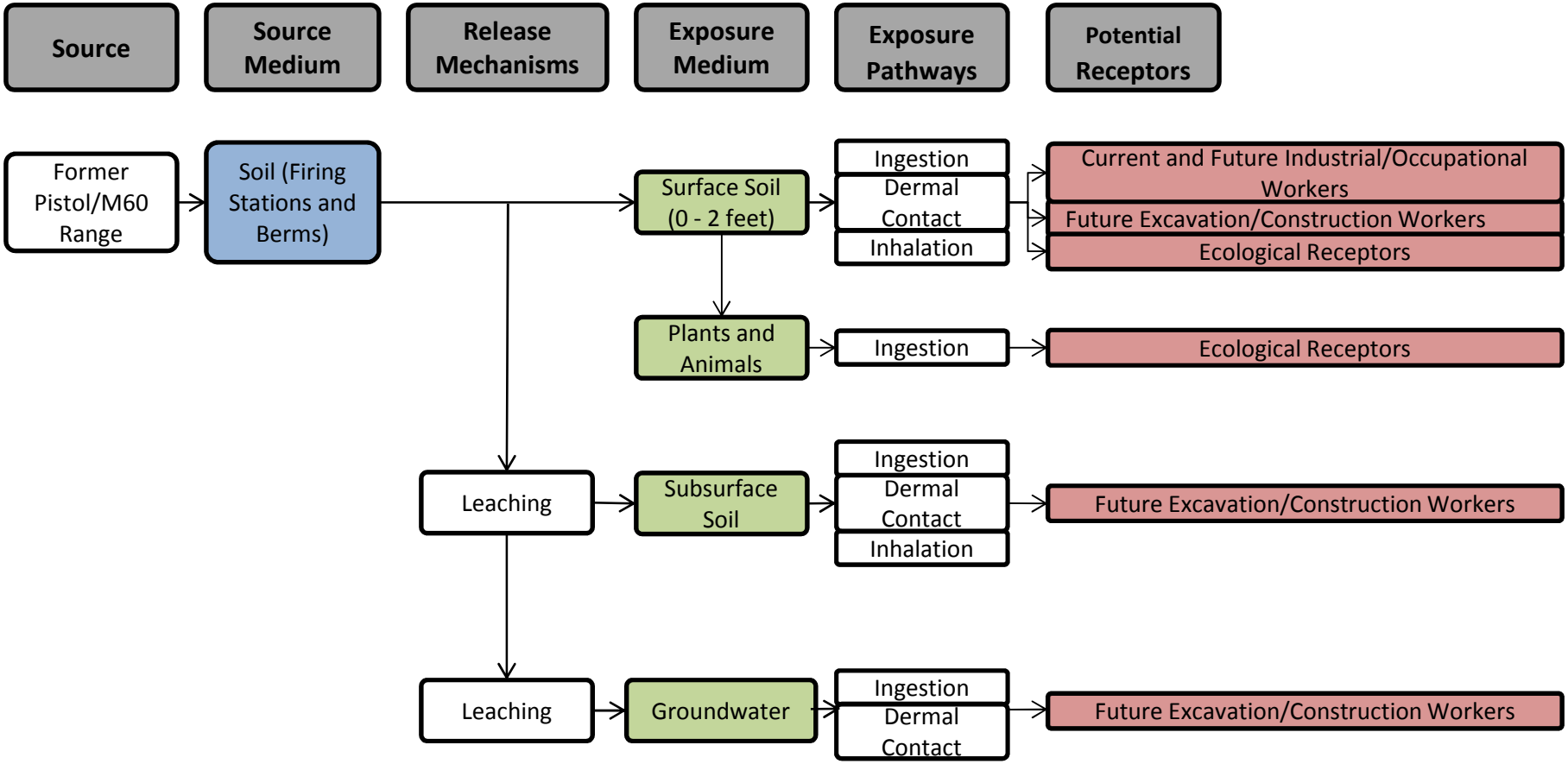


FIGURE 5-4
MC PATHWAY ANALYSIS
BUILDING 1341; FORMER PISTOL/M60 RANGE
NAVAL AIR STATION JOINT RESERVE BASE
FORTH WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: B. HAMBY	DATE: 1/31/2014
DRAWN BY: NRINEHART	TASK ORDER NUMBER: JM24

Service Layer Credits:

X:\Navy\NAS_JRB_Fort_Worth\Fig5_4_MC_ExposurePath_FormerPistol_M60Range.mxd

5.3 Building 1340, Former Rifle Range

The location of Building 1340, Former Rifle Range MRA, is shown on Figure 4-2. The CSM is included in Table 5-3 and presented graphically on Figure 5-5.

Table 5-3
CSM Information Profile — Building 1340, Former Rifle Range

Profile Type	Information Needs	PA Findings
Facility Profile	MRA Name and Installation:	Building 1340, Former Rifle Range
	EPA Region:	Region 6
	Lead Organization:	NAVFAC Southeast
	Installation Mission:	NAS JRB Fort Worth provides joint training capability and technical resources to enable Warfighter readiness.
	Location and Area:	Southeastern area, Southeast of Range Road Circle
	History:	The Former Rifle Range lies directly south of the Former Pistol/M-60 Range which shares a portion of its northern berm. The Former Rifle Range is in a similar configuration as the Former Pistol/M-60 Range with the firing station on the west and earthen berms on the north, east, and south sides. According to the 2000 Range Survey, the Former Rifle Range is considered closed as of August 1996 and was classified as a Small Arms Range (.50 caliber and under). The range was reportedly last used by NAS JRB Fort Worth Security Forces and USAF. No investigations for UXO have been conducted at the Former Rifle Range according to the survey. A 1965 project plan of the Former Rifle Range shows it was constructed with a covered firing station, eight overhead baffles, and four ground baffles.
	Status:	Closed
MEC and MC Profile	Potential Source Areas:	The potential source locations include the firing stations, berms, and the area circumscribed by the berms and firing station.
	Types of Munitions and Explosives:	Due to the nature of rifle range operations, MEC is assumed to not be present. Types of common small arms ammunition used at small arms ranges include 9mm, 12 gauge, .38 caliber, .45 caliber, 5.56mm, 7.62mm, .50 caliber rounds. Because small arms ammunition was likely used, these items are not considered MEC.
	MEC Density and Distribution:	Due to the nature of rifle range operations, MEC is assumed to not be present. Because small arms ammunition was likely used, these items are not considered MEC; therefore, the density and distribution of MEC is not applicable.

Table 5-3
CSM Information Profile — Building 1340, Former Rifle Range

Profile Type	Information Needs	PA Findings
	MEC Depth:	Due to the nature of rifle range operations, MEC is assumed to not be present. Because small arms ammunition was likely used, these items are not considered MEC; therefore, the depth of MEC is not applicable.
	MCs and Media:	Types of common small arms ammunition associated with the range may include 9mm, 12 gauge, .38 caliber, .45 caliber, 5.56mm, 7.62mm, .50 caliber rounds; therefore, the primary MC is lead. MC are likely confined to surface and subsurface soils (including the berm) and potentially groundwater.
Release Profile	Release/Transport Mechanism:	The potential for MC leaching to groundwater is considered very low because Installation soils are primarily composed of clays which will limit leaching. The potential for surface water runoff of sorbed or aqueous phase MC is low because the grounds are vegetated with maintained grasses and due to the relatively dry climate.
Physical Profile	Climate and Meteorology:	The climate of NAS JRB Fort Worth is subtropical with mild to moderate winters and hot, humid summers. This region receives approximately 30 inches of rainfall per year. Severe thunderstorms with wind speeds of 65 knots and hail storms are common (USAF 1993).
	Surface Topography:	The area surrounding the Former Rifle Range is relatively flat and featureless. There is a slight dip toward West Farmer Branch to the south.
	Geology:	Soils in the area of NAS JRB Fort Worth are usually clayey soils on nearly level to gently sloping uplands, or are deep loamy soils on level to sloping stream terraces. Permeability of the soil at the Installation has been determined to be slow, to moderately slow, allowing storm water runoff to occur rapidly, without significant infiltration. The soil is susceptible to some erosion (DON 2005).
	Hydrology:	No surface water bodies are located on NAS JRB Fort Worth. Lake Worth borders the northern part of the Installation and the West Fork of the Trinity River runs from north to south along the eastern boundary of the Installation. Storm water runoff from the Installation is conveyed to the Trinity River by either collecting in Lake Worth from direct runoff or from storm drainage systems, or by flowing into Farmers Branch Creek and then being conveyed into the West Fork of the Trinity River or by being collected by the storm sewer systems throughout the Installation and being piped to outflows that empty directly into the West Fork of the Trinity River (DON 2005).

Table 5-3
CSM Information Profile — Building 1340, Former Rifle Range

Profile Type	Information Needs	PA Findings
	Hydrogeology	There are five major hydrogeologic units located beneath NAS JRB Fort Worth. The units are described as an upper zone of perched water in alluvial terrace deposits, an aquitard in the Goodland, Limestone, and Walnut Formations; an aquifer in the Paluxy Formation; an aquitard in the Glen Rose Formation; and, an aquifer in the Twin Mountains Formation (DON 2005).
Land Use and Exposure Profile	Current land use:	Industrial
	Surrounding land use:	Industrial
	Future land use:	Industrial
	Accessibility:	The area is patrolled regularly due to its close proximity to the Indoor Small Arms Range, Building 1345. However, access to the area is not restricted.
	Potential Human Receptors:	Current and future human receptors include Installation personnel, contractors, and visitors. These groups fall into the following categories: current and future industrial workers and future construction workers.
Ecological Profile	Vegetation:	Vegetation in the area of NAS JRB Fort Worth consists predominantly of Bermuda and St. Augustine grasses. Woody brush plants of oaks, mesquite, and juniper and woody areas of various oak tree species. The 1.3 acre Trinity River Seep site is considered a Jurisdictional Wetland on the Installation.
	Wildlife:	According to the TPWD the predominant fish species in Lake Worth are: white crappie; largemouth, spotted, and white bass; and catfish. Mammals expected to occur on the installation include opossum, raccoon, striped skunk, several species of rodents, whitetail deer, red fox, coyote, bobcat, rabbits, and armadillo. Upland game birds include quail, turkey, doves, pheasants, ducks, geese, and cranes. Common reptiles include various species of lizards, snakes, and turtles.
	Protected Species:	Protected species potentially present on the Installation include: Arctic Peregrine Falcon, Bald Eagle, Mountain Plover, Whopping Crane, Texas Horned Lizard, Texas Garter Snake, and Plains Spotted Skunk.

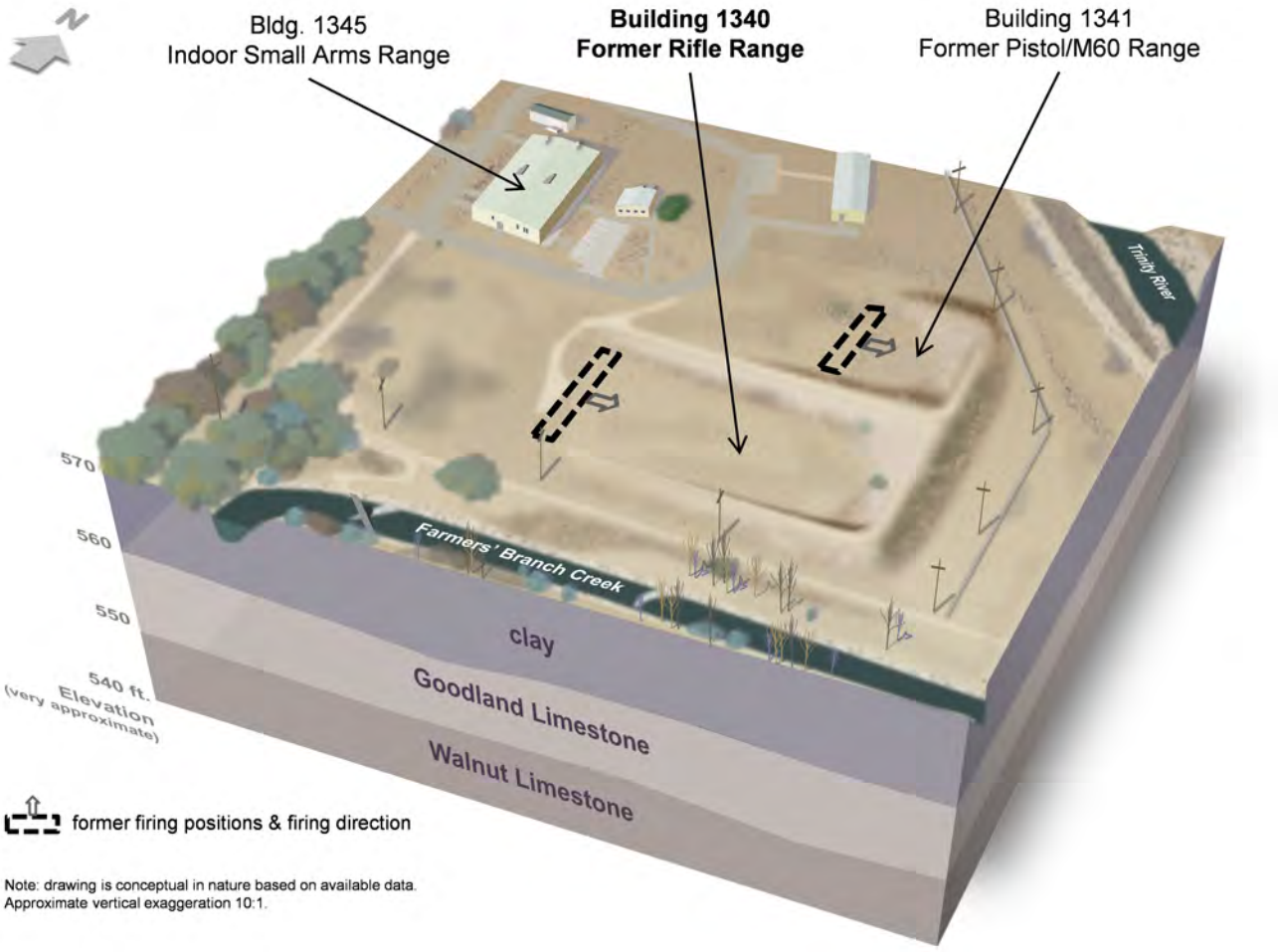


FIGURE 5-5
CONCEPTUAL SITE MODEL
BUILDING 1340, FORMER RIFLE RANGE
NAVAL AIR STATION JOINT RESERVE BASE
FORTH WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: B. HAMBY	DATE: 1/29/2014
DRAWN BY: AZIMMERMAN	TASK ORDER NUMBER: JM24

Service Layer Credits:

X:\NavyNAS_JRB_Fort_Worth\Fig5_5_CSM_building1340.mxd

5.3.1 MEC Pathway Analysis

Due to the nature of Rifle Range operations, MEC is assumed to not be present. Small arms ammunition was likely used, and these items are not considered MEC; therefore a MEC pathway analysis is not applicable to the Former Rifle Range.

5.3.2 MC Pathway Analysis

The pathway analysis for MC is shown in Figure 5-6. Potential receptors include both human and ecological receptors. Potentially complete exposure pathways include:

- **Current and Future Industrial/Occupational Workers:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–2 foot bgs interval are potentially complete exposure pathways.

- **Future Excavation/Construction Workers:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–10 foot bgs interval and incidental ingestion and dermal contact with groundwater are potentially complete exposure pathways are potentially complete exposure pathways.

- **Ecological Receptors:** Incidental ingestion and dermal contact of surface soil from the 0-2 foot bgs interval and ingestion of plants/animals (surface soil) are potentially complete exposure pathways.

5.3.3 Risk Analysis

Risks to human health and the environment from exposure to MC-contaminated media are considered moderate. This determination is based on the potentially complete exposure pathways for current/future receptors to come into direct contact with lead-contaminated media. Site media is recommended for sample collection and analysis in a follow-on investigation to quantify the degree of lead contamination and determine if MC pathways are complete.

MC Exposure Pathway Analysis

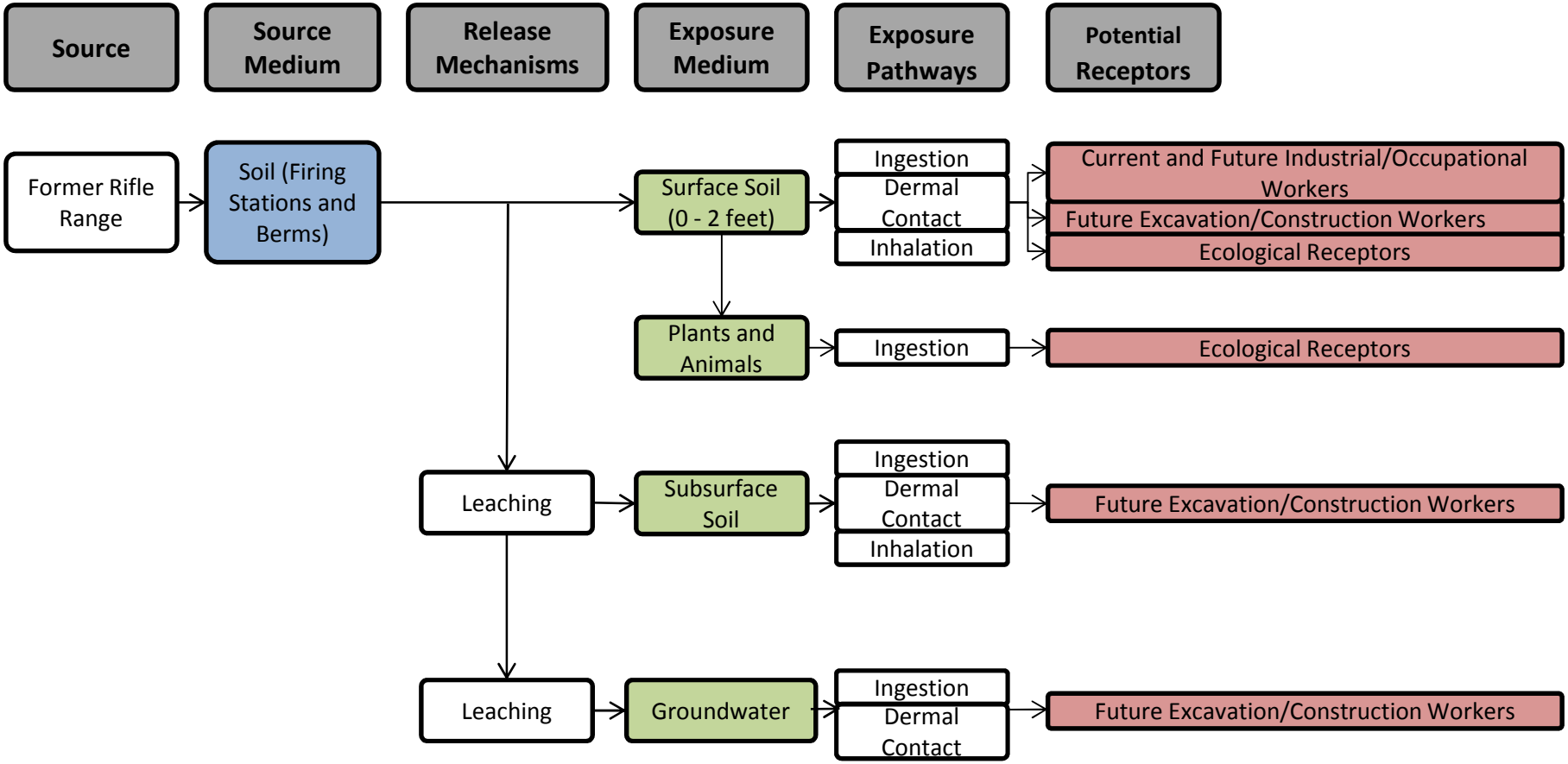


FIGURE 5-6
MC PATHWAY ANALYSIS
BUILDING 1340; FORMER RIFLE RANGE
NAVAL AIR STATION JOINT RESERVE BASE
FORTH WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

REQUESTED BY: B. HAMBY	DATE: 1/31/2014
DRAWN BY: NRINEHART	TASK ORDER NUMBER: JM24

Service Layer Credits:

X:\Navy\NAS_JRB_Fort_Worth\Fig5_6_MC_ExposurePath_FormerRifleRange.mxd

5.4 Buildings 3-157 — 3-161, Former Skeet Range

The location of Building 3-157 through 3-161, Former Skeet Range MRA, is shown on Figure 4-2. The CSM is included as Table 5-4 and presented graphically on Figure 5-7.

Table 5-4
CSM Information Profile — Buildings 3-157 — 3-161, Former Skeet Range

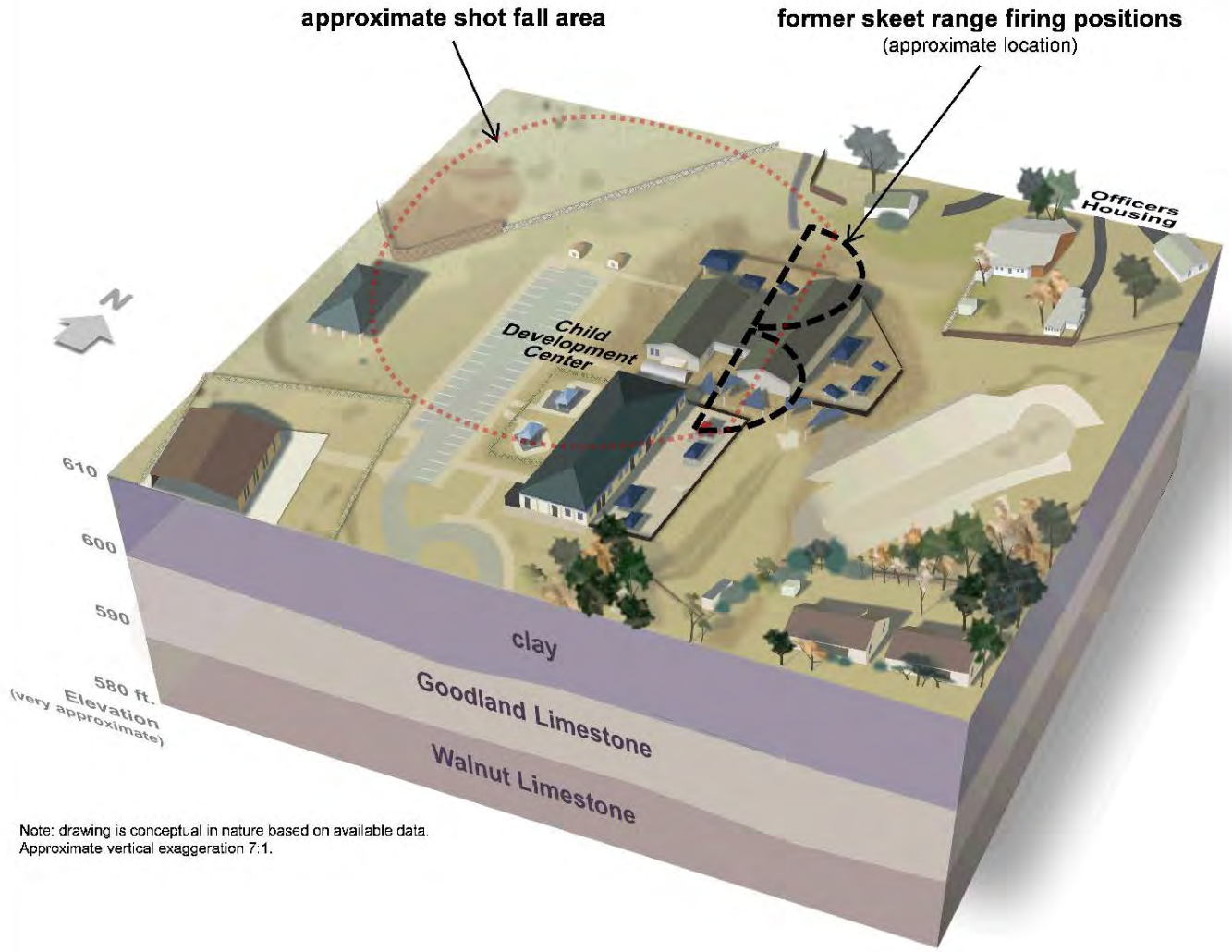
Profile Type	Information Needs	PA Findings
Facility Profile	MRA Name and Installation:	Buildings 3-157 — 3-161, Former Skeet Range, NAS JRB Fort Worth
	EPA Region:	Region 6
	Lead Organization:	NAVFAC Southeast
	Installation Mission:	NAS JRB Fort Worth provides joint training capability and technical resources to enable Warfighter readiness.
	Location and Area:	Northern area, north of Captain's Row and east of Sesame Street, between the Child Development Center (Building 3320) and the Baseball Field Snack Bar (Building 3334). Based on a 300-foot shot radius, the MRA occupied approximately 140,000 ft^2.
	History:	The Former Skeet Range was identified on the 1951 Base Layout Map. The map shows two half circles in a confirmation of a skeet range. The skeet ranges are oriented toward the northwest. The skeet ranges were not identified in any other documents or maps reviewed during this assessment. Sometime between 1978 and 1995, recreational fields were constructed in the shot path of the skeet range. In 2007, the Child Development Center was constructed over the former firing stations for the skeet range. The Former Skeet Range was not mentioned in the Navy's 2000 Closed, Transferred, Transferring, Active, and Inactive Range Survey.
	Status:	Inactive, demolished
MEC and MC Profile	Potential Source Areas:	The potential source locations include the firing stations and an approximate 300 foot arc to the northwest.
	Types of Munitions and Explosives:	Due to the nature of skeet range operations, MEC is assumed to not be present. Shotguns and clay pigeons were likely used, and these items are not considered MEC.
	MEC Density and Distribution:	Due to the nature of skeet range operations, MEC is assumed to not be present; therefore, the density and distribution of MEC is not applicable.
	MEC Depth:	Due to the nature of skeet range operations, MEC is assumed to not be present; therefore, the depth of MEC is not applicable.
	MCs and Media:	The primary MC of concern includes lead from shotgun shot-pellets and polycyclic aromatic hydrocarbons associated with clay pigeons. MC are likely confined to surface, subsurface soils and potentially shallow groundwater.

Table 5-4
CSM Information Profile — Buildings 3-157 — 3-161, Former Skeet Range

Profile Type	Information Needs	PA Findings
Release Profile	Migration Pathways:	The potential for MC leaching to groundwater is considered very low because Installation soils are primarily composed of clays which will limit leaching. The potential for surface water runoff of sorbed or aqueous phase MC is low because the grounds are relatively flat and vegetated with maintained grasses and due to the relatively dry climate.
Physical Profile	Climate and Meteorology:	The climate of NAS JRB Fort Worth is subtropical with mild to moderate winters and hot and humid summers. This region receives approximately 30 inches of rainfall per year. Severe thunderstorms with wind speeds of 65 knots and hail storms are common (USAF 1993).
	Surface Topography:	The area occupied by the Former Skeet Range is relatively flat and includes the Child Development Center (Building 3320) and recreational features.
	Geology:	Soils in the area of NAS JRB Fort Worth are usually clayey soils on nearly level to gently sloping uplands, or are deep loamy soils on level to sloping stream terraces. Permeability of the soil at the Installation has been determined to be low, allowing storm water runoff to occur rapidly, without significant infiltration. The soil is susceptible to some erosion (DON 2005)
	Hydrology:	No surface water bodies are located on NAS JRB Fort Worth. Lake Worth borders the northern part of the Installation and the West Fork of the Trinity River runs from north to south along the eastern boundary of the Installation. Storm water runoff from the Installation is conveyed to the Trinity River by either collecting in Lake Worth from direct runoff or from storm drainage systems, or by flowing into Farmers Branch Creek and then being conveyed into the West Fork of the Trinity River or by being collected by the storm sewer systems throughout the Installation and being piped to outflows that empty directly into the West Fork of the Trinity River (DON 2005).
	Hydrogeology	There are five major hydrogeologic units located beneath NAS JRB Fort Worth. The units are described as an upper zone of perched water in alluvial terrace deposits, an aquitard in the Goodland, Limestone, and Walnut Formations; an aquifer in the Paluxy Formation; an aquitard in the Glen Rose Formation; and, an aquifer in the Twin Mountains Formation (DON 2005).
Land Use and Exposure Profile	Current land use:	Recreational, Residential, and Commercial
	Surrounding land use:	Industrial, Recreational, Residential, and Commercial
	Future land use:	Industrial, Recreational, Residential, and Commercial
	Accessibility:	The area can be access by any person gaining entry into the Installation. The area is not within a secured portion of the Installation.

Table 5-4
CSM Information Profile — Buildings 3-157 — 3-161, Former Skeet Range

Profile Type	Information Needs	PA Findings
	Potential Human Receptors:	Current and future human receptors include Installation personnel, contractors, and visitors. These groups fall into the following categories: current and future residents, current and future recreational users, future industrial workers, and future construction workers.
Ecological Profile	Vegetation:	Vegetation in the area of NAS JRB Fort Worth consists predominantly of Bermuda and St. Augustine grasses. Woody brush plants of oaks, mesquite, and juniper and woody areas of various oak tree species. The 1.3 acre Trinity River Seep site is considered a Jurisdictional Wetland on the Installation.
	Wildlife:	According to the TPWD, the predominant fish species in Lake Worth are: white crappie; largemouth, spotted, and white bass; and catfish. Mammals expected to occur on the installation include opossum, raccoon, striped skunk, several species of rodents, whitetail deer, red fox, coyote, bobcat, rabbits, and armadillo. Upland game birds include quail, turkey, doves, pheasants, ducks, geese, and cranes. Common reptiles include various species of lizards, snakes, and turtles.
	Protected Species:	Protected species potentially present on the Installation include: Arctic Peregrine Falcon, Bald Eagle, Mountain Plover, Whopping Crane, Texas Horned Lizard, Texas Garter Snake, and Plains Spotted Skunk.



Note: drawing is conceptual in nature based on available data.
Approximate vertical exaggeration 7:1.

FIGURE 5-7
CONCEPTUAL SITE MODEL
BUILDING 3-157 - 3-160;
FORMER SKEET RANGE
NAVAL AIR STATION JOINT RESERVE BASE
FORTH WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

REQUESTED BY: B. HAMBY	DATE: 1/31/2014
DRAWN BY: NRINEHART	TASK ORDER NUMBER: JM24

X:\Navy\NAS_JRB_Fort_Worth\Fig5_7_CSM_FormerSkeetRange.mxd

5.4.1 MEC Pathway Analysis

Due to the nature of skeet range operations, MEC is assumed to not be present. Shotguns and clay pigeons were likely used, and these items are not considered MEC; therefore a MEC pathway analysis is not applicable to the Former Skeet Range.

5.4.2 MC Pathway Analysis

The pathway analysis for MC is shown in Figure 5-8. Potential receptors include both human and ecological receptors. Potentially complete exposure pathways include:

- **Current and Hypothetical Future Residents:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–10 foot bgs interval and incidental ingestion and dermal contact with groundwater are potentially complete exposure pathways.

- **Current and Future Recreational Users:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–2 foot bgs interval are potentially complete exposure pathways.

- **Future Industrial/Occupational Workers:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–2 foot bgs interval are potentially complete exposure pathways.

- **Future Excavation/Construction Workers:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–10 foot bgs interval and incidental ingestion and dermal contact with groundwater are potentially complete exposure pathways.

- **Ecological Receptors:** Incidental ingestion and dermal contact of surface soil from the 0-2 foot bgs interval and ingestion of plants/animals (surface soil) are potentially complete exposure pathways.

5.4.3 Risk Analysis

Risks to human health and the environment from exposure to MC-contaminated media are considered high. This determination is based on the potentially complete exposure pathways for current/future receptors to come into direct contact with lead-contaminated media. Site media is recommended for sample collection and analysis in a follow-on investigation to quantify the degree of lead contamination and determine if MC pathways are complete.

MC Exposure Pathway Analysis

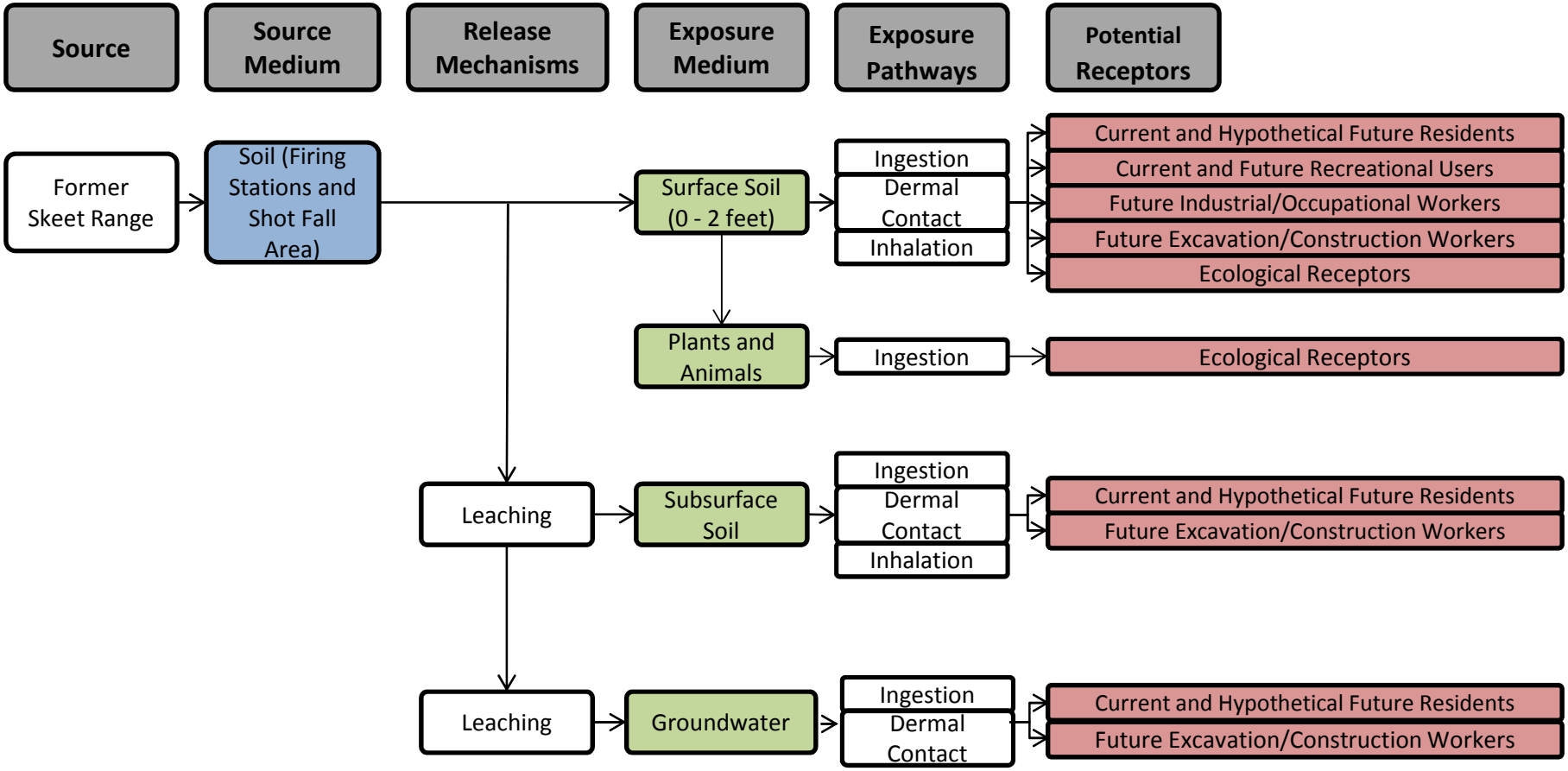


FIGURE 5-8
MC PATHWAY ANALYSIS
BUILDINGS 3-157 - 3-160; FORMER SKEET RANGE
NAVAL AIR STATION JOINT RESERVE BASE
FORT WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

REQUESTED BY: B. HAMBY	DATE: 1/31/2014
DRAWN BY: NRINEHART	TASK ORDER NUMBER: JM24

Service Layer Credits:

X:\Navy\NAS_JRB_Fort_Worth\Fig5_8_MC_ExposurePath_FormerSkeetRange.mxd

5.5 Former Skeet Range North

The location of Former Skeet Range North MRA, is shown on Figure 4-2. The CSM is included as Table 5-5 and presented graphically on Figure 5-9.

Table 5-5
CSM Information Profile — Former Skeet Range North

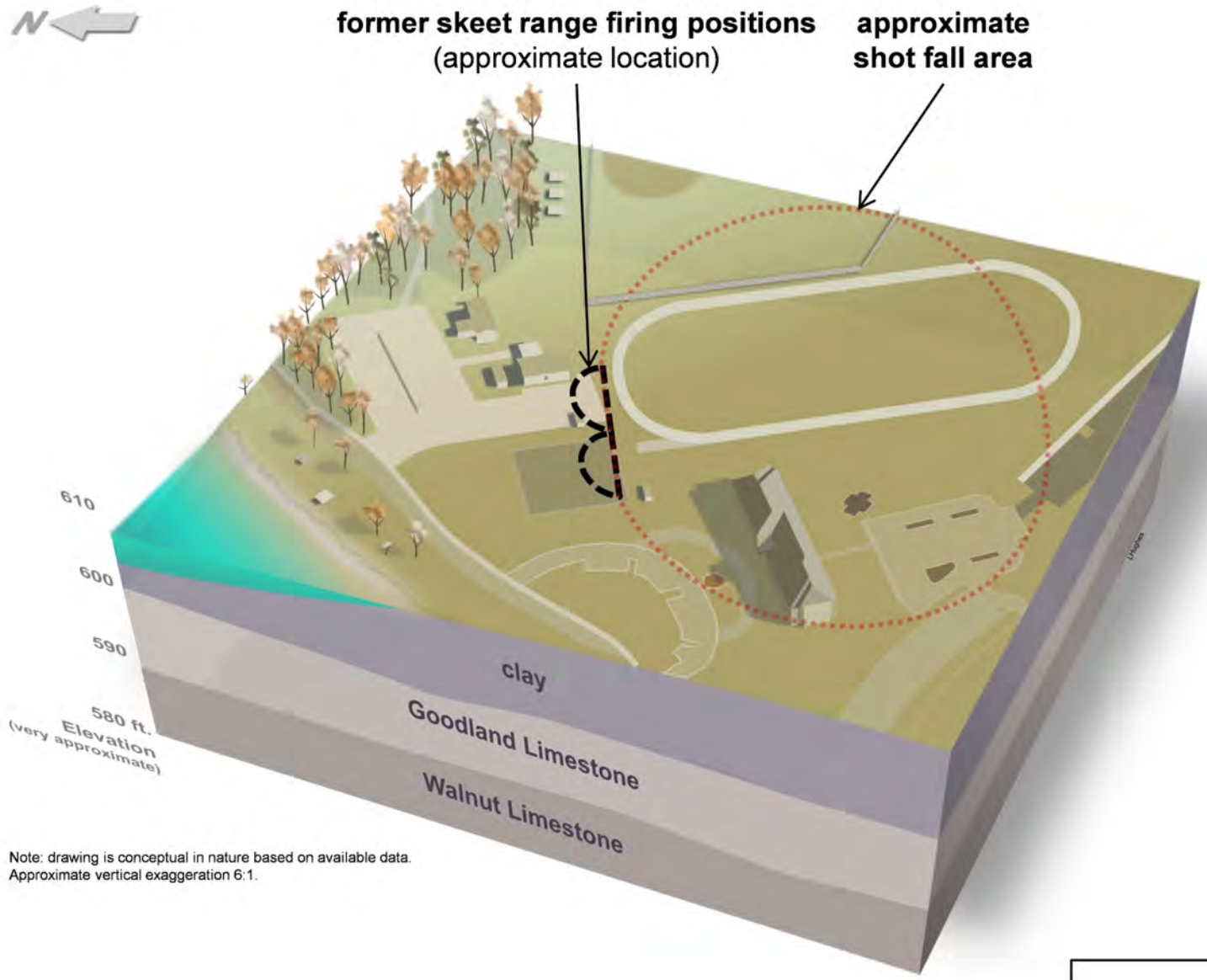
Profile Type	Information Needs	PA Findings
Facility Profile	MRA Name and Installation:	Former Skeet Range North, NAS JRB Fort Worth
	EPA Region:	Region 6
	Lead Organization:	NAVFAC Southeast
	Installation Mission:	NAS JRB Fort Worth provides joint training capability and technical resources to enable Warfighter readiness.
	Location and Area:	Northern portion of Installation, firing positions were located between the northern end of running track and Building 3341, Services Flight Building. Based on a 300-foot shot radius, the MRA occupied approximately 140,000 ft^2.
	History:	The Former Skeet Range North was identified on a 1963 aerial photograph, which indicated two half circles approximately 250 feet wide, suggesting that the skeet range consisted of two firing stations oriented toward the south. Additionally, what appeared to be two support buildings were also visible in the photo. The skeet range was also identified on 1968 and 1970 aerial photos, but was not present in 1979. Sometime between 1978 and 1995, recreational fields were constructed within the shot path of the skeet range. The Former Skeet Range was not identified in the Navy's 2000 Closed, Transferred, Transferring, Active, and Inactive Range Survey.
	Status:	Inactive, demolished
MEC and MC Profile	Potential Source Areas:	The potential source locations include the firing stations and an approximate 300-foot arc to the south.
	Types of Munitions and Explosives:	Due to the nature of skeet range operations, MEC is assumed to not be present. Shotguns and clay pigeons were likely used, and these items are not considered MEC.
	MEC Density and Distribution:	Due to the nature of skeet range operations, MEC is assumed to not be present; therefore, the density and distribution of MEC is not applicable.
	MEC Depth:	Due to the nature of skeet range operations, MEC is assumed to not be present; therefore, the depth of MEC is not applicable.
	MCs and Media:	The primary MC of concern includes lead from shotgun shot-pellets and polycyclic aromatic hydrocarbons associated with clay pigeons. MC are likely confined to surface, subsurface soils, and potentially shallow groundwater.

Table 5-5
CSM Information Profile —Former Skeet Range North

Profile Type	Information Needs	PA Findings
Release Profile	Migration Pathways:	The potential for MC leaching to groundwater is considered very low because Installation soils are primarily composed of clays which will limit leaching. The potential for surface water runoff of sorbed or aqueous phase MC is low because the grounds are relatively flat and vegetated with maintained grasses, and due to the relatively dry climate.
Physical Profile	Climate and Meteorology:	The climate of NAS JRB Fort Worth is subtropical with mild –to-moderate winters and hot and humid summers. This region receives approximately 30 inches of rainfall per year. Severe thunderstorms with wind speeds of 65 knots and hail storms are common (USAF 1993).
	Surface Topography:	The area occupied by the Former Skeet Range North is relatively flat, and is primarily covered by a recreational skate park and the asphalt parking lot for Building 3341, the Services Flight Building.
	Geology:	Soils in the area of NAS JRB Fort Worth are usually clayey soils on nearly level to gently sloping uplands, or are deep loamy soils on level to sloping stream terraces. Permeability of the soil at the Installation has been determined to be low, allowing storm water runoff to occur rapidly, without significant infiltration. The soil is susceptible to some erosion (DON 2005).
	Hydrology:	No surface water bodies are located on NAS JRB Fort Worth. Lake Worth borders the northern part of the Installation and the West Fork of the Trinity River extends from north to south along the eastern boundary of the Installation. Storm water runoff from the Installation is conveyed to the Trinity River by either collecting in Lake Worth from direct runoff, from storm drainage systems, or by flowing into Farmers Branch Creek and then being conveyed into the West Fork of the Trinity River. Additionally, storm water can be collected by the storm sewer systems throughout the Installation and piped to outflows that empty directly into the West Fork of the Trinity River (DON 2005).
	Hydrogeology	There are five major hydrogeologic units located beneath NAS JRB Fort Worth. The units are described as an upper zone of perched water in alluvial terrace deposits, an aquitard in the Goodland, Limestone, and Walnut Formations; an aquifer in the Paluxy Formation; an aquitard in the Glen Rose Formation; and, an aquifer in the Twin Mountains Formation (DON 2005).
Land Use and Exposure Profile	Current land use:	Recreational and Commercial
	Surrounding land use:	Industrial, Recreational, and Commercial
	Future land use:	Industrial, Recreational, and Commercial
	Accessibility:	The area can be access by any person gaining entry into the Installation. The area is not within a secured portion of the Installation.

Table 5-5
CSM Information Profile —Former Skeet Range North

Profile Type	Information Needs	PA Findings
	Potential Human Receptors:	Current and future human receptors include Installation personnel, contractors, and visitors. These groups fall into the following categories: current and future hotel guests, current and future recreational users, future industrial workers, and future construction workers.
Ecological Profile	Vegetation:	Vegetation in the area of NAS JRB Fort Worth consists predominantly of Bermuda and St. Augustine grasses. Woody brush plants of oaks, mesquite, and juniper and woody areas of various oak tree species. The 1.3 acre Trinity River Seep site is considered a Jurisdictional Wetland on the Installation.
	Wildlife:	According to the TPWD, the predominant fish species in Lake Worth are: white crappie; largemouth, spotted, and white bass; and catfish. Mammals expected to occur on the installation include opossum, raccoon, striped skunk, several species of rodents, whitetail deer, red fox, coyote, bobcat, rabbit, and armadillo. Upland game birds include quail, turkey, dove, pheasant, duck, goose, and crane. Common reptiles include various species of lizard, snake, and turtle.
	Protected Species:	Protected species potentially present on the Installation include: Arctic Peregrine Falcon, Bald Eagle, Mountain Plover, Whooping Crane, Texas Horned Lizard, Texas Garter Snake, and Plains Spotted Skunk.



Note: drawing is conceptual in nature based on available data.
Approximate vertical exaggeration 6:1.

FIGURE 5-9
CONCEPTUAL SITE MODEL
FORMER SKEET RANGE NORTH
NAVAL AIR STATION JOINT RESERVE BASE
FORT WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

REQUESTED BY: B. JACKSON	DATE: 1/30/2015
DRAWN BY: B. LIPSCOMB	TASK ORDER NUMBER: JM24

X:\Navy\NAS_JRB_Fort_Worth\CSM_Former_Skeet_Range_North.mxd

5.5.1 MEC Pathway Analysis

Due to the nature of skeet range operations, MEC is assumed to not be present. Shotguns and clay pigeons were likely used, and these items are not considered MEC; therefore a MEC pathway analysis is not applicable to the Former Skeet Range.

5.5.2 MC Pathway Analysis

The pathway analysis for MC is shown in Figure 5-10. Potential receptors include both human and ecological receptors. Potentially complete exposure pathways include:

- **Current and Future Hotel Guests:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–10 foot bgs interval and incidental ingestion and dermal contact with groundwater are potentially complete exposure pathways.

- **Current and Future Recreational Users:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–2 foot bgs interval are potentially complete exposure pathways.

- **Future Industrial/Occupational Workers:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–2 foot bgs interval are potentially complete exposure pathways.

- **Future Excavation/Construction Workers:** Incidental ingestion, dermal contact, and inhalation of soil from the 0–10 foot bgs interval and incidental ingestion and dermal contact with groundwater are potentially complete exposure pathways.

- **Ecological Receptors:** Incidental ingestion and dermal contact of surface soil from the 0-2 foot bgs interval and ingestion of plants/animals (surface soil) are potentially complete exposure pathways.

5.5.3 Risk Analysis

Risks to human health and the environment from exposure to MC-contaminated media are considered high. This determination is based on the potentially complete exposure pathways for current/future receptors to come into direct contact with lead-contaminated media. Site media is recommended for sample collection and analysis in a follow-on investigation to quantify the degree of lead contamination and determine if MC pathways are complete.

MC Exposure Pathway Analysis

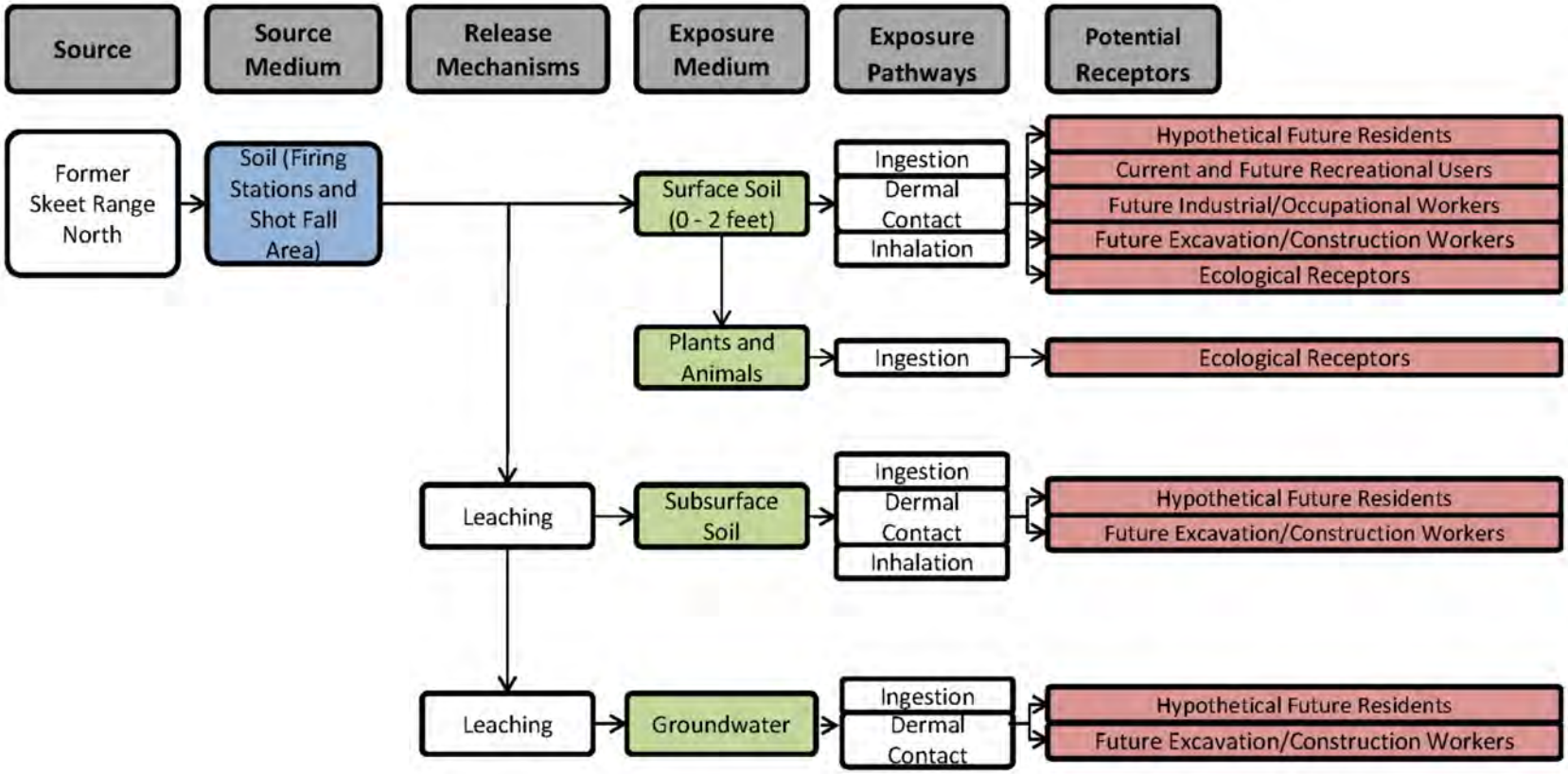


FIGURE 5-10
MC PATHWAY ANALYSIS
FORMER SKEET RANGE NORTH
NAVAL AIR STATION JOINT RESERVE BASE
FORT WORTH, TEXAS

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

REQUESTED BY: B. JACKSON	DATE: 1/30/2015
DRAWN BY: B. LIPSCOMB	TASK ORDER NUMBER: JM24

X:\Navy\NAS_JRB_Fort_Worth\MC_Pathway_Analysis_Former_Skeet_Range_North.mxd

6.0 CONCLUSIONS AND RECOMMENDATIONS

This PA report provides the necessary data to meet the goals and objectives of the PA. PA data were acquired from reviewing documents within on-base and off-base repositories, conducting interviews with Base personnel, and reviewing historical aerial photographs. The resulting data were compiled to identify and describe potential MRAs at NAS JRB Fort Worth. Potential MRAs were evaluated for MMRP eligibility based on DERP criteria (see Section 4.1), and the following areas were deemed MRAs eligible for inclusion into the MMRP:

- Building 1-162B, Former Pistol Range
- Building 1341, Former Pistol/M60 Range
- Building 1340, Former Rifle Range
- Buildings 3-157 through 3-161, Former Skeet Range
- Former Skeet Range North

CSMs were developed for these MRAs which are provided in Section 5.0. The Navy recommends "no further investigation" under the MMRP of the other potential MRAs listed in Table 4-1; however, if the status of a potential MRA changes to "closed" or "inactive," the potential MRA should be re-evaluated for MMRP eligibility.

Uncertainties associated with PA conclusions include the status of the Former Pistol/M-60 Range and Former Rifle Range. Installation personnel stated that lead shot was removed from these ranges in 1995; however, documentation of the removal efforts or sampling efforts (if performed), were not found during the PA data collection process. Because these documents could not be found or may not have been produced, the methods employed to remove small arms ammunition, the potentially contaminated soil, and the resulting cleanup levels achieved can only be speculated. Therefore, due to the absence of reporting documentation, the Former Pistol/M-60 Range and Former Rifle Range were retained as MRAs eligible for the MMRP.

7.0 REFERENCES

Bevell, M. (Interview). Human Resources. NAS JRB Fort Worth. 817.782.7858. 10 July 2013.

CH2M HILL. *Installation Restoration Program Records Search*. February 1984.

Chief Master Sargent Nielson (Interview). Air Force Flight Chief. NAS JRB Fort Worth. 817.782.7851. 10 July 2013.

Department of Defense. *BRAC Cleanup Plan*. April 1995.

Department of Navy. Facility Managers List. 9 July 2013

— *Integrated Natural Resources Management Plan*. 5 February 2005.

— *Closed, Transferred, Transferring, Active, and Inactive Range Survey.* January 2000.

— Base Map. 30 October 1991.

Earth Tech, Inc. *After Action Report*. December 2006.

EnSafe. *Pollution Prevention Management Plan.* October 2006.

Eckelbecker, G. (Interview). Explosive Safety Office. NAS JRB Fort Worth. 817.782.5334. 10 July 2013.

Epps, P. (Interview). NAS JRB Forth Worth. 817-782-5444. 10 July 2013

HHM Inc. *Integrated Cultural Resources Management Plan*. May 2004.

IT Corporation. *Hazardous Waste Management Plan*. March 2002.

Jersey, J. (Interview). Environmental Protection Specialist. NAS JRB Fort Worth Public Works Department. 9 July 2013.

Naval Facilities Engineering Command. Facility Map, Explosive Safety Arcs. 22 March 2013.

— Facility Map, Explosive Safety Arc. 18 October 2012.

— Installation Layout Map. 3 August 2012.

— Facility Map, Explosive Safety Arc. 22 July 2011.

— Facility Map, Explosive Safety Arc. 10 November 2004.

Meyer, R. (Interview). Environmental Director. NAS JRB Fort Worth Public Works Department. 817-782-6474. 11 July 2013.

Montrose, D. (Interview). EOD Point of Contact. NAS JRB Fort Worth. 817.782.7861. 10 July 2013.

United States Army Corps of Engineers. *Wetland Inventory*. 24 February 1997.

— Additional Runway Grading and R.R. Spur Relocation. October 1958.

United States Air Force. *Basewide Environmental Baseline Survey*. December 1993.

— Existing Building Schedule. June 1976.

— Master Plan Gas System. January 1969.

United Stated Environmental Protection Agency. Letter to Ms. Kathryn Halvorson. 10 April 2007.

Resolution Consultants. Basewide Preliminary Range Assessment Draft Work Plan, Naval Air Station Fort Worth, Texas Joint Reserve Base. July 2012.

Statler, D. (Interview). Air Field Manager. NAS JRB Fort Worth. 817.782.7689. 9 July 2013.

Strategic Air Command. Site Plan. 13 May 1987.

— Alter Range, Plan and Section. 23 August 1965.

— Base Layout Map. 7 July 1951.

Texas Commission on Environmental Quality. Approval No Further Action — *Draft Final After Action Report Offsite Weapons Storage Area Explosive Ordnance Disposal Range Ordnance Removal/Clearance at the Former Carswell AFB, Texas September 2006*. 15 February 2007.

Varner, R. (Interview). Deputy Environmental Director. NAS JRB Fort Worth Public Works Department. 817.782.6475. 9 July 2013.

Appendix A
Logbooks

Location NAS Fort Worth Date 7/9/13
Project Name NAVFAC SE

Onsite: Trent Sims / RC
Brad Jackson / RC
Brett Hamby / RC
Trent / NAVFAC SE
Weather: hot, sunny, dry
Objective: Kick-off meeting + begin PA data collection via record searches + interviews
1000 Meet w/ Trent at Public Works
1020 Meet w/ ~~[illegible]~~ Jack Jursey 817.
- 23 years on Base
- 30 on Base
- open detonation at end of runway
  - occurred once for disposal of old flares
  - flares were unused but were in a plane crash
- 2003-2005 waste manager
- Dennis Stetler — airfield manager
- Folks to talk to
  - EOD
  - Airfield Manager
  - Greg Eckelbecker - ESO Navy @ Bldg 1525 817 782 5334

TWS

Location NAS Fort Worth Date 7/9/13
Project Name NAVFAC SE

- Acquired Facility Index + 2 Base Maps
1145 Off-Base for Lunch
1300 Back at Public Works
1400 Dennis Stetler Airfield Manager
- Joint Reserve Base
- Files Air Force
- Files Navy
- 2006 - Airfield Manager
- Lt. Commander Johnson Navy Munitions Command
- One Range, belongs to Air Force
  Falcon Range, Navy uses
- Military operating Areas in Area
- Bunkers along North side of Base
- Ranges along SE corner
- Don Ray, Building 210, Public Affairs
- Navy moved in 94
- Bunkers in central airfield, formally used for nukes, no longer used for munitions but for material storage
1430 Depart for Public Affairs
1445 Arrive at Public Affairs
- scheduled an appointment

Location NAS Fort Worth Date 7/9/13
Project / Client NAVFAC SE

at 1330 Wednesday
1510 Arrive at Navy Munitions Command
→ security concerns, will return tomorrow after Env. POC provides them a heads up of our arrival
1530 Arrive at Public works, acquire access to records room
1630 Off-Base

JM
7/9/13

Location NAS Fort Worth Date 7/10/11
Project / Client NAVFAC SE

Onsite: Trent Sims / IRC
Tread / NAVFAC SE
Brett Hardy / IRC
Weather: hot, sunny, clear
Objective: Continue w/ PA site collection efforts
0750 Arrive at Public Works
0755 Meet w/ Ronald
- will provide old Air Force POC for Munitions
- Senior MSgt. for AF
- Bldg 1340 was orange but has been cleaned up by the Air Force
- Bldg 1345 is the indoor Range
- 3374 + 3380 Bunkers demolished in the past seven years
→ SWMU # 59 Building 6503 Weapons Storage Area Waste Accumulation Area (offsite)
→ SWMU #65 Weapons Storage Area Disposal Site (offsite)
- Chief Nelson w/ Air Force EOD
0840 Arrive at Navy Munitions Command
- met w/ Chief Nelson

Location: NAS Fort Worth Date: 7/10/13
Project / Client: NAVFAC SE

- 6 years on base
- AF owns bunkers but Navy parts
- Ranges located in south east corner
- EOD looking to establish OB/OD area
→ objects out of base to DRMO
- Bldg 1651 EOD
William Warwick ext 4430
- small arms, grenades, missiles, EOD items, flares, ejection activities
- 2 bays outside of bunker used for storage
ed. 7851
- EOD teams from other bases to remove + dispose of munitions

0910 Arrive at Bldg. 1651
met w/ Montrose @ 782.7861
- April 2013 first active
- ~~Eglin AFB~~ Dive AFB could have handled Air Force calls
- Fort Hood EOD for Army for calls
- OB/OD area
- ~2 years on base
- Disposed of 2.50-mm rounds at OB/OD location
Fort Hood EOD 254.287.8723

Twy

Location: NAS Fort Worth Date: 7/10/13
Project / Client: NAVFAC SE

- EOD staff stored in bunkers
- coveralls / counter charges + training articles
~~Lt~~ EOD IMS 7th EOD out of Dallas
- 763.780.9179 Mr. Allen Powell
- Gregory Eckelberry @ 782.5334

ACTION ITEMS
- Samantha Gorham → GIS layers, maps
- contact
  - ESO
  - Navy Munitions
  - Security Force
  - Range Managers
- Site walk of ranges
- Continue w/ records search
- Interview of Ronald
- Scan documents

12:15 Lunch
1250 Arrive on base
782-3584 is Johnson's #
350 - 8 years as ESO (Greg
- 4 years on base
- Bunkers on North 1951 - 1970s

Location: NAS Fort Worth Date: 7/10/13
Project / Client: NAVFAC SE

- OB/OD area on airfield
- will provide list of ordnance & CBgs were munitions are stored
- no record of EOD units since 2004
- will provide site approval for OB/OD area

Phal EOD — Mike Bevell in 1994 w potential
0944 → prior to 94 rifle/pistol range POC was used, after in 95, lead shot/round
→ Don Ray may have records or have soil-lead removal
→ informing that ranges were closed
- Sean Wallace of Security, @ 7266

0 1500 - Mike Bevell July 94'
- different types of small arms used
- due Oct 1, 1994
- Sean Wallace is a good POC regarding ranges
- AF and taken samples

1530 Arrive at Pattie Lewis record room
- 1-162B
- Skeet Range: 3-160, 161, 157, 158, 159
- Rifle: 1340 Pistol: 1341

Tues

Location: NAS Fort Worth Date: 7/10/13
Project / Client: NAVFAC SE

Indoor Range: 1345, 1346
Action Items.
- Samantha GIS files
- Site walk of 4 ranges
- Sean Wallace w/ Security
- Don Ray w/ POA
- EOD repository, Alan Powell
- Cultural / Natural Resources
- Interview Arb
→ acquire env. docs

1700 Completed Records review & copying

WP
7/10/13

Location: NAS Fort Worth Date: 7/11/13
Project Site: NAVFAC SE

Onsite: Trent Sims / RC
Dredd Hardy / RC
Brad Jackson / RC → running late
Weather: hot, sunny, clear
Objective: Complete PA data collection efforts
0800 Arrive at Public Works
0810 Request copy of Cultural / Natural Resource Plan from
0820 Depart for Security Forces
0830 Robert Meyer interview
- since 1996 on Base
- 2 years ago removed indoor range → trailer, it was cleaned up + recycled
- outdoor ranges closed, but don't have documents
- bunkers on north side of runway
- bunkers at east of airfield near of area used for storage (ammo for a long time) currently used for offices, storage, misc storage
0850 Searched other repositories at Public Works
Found 3 docs [illegible] Conv. + 73 Dec 93
- Final Wetland Inventory Feb 97

Location: NAS Fort Worth Date: 7/11/13
Project Site: NAVFAC SE

- Draft Historic Structures Survey Feb 93
- Land Management Plan Senior Quarters March 97
1000 Arrive at Public Affairs
- COO as POA
- provided a history short of NAS Fort Worth
- Air Force POA next to Dowling Alley @ Bld 1700
1045 Lunch
1145 Return to Public Works
- Reviewing docs + Admin rec file
Jean Wallace #7228
1220 Site Walk at the 4 ranges
1400 Arrive at Public Works
1430 Exit meeting w/ Robert Meyer
1530 Off-Base & Completed PA data collection

7/11/13

Location NAS Fort Worth Date 7/9/13

Project / Client NAVFAC Southeast

Robert E. Meyer - Environtal Director
Randy H. Varner - Deputy Environtal Dir.
[redacted]
Jack Jersey - Air Force Waste Person - Env. Prot. Spec.
* Dennis Statler - Air Field Manager.
- Public Affars Office.
- Explosive Ordnance Division
* They do have a base Archive area w/ maps, etc.
Samantha Branson - MAA Lady.

TREAD " " 6409 - Office
904-806-5258 - Mobile

* Bldg 1525 NAVY ESO - Greg Eckelberg - Rm 411
817-782-5334 out today.

* EOD TEAM - AIR FORCE - Lt. Commander Johnson.
Mr. Statler said to speak w/ EOD Team leader.
He said the Base was a fair reserve base.
F18 / Navy - Marines, F16 Air Force. He has been there since 2006 as civ field engr. They have 1 Range "FALCON RANGE" operated by the Air force.

Location NAS Fort Worth Date 7/9/13

Project / Client NAVFAC Southeast

SOW FOR NAS FORT WORTH → UFP SAPS for UST's on base. September Austin trip for Records Search.

* Lt. Commander Johnson - Navy Weapons Command. EOD Team

* DON Ray - Public Affairs Officer. Bldg 1210. Meet 1:30 pm on 7/10/13.

* Shawn Wallace 817 728 (Chief & Alice)

Appendix B
Documents and Records

- 1965 Alter Range, Plan and Section (SAC 1965)
- 1976 Existing Building Schedule (USAF 1976)
- 1984 *Installation Restoration Program Records Search* (CH2MHILL 1984)
- 1987 Site Plan (SAC 1987)
- 1993 *Basewide Environmental Baseline Survey* (USAF 1993)
- 1995 *BRAC Cleanup Plan* (DoD 1995)
- 1997 *Wetland Inventory* (USACE 1997)
- 2000 *Closed, Transferred, Transferring, Active, and Inactive Range Survey* (DON 2000)
- 2002 *Hazardous Waste Management Plan* (ITC 2002)
- 2005 *Integrated Natural Resources Management Plan* (DON 2005)
- 2006 *After Action Report, Offsite Weapons Storage Area, Explosive Ordinance Disposal Range/Ordinance Removal/Clearance at the Former Carswell AFB, Texas* (Earth Tech 2006)
- 2006 *Pollution Prevention Management Plan* (EnSafe 2006)
- 2007 TCEQ Letter Regarding Off-Site WSA (TCEQ 2007)
- 2007 EPA Letter Regarding Off-Site WSA (USEPA 2007)
- 2013 Facility Managers List (DON 2013)

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
19	FTW-	CATHODIC PROTECTION SYSTEM	F								
20	FTW-	RUNWAY APPROACH LIGHTING	F								
31	FTW-	SIDEWALK									
34	FTW	STORM DRAIN DISPOSAL									
35	FTW-	TAXIWAY PAVED SHOULDER									
37	FTW-	SANITARY SEWER MAIN									
38	FTW-PW	IND. WEST TRMT	F1								
39	FTW-	STORM SEWER									
40	FTW-	WATER DISTRIBUTION MAIN									
41	FTW-	WATER SUPPLY MAIN									
42	FTW-	RETAINING WALL									
45	FTW-	BOUNDARY FENCE									
46	FTW-	MAIN GATE SIGN									
47	FTW-	BEACON LIGHT	F								
48	FTW-	UTILITY LINE DUCTS (TUNNEL)	F								
49	FTW-DLA	DESC POL PIPE LINE		George Knam		7661	george.knam@navy.mil			7661	
50	FTW-	TAXIWAY LIGHTING	F								
51	FTW-	ELECTRICAL DISTRIBUTION	F								
53	FTW-	FIRE ALARM SYSTEM	F								
55	FTW-	FIRE HYDRANTS									
56	FTW-	GAS MAINS									
58	FTW-	DRIVEWAY (CONCRETE OTHER)									
60	FTW-	ROAD	F								
61	FTW-	RUNWAY LIGHTING	F								
62	FTW-	AIRFIELD LIGHTING SPECIAL	F								
63	FTW-	TELEPHONE DUCT FACILITY	F								
66	FTW-	AIRFIELD LIGHTING SPECIAL	F								
67	FTW-	AIRCRAFT ELECTRICAL OUTLETS	F								
68	FTW-	TRAFFIC LIGHTS	F								
69	FTW-	COMMUNICATIONS ANTENNA	F								
70	FTW-	COMMUNICATIONS ANTENNA	F								
71	FTW-	COMMUNICATIONS ANTENNA	F								
72	FTW-	VECHICLE PARKING NON ORG									
77	FTW-	AIRCRAFT PARKING APRON									
79	FTW-	RUNWAY PAVED SHOULDER									
81	FTW-	AIRCRAFT PARKING APRON									
84	FTW-	SECURITY FENCE PERIMETER									

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
85	FTW-	FENCE INTERIOR									
86	FTW-	AIRCRAFT PARKING APRON	F								
87	FTW-	SEWAGE TREATMENT & DISPOSAL									
91	FTW-	COMPRESSED AIR DISTRIBUTION	F								
92	FTW-	EXTERIOR AREA LIGHTING	F								
93	FTW-	EXTERIOR AREA LIGHTING	F								
124	FTW-	OPEN STORAGE AREA									
125	FTW-	HAZMAT STORAGE FACILITY	F								
130	FTW-	RUNWAY									
133	FTW-	SECURITY OPEN STORAGE									
150	FTW-	PAVED OVERRUN RUNWAY NORTHEND									
151	FTW-	PAVED OVERRUNN RUNWAY									
160	FTW-	AIRCRAFT PARKING APRON									
161	FTW-	AIRCRAFT PARKING APRON									
165	FTW-	AIRCRAFT PARKING APRON									
170	FTW-	AIRCRAFT TAXIWAY									
180	FTW-	AIRCRAFT TAXIWAY									
181	FTW-	AIRCRAFT TAXIWAY									
182	FTW-	AIRCRAFT TAXIWAY									
185	FTW-	AIRCRAFT TAXIWAY									
190	FTW-	AIRCRAFT TAXIWAY									
191	FTW-	AIRCRAFT TAXIWAY									
192	FTW-	AIRCRAFT TAXIWAY									
193	FTW-	AIRCRAFT TAXIWAY									
194	FTW-	AIRCRAFT TAXIWAY									
195	FTW-	AIRCRAFT TAXIWAY									
196	FTW-	AIRCRAFT TAXIWAY									
197	FTW-	AIRCRAFT TAXIWAY									
198	FTW-	AIRCRAFT TAXIWAY									
200	FTW-	PAD WARMUP HOLDING									
201	FTW-	PAD WARMUP HOLDING	F1								
202	FTW	PAD WARMUP HOLDING									
216	FTW-	WATER SUPPLY N/POT									
243	FTW	STORAGE									

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
247	FTW-HSG	QUARTERS E CMC FAMILY HOUSING									
248	FTW-HSG	GARAGE FAMILY HOUSING DETACHED									
300	FTW-	SEABEE D4 DISPLAY									
301	FTW-	DIRECTION/DIRECTORY SIGNS									
302	FTW-	UNIT/ORGANIZATION SIGNS									
303	FTW-	ANCHOR DISPLAY									
304	FTW	RECREATION PAVILLION									
305	FTW	BOAT PARKING AREA									
306	FTW-	GIANT VOICE	F								
307	FTW-	GIANT VOICE	F								
308	FTW-	GIANT VOICE	F								
309	FTW-	GIANT VOICE	F								
311	FTW-	GIANT VOICE	F								
313	FTW-	SAN SEWER MAIN									
318	FTW	DRIVEWAY									
334	FTW	STORM DRAIN DISPOSAL									
373	FTW	SAN SEWER MAL									
787	FTW	ANCHOR DISPLAY									
788	FTW-	ANCHOR DISPLAY									
789	FTW-ADMN	Sr Enlisted Training FAC	F3	Chief Harris	E-9	7606					
900	FTW-HSG	FAMILY HOUSING WHERRY (8541 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
901	FTW-HSG	FAMILY HOUSING WHERRY (6540 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
902	FTW-HSG	FAMILY HOUSING WHERRY (6537 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
903	FTW-HSG	FAMILY HOUSING WHERRY (6536 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
904	FTW-HSG	FAMILY HOUSING WHERRY (6533 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
905	FTW-HSG	FAMILY HOUSING WHERRY (6532 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
906	FTW-HSG	FAMILY HOUSING WHERRY (6529 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
907	FTW-HSG	FAMILY HOUSING WHERRY (6560 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
908	FTW-HSG	FAMILY HOUSING WHERRY (6525 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
909	FTW-HSG	FAMILY HOUSING WHERRY (6549 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
910	FTW-HSG	FAMILY HOUSING WHERRY (6521NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
912	FTW-HSG	FAMILY HOUSING WHERRY (6517 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
914	FTW-HSG	FAMILY HOUSING WHERRY (6513 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
915	FTW-HSG	FAMILY HOUSING WHERRY (6504 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
917	FTW-HSG	FAMILY HOUSING WHERRY (6500 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
918	FTW-HSG	FAMILY HOUSING WHERRY (6505 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
919	FTW-HSG	FAMILY HOUSING WHERRY (6501 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
920	FTW-HSG	FAMILY HOUSING WHERRY (6501 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
921	FTW-HSG	FAMILY HOUSING WHERRY (6500 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
922	FTW-HSG	FAMILY HOUSING WHERRY (6429 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
923	FTW-HSG	FAMILY HOUSING WHERRY (6420 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
924	FTW-HSG	FAMILY HOUSING WHERRY (6425 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
925	FTW-HSG	FAMILY HOUSING WHERRY (6416 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
926	FTW-HSG	FAMILY HOUSING WHERRY (6421 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
927	FTW-HSG	FAMILY HOUSING WHERRY (6412 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
928	FTW-HSG	FAMILY HOUSING WHERRY (6417 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
929	FTW-HSG	FAMILY HOUSING WHERRY (6408 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
930	FTW-HSG	FAMILY HOUSING WHERRY (6413 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
931	FTW-HSG	FAMILY HOUSING WHERRY (6404 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
932	FTW-HSG	FAMILY HOUSING WHERRY (6409 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
933	FTW-HSG	FAMILY HOUSING WHERRY (6400 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
934	FTW-HSG	FAMILY HOUSING WHERRY (6405 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
935	FTW-HSG	FAMILY HOUSING WHERRY (6556 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
936	FTW-HSG	FAMILY HOUSING WHERRY (6545 NIMITZ)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
937	FTW-HSG	FAMILY HOUSING WHERRY (6552 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
938	FTW-HSG	FAMILY HOUSING WHERRY (6541 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
939	FTW-HSG	FAMILY HOUSING WHERRY (6548 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
941	FTW-HSG	FAMILY HOUSING WHERRY (6544 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
942	FTW-HSG	FAMILY HOUSING WHERRY (6513 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
943	FTW-HSG	FAMILY HOUSING WHERRY (6540 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
944	FTW-HSG	FAMILY HOUSING WHERRY (6509	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
946	FTW-HSG	FAMILY HOUSING WHERRY (6506	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
947	FTW-HSG	FAMILY HOUSING WHERRY (6532 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
949	FTW-HSG	FAMILY HOUSING WHERRY (6528 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
951	FTW-HSG	FAMILY HOUSING WHERRY (6524 PHILLIP)	F5	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
953	FTW-HSG	FAMILY HOUSING WHERRY (6520)	F5	Nelson Cowan	CIV	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	CIV	817-782-5777	quani.fuentes@navy.mil
955	FTW-HSG	FAMILY HOUSING WHERRY (6516 PHILLIP)	F5	Nelson Cowan	CIV	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	CIV	817-782-5777	quani.fuentes@navy.mil

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
957	FTW-HSG	FAMILY HOUSING WHERRY (6512 PHILLIP)	F5	Nelson Cowan	CIV	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	CIV	817-782-5777	quani.fuentes@navy.mil
959	FTW-HSG	FAMILY HOUSING WHERRY (6508 PHILLIP)	F5	Nelson Cowan	CIV	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	CIV	817-782-5777	quani.fuentes@navy.mil
961	FTW-HSG	FAMILY HOUSING WHERRY (6504 PHILLIP)	F5	Nelson Cowan	CIV	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	CIV	817-782-5777	quani.fuentes@navy.mil
998	FTW-HSG	MISC O/RECTN FACILITY	F5	Nelson Cowan	CIV	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	CIV	817-782-5777	quani.fuentes@navy.mil
1055 - Van Pad	FTW-FRCW	FRC West	F5	Jason Mangham		6351/7454	Jason.Mangham@navy.mil	Wilfran Valencia		3230	wilfran.valenciamu@navy.mil
1411 - Van Pad			F3	Jason Mangham		6351/7454	Jason.Mangham@navy.mil	Wilfran Valencia		3230	wilfran.valenciamu@navy.mil
B1000	FTW-OPS	OPERATION	F6	ET2 Chad Sieg	AD1	7843	chad.sieg@navy.mil	ET1 Arciero Salvatore	ET1	7843	
B1001	FTW-Sec	Sentry House	F6	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1002	FTW-PW	Water Distribution Bldg.	F6	Johnny Flores	Civ	7147	johnny.flores2@navy.mil	David Walker	Civ	7147	david.m.walker@navy.mil
B1003	FTW-PW	WATER TANK	F6								
B1011	FTW-	WASTE DUMPSTER STATION									
B1013	FTW-	SHELTER									
B1014	FTW-FIRE	Fire Training	F6	roger green	Civ	6333	roger.l.green@navy.mil	Allen Almodovar	Civ	6332	allen.almodovar@navy.mil
B1015	FTW-MOMG	MOMAG Training	F6	Rachel Chapman	mn1	3898	rachel.chapman@navy.mil	Steven Themins	mncs	6059	steven.r.themins@navy.mil
B1016	FTW-AIMD	AIMD Engine Shop	F6	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Wilfran Valencia		3230	wilfran.valenciamu@navy.mil
B1017	FTW-	HAZARDOUS WASTE COLLECTION									
B1018	FTW-	WASTE DUMPSTER STATION									
B1020	FTW-Sec	Gate House West	F5	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1021	FTW-AIMD	AIMD LOX Farm	F6	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Lane Herchberger	GS-7	5292	lane.herchberger@navy.mil
B1022	FTW-AIMD	AIMD IMRL	F6	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Wilfran Valencia		3230	wilfran.valenciamu@navy.mil
B1024	FTW-AIMD	AIMD LOX Fac	F5	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Lane Herchberger	GS-7	5292	lane.herchberger@navy.mil
B1026	FTW-		F6								
B1027	FTW-Army	ASF (Aviation Support Facilitty) Carswell	F6	Kerry Arnold	Civ	782-3955	kerry.k.arnold.civ@mail.mil	Drew Welborn	Civ	782-7046	drew.c.welborn.civ@mail.mil
B1029	FTW-Army	B-Company 90th ASB (Aviation Support Battalion)	F6	Wayne Davis	CW4	782-3955	ernest.w.davis22.mil@mail.mil	Drew Welborn		782-7046	drew.c.welborn.civ@mail.mil
B1041	FTW-PW	FIRE PUMP HOUSE	F4								
B1045	FTW-	OIL WATER SEPERATOR AT B1049									
B1046	FTW-AIMD	OIL WATER SEPERATOR AT B1048									
B1047	FTW-AIMD	Line Shack	F4								
B1048	FTW-46	HANGAR OH SPACE	F4	Calvin Civis		817-782-7358	calvin.civis@navy.mil	Jacob Hood		817-782-7358	jacob.hood@navy.mil

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1049	FTW-Army	339th Military Intellengence	F4	John Peters	SFC	782-3955	john.e.peters22.mil@mail.mil	Drew Welborn	Civ	782-7046	drew.c.welborn.civ@mail.mil
B1050	MALS-41	HANGAR	F4	Gennaro Martinez	Gysgt	2893	gennaro.martinez@usmc.mil	Devon Harris	SSgt	2897	devon.harris@usmc.mil
B1050	FTW-59 T4	VR-59 Safety DepT HANGAR	F4	John Spence	AT1	817-782-1546	john.spence1@navy.mil	Kenneth Frantzen	AWFC		Kenneth.w.frantzen@navy.mil
B1050	FTW-234 T2&3	VMGR-234	F4	Victor.Mandal	E-5	2908	victor.manda@usmc.mil	Emery Cruz	E-7	2908	emery.cruz@usmc.mil
B1050	FTW-234 T2&3	VMGR-234	F4	Wilson Shunsee	Maj	2840	wilson.shunsee@usmc.mil				
B1051	FTW-59	VR-59 PAVILLION	F4	John Spence	AT1	817-782-1546	john.spence1@navy.mil				
B1052	FTW-	OIL WATER SEPERATOR AT B1050									
B1053	FTW-	VR59 UNIT PROPELLER DISPLAY									
B1054	FTW-DLA	DESC - DIESEL STORAGE TANK #1 A/G (OUTAGE ONLY)	F6	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1054	FTW-DLA	DESC - DIESEL STORAGE TANK #1 A/G	F6	George Knam		7661	george.knam@navy.mil			7661	
B1055	FTW-AIMD	AVIONICS SHOP	F4	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Wilfran Valencia		3230	wilfran.valenciamu@navy.mil
B1055	FTW-234 T2&3	VMGR-234	F4	Wilson Shunsee	Maj	2840	wilson.shunsee@usmc.mil				
B1056	FTW-	BOTTLED GAS STORAGE	F4								
B1057	FTW-SUP	TANK TRUCK PARKING BLDG	F5	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1057	FTW-SUP	TANK TRUCK PARKING BLDG	F5	George Knam		7661	george.knam@navy.mil			7661	
B1058	FTW-SUP	PETROL SPILL CONTAINMENT (OUTAGE ONLY)	F5	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1058	FTW-SUP	PETROL SPILL CONTAINMENT	F5	George Knam		7661	george.knam@navy.mil			7661	
B1059	FTW-AIMD	INSERT STORAGE	F4	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Dan Bernhardt	E-8	7508	daniel.bernhardt@navy.mil
B1060	FTW-AIMD	AIR FRAME SHOP	F4	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Wilfran Valencia		3230	wilfran.valenciamu@navy.mil
B1061	FTW-	OIL WATER SEPERATOR AT B4160									
B1062	FTW-DLA	VEHICLE FUELING STATION	F4	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1062	FTW-DLA	VEHICLE FUELING STATION	F4	George Knam		7661	george.knam@navy.mil			7661	
B1063	FTW-	OIL WATER SEPERATOR AT B4260									
B1064	FTW-DLA	VEHICLE FILLING STATION BLDG (OUTAGE ONLY)	F4	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1064	FTW-DLA	VEHICLE FILLING STATION BLDG	F4	George Knam		7661	george.knam@navy.mil			7661	
B1065	FTW-DLA	DESC - MOGAS STORAGE TANK #3 A/G		George Knam		7661	george.knam@navy.mil			7661	
B1066	FTW-PW	Valve HSE Shelter	F4	Johnny Flores	Civ	7147	johnny.flores2@navy.mil	David Walker	Civ	7147	david.m.walker@navy.mil
B1067	FTW-DLA	DESC - JP8 STORAGE TANK #2 A/G		George Knam		7661	george.knam@navy.mil			7661	
B1068	FTW-41	MAG-41 HQ/F 2843	F3	Erica Bennett		2841	erica.bennett@usmc.mil	Anthony Garica		2844/2845	anthony.i.garcia@usmc.mil
B1068	FTW-41	MAG-41 HQ/F 2843	F3	Wilson Shunsee	Maj	2840	wilson.shunsee@usmc.mil				
B1069	FTW-	4TH MAW FLAGPOLES									

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1083	FTW-41	TOILET Facility/VAN PAD	F3	Justin Kloppe	E-4	739-2846	justin.kloppe@usmc.mil	Anthony Garcia	E-5	2844/2845	anthony.i.garcia@usmc.mil
B1084	FTW-41	41 MALS	F3	Justin Kloppe	E-4	739-2846	justin.kloppe@usmc.mil	Anthony Garcia	E-5	2844/2845	anthony.i.garcia@usmc.mil
B1101	FTW-DLA	(POL) (OUTAGE ONLY)	F5	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1101	FTW-DLA	TANG (POL)	F5	Alan Douglas	E8	817-852-3574	alan.douglas@ang.af.mil				
B1101	FTW-DLA	DLA - Navy (ADMIN) Petrol Ops Bldg.	F5	George Knam		7661	george.knam@navy.mil			817-782-7661	
B1102	FTW-	OIL WATER SEPERATOR AT B1101									
B1145	FTW-MWR	Action Zone Youth	F5	Angela Noll	Civ	7520/7566	angela.noll@navy.mil	Daphne Salinas	Civ	7744	daphne.salinas@navy.mil
B1145	FTW-MWR	MWR (Outdoor Rec& Auto Hoby shop)	F5	Dianne Zachry	Civ	7569	dianne.zachry@navy.mil	Daphne Salinas	Civ	7744	daphne.salinas@navy.mil
B1146	FTW-SUP	STORAGE SHED(OUTAGE ONLY)	F5	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1146	FTW-SUP	STORAGE SHED	F5	George Knam		7661	george.knam@navy.mil			7661	
B1146G	FTW-SUP	Oil WATER SEPERATOR AT B1145	F5	George Knam		7661	george.knam@navy.mil			7661	
B1156	FTW-DLA	DESC - Navy (FUEL) Jet Fuel Storage (OUTAGE ONLY)	F3	Jason Lawhorne	ABF2	7661	jason.lawhorne@navy.mil	Juan Legarda	ABF2	7661	juan.legarda@navy.mil
B1156	FTW-DLA	DESC - Navy (FUEL) Jet Fuel Storage	F3	George Knam		7661	george.knam@navy.mil			7661	
B1157	FTW-DLA	DESC - Navy (FUEL) Jet Fuel Storage	F3	Jason Lawhorne	ABF2	7661	jason.lawhorne@navy.mil	Juan Legarda	ABF2	7661	juan.legarda@navy.mil
B1157	FTW-DLA	DESC - Navy (FUEL) Jet Fuel Storage	F3	George Knam		7661	george.knam@navy.mil			7661	
B1158	FTW-DLA	DESCNavy (FUEL) Pump Stand	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1158	FTW-DLA	DESCNavy (FUEL) Pump Stand	F3	George Knam		7661	george.knam@navy.mil			7661	
B1159	FTW-DLA	DESC - Navy (FUEL) Jet Fuel Storage (OUTAGE ONLY)	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1159	FTW-DLA	DESC - Navy (FUEL) Jet Fuel Storage	F3	George Knam		7661	george.knam@navy.mil			7661	
B1161	FTW-	SHED/SHELTER 4 MISC POL FAC	F3								
B1163	FTW-DLA	DESC - STD UNLOAD (OUTAGE ONLY)	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1163	FTW-DLA	DESC - STD UNLOAD	F3	George Knam		7661	george.knam@navy.mil			7661	

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1164	FTW-DLA	DESC - LF STD UNLOAD (OUTAGE ONLY)	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1164	FTW-DLA	DESC - LF STD UNLOAD	F3	George Knam		7661	george.knam@navy.mil			7661	
B1165	FTW-DLA	DESC - TANK TRUCK/TANK CAR	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1165	FTW-DLA	DESC - TANK TRUCK/TANK CAR	F3	George Knam		7661	george.knam@navy.mil			7661	
B1166	FTW-DLA	DESC - TANK TRUCK/TANK CAR UNLOAD (OUTAGE ONLY)	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1166	FTW-DLA	DESC - TANK TRUCK/TANK CAR UNLOAD	F3	George Knam		7661	george.knam@navy.mil			7661	
B1167	FTW-DLA	DESC - TANK TRUCK/TANK CAR UNLOAD Navy (FUEL)	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1167	FTW-DLA	DESC - TANK TRUCK/TANK CAR UNLOAD Navy (FUEL)	F3	George Knam		7661	george.knam@navy.mil			7661	
B1168	FTW-DLA	Navy (FUEL) Shed/Misc APOL Pipe Fac (OUTAGE ONLY)	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1168	FTW-DLA	Navy (FUEL) Shed/Misc APOL Pipe Fac	F3	George Knam		7661	george.knam@navy.mil			7661	
B1169	FTW-DLA	Navy (FUEL) Shed/Misc APOL Pipe	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1169	FTW-DLA	Navy (FUEL) Shed/Misc APOL Pipe	F3	George Knam		7661	george.knam@navy.mil			7661	
B1170	FTW-DLA	DLA- Navy (FUEL) POL Oper/Elec Emerg/PWR (OUTAGE ONLY)	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1170	FTW-DLA	DLA- Navy (FUEL) POL Oper/Elec Emerg/PWR	F3	George Knam		7661	george.knam@navy.mil			817-782-7661	
B1174	FTW-DLA	DESC - TRUCK/TANK CAR UNLOAD (OUTAGE ONLY)	F4	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1174	FTW-DLA	DESC - TRUCK/TANK CAR UNLOAD	F4	George Knam		7661	george.knam@navy.mil			7661	
B1188	FTW-	OTHER PAVEMENT									
B1191	FTW-301	Vehicle Maintenance Shop 301 Trans AFRC	F4	Matthew Sherman	Civ	817-782-7195	matthew.sherman.1@us.af.mil				
B1191	FTW-TANG	Vehicle Maintenance Shop (Motor Pool)	F4	Mike Lowe	E-9	817-852-3571	Michael.lowe@ang.af.mil				
B1191	FTW-PW	BSVE	F4	Bonnel Ray	Civ	7401	bonnel.ray@navy.mil	Fred Cox	Civ	5432	fred.e.cox@navy.mil
B1192	FTW-	OIL WATER SEPERATOR AT B1191									
B1194	FTW-301	VEHICLE REFL SHOP	F4	Matthew Sherman	Civ	817-782-7195	matthew.sherman.1@us.af.mil				
B1195	FTW-301	301 TRANS AFRC	F4	Matthew Sherman	Civ	817-782-7195	matthew.sherman.1@us.af.mil				
B1196	FTW-	OIL WATER SEPERATOR AT B1194									
B1202	FTW-PW	COVERED STORAGE ELECTRICAL	F4								

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1203	FTW-	OPEN STORAGE PUBLIC WORKS									
B1204	FTW	UH-34D SEAHORSE DISPLAY									
B1205	FTW-	F-18 AIRCRAFT DISPLAY									
B1206	FTW-	A-4 AIRCRAFT DISPLAY									
B1207	FTW-	F-14A AIRCRAFT DISPLAY									
B1208	FTW-	F-18 AIRCRAFT DISPLAY									
B1209	FTW-	F-4 AIRCRAFT DISPLAY									
B1210	FTW-PW	OXY ACETYLENE STORAGE		Russ Neely	Civ	5778	russell.l.neely2@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B1212	FTW-PW	Pavement Grnds Equip. Shed	F4	Russ Neely	Civ	5778	russell.l.neely2@navy.mil	Ray Johnson	Civ	5687	raymond.johnson@navy.mil
B1213	FTW-PW	Supply Storage	F4	Russ Neely	Civ	5778	russell.l.neely2@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B1214	FTW-PW	Admin Bldg.		Russ Neely	Civ	5778	russell.l.neely2@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B1215	FTW-PW	Base Engr/Admin	F3	Ted Gaskin	Civ	7198	theodore.gaskin@navy.mil				
B1215	FTW-301	Base Engr/Admin	F3	Toni Duffy	Civ	817-782-6296	tony.duffy@us.af.mil				
B1216	FTW-PW	SMOKERS SHELTER									
B1217	FTW-PW	Public Works Shop	F3	Russ Neely	Civ	5778	russell.l.neely2@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B1218	FTW-PW	SMOKERS SHELTER									
B1219	FTW-PW	Storage Ready Issue	F3	Mozell Davis	Civ	3998	mozell.davis@navy.mil	Steve Carr	Civ	6449	steven.carr@navy.mil
B1220	FTW-PW	SMOKERS SHELTER									
B1229	FTW-SM	Serv Mart/F 3815	F3	Troy Reed	Civ	3814	treed@salighthouse.org	Ray Williams		3814	rwilliams@salighthouse.org
B1230	FTW-PW	PWO Recycling	F3	Marvin Bry	Civ	817-782-7634	marvin.bry@navy.mil				
B1230	FTW-PW	PWO Recycling	F3	Ron Estilow	Civ	817-786-6241	ronald.estilow@navy.mil				
B1232	FTW-PW	PWO Recycling	F3	Marvin Bry	Civ	817-782-7634	marvin.bry@navy.mil				
B1234	FTW-610	610 Security Supply	F3	Robert Ivey	E-6	817-782-1672 or 739-7277	robert.ivey@us.af.mil	James Theodis	E-7	817-782-3737	theodis.james@us.af.mil
B1235	FTW-610	610 Security Forces	F3	James Theodis	E-7	817-782-3737	theodis.james@us.af.mil	James Hettinger	E7	817-782-3737	james.hettinger@us.af.mil
B1236	FTW-301	301 Supply 2 General Warehouse	F3	Larry Cook	Civ	817-782-7483	lawrence.cook.1@us.af.mil	Adrian Reagan	Civ	5568	adrian.reagan.1@us.af.mil
B1239	FTW-	LOAD/UNLOAD PLATFORM									
B1240	FTW-	OPEN STORAGE SUPPLY									
B1243	FTW-PW	EQUIPMENT REPAIR	F3	Marvin Bry	Civ	817-782-7634	marvin.bry@navy.mil				
B1244	FTW-PW	Storage Faciltiy	F3	Ron Estilow	Civ	817-786-6241	ronald.estilow@navy.mil				
B1250	FTW-SUP	Haz Mat Storage (OUTAGE ONLY)	F1	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1250	FTW-SUP	Haz Mat Storage	F1	Michael W Johnson	LS3	817-782-7303	michael.w.johnson7@navy.mil	Shamus Crawford	SK2	817-782-7546	shamus.crawford@navy.mil
B1251	FTW-SUP	Navy Supply General Warehouse (For Utility Outages Only)	F1	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1251	FTW-SUP	Navy Supply General Warehouse	F1	Renato Gayatao	LS2	817-782-5546	renato.gayatao.rp@navy.mil	Gustavo Chavez	LS3	504-678-9881	gustavo.c.hernandez@navy.mil
B1251	FTW-SUP	FRC ASD General Warehouse	F1	Milton Owens	LS2	817-782-7220	milton.owens@navy.mil	Jeffery McNair		7220	jeffrey.mcnair@navy.mil
B1251	FTW-SUP	FRC ASD General Warehouse	F1	Timothy Armstrong	LS2	817-782-7220	armstrong.timothy@navy.mil	Greg Bullard	LSCS	7220	greg.bullard@navy.mil
B1266	FTW-SUP	SUP Hazmat Container Pad (OUTAGE ONLY)	F2	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1266	FTW-SUP	SUP Hazmat	F2	Renato Gayatao	LS2	817-782-5546	renato.gayatao.rp@navy.mil	Gustavo Chavez	LS3	504-678-9881	gustavo.c.hernandez@navy.mil
B1267	FTW-SUP	SUP Hazmat (OUTAGE ONLY)	F2	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1267	FTW-SUP	SUP Hazmat	F2	Renato Gayatao	LS2	817-782-5546	renato.gayatao.rp@navy.mil	Gustavo Chavez	LS3	504-678-9881	gustavo.c.hernandez@navy.mil
B1268	FTW-SUP	SUP Hazmat (OUTAGE ONLY)	F2	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1268	FTW-SUP	SUP Hazmat	F2	Michael W Johnson	LS3	817-782-7303	michael.w.johnson7@navy.mil	JoseCarlo Marcelo	SK2	817-782-7667	shamus.crawford@navy.mil
B1269	FTW-SUP	SUP Hazmat (OUTAGE ONLY)	F2	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1269	FTW-SUP	SUP Hazmat	F2	Michael W Johnson	LS3	817-782-7303	michael.w.johnson7@navy.mil	JoseCarlo Marcelo	SK2	817-782-7667	shamus.crawford@navy.mil
B1270	FTW-SUP	SUP Hazmat (OUTAGE ONLY)	F2	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1270	FTW-SUP	SUP Hazmat	F2	Renato Gayatao	LS2	817-782-5546	renato.gayatao.rp@navy.mil	Gustavo Chavez	LS3	504-678-9881	gustavo.c.hernandez@navy.mil
B1271	FTW-SUP	SUP Hazmat Container Pad (OUTAGE ONLY)	F2	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1271	FTW-SUP	SUP Hazmat Container Pad	F2	Michael W Johnson	LS3	817-782-7303	michael.w.johnson7@navy.mil	JoseCarlo Marcelo	SK2	817-782-7667	shamus.crawford@navy.mil
B1275	FTW-AFES	AAFES Military Clothing (817-731-1516)	F2	Kay Walker	Civ	817-738-6171	kropkam@aafes.com	Laura Brown	Civ	817-738-6171	brownlau@aafes.com
B1275	FTW-AFES	Alteration/Coffe Shop	F2	Sandra Long	Civ	817-731-1516	longs@aafes.com	Steven Neighbors	Civ	817-680-5469	neighborssw@aafes.com
B1278	FTW-PW	Environmental Admin	F2	Maurice Engelgau	Civ	6250	maurice.engelgau@navy.mil				
B1300	FTW-Sec	Sec Gate House	F5	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1301	FTW-Sec	Sec Bus Station/Shelter	F5	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1302	FTW-Sec	SMOKERS SHELTER		Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1303	FTW-Sec	Sec Vistor Center	F5	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1304	FTW-Sec	Guard House	F5	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1305	FTW-Sec	Sec Main Gate Cover (Canopy)	F5	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1306	FTW-	WASTE DUMPSTER STATION									
B1307	FTW-Sec	Mechanical Barrier's Gate		Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1311	FTW-	Switching Station Bldg.	MAIN DIST								
B1312	FTW-PW	PW Electrical Switching Station	MAIN DIST	Ron Allen	Civ	5778	ronald.d.allen@navy.mil	Johnny Flores	Civ	7147	johnny.flores2@navy.mil
B1322	FTW-Sec	Mechanical Barriers E. Gate		Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1323	FTW-	WASTE DUMPSTER STATION									
B1324	FTW-CBH	BOQ (Transit)	F1	Garland Carnley	E-6	7721	garland.carnley@navy.mil	Richie Franklin	Civ	7721	richie.franklin@navy.mil
B1325	FTW-CBH	Rec Pavillion	F1	Garland Carnley	E-6	7721	garland.carnley@navy.mil	Richie Franklin	Civ	7721	richie.franklin@navy.mil
B1326	FTW-CBH	BOQ (Transit)	F1	Garland Carnley	E-6	7721	garland.carnley@navy.mil	Richie Franklin	Civ	7721	richie.franklin@navy.mil
B1329	FTW-	ANTENNA AT B1336	F8								
B1330		Personal Property/HHG	F1	Renato Gayatao	LS2	817-782-7546	renato.gayatao.rp@navy.mil	Gustavo Chavez	LS3	504-678-9881	gustavo.c.hernandez@navy.mil
B1330	FTW-HSG	Traffic Mang Office (Housing)	F1	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B1330	FTW-HSG	Traffic Mang Office (House Hold Goods)	F1	Phil Fines	Civ	817-782-7300	phil.fines@navy.mil			817-782-5777	
B1331	FTW-	SHELTER									
B1332	FTW-Sec	GATE SENTRY HOUSE	F8	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1333	FTW-	SHELTER									
B1334	FTW-	WASTE DUMPSTER STATION									
B1335	FTW-	WASTE DUMPSTER STATION									
B1336	FTW-Sec	Police Station	F1	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1337	FTW-Sec	Security Storage	F1	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1339	FTW-Sec	Security Covered Storage	F1	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1340	FTW-	SMOKERS SHELTER									
B1344	FTW-301	301 CATMS (SF)	F1	Paul Wright	E7	817-782-7038	paul.wright.4@us.af.mil	Ronald Zumwalt	E6	817-782-7038	ronald.zumwalt.1@us.af.mil
B1345 ✔	FTW-OPS	SMALL ARMS RANGE INDOOR	F1	Trenton Hagley	E-6	3918	trenton.hagley@navy.mil	Robert Alvizo	E5	3918	robert.alvizo@navy.mil
B1346	FTW-	SMOKERS SHELTER	F1								
B1347	FTW-PW	PW Envir Hazard Stor Bldg.	F8	John Cummings	Civ	6481	john.r.cummings@navy.mil	Robert Myer	Civ	6474	robert.myer@navy.mil
B1348 ✔	FTW-OPS	Training Facility/Weapons Cleaning	F8	Trenton Hagley	E-6	3918	trenton.hagley@navy.mil	William Topping	E5	3918	william.topping1@navy.mil
B1349	FTW-	SHELTER									
B1359	FTW-22	NMCB 22 Operational Storage	F8		DU1	5882		Reginald Cyr	BU2	5882	reginald.cyr@navy.mil

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1360	FTW-22	NMCB 22 Battalion/Sqd HQ	F8		DU1	5882		Reginald Cyr	BU2	5882	reginald.cyr@navy.mil
B1361	FTW-	SEABEE OPEN STORAGE AREA									
B1362	FTW-	PICNIC SHELTER AT BLDG. 1330									
B1363	FTW-22	Vehicle Wash Platform	F8		DU1	5882		Reginald Cyr	BU2	5882	reginald.cyr@navy.mil
B1364	FTW-22	NMCB 22 Vehicle Maint. Shop	F8		DU1	5882		Reginald Cyr	BU2	5882	reginald.cyr@navy.mil
B1365	FTW-22	WEIGHING SCALE	F8		DU1	5882		Reginald Cyr	BU2	5882	reginald.cyr@navy.mil
B1366	FTW-	VEHICLE LOAD RAMP									
B1370	FTW-22	NMCB 22 Academic/Inst/Restr Bldg.	F8		DU1	5882		Reginald Cyr	BU2	5882	reginald.cyr@navy.mil
B1371	FTW-22	OPEN STORAGE SUPPLY			DU1	5882		Reginald Cyr	BU2	5882	reginald.cyr@navy.mil
B1372 ✓	FTW-22	NMCB 22 Operational Stor/Ready Issue	F8		DU1	5882		Reginald Cyr	BU2	5882	reginald.cyr@navy.mil
B1373	FTW-22	NMCB 22 Seabee Training Facility	F8		DU1	5882		Reginald Cyr	BU2	5882	reginald.cyr@navy.mil
B1380	FTW-22	NMCB 22 Recreational Pavillion	F8		DU1	5882		Reginald Cyr	BU2	5882	reginald.cyr@navy.mil
B1381	FTW-	UH-1H HELICOPTER DISPLAY									
B1382	FTW-	OH-58A HELICOPTER DISPLAY									
B1401	FTW-AIMD	GSE OVERHAUL SHOP	F3	Wagner, Mark D.		(240) 925-6075	mark.d.wagner@navy.mil				
B1402	FTW-SW (ATLC)	Training Facility (Simulator)	F3	Troy Rudisill	AWF1	7466	troy.rudisill@navy.mil	Thomas Doane	LT	817-782-5599	thomas.m.doane@navy.mil
B1403	FTW-112	HANGAR	F3	Gennaro Martinez		817-782-2983	gennaro.martinez@usmc.mil	Wilson Shunsee	Maj	2840	wilson.shunsee@usmc.mil
B1403A	FTW-112	ADDITION TO BLDG. (LEAN TO)	F3	Gennaro Martinez		817-782-2983	gennaro.martinez@usmc.mil	Wilson Shunsee	Maj	2840	wilson.shunsee@usmc.mil
B1404	FTW-OPS	OPS Hangar	F3	Dennis Statler		7689	dennis.statler@navy.mil	AD1 Eric Hemming	AD1	5715	eric.hemming@navy.mil
B1405	FTW-OPS	OPS (C-12 Hanger)	F3	Dennis Statler		7689	dennis.statler@navy.mil	AD1 Eric Hemming	AD1	5715	eric.hemming@navy.mil
B1406	FTW-	HAZMAT STORAGE	F3								
B1407	FTW-OPS	T-LINE ACFT OPS	F3	AD1 Maurice White	AD1	7171	maurice.white1@navy.mil	AD1 Eric Hemming	AD1	5715	eric.hemming@navy.mil
B1408	FTW-OPS	OPS (L/Unload Ramp	F3	Dennis Statler	Civ	7689	dennis.statler@navy.mil	Anthony Thurman	E-6	7185	anthony.thurman@navy.mil
B1409W	FTW-	OIL WATER SEPERATOR AT B1403									
B1409W	FTW-FIRE	Fire PROTECTION WATER MAIN									
B1410 ✓	FTW-41	Mag-41 HQ/F 473	F3	Beura Larkin		2846	beura.larkin@usmc.mil	Cory Jaco		2846	cory.jaco@usmc.mil
B1410 ✓	FTW-41	Mag-41 HQ/F 473	F3	Wilson Shunsee	maj	2840	wilson.shunsee@usmc.mil				
B1411	FTW-FRC		F3	Jason Mangham	E6	6351/7454	jason.mangham@navy.mil	Todd Anderson	E6	3910	todd.anderson1@navy.mil
B1412	FTW-PW	PW Pump House	F3	Russ Neely	Civ	5778	russell.l.neely2@navy.mil	Johnny Flores	Civ	7147	johnny.flores2@navy.mil
B1413	FTW-	HAZMAT STORAGE	F3								
B1414	FTW-AIMD	GSE SHOP	F3	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Todd Anderson	E-6	3910	todd.anderson1@navy.mil
B1415	FTW	HAZARD WASTER STORAGE	F3								
B1417	FTW-Sec	GATE SENTRY HOUSE	F3	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B1418	FTW-NATE	NATEC	F3	James Stanley	Civ	6396	james.b.stanley@navy.mil				

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1418	FTW-46	VR46	F3	Calvin Civis	AMC	817-782-3464	calvin.civis@navy.mil	Jacob Hood	AT1	817-782-3533	jacob.hood@navy.mil
B1420	FTW-301	301 DEPLOYMENT CENTER Z-26	F3	Curtis Peterson	Civ	817-782-5822	curtis.peterson@us.af.mil	Scott Gordon	E-6	739-6949	scott.gordon.3@us.af.mil
B1421	FTW-OPS	OPS Rec Pavillion	F3	Dennis Statler	Civ	7689	dennis.statler@navy.mil	Anthony Thurman	E-6	7185	anthony.thurman@navy.mil
B1422	FTW-OPS	OPS/Ground Electronic GEMD	F3	Anthony Woods		7843	anthony.l.woods@navy.mil	Sergio Morales		7171	sergio.morales@navy.mil
B1422	FTW-OPS	OPS Pax Terminal	F3	AD1 Maurice White	AD1	7171	maurice.white1@navy.mil	AD1 Eric Hemming	AD1	5715	eric.hemming@navy.mil
B1424	FTW-	OIL WATER SEPERATOR AT B1405									
B1425	FTW-OPS	OPS	F7	AD1 Maurice White	AD1	7171	maurice.white1@navy.mil	AD1 Eric Hemming	AD1	5715	eric.hemming@navy.mil
B1425	FTW-FIRE	Fire Dept	F7	Samson Desessa	Civ	6339	samson.desessa@navy.mil	Keith Guess		6339	keith.guess@navy.mil
B1425	FTW-NO	NAVTRAMETOC DET (Weather)	F7								
B1426	FTW-	OIL WATER SEPERATOR AT B1410									
B1427	FTW-301	301 Security Manager/Finger Printing	F7								
B1427	FTW-OPS	Base IT	F7	Cheryl Pagan		7628	cheryl.pagan@navy.mil	Sergio Morales		7171	sergio.morales@navy.mil
B1428	FTW-OPS	OPS/GEMD ADMIN TRAINING	F7	Paul Murray		6331	paul.w.murray@navy.mil	Dennis Statler	Civ	7689	dennis.statler@navy.mil
B1429	FTW-FIRE	SPILL RESPONSE FACILITY	F7	john carrizales	Civ	6333	john.carrizales@navy.mil	Allen Almodovar	GS-05	6332	allen.almodovar@navy.mil
B1431	FTW-	SPILL RESPONSE EQUIPMENT	F7								
B1432	FTW-	FLAMMABLE STORAGE SHED	F7								
B1433	FTW-	OIL WATER SEPERATOR AT B1195									
B1434	FTW-	BREAK SHELTER									
B1435	FTW-AIMD	AIRCRAFT PLANT GROUND SUPPLY EQUIP	F3	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil				
B1436	FTW	HAZMAT STORAGE	F3								
B1437	FTW-	FLAGPOLE									
B1438	FTW-PW	PW Hazard Maint. Storage	F3	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Russ Neely	Civ	5778	russell.l.neely2@navy.mil
B1440	FTW-	WASTE DUMPSTER STATION									
B1445	FTW-SW (ATLC)	Air Logistics Training Command	F3	Jeremy Emmart	HM1	6312	jeremy.emmart1@navy.mil	Thomas Doane	LT	817-782-5599	thomas.m.doane@navy.mil
B1446	FTW-	STORAGE SHED	F3								
B1449	FTW-PW	PW Potable Water Tank Elevated	F3	Johnny Flores	Civ	7147	johnny.flores2@navy.mil	David Walker	Civ	7147	david.m.walker@navy.mil
B1450	FTW-NMCI	NMCI& (AIS) (ADP) SUPPLY DATA	F3	Paul Alberti	Civ	5703	paul.alberti@navy.mil				
B1451	FTW-	WASTE DUMPSTER STATION									
B1501	FTW-ADMN	Post Office	F3	J'Von Wallace	E4	817-782-3441	jvon.a.wallace@navy.mil			817-782-6387	
B1501	FTW-SUP	Post Office (OUTAGE ONLY)	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1501	FTW-SUP	Post Office	F3	William Dodson	LS2	7667	william.d.dodson@navy.mil	Barbara Pagan	LS2	5546	barbara.pagan@navy.mil
B1503	FTW-	WASTE DUMPSTER STATION									
B1505	FTW-NLSO	Young Marines	F3	Calvin Williams	ETC	3441	calvin.williams1@navy.mil	Luther Hogan		817-366-5714	luther.hogan@us.af.mil
B1506	FTW-GAL	Navy Galley (OUTAGE ONLY)	F3	Bill Zabicki	LCDR	5581	william.zabicki@navy.mil				
B1506	FTW-GAL	Navy Galley	F3	Daniel W. Johnson	CSC	817-782-6389	daniel.w.johnson3@navy.mil	Charles BeeBe	BM3	817-782-7388/7383	charles.beebe@navy.mil
B1506	FTW-TANG	TANG Dining Hall	F3	Ed Walden	E7	817-852-3318	edward.walden@ang.af.mil	Melinde Manire	E7	817-852-3646	melinde.manire@ang.af.mil
B1507	FTW-GAL	STORAGE BLDG.	F3	Daniel W. Johnson	CSC	817-782-6389	daniel.w.johnson3@navy.mil	Charles BeeBe	BM3	817-782-7388	charles.beebe@navy.mil
B1508	FTW-ADMN	FLAGPOLE									
B1509	FTW-ADMN	FLAGPOLE									
B1510 (F1/I	FTW-ADMN	NAS JRB Base HQ	F2	PS1 Ndikum Nathaniel N	PS2	817-782-3377	nathaniel.ndikum@navy.mil	Hamilton Justin J	PS3	817-782-3375	justin.j.hamilton1@navy.mil
B1510 (FL :	FTW-TWS	Tactical Support Wing	F2	AS1 Gonzales Adrian	AS1	3061	adrian.gonzales@navy.mil		LS2	5181	
B1511	FTW-ADMN	FLAGPOLE									
B1512	FTW-	A-4 DISPLAY									
B1513	FTW-8TH	8TH Marines	F3	Julius Cromartie		817-782-6753	Julius.cromartie@marines.usmc.mil				
B1514	FTW-	WASTE DUMPSTER STATION									
B1515	FTW-NL	Navy Legal	F2	Robert Howeth	Civ	6007	robert.howeth@navy.mil			6011	
B1516	FTW-AFES	AAFES Car Wash	F2	Andrew Vereen	Civ	817-989-2852	vereena@aafes.com	Pamela Bevely	Civ	817-989-2852	bevelyp@aafes.com
B1517	FTW-CBH	CBH Pavillion		Garland Carnley	E-6	7721	garland.carnley@navy.mil	Richie Franklin	Civ	7721	richie.franklin@navy.mil
B1518	FTW-AFES	AAFES Gas Station (817-989-2852)	F2	Andrew Vereen	Civ	817-989-2852	vereena@aafes.com	Pamela Bevely	Civ	817-989-2853	bevelyp@aafes.com
B1520	FTW-CBH	BEQ (Transit)	F2	Garland Carnley	E-6	7721	garland.carnley@navy.mil	Richie Franklin	Civ	7721	richie.franklin@navy.mil
B1521	FTW-CBH	BEQ (Transit)	F2	Garland Carnley	E-6	7721	garland.carnley@navy.mil	Richie Franklin	Civ	7721	richie.franklin@navy.mil
B1522	FTW-CBH	BEQ (Transit)	F2	Garland Carnley	E-6	7721	garland.carnley@navy.mil	Richie Franklin	Civ	7721	richie.franklin@navy.mil
B1523	FTW-CBH	BEQ (Transit)	F2	Garland Carnley	E-6	7721	garland.carnley@navy.mil	Richie Franklin	Civ	7721	richie.franklin@navy.mil
B1524	FTW-CBH	BEQ (Transit)	F2	Garland Carnley	E-6	7721	garland.carnley@navy.mil	Richie Franklin	Civ	7721	richie.franklin@navy.mil
B1525 (1st	FTW-NLSO	Navy Legal (Defense Service Office	F2	Jacob R. Johnson	LN1	782-3761	jacob.r.johnson@navy.mil	Laura Bateman	LT	782-3760	laura.bateman@navy.mil
B1525 (2nd	FTW-NCR	Navy 9th Regiment	F2	Rachel M. Williams	BU1	817-782-3601	rachel.m.williams@navy.mil				
B1525 (3rd	FTW-CAP	Civial Air Patrol	F2	MSGT Lisa Griffith	MSGT	6400	lisa.griffith@us.af.mil	Norberto.Loeravasquez		6400	Norberto.Loeravasquez@us.af.mil
B1525 (4th	FTW-OSH	Safety (Navy)	F2	Jack McCallum	Civ	5334	jack.mccallum@navy.mil	David Martinez	Civ	5452	david.martinez3@navy.mil
B1526	FTW-CBH	RECREATION PAVILLION									
B1527	FTW-	UTILITY PAD	F								
B1528	FTW-	UTILITY PAD	F								

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1529	FTW-	UTILITY PAD	F								
B1530	FTW-	UTILITY PAD	F								
B1531	FTW-	SMOKERS SHELTER									
B1532	FTW-	UTILITY PAD	F								
B1533	FTW-	UTILITY PAD	F								
B1534	FTW-	SMOKERS SHELTER									
B1535	FTW-CBH	BASKETBALL COURT									
B1536	FTW-	UTILITY PAD	F								
B1537	FTW-	PERSONAL STORAGE LOCKERS									
B1538	FTW	SMOKERS SHELTER									
B1539	FTW-	WASTE DUMPSTER STATION									
B1550	FTW-DR	C4 Intelligence Command	F3	Joseph Karasick	Civ	817-782-7101	joseph.karasick@navy.mil	Stacy Simmons	E-7	817-782-7107	stacy.simmons@navy.mil
B1551	FTW-	WASTE DUMPSTER STATION									
B1560	FTW-	SMOKERS SHELTER									
B1561	FTW-CBH	CRASWELL INN SIGN									
B1562	FTW-	PERSONAL STORAGE LOCKERS									
B1563	FTW-	SMOKERS SHELTER									
B1564	FTW-ADMN	Colleges	F3	Jeannie Simmons	Civ	817-737-8180	simmo9de@erau.edu	Brian rolfes	Civ	817-737-6442	rolfesb@northwood.edu
B1564	FTW-OPM	Office of Personnel Management/Federal Investigative Services (OPM)	F3	Randy Stine	Civ	405-417-6188	randy.stine@opm.gov	Chris (Randall) Lee	Civ	972-670-6550	
B1565	FTW-CBH	BOQ Dormitory (Permanent)	F3	Richard Oglesby	E-6	3388	richard.e.oglesby@navy.mil	Patrick Thompson	Civ	3388	patrick.thompson1@navy.mil
B1566	FTW-CBH	BOQ Dormitory (Permanent)	F3	Richard Oglesby	E-6	3388	richard.e.oglesby@navy.mil	Patrick Thompson	Civ	3388	patrick.thompson1@navy.mil
B1567	FTW-CBH	BEQ (E1-E4) (Permanent)	F2	Richard Oglesby	E-6	3388	richard.e.oglesby@navy.mil	Patrick Thompson	Civ	3388	patrick.thompson1@navy.mil
B1568	FTW-CBH	BEQ (Permanent)	F2	Richard Oglesby	E-6	3388	richard.e.oglesby@navy.mil	Patrick Thompson	Civ	3388	patrick.thompson1@navy.mil
B1570	FTW-	WASTE DUMPSTER STATION									
B1572	FTW-	SMOKERS SHELTER									
B1573	FTW-	UTILITY PAD	F								
B1574	FTW-	UTILITY PAD	F								
B1575	FTW-	UTILITY PAD	F								
B1601	FTW-	HAZARDOUS WASTE COLLECTION									
B1602	FTW-301	301 MXS/AGE	F7	Doyle Easterling	E7	817-782-3645	doyle.easterling.1@us.af.mil	Deborah Adams	E6	817-782-7168	deborah.adams.2@us.af.mil
B1603	FTW-301	301 MXS/AGE	F7	Doyle Easterling	E7	817-782-3645	doyle.easterling.1@us.af.mil	Deborah Adams	E6	817-782-7168	deborah.adams.2@us.af.mil
B1604	FTW-301	Security Anti- Terrorism	F7	James Pettus	Civ	817-782-7365	james.pettus@us.af.mil				
B1604	FTW-301	Union	F7	James Pettus	Civ	817-782-7168	james.pettus@us.af.mil	Adrian Reagan	Civ	5688	adrian.reagan.1@us.af.mil
B1608	FTW-301	301 MXS/AMXS Storage (50/50 split)	F7	Tom Barnicle (AMXS)	Civ	817-782-5622	thomas.barnicle.1@us.af.mil	David Deloach	Civ	817-782-7854	david.deloach.1@us.af.mil
B1614	FTW-		F7								

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1615	FTW-301	301st 73rd AERIAL PORT	F7	Steve Kukawa	Civ	817-852-5343	steve.kukawka@us.af.mil	Deborah Alleman	E7	5091	deborah.alleman@us.af.mil
B1616	FTW-301	301st 73rd	F7	Steve Kukawa	Civ	817-782-5343	steve.kukawka@us.af.mil	Deborah Alleman	E7	5091	deborah.alleman@us.af.mil
B1618	FTW-301 ✓	301st Security Forces	F7	Paul Wright	E-7	817-782-7038	paul.wright.4@us.af.mil	Ronald Zumwalt	E-6	817-782-7038	ronald.zumwalt.1@us.af.mil
B1619	FTW-301 ✓	301 Security Forcs	F7	Paul Wright	E-7	817-782-7038	paul.wright.4@us.af.mil	Ronald Zumwalt	E-6	817-782-7038	ronald.zumwalt.1@us.af.mil
B1627	FTW-301	GAS CYLINDER STORAGE	F7	Randy Loyer	Civ	817-782-7885	randy.loyer.1@us.af.mil	Butch Love	Civ	817-782-7227	delanamor.love.1@us.af.mil
B1628	FTW-301	AUTO VEHICLE MAINT SHOP	F7	Randy Loyer	Civ	817-782-7885	randy.loyer.1@us.af.mil	Butch Love	Civ	817-782-7227	delanamor.love.1@us.af.mil
B1629	FTW-EM	ECC Center (Navy)	F7	Steve Thrall (1 Nov 06)	Civ	5582	stephen.thrall@navy.mil	Malone Smith	Civ	7070	malone.smith.1@us.af.mil
B1630	FTW-301	457 FS Life Support	F7	Roy Pena	SSGT	(817) 782-5363	roy.pena.1@us.af.mil	MIRACLE CARTER	TSGT	(817) 782-5363	miracle.carter.1@us.af.mil
B1632	FTW-301	DESC - AGE/ Fuel Storage Tank	F7	David Reyes	E4	817-782-7168	david.reyes.10@us.af.mil	Bill Morin	Civ	817-782-7168	bill.morin@us.af.mil
B1633	FTW-EM	Recreation Pavillion		Steve Thrall (1 Nov 06)	Civ	5582	stephen.thrall@navy.mil	Malone Smith	Civ	7070	malone.smith.1@us.af.mil
B1637	FTW-301	AC Part Store (LG)	F7	Deborah King	Civ	739-5480	deborah.king@us.af.mil	William T. Tell	Civ	817-782-7607	william.tell.1@us.af.mil
B1639	FTW-		F7								
B1641	FTW-301	457 storage	F7	Tom Barnicle (AMXS)	Civ	817-782-5622	thomas.barnicle.1@us.af.mil				
B1642	FTW-301	AIRCRAFT MAINTENANCE	F7	David Deloach	E-7	817-782-7854	david.deloach.1@us.af.mil			817-782-7287	
B1643	FTW-301	AIRCRAFT MAINTENANCE DOCK	F7	Jesus G. San Miguel	E-7	817-782-7083	jesus.sanmiguel.1@us.af.mil	Mike Donnelly	E-8	739-3717	mike.donnelly.1@us.af.mil
B1644	FTW-301	FIRE PROTECTION VALVE HOUSE	F7	John Ruiz	Civ	817-782-7035	john.ruiz@us.af.mil				
B1644P	FTW-	Water Pump Station	F7								
B1645	FTW-		F7								
B1647	FTW-	FIRE PROTECTION VALVE HOUSE									
B1648 ✓	FTW-301	AIRBORNE WEAPON SUPPORT SHOP	F7	Levy Farris	Civ	817-782-3393	levy.farris.1@us.af.mil	Cornelius Kay	Civ	817-782-7828	cornelius.kay.1@us.af.mil
B1649	FTW-301	301 MXS/Avionics maintenance	F7	Mark Roath	Civ	817-782-7041	mark.roath.1@us.af.mil	Karl Freund	Civ	5251	karl.freund.1@us.af.mil
B1650	FTW-301	301 MXG/MOF Staff	F7	David Deloach	Civ	817-782-7845	david.deloach.1@us.af.mil			817-782-7287	
B1651	FTW-301	301 Civil Eng Facility	F7	Timothy Webster H	E6	817-782-7814	timothy.webster.4@us.af.mil	Donald Meadows	E7	817-782-7336	donald.meadows@us.af.mil
B1653	FTW-301	301 Civil Eng Storage	F7	Timothy Webster H	TSGT	817-782-7814	timothy.webster.4@us.af.mil	Donald Meadows	E7	817-782-7336	donald.meadows@us.af.mil
B1654	FTW-301	301 FW HQ	F7	Kermitt Keen	Civ	817-782-6942	kermitt.keen@us.af.mil				
B1655	FTW-301	301 AMX	F7	Mark Roath	Civ	817-782-7041	mark.roath.1@us.af.mil	Karl Freund		5251	karl.freund.1@us.af.mil
B1656	FTW-301	301 Maintenance Dock	F7	Steven Van Kleeck	E-6	817-782-7329	steven.vankleeck.1@us.af.mil	Kalen Branford	Civ	817-782-7329	kalen.bransford.1@us.af.mil
B1657	FTW-PW	PW Water Pump Station	F7	Russ Neely	Civ	5778	russell.l.neely2@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B1659	FTW-301	301 FS	F7	Troy Coffman	E-7	817-782-5695	troy.coffman.1@us.af.mil				
B1660	FTW-301	301 MSG	F7	Regina W. Hudson	MSgt	817-782-6931	regina.hudson.1@us.af.mil	James Singleton	Civ	817-782-5630	james.singleton.4@us.af.mil
B1661	FTW-301	301 MX/AAB	F7					Jeff Dorough	Civ	817-782-7265	jeff.dorough.1@us.af.mil
B1662	FTW-301	CW Class Rm	F7	Regina W. Hudson	MSgt	817-782-6931	regina.hudson.1@us.af.mil	James Singleton	Civ	817-782-5630	james.singleton.4@us.af.mil
B1663	FTW-301	301 MSG	F7	Regina Hudson	MSgt	817-782-6932	regina.hudson.1@us.af.mil	James Singleton	Civ	817-782-5630	james.singleton.4@us.af.mil
B1667	FTW-TANG	TANG Bse Shed	F7	Joel Cherry	E-7	817-852-3446	joel.cherry@ang.af.mil	David Shamburger	Civ	817-852-3445	david.shamburger.2@us.af.mil
B1670	FTW-TANG	TANG Areial Port Tn	F7	Richard Plank	E-7	817-852-3576	richard.plank@ang.af.mil	Donald Talbert	E-8	817-852-3652	donald.talbert@ang.af.mil

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1671	FTW-TANG	TANG BE Maint SHP (CE)	F7	Joel Cherry	E-7	817-852-3446	joel.cherry@ang.af.mil	David Shamburger	Civ	817-852-3445	david.shamburger.2@us.af.mil
B1672	FTW-TANG	TANG Wing HQ	F7	Justin Grace			Justin.grace@ang.af.mil	Elijah Vo	E4	817-852-3308	elijah.vo@ang.af.mil
B1673	FTW-TANG	TANG Bse Whse	F7	Eric Richardson	E7	817-852-3602	eric.richardson@ang.af.mil	Steve White	E7	817-852-3314	steven.white@ang.af.mil
B1674	FTW-TANG	TANG Fuel Cell Fac	F7	Shawn Bearden	E6	817-852-3158	shawn.bearden@ang.af.mil	Watane Pipkins	E6	817-852-3518	watane.pipkins@ang.af.mil
B1675	FTW-TANG	TANG ACPT/Maint	F7	Charles Chavers	E8	817-852-3518	charles.chavers@ang.af.mil	Michael Pankey	E7	817-852-3669	michael.pankey@ang.af.mil
B1676	FTW-TANG	TANG MXG Hanger	F7	Tommy Safford	E-8	817-852-3523	tommy.safford@ang.af.mil	Steve Haemker	E-7	817-852-3534	steven.haemker@ang.af.mil
B1677	FTW-TANG	TANG Wtr pmp stn	F7	Joel Cherry	E-7	817-852-3446	joel.cherry@ang.af.mil	David Shamburger	Civ	817-852-3445	david.shamburger.2@us.af.mil
B1678	FTW-TANG	TANG Bse Storg shed	F7	Roderic Harris	E-7	817-852-3551	roderic.harris@ang.af.mil	Robert Mitchell	E-6	817-852-3017	robert.mitchell@ang.af.mil
B1679	FTW-TANG	TANG Wtr tank stor	F7	Joel Cherry	E-7	817-852-3446	joel.cherry@ang.af.mil	David Shamburger	Civ	817-852-3445	david.shamburger.2@us.af.mil
B1680	FTW-TANG	TANG Veh Maint	F7	Joel Cherry	E-7	817-852-3446	joel.cherry@ang.af.mil	David Shamburger	Civ	817-852-3445	david.shamburger.2@us.af.mil
B1681											
B1682											
B1683											
B1684											
B1685											
B1686											
B1687											
B1689											
B1690											
B1691	FTW-TANG	TANG Veh Maint	F7	Joel Cherry	E-7	817-852-3446	joel.cherry@ang.af.mil	David Shamburger	Civ	817-852-3445	david.shamburger.2@us.af.mil
B1700	FTW-10TH	10 AF HQ	F7	Don Meadows	E-9	817-782-3219	donald.meadows@us.af.mil	Scott McDaniel	E9	817-782-3214	scott.mcdaniel@us.af.mil
B1701	FTW-	WASTE DUMPSTER STATION									
B1702	FTW	WASTE DUMPSTER STATION									
B1703	FTW-	WASTE DUMPSTER STATION									
B1704	FTW-	WASTE DUMPSTER STATION									
B1710	FTW-301	301 Conf/LG	F7	John Green	Civ	817-782-7315	john.green.10@us.af.mil	Steve Munnell	Civ	817-782-7697 (Cell- 817-401-5080)	steven.munnell@us.af.mil
B1711	FTW-MD	USN Medical	F3	David Ogle	Civ	5953	david.ogle.ctr@med.navy.mil	Joel Rico	E-7	817-726-1429	joel.rico@bumed.navy.mil
B1711	FTW-MD	USN Medical	F3	Damien Brown		5964	damien.brown@med.navy.mil	Reece Sheeler			reece.sheeler@med.navy.mil
B1720	FTW-DR	Joint Reserve Intel Command	F3	Joseph Karasick	Civ	817-782-7107	joseph.karasick@navy.mil	Stacy Simmons	E-7	817-782-7107	stacy.simmons@navy.mil
B1726	FTW-		F7								
B1729	FTW-301	301 COMM	F7								
B1730	FTW-NCTS	Base Communication Office	F7	Ronald Marchand		7400	ronald.marchand1@navy.mi	301 CF SCBN			301CF.SCBN@us.af.mil
B1730	FTW-301	301MSG/Comm	F7	Dino Evans	Civ	817-782-5650	Dino.Evans.2@us.af.mil	Daniel Tipton	Civ	817-782-5321	daniel.tipton@us.af.mil
B1739	FTW-MD	Vet Clinic	F7	HM2 Keith Gover	HM2	5953	keith.grover@med.navy.mil	Damien Brown		5964	damien.brown@med.navy.mil
B1740	FTW-TANG	TANG Med Training	F7	Sean Fenton	E-7	817-852-3008	sean.fenton.1@ang.af.mil				

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1752	FTW-NOSC	NOSC Trng Sim	F7	Jose A. Rodriguez	E-6	1641	jose.a.rodriguez@navy.mil				
B1752	FTW-SW (ATLC)	Flt Simulator (Air Logistics Training	F7	Troy Rudisill	AWF1	7466	troy.rudisill@navy.mil	Thomas Doane	LT	817-782-5599	thomas.m.doane@navy.mil
B1765	FTW-DECA	COMMISSARY	F7	Sam Tresenriter		3681	samuel.tresenriter@deca.mil	Lorenzo Cherry		3681	lorenzo.cherry@deca.mil
B1765	FTW-AFES	AAFES BXTRA (817-377-8209)	F7	Arcenia Ferguson	Civ	817-377-8209	fergusona@aafes.com	Mellisa Hughes	Civ	817-377-2908	hughesmel@aafes.com
B1766	FTW-AFES	Burger King (817-569-0468)	F2	Glenda Hendrix	Civ	817-569-0468	hendrixg@aafes.com	Serrano	Civ	817-569-0468	serranoto@aafes.com
B1776	FTW-301	301 Family Support	F2	Jay Evans		817-782-7435	jay.evans.1@us.af.mil	Tom Blair	E-7	817-782-7527	thomas.blair.3@us.af.mil
B1780	FTW-301	301 Public Health (Med Sq)	F7	Stephen Lawrence	Civ	817-782-3632	stephen.lawrence@us.af.mil				
B1782	FTW-301	301Base Honor Guard	F7	Graciela Vargas	TSGT	817-782-7502	graciela.vargas@us.af.mil			3849	
B1790	FTW-301	457 Fighter Sq	F7	Jayson Vara	E-6	817-782-3096 x 221	jayson.vara@us.af.mil	Greg James		3069 X221	gregory.james.4@us.af.mil
B1791	FTW-301	301 COMM Ant	F7								
B1790	FTW-301	457 Fighter Sq (Outages only)	F7	Ryan Dekok	Maj	3068	ryan.dekok.1@us.af.mil				
B1792	FTW-301	457th Fighter Squadron	F7	Paul Chavez	Civ	817-782-5005	paul.chavez@us.af.mil	Jack Baker	Civ	817-782-5008	jack.baker.1@us.af.mil
B1801	FTW-	ANCHOR DISPLAY									
B1802	FTW-NOSC	NOSC Trng Fac	F2	Knowlton, Jason	AZ1	1641	jason.knowlton@navy.mil	Jeremy Bernier	E-6	1644	jeremy.bernier@navy.mil
B1802	FTW-MWR	Library	F2	Pat Tellmann	Civ	7735	patricia.tellman@navy.mil	Dianne Zachry	Civ	7569	dianne.zachry@navy.mil
B1803	FTW-NOSC	NOSC NAVRESCEN	F2	Ty Millette	AME2	1624	ty.millette1@navy.mil			1643	
B1810	FTW-MWR	Gym Admin Office	F3	Dianne Zachry	Civ	7569	dianne.zachry@navy.mil	Daphne Salinas	Civ	7744	daphne.salinas@navy.mil
B1810	FTW-MWR	Fitness Center	F3	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	James Nelson	Civ	7569	jameswnelsonjr@yahoo.com
B1811	FTW-	SUPPORT STRUCTURE									
B1812	FTW-MWR	Tennis Ct (MWR)	F3	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Kerick Gibson	Civ	5760	Kerick.Gibson@navy.mil
B1813	FTW-	WASTE DUMPSTER STATION									
B1814	FTW-MWR	MWR ACTIVITIES MARQUEE	F3	Amy Munnell	Civ	7762	amy.munnell@navy.mil	Daphne Salinas	Civ	7744	daphne.salinas@navy.mil
B1815	FTW-MWR	Liberty Room	F3	Carl Roberts	Civ	3175	carl.r.roberts@navy.mil	Dianne Zachry	Civ	7569	dianne.zachry@navy.mil
B1815	FTW-MWR	TexPlex (Bowling Alley)	F3	Carl Roberts	Civ	3175	carl.r.roberts@navy.mil	Dianne Zachry	Civ	7569	dianne.zachry@navy.mil
B1836	FTW-	WASTE DUMPSTER STATION									
B1838	FTW-CHAP	Chapel (Robert P Taylor Memorial Chapel)	F2	Amir Ayyobi	RP3	5665	amir.ayyobi@navy.mil	Christopher Grady	Ltjg	5665	christopher.r.grady@navy.mil
B1840	FTW-ADMN	Thrift Shop	F3	Maurine Nelson	Civ	817-782-5240	No email - cell no 817-480-4167	Bobbie Cortney	Civ	817-782-5240	no email - cell no=817-832-7453
B1844	FTW-MWR	MWR MARQUEE	F3	Amy Munnell	Civ	7762	amy.munnell@navy.mil				
B1845	FTW-MWR	Movie Theatre	F3	Margie Fisher	Civ	7762	margaret.fisher@navy.mil	Daphne Salinas	Civ	7744	daphne.salinas@navy.mil
B1870	FTW-CU	Omniamerican Bank	F2	Staci Hubenak	Civ	817-367-5821	staci.hubenak@omniamerican.c	Dana Godi	Civ	817-365-5501	
B1880	FTW-AFES	Food Court (817-738-4916)	F2	Norma Moody	Civ	817-626-4244	moodyn@aafes.com	Sophie France	Civ	817-367-0309	frances0@aafes.com
B1880	FTW-AFES	BX Main Store (817-738-1943)	F2	James Osborne	Civ	817-738-1943	osbornejames@aafes.com	Geoff Goodkin	Civ	817-989-2852	goodkingeo@aafes.com
B1880	FTW-AFES	AAFES Consessions Barber shop,	F2	Sandra Long	Civ	817-731-1516	longs@aafes.com	Steven Neighbors	Civ	817-680-5469	neighborssw@aafes.com
B1882	FTW-301	F16 Support Struct (301st Air Park)		Bobby Brown	Civ	817-782-3847	bobby.brown.3@us.af.mil				

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1883	FTW-301	F-4 Support Struct (Air ParK)		Bobby Brown	Civ	817-782-3847	bobby.brown.3@us.af.mil				
B1884	FTW-301	F-104 Support Struct (Air Park)		Bobby Brown	Civ	817-782-3847	bobby.brown.3@us.af.mil				
B1885	FTW-301	Air Park		Bobby Brown	Civ	817-782-3847	bobby.brown.3@us.af.mil				
B2570	FTW-MWR	Lone Star Center (Club)	F1	Dianne Zachry	Civ	7569	dianne.zachry@navy.mil				
B2571	FTW-MWR	STORAGE BLDG.	F8								
B2572	FTW-MWR	STORAGE BLDG.	F8								
B2573	FTW-MWR	STORAGE BLDG.	F8								
B2575	FTW-MWR	WASTE DUMPSTER STATION									
B3175	FTW-ADMN	Family Support Center (Navy)	F2	David Farris	Civ	739-5287	david.farris@navy.mil	Al Starks	Civ	739-5290	al.starks@navy.mil
B3176	FTW-ADMN	STORAGE SHED	F2								
B3178	FTW-	RECREATION PAVILLION									
B3179	FTW-	WASTE DUMPSTER STATION									
B3201	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3202	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3203	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3205	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3206	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3207	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3208	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3209	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3210	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3216	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3217	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3218	FTW-HSG	SINGLE FAMILY	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3253	FTW-HSG	Family Housing 8-Plex	F2	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3256	FTW-HSG	Family Housing 8-Plex	F2	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3263	FTW-HSG	QTRS C Officer's Family Housing	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3264	FTW-HSG	QTRS B XO'S Family Housing	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3265	FTW-HSG	QTRS A CO'S Family Housing	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3266	FTW-HSG	QTRS D Officer's Family Housing	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3268	FTW-HSG	Officer's Housing Det Garage	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3269	FTW-HSG	Officer's Housing Det Garage	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3270	FTW-HSG	Officer's Housing Det Garage	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3271	FTW-HSG	Officer's Housing Det Garage	F7	Nelson Cowan	Civ	817-782-5710	nelson.cowan@navy.mil	Quani Fuentes	Civ	817-782-5777	quani.fuentes@navy.mil
B3300	FTW-	FLAGPOLE									
B3301	FTW-MWR	Running Track	F7	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3302	FTW-Sec	Boat Lift									

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B3302	FTW-	WASTE DUMPSTER STATION									
B3305	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3306	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3307	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3308	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3309	FTW-MWR	Toilet Facility	F7	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3310	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3311	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3312	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3313	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3314	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3315	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3316	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3317	FTW-	WASTE DUMPSTER STATION									
B3318	FTW-MWR	Ballfield Complex/Pavilions	F7	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zachry	Civ	7569	dianne.zachry@navy.mil
B3319	FTW-MWR	Training Tank (Pool)	F7	Donna Johnston	Civ	5760/1220/1221	donna.johnston1@navy.mil	Dianne Zachry	Civ	7569	dianne.zachry@navy.mil
B3320	FTW-MWR	Child Development Center	F7	LYDIA THORNTON	CIV	7520	lydia.thornton@navy.mil	Daphne Salinas	Civ	7744	daphne.salinas@navy.mil
B3321	FTW-MWR	SoftBall Field	F7	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3322	FTW-MWR	Ballfield	F7	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3323	FTW-		F7								
B3324	FTW-MWR	Sea Cadets Bldg	F7								
B3325	FTW-MWR	Football- Soccer Field	F7	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3326	FTW-MWR	Outdoor Rec Annex	F7	Allan Taylor	Civ	6375/76	richard.a.taylor1@navy.mil	Dianne Zachry	Civ	7569	dianne.zachry@navy.mil
B3327	FTW-MWR	Boat Ramp	F7								
B3328	FTW-MWR	Marina Facility	F7	Allan Taylor	Civ	6375/6376	richard.a.taylor1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3332	FTW-MWR	SoftBall Field	F7	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3334	FTW-MWR	Snack Bar baseball field	F7	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Kerick Gibson	Civ	730-5760	
B3335	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3338	FTW-MWR	Recreation Pavillion		Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3339	FTW-FIRE	Fire Rescue Pier									
B3341	FTW-301	Services Flight Building	F7	Graciela Vargas	TSGT	817-782-7502	graciela.vargas@us.af.mil	Carolyn Pitts	Civ	817-782-7503	carolyn.pitts.1@us.af.mil
B3342	FTW-MWR	Skateboard Park	F7	Dianne Zachry	Civ	7569	dianne.zachry@navy.mil	Allan Taylor	Civ	6375/76	richard.a.taylor1@navy.mil
B3343	FTW-MWR	Recreation Pavillion	F7	Donna Johnston	Civ	5760	donna.johnston1@navy.mil	Dianne Zacahry	Civ	7569	dianne.zachry@navy.mil
B3346	FTW-ADMN	E-6 Association	F7	Jeffery Fetsko	E-6	6029	jeffrey.fetsko@navy.mil				navylodge-fortworthoffice@nexweb.org
B3347	FTW-MWR	MARINA 54 BOAT SLIP									

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B1792	FTW-301	457th Fighter Squadron (Outages only)	F7	Ryan Dekok	maj	3068	ryan.dekok.1@us.af.mil				
B3348	FTW-301	Storage, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3348	FTW-NL	Navy Lodge Sign (back)	F7	Pamela Kimball	Civ	569-1700	navylodge-	Pamela Hansen	Civ	569-1700	navylodge-
B3349	FTW-301	301 Storage Shed	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3349	FTW-NL	Storage Shed	F7	Saquarius Owens	Civ	817-569-1700	saquarius.owens@nexweb.org	Harry Olmos	Civ	817-569-1700	navylodge-
B3350	FTW-NL	Navy Lodge	F7	Lodge Manager	Civ	817-569-1700	navylodge.fortworth@nexweb.org	Harry Olmos	Civ	817-569-1700	navylodge-fortworthoffice@nexweb.org
B3351	FTW-OPS	Ready Service Magazine	F7	Trenton Hagley	E-6	3918	trenton.hagley@navy.mil	William Topping	E5	3918	william.topping1@navy.mil
B3352	FTW-OPS	Support Equipment Storage	F7	Trenton Hagley	E-6	3918	trenton.hagley@navy.mil	William Topping	E5	3918	william.topping1@navy.mil
B3354	FTW-NL	Navy Lodge Sign (Front)	F7	Saquarius Owens	Civ	817-569-1700		Harry Olmos	Civ	817-569-1700	
B3355	FTW-301	OPS Weapons Support/Classroom	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil				
B3355	FTW-OPS	OPS Weapons Support/Classroom	F7								
B3356	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3356	FTW-NL	Navy Lodge Playgroung	F7			817-569-1700	navylodge.fortworth@nexweb.org	Harry Olmos	Civ	817-569-1700	navylodge-fortworthoffice@nexweb.org
B3357	FTW-OPS	Wash Rack	F7								
B3358	FTW-OPS	Recreation Pavillion									
B3359	FTW-OPS	Small Arms Armory	F7	Jimmy Escamilla	E-6	7185	jimmy.escamilla@navy.mil	Anthony Thurman	E-6	7476	anthony.thurman@navy.mil
B3360	FTW-PW	Standby Generator Plant	F7								
B3361	FTW-	Utility Pad with Screen	F								
B3367	FTW-OPS	Hazard Storage	F7	Jimmy Escamilla	E-6	7185	jimmy.escamilla@navy.mil	Anthony Thurman	E-6	7476	anthony.thurman@navy.mil
B3368	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3369	FTW-OPS	Ops Weapons Storage	F7	Jimmy Escamilla	E-6	7185	jimmy.escamilla@navy.mil	Anthony Thurman	E-6	7476	anthony.thurman@navy.mil
B3371	FTW-OPS	Ready Service Magazine	F7	Jimmy Escamilla	E-6	7185	jimmy.escamilla@navy.mil	Anthony Thurman	E-6	7476	anthony.thurman@navy.mil
B3372	FTW-OPS	Ready Service Magazine	F7	Jimmy Escamilla	E-6	7185	jimmy.escamilla@navy.mil	Anthony Thurman	E-6	7476	anthony.thurman@navy.mil
B3373	FTW-OPS	Ready Service Magazine	F7	Jimmy Escamilla	E-6	7185	jimmy.escamilla@navy.mil	Anthony Thurman	E-6	7476	anthony.thurman@navy.mil
B3374	FTW-OPS	Ready Service Magazine	F7	Jimmy Escamilla	E-6	7185	jimmy.escamilla@navy.mil	Anthony Thurman	E-6	7476	anthony.thurman@navy.mil
B3375	FTW-OPS	Ready Service Magazine	F7	Jimmy Escamilla	E-6	7185	jimmy.escamilla@navy.mil	Anthony Thurman	E-6	7476	anthony.thurman@navy.mil
B3376											
B3377	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3378	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3381	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3383	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3384	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3385	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3386	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B3387 ✓	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B3388 ✓	FTW-301	Stor, Seg Mag	F7	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B4107	FTW-301	Runway 17 Loc Antenna (Glide Scope)	F4	Bryce Humphrey	Civ	817-782-3238	bryce.humphrey.1@us.af.mil	Douglas Mata	Civ	817-782-5408	douglas.mata.1@us.af.mil
B4108	FTW-301	Runway 17 Loc Antenna (ILS Loc)	F4	Bryce Humphrey	Civ	817-782-3238	bryce.humphrey.1@us.af.mil	Douglas Mata	Civ	817-782-5408	douglas.mata.1@us.af.mil
B4109	FTW-301	Runway 17 ILS Loc	F4	Bryce Humphrey	Civ	817-782-3238	bryce.humphrey.1@us.af.mil	Douglas Mata	Civ	817-782-5408	douglas.mata.1@us.af.mil
B4111	FTW-301	Em Generator Building	F4	Bobby Brown	Civ	817-782-3847	bobby.brown.3@us.af.mil	Bryce Humphrey	Civ	817-782-3238	bryce.humphrey.1@us.af.mil
B4112	FTW-OPS	Aviation Metorological Fac	F4	Dennis Statler	Civ	7689	dennis.statler@navy.mil				
B4113	FTW-OPS	Aviation Metorological Fac	F4	Dennis Statler	Civ	7689	dennis.statler@navy.mil				
B4114	FTW-OPS	Aircraft Arrest Gear	F4	Dennis Statler	Civ	7689	dennis.statler@navy.mil	Anthony Thurman	E-6	7185	anthony.thurman@navy.mil
B4116	FTW-301	301 FAR FIELD MONITOR (N end)	F4	Bryce Humphrey	Civ	817-782-3238	bryce.humphrey.1@us.af.mil	Douglas Mata	Civ	817-782-5408	douglas.mata.1@us.af.mil
B4119	FTW-OPS	Ground Control Approach	F4	Dennis Statler	Civ	7689	dennis.statler@navy.mil				
B4120	FTW-OPS	Aircraft Arrest Gear	F4	Dennis Statler	Civ	7689	dennis.statler@navy.mil				
B4127	FTW-PW	STD by Elect Gen Plant	F6	Bobby Brown	Civ	739-3847	bobby.brown.3@us.af.mil				
B4127G	FTW-	STD BY ELECT GEN PLANT	F6								
B4129	FTW-301	301 ILS Localizer	F6	Bryce Humphrey	Civ	817-782-3238	bryce.humphrey.1@us.af.mil	Douglas Mata	Civ	817-782-5408	douglas.mata.1@us.af.mil
B4130	FTW-301	301 com AC Plant	F6	Bryce Humphrey	Civ	817-782-3238	bryce.humphrey.1@us.af.mil	Douglas Mata	Civ	817-782-5408	douglas.mata.1@us.af.mil
B4131	FTW-301	Runway 17 ILS GS Antenna	F6								
B4135	FTW-PW	STD by Elect Gen Plant	F6	Bobby Brown	Civ	739-3847	bobby.brown.3@us.af.mil				
B4136	FTW-OPS	OPS GEMD TACAN	F4								
B4137	FTW-OPS	Navy (PAR SITE)	F4								
B4139	FTW-OPS	T-LINE AC Washrack	F4								
B4141	FTW-PW	STD by Elect Gen Plant (Tie-Switch)	F4	Bobby Brown	Civ	739-3847	bobby.brown.3@us.af.mil				
B4142	FTW-301	Latrine	F6								
B4143	FTW-OPS	OPS Transmitter Bldg	F6	Dennis Statler	Civ	7689	dennis.statler@navy.mil				
B4145	FTW-PW	STD by Elect Gen Plant	F4	Bobby Brown	Civ	739-3847	bobby.brown.3@us.af.mil				
B4146	FTW-301	301 MXS Test Cell	F6								
B4147	FTW-	Oil WatER SEPERATOR AT B4146									
B4150	FTW-301		F4								
B4151	FTW-PW	PW Water Dist Supply Bldg.	F4	Johnny Flores	Civ	7147	johnny.flores2@navy.mil	David Walker	Civ	7147	david.m.walker@navy.mil
B4152	FTW-301		F4								
B4153	FTW-301		F4								
B4154	FTW-PW	Portable Lox Farm	F4	Bonnel Ray	E-8	7401	bonnel.ray@navy.mil				
B4155	FTW-PW	Runway Lighting Vault	F4	Bonnel Ray	E-8	7401	bonnel.ray@navy.mil				
B4157	FTW-PW	PW Maint Shack	F4	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	David Kissiah	Civ		dave.kissiah@navy.mil
B4159	FTW-OPS	PW Storage Building	F4	Dennis Statler	Civ	7689	dennis.statler@navy.mil				

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B4160	FTW-TANG	AGE Administration Bldg	F4	Jeremy Stringer	E7	817-852-3529	jeremy.stringer@ang.af.mil	Kirton Cooper	E7	817-852-3529	kirton.cooper@ang.af.mil
B4161	FTW-TANG	TANG Wash Rack	F4	Jeff Ray	E-8	817-852-3528	jeffery.ray@ang.af.mil	Jeremy Stringer	E-6	817-852-3529	jeremy.strinter@ang.af.mil
B4162	FTW-TANG	TANG Lox Storage	F4	Jeff Ray	E-8	817-852-3528	jeffery.ray@ang.af.mil	Jeremy Stinger	E-6	817-852-3529	jeremy.stringer@ang.af.mil
B4171	FTW-TANG	Storage Bldg.	F4	Joel Cherry	E-7	817-852-3445	joel.cherry@ang.af.mil	Tom Castleman	E-8	817-852-3274	james.castleman@ang.af.mil
B4171G	FTW-	STD BY ELECTR POWER GEN PLANT	F4								
B4174	FTW-TANG	TANG Hanger	F4	Jeff Ray	E-8	817-852-3528	jeffery.ray@ang.af.mil	Jeremy Stringer	E-6	817-852-3529	jeremy.stringer@ang.af.mil
B4175 ✓	FTW-TANG	TANG Squardron Operations	F4	Tom Castleman	E-8	817-852-3274	james.castleman@ang.af.mil	Joseph English	E7	817-852-3256	joseph.english@ang.af.mil
B4175 ✓	FTW-TANG	TANG Security Forces	F4	Jerry Jones	E8	817-852-3700	jerry.jones.1@ang.af.mil	David Rogers	E7	817-852-3066	david.rogers@ang.af.mil
B4175 ✓	FTW-TANG	TANG Security Forces Storage	F4	Michael Brownlow	E8	817-852-3521	michael.brownlow.1@us.af.mil	Samuel Medina	E6	817-852-3522	samuel.medina@ang.af.mil
B4176	FTW-	BREAK SHELTER									
B4178	FTW-TANG	GUARD TOWER	F4								
B4180 ✓	FTW-TANG	Security Force Storage (TANG)	F4	Jerry Jones	E8	817-852-3700	jerry.jones.1@ang.af.mil	David Rogers	E7	817-852-3066	david.rogers@ang.af.mil
B4190	FTW-301	Runway 35 ILS Loc Antenna	F4	Bryce Humphrey	Civ	817-782-3238	bryce.humphrey.1@us.af.mil	Douglas Mata	Civ	817-782-5408	douglas.mata.1@us.af.mil
B4191	FTW-301	Runway 35 ILS Loc Equipment	F4	Bryce Humphrey	Civ	817-782-3238	bryce.humphrey.1@us.af.mil	Douglas Mata	Civ	817-782-5408	douglas.mata.1@us.af.mil
B4193	FTW-OPS	OPS ASR-8 Site	F6	Dennis Statler		7689	dennis.statler@navy.mil				
B4194	FTW-	POWER CHECK PAD	F6								
B4202	FTW	WASTE DUMPSTER STATION									
B4203	FTW-	SMOKERS SHELTER									
B4204	FTW-	Oil Water Seperator at B4215									
B4205	FTW-OPS	Air Traffic Control Tower	F6	Steven Hogue	AC1	817-782-3570	steven.hogue@navy.mil	ACC Johnny Hill	ACC	7531	johnny.r.hill@navy.mil
B4205A	FTW-OPS	Ground Electronic Maintenance Dept (GEMD)	F6	Chad Sieg		7842	chad.sieg@navy.mil	Henry Rickenbacker		7842	henry.rickenbacker@navy.mil
B4206	FTW-	OIL WATER SEPERATOR AT BLDG. 4210									
B4207	FTW-	BREAK SHELTER									
B4208	FTW-PW	PW Vault Bldg	F6	Ray Johnson	Civ	5778/6225	raymond.johnson@navy.mil	Leo Apodaca	Civ	739-5778/6225	leo.apodaca@navy.mil
B4209	FTW-14	14 Marines Wash Rack	F6	Fermin Rodiguez	E-5	6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4210	FTW-14	14 Marines Reserve Training	F6	Fermin Rodiguez	SGT	6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4211	FTW-14	14TH MARINE REG FLAGPOLES		Fermin Rodiguez		6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4212	FTW-Sec	Security Tower	F6	Trevor Guevara	MA2	6293	trevor.guevara@navy.mil	Joshua Summers	MA1	7006	joshua.1.summers@navy.mil
B4213	FTW-14	14 MarinesHazrad Flam Stor Bldg	F6	Fermin Rodiguez	E-5	6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4214	FTW-14	14 Marines Hazard Flam Stor Bldg	F6	Fermin Rodiguez	E-5	6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4215	FTW-MIUW	MIUW-109 Vehicle Maintenance	F6					DESMOND JONES	LS1	6185	desmond.jones@navy.mil
B4216	FTW-MIUW	Storage Building	F6	donald mapes	E-6	3028	donald.mapes@navy.mil	wayne duerler	E-6	6182	wayne.duerler@navy.mil
B4216G	FTW-	ELECTR ELECT POWER GEN PLANT	F6								

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B4217	FTW-MIUW	Storage Building	F6	donald mapes	E-6	3028	donald.mapes@navy.mil	wayne duerler	E-6	6182	wayne.duerler@navy.mil
B4218	FTW-MIUW	Vehicle Wash Rack	F6								
B4219	FTW	LOAD-UNLOAD RAMP									
B4220	FTW-OPS	Ops Storg Igloo	F6	Trevian M. Goodwine	E-6	3171	trevian.goodwine@navy.mil				
B4221	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4222 ✓	FTW-14	Weapons Storage	F6	Fermin Rodiguez		6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4223	FTW-41	Storage Igloo	F6	Trevian M. Goodwine	E-6	3171	trevian.goodwine@navy.mil				
B4224	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4225	FTW-41	Storage Igloo	F6	Justin Kloppe	E-4	2846	justin.kloppe@usmc.mil	Anthony Garcia	E-5	2844/2845	anthony.i.garcia@usmc.mil
B4226	FTW-370	STOR IGLOO	F6								
B4227	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4228	FTW-Army	Admin Bldg.	F6	Kerry Arnold	Civ	782-3955	kerry.k.arnold.civ@mail.mil	Drew Welborn	Civ	782-7046	drew.c.welborn.civ@mail.mil
B4229	FTW-Army	Motor Pool	F6	Kerry Arnold	Civ	782-3955	kerry.k.arnold.civ@mail.mil	Drew Welborn	Civ	782-7046	drew.c.welborn.civ@mail.mil
B4230	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4231 ✓	FTW-Army	Arms Room	F6	Kerry Arnold	Civ	782-3955	kerry.k.arnold.civ@mail.mil	Drew Welborn	Civ	782-7046	drew.c.welborn.civ@mail.mil
B4232	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4233	FTW-Army	Supply Cage	F6	Kerry Arnold	Civ	782-3955	kerry.k.arnold.civ@mail.mil	Drew Welborn	Civ	782-7046	drew.c.welborn.civ@mail.mil
B4234	FTW-14	Igloo	F6	Fermin Rodiguez		6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4235	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4236	FTW-41	Igloo	F6	Justin Kloppe	E-4	2846	justin.kloppe@usmc.mil	Anthony Garcia	E-5	2844/2845	anthony.i.garcia@usmc.mil
B4237	FTW-14	Storage Igloo	F6	Fermin Rodiguez		6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4238	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4239	FTW-14	Storage Igloo	F6	Fermin Rodiguez		6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4240	FTW-14	14 Marines Storage Igloo	F6	Fermin Rodiguez		6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4241	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4242	FTW-14	Storage Igloo	F6	Fermin Rodiguez		6639	fermin.rodriguez@usmc.mil	Aaron Vasquez		6636	aaron.vasquez@usmc.mil
B4243 ✓	FTW-41	Mag-41 MATCS	F6	Michael Wilson		7249	micheal.l.wilson7@usmc.mil	Jason Weir		7249	jason.d.weir@usmc.mil
B4244	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4245	FTW-41	Marine Storage Bldg.	F6	Michael Wilson		7249	micheal.l.wilson7@usmc.mil	Jason Weir		7249	jason.d.weir@usmc.mil
B4246	FTW-41	Marine Storage Bldg.	F6	Michael Wilson		7249	micheal.l.wilson7@usmc.mil	Jason Weir		7249	jason.d.weir@usmc.mil
B4247	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4248 ✓	FTW-301	301 Munition Storage	F6	Edward Kusterbeck	MSgt	5644	edward.kusterbeck.1@us.af.mil			817-782-3179	
B4249 ✓	FTW-301	Storage Igllo/Armory	F6	Rodney Pollard	Civ	817-782-7896	rodney.pollard.1@us.af.mil	Debroah King	Civ	817-782-5480	debroah.king@us.af.mil
B4250	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4251	FTW-301	Storage Igloo	F6	Rodney Pollard	Civ	817-782-7896	rodney.pollard.1@us.af.mil	Debroah King	Civ	817-782-5480	debroah.king@us.af.mil

BLDG #	CODE	UNIT	ELEC FEED	PRIMARY FACILITY MANAGER	Pay/G	PHONE	EMAIL	ALTERNATE FACILITY MANAGER	Pay/G	PHONE	EMAIL
B4252	FTW-AIMD	AIMD GSE Storage	F6	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Sean Fitzgibbon	E-8	5737	sean.fitzgibbon@navy.mil
B4253	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4254 ✓	FTW-AIMD	AIMD Bunker	F6	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Sean Mahoney	E-8	7808	sean.mahoney@navy.mil
B4255	FTW-AIMD	Test Cell Storage	F6	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil	Sean Fitzgibbon	E-8	5737	sean.fitzgibbon@navy.mil
B4256	FTW-PW	PW Elect Power Station Bldg	F6	Ron Allen	Civ	5312	ronald.d.allen@navy.mil	Ricky Medors	Civ	5687	rickie.meadors@navy.mil
B4257	FTW-AIMD	AIMD Test Cell Storage	F6	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil		E-8	7651	
B4258	FTW-TANG	Jet Engine Test Pad	F6	Joel Cherry	E7	817-852-3445	joel.cherry@ang.af.mil				
B4259	FTW-TANG	C-130 Engine Test Cell	F6	Joel Cherry	E-7	852-3445	joel.cherry@ang.af.mil				
B4260	FTW-AIMD	Hush House	F6	Jason Mangham		6351/ 7454	Jason.Mangham@navy.mil		E-8	7651	
B4261	FTW-	Test Pad Storage	F6								
B4262	FTW-	Test Pad Storage	F6								
B4263	FTW-	Test Pad Storage	F6								
B4264	FTW-	Test Pad Storage	F6								
B4265	FTW-	Engine Test Cell	F6								
B4266	FTW-	Engine Test Cell	F6								
B4267	FTW-	Test Cell Storage	F6								
B4268	FTW-	Test Cell Storage	F6								
F99000	FTW-301	Land Site		Bryce Humphrey	Civ	817-782-3238	bryce.humphrey.1@us.af.mil	Douglas Mata	Civ	817-782-5408	douglas.mata.1@us.af.mil

FACILITY MANAGERS LIST WITH ELECTRICAL FEEDERS AND MAINTENANCE PREPNDERANT USER

MAINT RESP UIC	PREP USER UIC
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
D33	D33
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447

FACILITY MANAGERS LIST WITH ELECTRICAL FEEDERS AND MAINTENANCE PREPNDERANT USER

MAINT RESP UIC	PREP USER UIC
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N68836
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447
N83447	N83447

CARSWELL AFB
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 739

Kathleen Hartnett White, *Chairman*
Larry R. Soward, *Commissioner*
Martin A. Hubert, *Commissioner*
Glenn Shankle, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

2007 FEB 20 AM 11 08

February 15, 2007

Ms. Norma Landez
BRAC Environmental Coordinator
AFRPA/DK
143 Billy Mitchell, Suite 1
San Antonio, TX 78226-1816

Re: Approval No Further Action - *Draft Final After Action Report Offsite Weapons Storage Area Explosive Ordnance Disposal Range Ordnance Removal/Clearance at the Former Carswell AFB, Texas September 2006*
Former Carswell Air Force Base (AFB)
TCEQ SWR No. 65004
EPA ID No. TX2571724333
TCEQ Hazardous Waste Permit No.

Dear Ms. Landez:

The Texas Commission on Environmental Quality (TCEQ) has reviewed the referenced submittal (After Action Report) dated September 2006 and received by the TCEQ on October 18, 2006. In addition, the TCEQ also reviewed comments received from EPA Region 6 dated November 20, 2006. As you are aware, by letter dated September 14, 2001, the TCEQ approved the deed certification and release from post-closure care responsibilities for the Weapons Storage Area (WSA), including the Explosive Ordnance Disposal (EOD) Range. The deed certification for the WSA stated that contaminants remaining at the site had been remediated to meet residential soil criteria under Risk Reduction Standard (RRS) No. 2 pursuant to 30 Texas Administrative Code (TAC) 335 Subchapters A and S.

According to the After Action Report, this is the second removal/clearance of munitions and explosives of concern (MEC) conducted at the EOD Range. The first removal/clearance was conducted by EOD personnel from Hill AFB in 1995, and certified that the land was approved for livestock grazing or agricultural landuse. Because of the depth below land surface to which the EOD Range was cleared, the Department of Defense Explosives Safety Board (DDESB) recommended that if the property were to be used for any purpose other than livestock grazing where excavations below 0.5 to 1 foot in depth could occur, EOD personnel should be consulted.

The purpose of the removal/clearance that was conducted in 2006 and is the subject of the After Action Report, was to "locate, identify, remove and dispose of remaining material potentially presenting an explosive hazard (MPPEH), including MEC and UXO" so that the EOD Range could be certified for residential landuse. The After Action Report certifies that "all detectable explosive hazards, have been removed from the project site, and that the site is suitable for residential re-use".

P.O. Box 13087 • Austin, Texas 78711-3087 • 512/239-1000 • Internet address: www.tceq.state.tx.us

printed on recycled paper using soy-based ink

Table 4-2 Soil Sample Analytical Results identified the results of soil verification samples collected following the excavation and removal of any MPPEH, including MEC and UXO, at the EOD Range. Based upon our review, all identified site-specific contaminants of concern (CoCs) are below the RRS No. 2 residential medium specific concentrations (MSCs), therefore, no further action is required concerning these CoCs. The TCEQ does have the following comment concerning the removal/clearance at the EOD Range:

- According to Appendix D Data Quality Objectives, Subsection D.2.1 MEC Detection, the maximum detection depth for a 20 millimeter (mm) projectile was 5 to 8 inches below grade, and 56 inches for a 105 mm projectile. According to Table 4-1 Recovered MPPEH Items, the majority of MPPEH found during the removal/clearance were 20 mm high explosive (HE) projectiles. Because it is reasonable to assume that residential reuse of the WSA, including the EOD Range could result in excavations below the depth certified (5 to 8 inches) in the After Action Report, the TCEQ requests that the landuse restrictions proposed in Section 6.0 of the After Action Report be modified to include a notice to future purchasers that the potential still exists to encounter MPPEH at depths below 5 to 8 inches. In a letter from EPA Region 6 dated April 5, 2002, concerning the Finding of Suitability to Transfer (FOST) the WSA, EPA requested the following language or similar language be included in the deed conveying the EOD Range: *"All present/or future users, owners and inhabitants of this land are hereby advised that the possibility does exist that some explosive ordnance may still be located on this land, due to surface distortions, erosion by weather and the fact that present technology does not permit a guarantee of complete removal. Therefore, digging, excavating, or otherwise disturbing soil below a depth of .5 feet is prohibited without prior written permission of the United States Air Force"*. It appears that this language or similar language is still appropriate for the EOD Range and should be included in the deed conveying the property.

Questions concerning this letter should be directed to me at (512) 239-2360. When responding by mail, please submit an original and one copy of all correspondence and reports to the TCEQ Environmental Cleanup Section I at Mail Code MC-127. An additional copy should be submitted to the local TCEQ Region Office. The information in the reference block should be included in all submittals.

Sincerely,

Mark A. Weegar

Mark A. Weegar, P.G., Senior Project Manager
Team 1, Environmental Cleanup Section I
Remediation Division
Texas Commission of Environmental Quality

MW/mw

cc: Mr. Noel Bennett, USEPA Region 6, Dallas, TX (6PD-NB)
Waste Program Manager, TCEQ Region 4 Office, Dallas/Fort Worth

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

CARSWELL AFB
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 745

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

APR 10 2007

Ms. Kathryn M. Halvorson, Director
Air Force Real Property Agency
1700 N. Moore Street, Suite 2300
Arlington, VA 22209-2802

Dear Ms. Halvorson:

The U.S. Environmental Protection Agency (EPA) has completed the review of the Department of the Air Force's *Draft Final Finding of Suitability to Transfer (FOST) and Supplemental Environmental Baseline Survey (SEBS) of Parcel K (Off-site Weapons Storage Area)* of April 2007. The 247-acre parcel is proposed for transfer by deed through a public sale by the General Services Administration. The anticipated use of the property is residential and light commercial or agricultural. Based on available information and analytical data from site investigations, reports and records available to this office, EPA concurs with comment on the Air Force's demonstration that Parcel K is suitable to transfer. The environmental conditions of the parcel will not present an unacceptable risk to human health or the environment if the deeds include appropriate restrictions on future use by transferees as provided in the FOST and subject to the comment below.

EPA does have a note of caution regarding the use of the former Explosive Ordnance Disposal (EOD) area which is a subarea within the larger Weapons Storage Area. This area has been cleared of ordnance, some of which were live potentially explosive rounds of ammunition. There is no threshold or safe level for even one item of potentially explosive ordnance. Clearance of ordnance does not mean that the area is free of risk. There will always be safety uncertainties associated with use of the property.

If you have any questions, please have a member of your staff contact Ms. Laurie King at (214) 665-6785.

Sincerely yours,

Carl E. Edlund, P.E.
Director
Multimedia Planning and
Permitting Division

cc: Mr. Mark Weegar, Project Coordinator, TCEQ
Ms. Norma Landez, Air Force Real Property Agency

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

POLLUTION PREVENTION MANAGEMENT PLAN
NAVAL AIR STATION JOINT RESERVE BASE
FORT WORTH, TEXAS

VOLUME I

Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Engineering Field Division South
Charleston, SC

Reviewed and Updated by:

4545 Fuller Drive, Suite 342
Irving, TX 75038
(972) 791-3222

October 2006

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS iii
CERTIFICATE OF COMPLETENESS iv
NAS JRB Fort Worth Pollution Prevention Policy Statement v

EXECUTIVE SUMMARY vi

1.0 INTRODUCTION 1-1

2.0 POLLUTION PREVENTION MANAGEMENT SYSTEM 2-1
2.1 Identify and Track Program Objectives and Technical Initiatives 2-6
2.2 P2 Management Roles and Responsibilities of Base Personnel 2-13
2.3 Roles and Responsibilities for P2 Survey Members 2-21

3.0 IMPLEMENTATION PLAN 3-1
3.1 Implement Base-Wide Rag Laundering Program 3-4
3.2 Reassignment or Repair of PPEP and P2 Equipment 3-9
3.3 Procure Alternative Fuel Forklifts Through Attrition 3-15
3.4 Procure Hybrid (AFV) Pickups Through Attrition 3-18
3.5 Purchase an Oil Filter Crusher for TANG 3-21
3.6 Expand the Lubricant Analysis Program 3-24
3.7 Use Rechargeable Flashlights 3-27
3.8 Sort and Recycle Plastic and Aluminum Cans 3-30

4.0 PROJECT FUNDING 4-1

List of Figures

Figure 2-1 Identifying and Tracking Program Objectives and Initiatives 2-3
Figure 2-2 Evaluation of Initiatives 2-4
Figure 2-3 NAS JRB Fort Worth Unwanted Materials Disposition 2-5
Figure 2-4 NAS JRB Fort Worth Pollution Prevention (P2) Organizational Chart 2-15
Figure 2-5 Key P2 Program Responsibilities at NAS JRB Fort Worth 2-16
Figure 4-1 P2 Funding Flowchart 4-4
Figure 4-2 Navy's Pollution Prevention Equipment Program (PPEP) Flow Chart 4-5
Figure 4-3 Navy's PPEP – Activity P2 Equipment Request Flow Chart 4-6

List of Tables

Table ES-1 NAS JRB Fort Worth P2 Project Highlights vii
Table ES-2 NAS JRB Fort Worth Priority P2 Projects (2006-2009) ix
Table 3-1 Status of 2003 P2 Initiatives 3-1
Table 3-2 Programmatic Initiative and Technical Objectives 3-3

List of Appendices

Appendix A Media Maps
Appendix B Media Matrix
Appendix C Work Center Questionnaire
Appendix D Table of Work Centers with Points of Contact
Appendix E Master List of P2 Initiatives
Appendix F Programmatic and Life Cycle Costs
Appendix G Work Center Reports
Appendix H Work Centers with Previous P2 Initiatives and Projects

ACRONYMS AND ABBREVIATIONS

AFFF	aqueous film forming foam
AFV	alternatively fueled vehicles
AUL	Authorized User List
CHRIMP	Consolidated Hazardous Material Reutilization and Inventory Management Program
CNO	Chief of Naval Operations
CNRF	Commander, Naval Reserve Forces
DoD	Department of Defense
DON	Department of Navy
EMS	Environmental Management System
EO	executive order
EPR	Environmental Project Requirement
GSA	General Services Administration
HAZMAT	hazardous materials
HAZMINCEN	Hazardous Materials Minimization Center
HSMS	Hazardous Substance Management System
INRMP	Integrated Natural Resources Management Plan
MCON	Military Construction
MSDS	Material Safety Data Sheet
NAS JRB	Naval Air Station Joint Reserve Base
NAVFAC EFD SOUTH	Southern Division, Naval Facilities Engineering Command
NCBC	Naval Construction Battalion Center
ODS	Ozone Depleting Substances
OMNR	Operation and Maintenance, Naval Reserve
OPN	Other Procurement—Navy
OPNAVINST	Chief of Naval Operations Instruction
P2	Pollution Prevention
P2ADS	Pollution Prevention Annual Data Summary
P2MP	Pollution Prevention Management Plan
P2MS	P2 Management System
PAO	public affairs officer
PM	Preventive Maintenance
POA&M	Assess, Implement, Manage, and Measure
PPEP	Pollution Prevention Equipment Program
RCRA	Resource Conservation and Recovery Act
SPCC	Spill Prevention Control and Countermeasure
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TRI	Toxic Release Inventory
USDOE	U.S. Department of Energy
USEPA	U.S. Environmental Protection Agency
WC	work center
WRPA	Waste Reduction Policy Act

CERTIFICATE OF COMPLETENESS

I hereby certify and affirm that, to the best of my knowledge, this Naval Air Station Joint Reserve Base, Fort Worth, Texas, Pollution Prevention Management Plan meets federal, state, and Navy requirements; that the information contained herein is correct and complete; and that I have the authority to commit the NAS JRB Fort Worth, Texas, resources necessary to implement this plan.

_____ _____

Captain J. J. McCormack **Date**

Commanding Officer
Naval Air Station Joint Reserve Base
Fort Worth, Texas

NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH POLLUTION PREVENTION POLICY STATEMENT

Naval Air Station Joint Reserve Base (NAS JRB) Fort Worth is an advocate of the Navy's Pollution Prevention objectives and a clean, safe environment. As such, it has developed its own Pollution Prevention Management Plan and supports its full implementation. The Base's Pollution Prevention Program is dynamic; changing as new regulations, new techniques, new material substitutions, and better waste handling procedures are developed. The guidelines of the Pollution Prevention efforts of this Activity are based on the following:

Environmental Compliance: The Pollution Prevention Management Plan and its concepts should be used not only for reduction of waste, but also to ensure continued compliance with environmental regulations. By implementing the proper pollution prevention procedures and equipment, environmental controls can be reduced or eliminated.

Source Reduction: Reducing and eliminating use of hazardous materials is a prime consideration in the Pollution Prevention Program. Through substitution of environmentally friendly products and less dangerous materials, the amount of hazardous waste produced will decrease. NAS JRB Fort Worth is committed to identifying and implementing waste reduction opportunities through encouragement and involvement of all employees.

Waste Minimization: Minimizing the generation of hazardous and nonhazardous waste to levels that are technically and economically feasible will also aid the Activity in attaining its pollution prevention objectives. Any application where potential waste can be reused or recycled will result in waste minimization. Doing so will ensure that the Activity will be in full compliance with applicable federal and state waste regulations.

Promoting Responsible Citizenship: Each Navy and contractor employee is responsible for reducing the generation of waste, for complying fully with all waste reduction program objectives, and for complying with federal or state waste regulations.

Encouraging Feedback: All Navy and contractor personnel are urged to come forth with suggestions for further reducing waste in their own areas and in any other area for which they may have ideas.

NAS JRB Fort Worth seeks to demonstrate its corporate citizenship and environmental stewardship by achieving full environmental compliance at the lowest life cycle cost. We promote cooperation and coordination between the Navy and the general public. Our shared goal of reducing waste at its source and recycling reusable materials will promote a better environment.

Captain J.J. McCormack **Date**

Commanding Officer
Naval Air Station Joint Reserve Base
Fort Worth, Texas

EXECUTIVE SUMMARY

The primary mission of Naval Air Station Joint Reserve Base (NAS JRB) Fort Worth is to train, equip, and support assigned Navy, Marine, Air Force, and Texas Air National Guard (TANG) aviation and ground units in preparation for mobilization readiness. NAS JRB Fort Worth personnel consider protection of the environment to be an intrinsic aspect of this mission. Pollution prevention (P2) is crucial to implementing environmental programs at the base. In general, P2 refers to the implementation of practices that reduce or eliminate the creation of pollutants through process improvements, technology upgrades, use of less toxic materials, and waste recycling/reuse.

This P2 Management Plan (P2MP) was developed to comply with Executive Order (EO) 13148, Chief of Naval Operations Instruction 5090.1B Chapter 3, and the Texas Waste Reduction Policy Act (WRPA). State of Texas rules are specified in 30 Texas Administrative Code (TAC) 335, Subchapter Q (specifically §335.471 - §335.480). The Department of Navy refers to this plan as the Pollution Prevention Management Plan and the Texas Commission on Environmental Quality (TCEQ) refers to it as the Source Reduction and Waste Minimization Plan. Under WRPA, managers of facilities that are large-quantity generators must:

1. Prepare a Source Reduction and Waste Minimization Plan.
2. Submit an executive summary of the plan.
3. Report annually to the TCEQ on pollution prevention activities.

The NAS JRB Fort Worth P2MP is designed to fulfill the first two requirements. This plan will enable NAS JRB Fort Worth to maintain its P2 program efficiently, especially in the area of hazardous materials management and waste reduction. By following this plan, NAS JRB Fort Worth will be able to better manage its P2 efforts to achieve reduction goals and foster environmental awareness among its personnel. As a result, the volume and toxicity of hazardous and solid wastes that are generated, treated, or disposed will be reduced or eliminated. NAS JRB Fort Worth should realize the added benefits of a safer workplace, reduced management and liability costs for hazardous and solid waste disposal, and improved compliance with environmental regulations.

Site information for the executive summary as required by TCEQ is as follows:

Facility and Address:	Naval Air Station Joint Reserve Base Fort Worth Commanding Officer NAS JRB Fort Worth Fort Worth, Texas 76127

U.S. Environmental Protection Agency (USEPA)
ID Number: TX0571924042

TCEQ Solid Waste Number: 65004

SIC Code: 9711

Environmental Director: Mr. Rob Myer
Environmental Department
NAS JRB Fort Worth
Fort Worth, Texas 76127
(817) 782-6470, ext. 11

The P2MP was originally developed in 1995 and updated in 1997, 2000, 2003, and now in 2006. Numerous P2 initiatives have been implemented at NAS JRB Fort Worth since the mid 1990s. Table ES-1 illustrates some of the initiative highlights.

Table ES-1: NAS JRB Fort Worth P2 Project Highlights

Initiative	Benefit
Used Oil and Fuel Reuse Offsite (Waste Minimization)	Approximately 100 tons per year of this material are now sold to a contractor for use as a low-grade fuel.
Solar Lighting Panels (Energy Conservation)	Site survey results indicate that 10% - 15% of base parking lots are lit by solar powered lights.
Drum Crushers (Waste Minimization)	Hazardous Materials Minimization Center (HAZMINCEN) is utilizing two drum crushers to make management and transportation of drums for recycling more efficient.
Soil Erosion Control (Minimize Sediment Discharge)	A $1.4 million initiative was undertaken to reduce soil erosion at the southern end of the runway. Natural grasses that meet Bird Aircraft Strike Hazard and other Navy requirements were selected and planted.
Electric Carts (Energy Conservation, Air Emission Reduction)	Personnel utilize electric carts for transportation on base. Electric carts replace gasoline carts and automobiles.
Universal Waste Recycling (Waste Minimization)	3-6 tons per year of lead-acid batteries, other batteries and fluorescent light tubes and paint are recycled offsite.
Dehumidifier Systems for Military Asset Storage (Source Reduction)	Greatly reduced the man-hours required for preservation of stored military equipment; minimized hazardous waste generation; and increased the availability of assets.
Vinyl Stenciling Units (Source Reduction)	Reduces paint use as well as paint-related debris waste

Digital X-ray Processing (Source Reduction)	This will eliminate the use and disposal of X-ray film developer and fixer in the Non-Destructive Inspection lab. Currently, both film and digital X-ray are being taken until digital X-ray is approved for engineering crack inspection.
Refrigerant Conversion (Source Reduction)	Eliminated Class I ozone depleting substances (ODS) use in all air conditioning and refrigeration systems holding > 5 lb. of charge.
Lighting Conversions - Replaced T-12 ballasts and lights with T-8 ballasts and lights in most buildings on base. (Source Reduction)	The T-8 systems require 2-3 lights per ballast versus 4 to provide the same lighting and each light uses 20% less wattage. The T-8 lights are also mercury-free.
Plumbing Retrofits (Source Reduction)	Low–flush toilets and urinals as well as low-flow faucets have been installed in many of the buildings on base. These reduce water use and, therefore, production of wastewater to be treated.
Closed-loop Vehicle and Equipment Wash Racks (Source Reduction)	Drastically reduces water consumption and discharge from two cleaning operations.
MEK Substitution (Source Reduction)	Reduced MEK use from more than 3,000 lb/year in 2000 to 400 lb/year in 2002.

Some of the overall impacts of these initiatives include:

- Nearly 40% of solid waste generated onsite is recycled.
- For fiscal years 2002–2004, 66,199 tons of construction debris were generated on base and 46,980 tons were recycled—a recycle rate of 71%. The Navy does not use construction debris recycling data to calculate solid waste diversion rates. However, the recycling program is very successful.
- Resource Conservation and Recovery Act (RCRA) hazardous waste generation has been reduced by 82% since 1999 from 90,000 pounds per year to less than 15,600 pounds in 2005. This meets the metric of reducing hazardous waste to less than 30,000 pounds per year set in the 2003 P2MP update.
- Oil and oily waste is 100% recycled offsite. In 2003 and 2004 combined, 308 tons of oil and oily waste were recycled offsite.
- Five tons of lead acid batteries were recycled offsite in 2003 and 2004 combined.
- All non mission-critical uses of Class I ODSs have been eliminated except for two or three minor products (less than four pounds per year each).
- No Toxic Release Inventory (TRI) chemicals are used in sufficient quantities at the base to trip Emergency Planning and Community Right-to-Know Act of 1986, Section 313 reporting requirements.
- All hazardous materials used on base (except bulk fuels) must be obtained and returned through the central HAZMINCEN. In 2002, this requirement reduced hazardous material purchase costs by $66,656.

Table ES-2 lists priority P2 initiatives on base for the next three years. Priority P2 initiatives were selected based on information gathered during the site survey (105 work centers) and previous P2 initiatives. New initiatives are detailed in Section 3.0 (Implementation Plan).

Table ES-2: NAS JRB Fort Worth Priority P2 Projects (2006-2009) (in order of priority)

Project / Initiative	Potential Benefit
Implement Basewide rag laundering program. (Waste Reduction/Resource Conservation)	Reduce incinerated waste from the current 45,000–50,000 pounds per year to 15,000 pounds per year by laundering oil from rags. Conserve rags for reuse.
Reassignment and repair of Pollution Prevention Equipment Program (PPEP) and P2 equipment. (Reduce Hazmat, Reduce Water and Wastewater, Reduce Air Emissions, Reduce Solid and Hazardous Waste)	Derive benefit from PPEP and P2 equipment that is idle. Reassigning equipment that is already on base avoids cost of procurement.
Procure alternative fuel forklifts through attrition. (Reduce Air Emissions, Conserve Resources)	Conserve gasoline and diesel by utilizing propane fueled forklifts. Propane forklifts are cleaner running than diesel and gasoline units and maintain power better than battery forklifts.
Replace gasoline powered pickups on base with hybrid pickups through attrition. (Reduce Air Emissions, Conserve Resources)	Hybrid pickups are estimated to have slightly longer vehicle life, run cleaner, and conserve resources.
Purchase a filter crusher. (Reduce Solid Waste)	A new filter crusher for TANG would reduce solid waste by maximizing the number of filters in a drum. Two work centers could share it.
Expand lubricant analysis program. (Reduce Volume of Used Oil and Solid Waste)	Use Marine lubricant analysis program as a model to reduce lubricant change outs avoiding costs and reducing waste
Utilize rechargeable flashlights. (Reduce Solid Waste, Conserve Resources)	Utilize rechargeable flashlights to avoid the cost of purchasing low-quality flashlights. Reduce the number of batteries disposed.
Sort and recycle plastic and aluminum cans. (Solid Waste Reduction)	Enhancing an already strong recycling program will capture additional materials and help reach Navy recycling goal.
Hydraulic Fluid Recyclers (Waste Minimization)	Reduce hydraulic fluid use and waste in ground support equipment (<1,000 gallons/year).

Implementing the P2MP will ensure the NAS JRB Fort Worth continues to make progress toward the following goals:

- Maintain a 40% solid waste diversion rate (excluding used oil, antifreeze, batteries, and construction and demolition debris)
- Maintain RCRA hazardous waste generation at 16,000 pounds or less per year
- Maintain use of all TRI chemicals below reporting thresholds
- Eliminate all noncritical uses of Class I ODSs.

- Increase the number of alternative fueled or hybrid vehicles in the General Services Administration (GSA) motor pool

1.0 INTRODUCTION

Naval Air Station Joint Reserve Base (NAS JRB) Fort Worth has developed a Pollution Prevention Management Plan (P2MP) that focuses on eliminating the use of unnecessary or environmentally unsound materials or processes. The intent of the P2MP is to provide a management system for the Pollution Prevention Program and to provide an implementation plan for pollution prevention (P2) opportunities that will facilitate achievement of NAS JRB Fort Worth's pollution prevention objectives. The P2MP is supplemented by a reference document, Volume 2, which includes information used in the development of the 2006 P2MP.

This P2MP was developed to comply with Executive Order (EO) 13148 (April 2000) and Department of Navy (DON) requirements of Chief of Naval Operations Instruction (OPNAVINST) 5090.1B, which states that the Commanding Officer shall "develop and implement an Activity Pollution Prevention Plan" and "[u]pdate the Pollution Prevention Plan on a regular basis." This P2MP also fulfills the requirements of the Texas Waste Reduction Policy Act (WRPA) of 1991 as administered by the Texas Commission on Environmental Quality (TCEQ). The WRPA has been codified in 30 Texas Administrative Code (TAC) Chapter 335 Subchapter Q. The DON refers to this plan as the Pollution Prevention Management Plan and TCEQ refers to it as the Source Reduction and Waste Minimization Plan. They are compatible documents. Under the TCEQ WRPA, managers of facilities that are large-quantity generators must:

- Prepare a Source Reduction and Waste Minimization Plan.
- Submit an executive summary of the plan to TCEQ.
- Report annually on pollution prevention activities.

This P2MP describes the ongoing P2 program at NAS JRB Fort Worth and is a proactive approach to managing the Activity's Pollution Prevention Program. It may be used as the foundation from which to build the Activity's Environmental Management System (EMS). In contrast to compliance-based approaches, an EMS addresses concerns throughout an Activity's operations, including policy, planning, implementation, and review. It takes advantage of the "plan, do, check, and act" cycle. An EMS is a management system, not a performance system. It addresses management actions that, if carried out, will achieve the performance requirements established by the organization. Those performance requirements are developed by the organization with consideration given to applicable laws, regulations, policies, or interests. This P2MP was developed using these EMS principles. This EMS approach to P2 is consistent with the DON strategy of Assess, Implement, Manage, and Measure to achieve Sustained Compliance and Operational Readiness for Environmental Excellence.

The primary goal of this P2MP is to eliminate, reduce, or minimize pollution at points of compliance in all media areas while maintaining mission readiness and providing support to the fleet. It provides a process for the Activity to identify and track program objectives and technical initiatives, evaluate completed P2 initiatives, and assign roles and responsibilities. It is the "plan, do, check, act" cycle that ensures the Activity's P2 Program is working effectively. This process ensures that the plan is sustainable by continuously evaluating progress made in executing the P2 Implementation Plan (Section 3.0) and progress toward the Activity's P2 objectives. It also ensures that corrective action is taken when initiatives prove ineffective.

The Implementation Plan describes each initiative recommended for the Activity, its objectives, and the work centers affected. It also provides a Plan of Action and Milestones (POA&M) to implement the initiative along with a metric to track its progress. The POA&Ms include:

- Steps necessary to implement the recommendation.
- Personnel responsible for implementing each step.
- Personnel responsible for ensuring that the action has been completed.
- An estimated start and actual completion date for each step.

The Reference Document, Volume 2, contains a compilation of the forms and data used to develop the P2MP. The Reference Document should be reviewed, validated, or changed as necessary, and used as a basis for future P2MP updates. This plan update addresses multimedia pollution prevention opportunities and emphasizes tracking of initiatives to ensure they are accomplished.

2.0 POLLUTION PREVENTION MANAGEMENT SYSTEM

The P2 Management System (P2MS) is the process by which the P2 Program will be managed. Management system components and processes are summarized in the following flow charts:

- Figure 2-1 — Identifying and Tracking Program Objectives and Initiatives
- Figure 2-2 — Evaluation of Initiatives

These flow charts illustrate significant steps in each process, identify personnel to perform them, and establish a timeline of when they shall be performed. As such, the flow charts may be used as a model to establish an EMS for the base. Steps that are highlighted in yellow on the flow charts are critical to the P2MS and should be added to the EMS if implemented.

The flow chart identified as Figure 2-1 corresponds to the actions to be accomplished by specified personnel identified in Section 2-1. Roles and responsibilities by position are summarized in Section 2.2.

The primary goal of the P2MP is to eliminate or minimize pollution at points of compliance in all media areas while maintaining mission readiness and providing support to the fleet. The 2006 update of the NAS JRB Fort Worth P2MP followed the Management System outlined in Figures 2-1 and 2-2. As a result, the following qualitative programmatic goals were developed:

- Hazardous Materials – Minimize the volume of hazardous materials being used on base.
- Hazardous Waste – Continue to reduce total hazardous waste generated.
- Water and Wastewater – Reduce water consumption and wastewater generation.
- Air – Reduce air emissions.
- Conserve Resources – Reuse materials rather than disposing or incinerating.
- Solid Waste – Reduce volume of solid waste and recycle as much as economically possible.

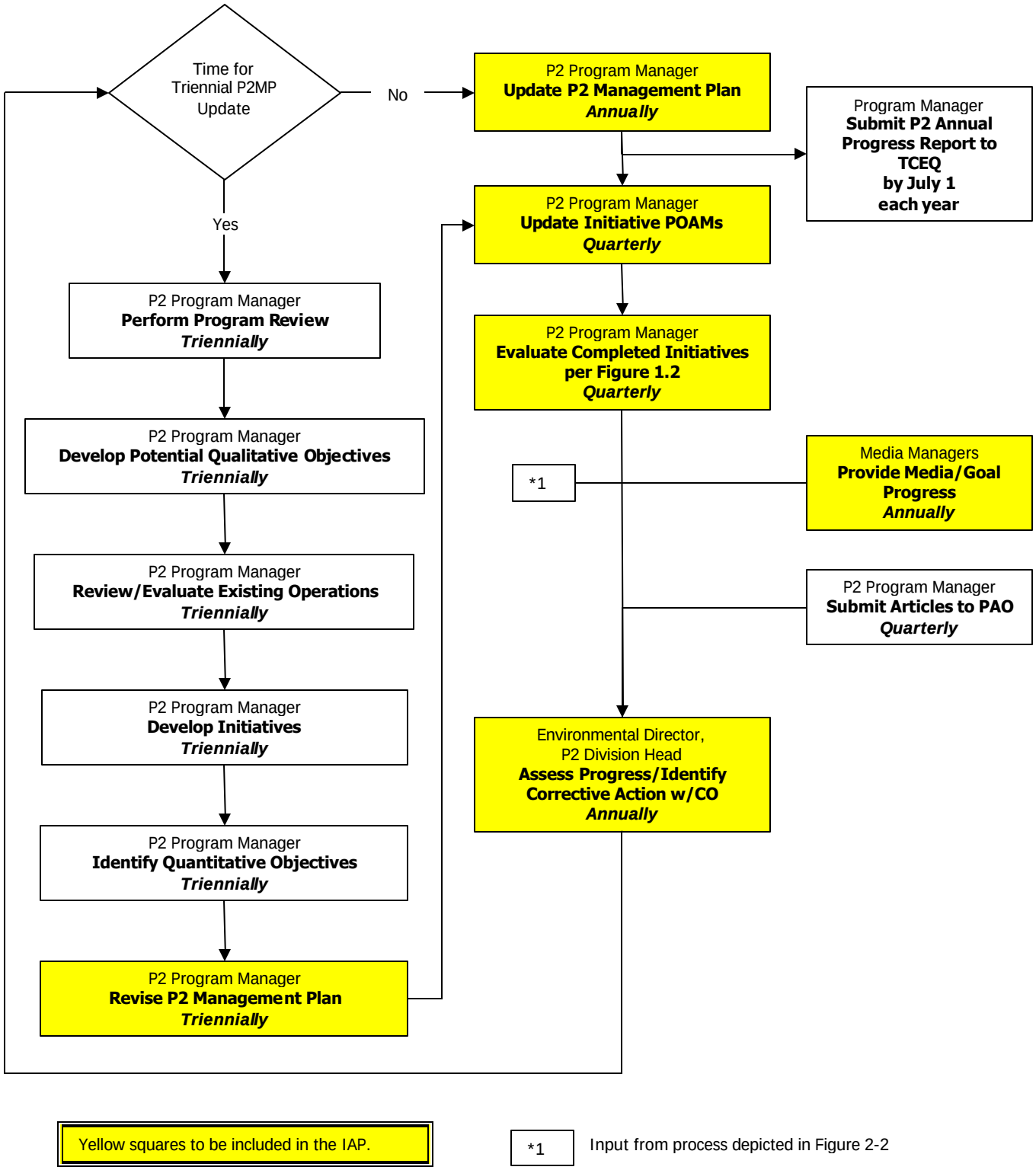
These qualitative goals are further defined and quantified in Section 3, some in the form of Technical Initiatives, others in the form of Programmatic Initiatives. Technical initiatives typically establish: use of a new technology or use of technically improved equipment. Programmatic Initiatives establish process changes or new processes that positively impact pollution prevention. Implementation of technical and programmatic initiatives is monitored by tracking metrics while executing the Implementation Plan.

The P2MS is a dynamic, sustainable process, and the P2 program manager as well as other users may enter the process at any step. Steps in this process may be executed by base personnel identified in the flow chart or via contract.

The P2MS encompasses all media, but stresses waste reduction and elimination. Figure 2-3 identifies wastes generated by NAS JRB Fort Worth and illustrates the final disposition of each waste stream. Waste streams are shown on the left of the figure with their corresponding management pathways depicted in the central portion of the figure and final disposition on the right. Information for the figure was gathered during the site survey, from discussion with base personnel, and from the 2003 P2MP Update.

Identifying and Tracking P2 Program Objectives and Initiatives

Figure 2-1



Yellow squares to be included in the IAP.

*1 Input from process depicted in Figure 2-2

Evaluation of Initiatives

Figure 2-2

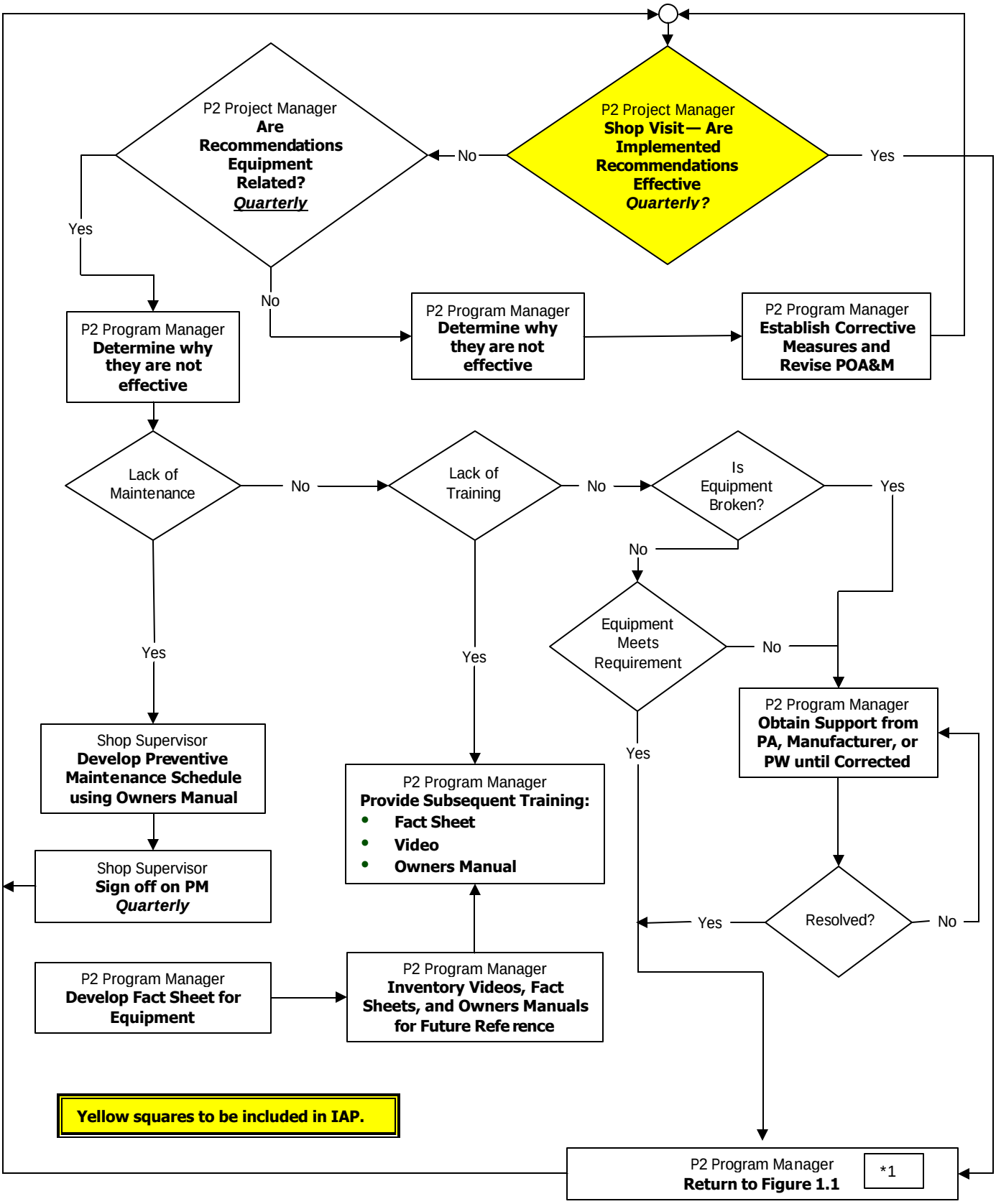
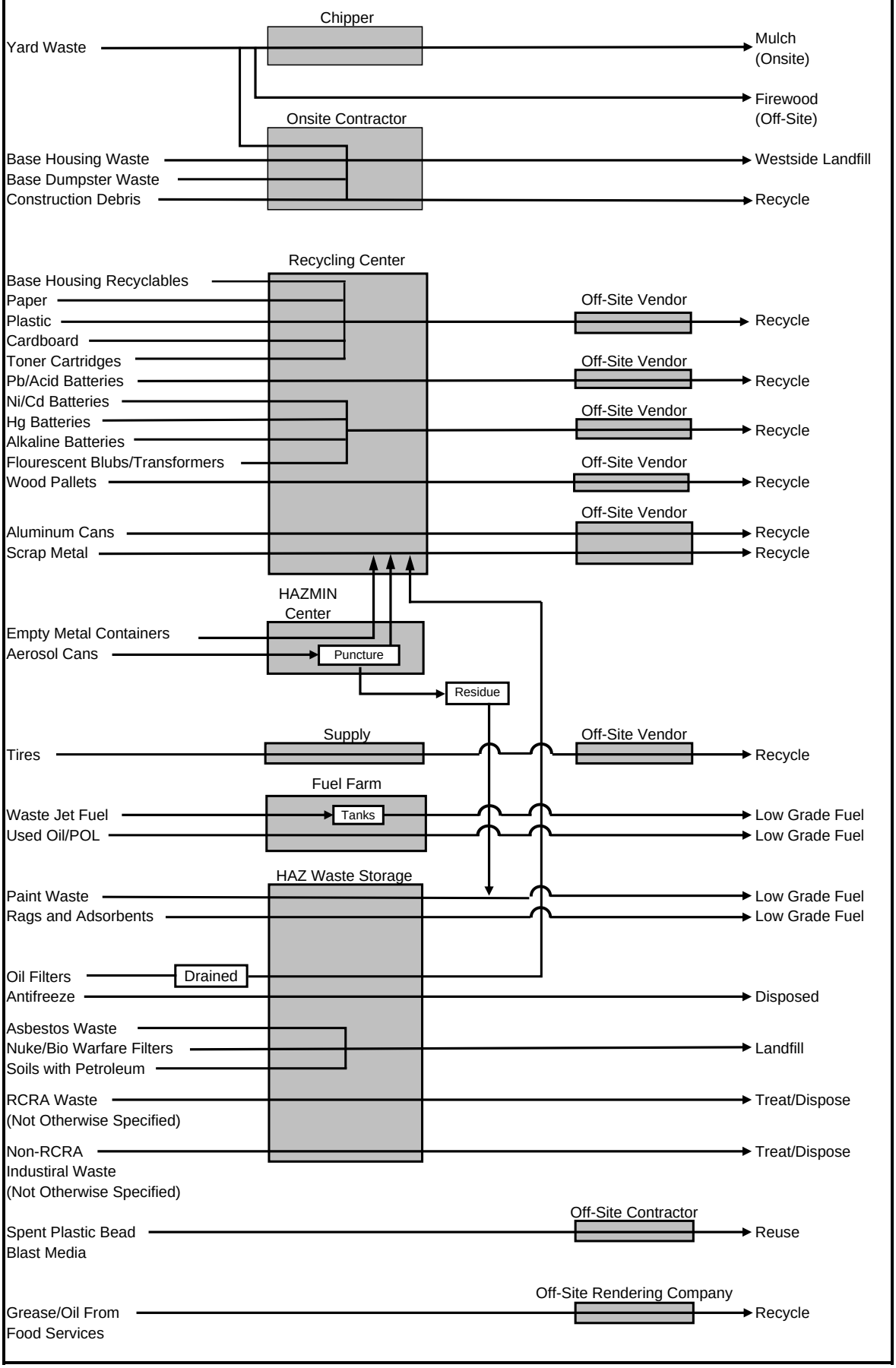


Figure 2-3: NAS JRB Ft. Worth Unwanted Materials Disposition



2.1 Identify and Track Program Objectives and Technical Initiatives

This section details actions to be taken by Activity personnel or contractors during each step of the P2MS process. These steps are depicted in Figure 2-1. In general terms these actions include:

- Triennial Operations
- Program Review

Prior to the P2MP triennial update, the P2 program manager shall review the following federal, state, and Navy documents to refamiliarize himself with regulations and technical guidance pertaining to the P2 Program. The P2 program manager should carefully note any changes or revisions.

- OPNAVINST 5090.1B
- Navy Shore Pollution Prevention Plan Updates (NFESC UG-2046-ENV)
- Department of Defense Instruction (DoDINST) 4210.15, Hazardous Material Pollution Prevention
- Tri-Service P2 Opportunity Handbook
- Hazardous and Solid Waste Amendments of 1984, Section 224
- The Pollution Prevention Act of 1990
- Texas Waste Reduction Policy Act
- Executive Order 13148 "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements"

Additionally, the P2 program manager shall review site-specific documents prior to the triennial update of the P2MP. This review will help the P2 program manager set quantitative goals. These documents include, but are not limited to the following multimedia guidance and data plans:

- Emergency Planning and Community Right-to-Know Act Data and Reports
- Annual Waste Summaries
- Pollution Prevention Annual Data Summary (P2ADS) Reports
- Waste Stream Determinations
- Material Safety Data Sheets (MSDSs)
- Material Purchase Orders
- Authorized User Lists
- Hazardous Waste Manifests
- Hazardous Substance Management System (HSMS) Database
- Energy Survey

- Spill Prevention Control and Countermeasure (SPCC) Plan
- Storm Water Pollution Prevention Plan
- Air Emissions Inventory
- Pollution Prevention Management Plan
- Hazardous Waste Management Plan
- Solid Waste Management Plan
- Integrated Natural Resources Management Plan (INRMP)
- Integrated Contingency Plan
- Installation Restoration/Underground Storage Tank/Hazardous Waste Cleanup Program Documents
- Pesticides Management Plan
- Environmental Compliance Evaluations/Environmental Quality Audit Reports

The P2 program manager shall use the above information every three years to develop media maps. Media maps shall outline the following information for each media area (Vol. II, Appendix A):

- Areas of Interest to the Media Being Evaluated – Record the physical location, building number, and or shop/work center to be evaluated.
- Actual P2 Successes – Previous media initiatives accomplished that would qualify as P2 successes.
- Previous P2 Recommendations – Previous media recommendations made in media plans that would qualify as P2 recommendations.
- Opportunities for further P2 Initiatives – Any possible opportunities that “stand out” during the review of multimedia information and merit consideration as future P2 initiatives.
- Effective Metrics – Metrics that are or could be used to identify successes and failures within the media being reviewed.
- Points of Compliance – Specific units, processes, or items that are controlled by the media being evaluated (e.g., vents, outfalls, tanks, etc.).
- Source documents used during review.

Develop Potential Qualitative Objectives

Triennially, the **P2 program manger** shall:

- Develop a matrix listing each work center and the associated media areas of concern (see Vol. II, Appendix B).
- Review and evaluate media maps (Vol. II, Appendix A).
- Identify potential qualitative objectives for the P2MP based upon the review of the various environmental media programs, including an effective metric for each objective.

Review and Evaluate Existing Operations

Triennially, the **P2 program manager** shall conduct field visits of all work centers and evaluate existing operations. The purpose of the field survey is to: ensure that work center processes are documented and management procedures are accurate, document P2 progress to date, and identify the potential for additional P2 initiatives. The work center survey should consist of the following:

- Determine the work centers to be evaluated. This determination is made by considering the following:
    - New operations or processes
    - Significant changes in operation or process
    - Mission impact potential
    - Significant areas for potential release
    - Significant areas for worker exposure
    - Areas not reviewed during the last update of the P2MP
    - Any customer requested areas

Prior to conducting the field survey, the following steps should be taken:

- Create folders for each work center. Folders should include:
    - Media matrix (see Vol. II, Appendix B)
    - Work center HSMS Authorized User List (AUL)
    - Work center reports from various environmental plans, if available (e.g., SPCC Plan, Storm Water Pollution Prevention Plan, P2MP)

  - Media maps that have information related to the work center (e.g., compliance points and areas of interest to the media being evaluated)
  - Materials issued to the work center from Hazardous Materials Minimization Center (HAZMINCEN)
  - Waste streams generated by the work center (from HSMS)
  - Work center questionnaire (See Vol. II, Appendix C)

- Develop a work center matrix listing all the work centers, known processes for each work center, and a schedule of when the field visit is to occur prior to going in the field. (See Vol. II, Appendix D for work centers and points of contact.)

During the field visit, the following tasks must be completed:

- Complete work center questionnaire (Vol. II, Appendix C).
- Look at all media points of compliance, noting any additional points of compliance not previously identified (i.e., tanks, vents, outfalls, monitoring wells).
- Seek P2 ideas from shop workers.
- Look at P2 equipment (Pollution Prevention Equipment Program [PPEP] and non-PPEP) and determine its effectiveness based on shop interviews.
- Inventory Hazardous Material (HAZMAT) lockers and note materials that are present. Also note materials without HSMS barcodes.
- Document the management review, including identification of programmatic initiatives.
- Determine whether previous recommendations have been implemented. If so capture as a success. If not, determine whether recommendations are still valid or a barrier exists. If recommendations are still valid, re-recommend.
- Determine whether quantitative goals have been met from the previous plan. If objectives were met, record them as a success; if not, determine what can be done to ensure that the new objectives are met.

Develop Initiatives

Based on the three-year review of the Activity operations, the **P2 program manager** shall develop P2 initiatives and determine the effectiveness of the previous initiatives.

- Create a master list of potential technical (work center) and programmatic (management system) initiatives.

- Rank potential initiatives on a scale of 1-5 (1 being negative impact, 3 being no effect, and 5 being positive impact), based on criteria (see Vol. II, Appendix E). The criteria should, at a minimum, include primary qualitative goals.
- Perform a "sanity check" on the outcome of the ranking.
- Determine the cutoff score for initiatives that will be implemented first (mark priority initiatives in yellow in Vol. II, Appendix E).
- Develop a POA&M for initiatives. Assign start and completion dates for priority initiatives that are feasible (see Chapter 3 - Implementation Plan).
- Perform economic analysis for selected technical initiatives. Use the economic analysis guide found in Vol. II, Appendix F when PPEP analysis is not available.

Identify Quantitative Objectives

Every three years, the **P2 program manager** shall determine the final, quantitative objectives of the updated P2MP.

- For each programmatic goal, sum all the reduction potential (numerical) from each contributing work center (technical initiative). Technical initiatives are targeted to a particular process.
- Evaluate the potential for each programmatic initiative to contribute to each programmatic goal. Programmatic initiatives are basewide in nature, not specific to selected work centers.
- Develop a matrix (see Figure 2-1) outlining the P2MP's quantitative objectives by programmatic goal.
    - Check each affected programmatic goal for programmatic initiatives
    - Identify the quantitative objective for technical work center initiatives

Revise P2 Management Plan

Every three years, the **P2 program manager** shall update the P2MP. This schedule will ensure compliance with EO13148 and the Texas WRPA. The updated plan shall contain the following information:

- Executive Summary to be updated and submitted to the TCEQ annually
- P2 Management System (revised as necessary).
- Implementation Plan for current programmatic and technical initiatives.
- Reference document containing the data used to create the plan including, but not limited to, the following:

- Work center reports (see Vol. II, Appendix H)
- Qualitative objectives
- Quantitative objectives
- Initiatives evaluated, with rankings
- Media maps

- Quantitative objectives that have been met since the P2MP's previous update. These objectives shall be captured as successes in the updated plan.
- All quantitative objectives that were not met and a discussion of why they were not met.

Update Initiative POA&Ms

Although POA&Ms are executed on a day-to-day basis, the **P2 program manager** shall formally update the POA&Ms quarterly by:

- Documenting all actions that have been accomplished to date.
- Noting the slippages of the estimated completion dates by pen and ink changes to the Implementation Plans found in Section 2.

Evaluate Completed Initiatives

The following section details actions to be taken during each step of the process depicted by Figure 2-2.

On a quarterly basis, the **P2 Program program manager** shall visit the work centers where initiatives (programmatic and technical) have been implemented to ensure that the P2 recommendations are effective. If the initiative has not been correctly implemented, the P2 program manager shall attempt to determine where the barrier occurred.

- Equipment Maintenance. The P2 program manager shall provide the shop supervisor with the owner's manual and assist in developing a preventive maintenance (PM) schedule. After a PM schedule is developed, the shop supervisor shall sign off on the document quarterly to ensure that it is being maintained.
- Training. The P2 program manager shall provide work center employees with training via training video of the initial start-up and installation demonstration, fact sheets, and/or owner's manual.

- Equipment is Inoperable. The P2 program manager shall obtain support from the procurement agent, the manufacturer, or public works to repair the piece of equipment.
- Equipment Inappropriate for work center or Process. The P2 program manger shall contact the procurement agent, the manufacturer, or public works to either relocate the piece of equipment or procure the appropriate equipment for the work center.
- Other Non Equipment Reasons. The P2 program manager shall determine why they are not effective and develop a POA&M to make them effective.

After initiatives are determined to be effective, the P2 program manager shall document the metrics; record the initiative as a success and report to the environmental director during the next quarterly meeting.

Provide Media/Goal Progress

Media managers shall assemble supporting P2 data for their respective programs on an annual basis, noting progress toward the P2 Program objectives listed in Section 3.0. Data shall be:

- Assembled and loaded into Excel spreadsheets provided in Volume II and graphed to track progress toward completing selected initiatives.
- If Excel spreadsheets are not provided in Volume II, note progress in the Section 3.0.

Information used to track initiative progress shall be drawn from the P2ADS Reports, Annual Waste Summaries and work center reports where appropriate. Information used to track initiative progress can also be used to report P2 progress to the TCEQ in required annual reports.

Present Objective and Initiative Progress to the Environmental Director

The P2 Program Manager shall present the POA&Ms for each P2 initiative, along with baseline information and any schedule barriers to the environmental director on a quarterly basis. One quarterly update per year shall include the data received from the media managers on progress made toward the qualitative goals.

Submit Articles to the Public Affairs Officer

The P2 program manager shall submit the data prepared for the environmental director brief to the public affairs officer (PAO) to publish in the base newspaper on a quarterly basis. The P2 program manager shall also submit the data prepared for the environmental director brief to the PAO

quarterly to promote awareness and visibility and give recognition to the work center with the most improvement.

Assess Progress and Identify Corrective Action with the Commanding Officer

The environmental director and the P2 program manager shall meet annually with the commanding officer or executive officer (CO/XO) to assess progress toward meeting P2 objectives and identify any necessary corrective action measures. As a result of this discussion the following will occur:

- The P2 program manager will develop a POA&M of the corrective measures that result from this meeting.

- The POA&Ms shall be distributed to all affected work centers, tenant commands, etc. with a cover letter from the CO/XO stressing the importance of meeting the dates and actions outlined in the POA&M.

Update P2MP

The **P2 Program Manger** shall review the P2MP annually and make pen and ink changes to ensure the plan is up to date and progress on initiatives has been documented. These changes are generally minor revisions and consist of points of contact, phone numbers, and work center locations.

2.2 P2 Management Roles and Responsibilities of Base Personnel

The Environmental Department is the organization primarily responsible for environmental compliance and protection at NAS JRB Fort Worth. The deputy environmental director and the P2 program manager are primarily responsible for the NAS JRB Fort Worth P2 Program. However, as outlined below, there are numerous stakeholders at NAS JRB Fort Worth who ensure the effective and continuous implementation of P2 on a daily basis. Figure 2-4 provides a P2 organization chart for NAS JRB Fort Worth, while Figure 2-5 summarizes key P2 program responsibilities.

Commanding Officer/Executive Officer

- Ensure that NAS JRB Fort Worth has an assigned environmental director and P2 program manager who have sufficient resources to implement this plan.
- Ensure basewide consolidation of P2 training and awareness resources.

- Ensure that construction and maintenance contracts awarded for work at NAS JRB Fort Worth incorporate P2 training and awareness for all workers.
- Maintain a signed P2 Command policy statement. A new P2 policy statement shall be issued by each new CO of NAS JRB Fort Worth within 30 days after the CO assumes command. Review, update, and issue NAS JRB Fort Worth Policy Statement and ensure that all tenant commands have developed their own P2 policies and that they dovetail with the Activity's policy.

Figure 2-4: NAS JRB Fort Worth Pollution Prevention (P2) Organizational Chart

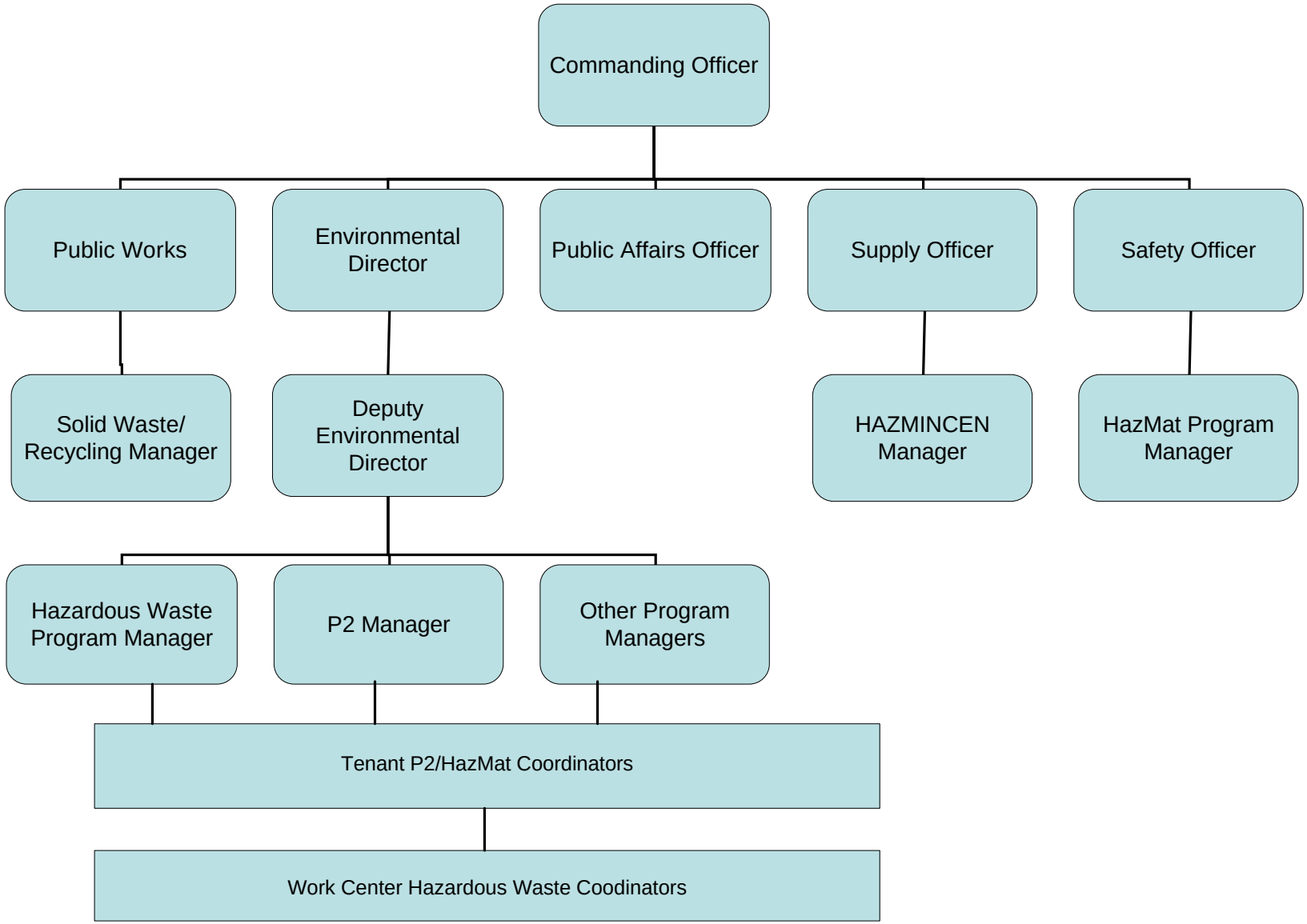


Figure 2-5: Key P2 Program Responsibilites at NAS JRB Fort Worth

	Establishing an Annually Updating NAS JRB Fort Worth P2 Policy	Establishing and Updating NAS JRB Fort Worth Tenant Command P2 Policy	Implementing Priority P2 Opportunities	Quaterly Work Center P2 Reports	Update Work Center P2 Reports (Quarterly)	Compliance Issues P2 Reviews	Navy PPEP Funding Request	Work Center P2 Opportunity Implementation	AUL Updates (Annual)	Hazardous Material Substitute Searches (On-going)	CHRIMP Program	Semi-annual P2 Briefings to Commanding Officer	P2ADS Reports (Annual)	Annual P2 Performance Report	Implement P2 Training Initiatives	Implement P2 Awareness Initiatives	Updating the P2 Plan (every 3 years)
Commanding Officer	X	X										X					X
Public Works Officer	X	X										X					X
Environmental Director	X	X					X					X			X	X	X
Compliance Division Head			X			X	X					X		X			X
P2/HAZMAT Program Manger			X	X	X	X	X	X		X	X	X		X	X	X	X
HAZMINCEN Manger									X	X	X						
Tenant/Department P2/HAZMAT Coordinator		X		X	X	X		X									
Work Center Hazardous Waste Coordinators				X				X	X	X							
Hazardous Waste Program Manager													X				
Solid Waste/Recycling Program Manager													X				
Other Compliance Division Program Mangers						X											
Public Affairs Officer																X	

- Sign and fully endorse finalized P2MP.
- Stress the importance of P2 in helping accomplish the mission.
- Issue cure letter stressing the importance of meeting the dates outlined in the POA&Ms for the P2 initiatives when corrective action is required.

Environmental Director

- Ensure that NAS JRB Fort Worth has an assigned P2 manager who has sufficient resources to implement this plan.
- Provide support to the P2 program manager and deputy environmental director.
- Ensure that the command meets all the requirements for the P2 Program outlined in state, federal, and Department of Defense (DoD) regulations.
- Provide annual briefs to the CO on P2 initiatives, objectives, successes, and needs, and identify any necessary corrective action.
- Obtain funding for NAS JRB Fort Worth P2 projects and equipment through the Navy PPEP, Operation and Maintenance, Naval Reserve (OMNR), and/or the Environmental Project Requirement (EPR) System (see Section 4—Project Funding).
- Serve as strong environmental advocate to other departments.
- Regularly (no less than quarterly) meet with the P2 program manager to receive a status update on media-specific objectives.

P2 Program Manager

- Manage the NAS JRB Fort Worth P2 Training and Awareness Program. Be an advocate of P2 training with other departments such as Base Safety.
- Develop procedures to ensure that all Activity personnel receive appropriate training.
- Coordinate the collection, production, management, and dissemination of P2 training and information for the Activity and its tenant commands.
- Update training as required. Stay current with the changing requirements of the P2MP and industrial trends, including new equipment and material substitutions.
- Coordinate and provide other types of P2-related basewide or command-specific training and awareness.
- Assign responsibilities as required to support the activities described in the plan.
- Perform long-range planning to meet P2 objectives (e.g., EPR exhibits).
- Identify and request appropriate funding for P2 initiatives using procedures in Section 4.0.
- Submit funding requests through EPR exhibits.
- Provide P2 management support to all departments, commands, and tenants.
- Review and update local instructions/plans for P2 Program applicability/integration.

- Review, develop, and update Inter-Service Support Agreements, Memoranda of Agreement , and Memoranda of Understanding to ensure P2 objectives are addressed.
- Ensure that media projects, plans, etc., incorporate P2 initiatives and goals.
- Modify the Activity's Internal Assessment Plan and Media Inspection Check Sheets to include P2 initiatives.
- Annually meet with the environmental director and CO to assess the progress toward the P2 goals and identify any necessary corrective action.
- Meet quarterly with the deputy environmental director to receive status on POA&Ms for each P2 initiative and identify any barriers in the program.
- Coordinate all basewide P2 special events such as Arbor Day, Beach Cleanup, etc.
- Update P2MP whenever there are process changes.
- Work with the tenant and department Point of Contacts and/or work centers to identify and implement P2 projects.
- Promote awareness of P2 and ongoing and new initiatives on base.
- Annually make "pen and ink" revisions to the plan. These are typically points of contact and phone number changes.
- Annually assemble data received from the Department Compliance head and media managers on the progress toward the media objectives and present data to the environmental director.
- Quarterly update the POA&Ms for P2 initiatives.
- Quarterly visit the work centers to ensure that the P2 recommendations and equipment are effective and working properly. Ensure that PPEP-purchased equipment is identified properly. If P2 equipment is not working properly, the P2 program manager shall determine if the cause is lack of maintenance, lack of training, equipment in need of repair, or inappropriate equipment in the work center.
- Provide assistance to the work center once the problem is identified.
- Quarterly submit P2 data to the PAO to publish in the base newspaper.
- Quarterly recognize in the base newspaper the work center or Tennant Command with the greatest P2 improvements.
- To be completed by contractor with P2 program manager oversight every three years:

    - Review P2-related state, federal, and DoD regulations.
    - Review all media-related plans for P2 initiatives.
    - Create media maps.
    - Develop qualitative objectives for each media area.
    - Conduct field survey of work centers to review and evaluate all existing operations and document processes or process changes.

- Review the Activity's operations to evaluate the effectiveness of the previous P2 initiatives.
- Develop qualitative and quantitative goals for each media area.
- Update the P2MP.

Deputy Environmental Director

- Oversee implementation of priority P2 opportunities at NAS JRB Fort Worth.
- Implement an ongoing program to apply P2 solutions to environmental compliance issues.
- Oversee the tracking and reporting of key P2 performance metrics. This includes assisting the P2 program manager in annual P2 performance reporting.
- Manage training and awareness (and support other P2 activities) as assigned by the P2 program manager.
- Communicate to training coordinator any equipment or program training needed by personnel.
- Assist the training coordinator with training and forwarding up-to-date P2 information to appropriate personnel.
- Perform long-range planning to meet P2 objectives (e.g., EPR exhibits).
- Annually assemble data for respective programs using the metric identified for the media area. The data shall be presented in an Excel spreadsheet in a standardized format and graphed next to the goal. This information shall also be used for the Activity's P2ADS report.
- Provide P2 program manager with media plans and help develop quantitative and qualitative objectives.
- Provide media specific recommendations to the P2 program manager to modify the Activity's P2MP and Media Inspection Checklists to include P2 initiatives.

Hazardous Waste Program Manager

- Search for offsite vendors who will recycle or reuse NAS JRB Fort Worth wastes rather than dispose of them.
- Track hazardous waste generation and work with the P2 program manager to identify and implement P2 initiative to reduce or eliminate the waste stream.
- Work with the HAZMINCEN manager to identify unopened containers of hazardous materials that can potentially be reused.
- Identify wastes turned in by work centers that can be recycled onsite and offsite.

Solid Waste/Recycling Program Manager

- Advertise and promote recycling programs at NAS JRB Fort Worth. Ensure that base personnel are clearly aware of the base recycling program and its components.
- Periodically evaluate the addition of new recyclable materials to the program.

Occupational Safety and Health Manager

- Review and approve all AULs in HSMS.
- Ensure that all contractors on base register materials through the Consolidated Hazardous Material Reutilization and Inventory Management Program (CHRIMP).
- Ensure that safety personnel and work center HAZMAT coordinators receive required P2 training.
- Screen new HAZMAT requests to determine hazard potential.
- Manage the central repository of MSDSs.
- Assume overall responsibility for Hazardous Material Management Program.
- Identify for whom and to what frequency P2/CHRIMP/HSMS training is required.
- Administer P2/CHRIMP/HSMS training.

All Work Center Supervisors

- Provide input to the environmental media managers regarding specific training needs to aid with P2 efforts.
- Develop preventive maintenance schedule for PPEP equipment.

HAZMAT Coordinators/Authorized Credit Card User for Each Shop

- Work with P2 program manager to investigate and implement P2 opportunities.
- Ensure PPEP equipment is functioning properly.
- Stay abreast of the latest developments in material substitutions and process changes being recommended and implemented within their organizations.
- Ensure material is purchased through CHRIMP.
- Ensure credit-card-purchased material arrives at the work center through CHRIMP.

HAZMINCEN Manager

- Purchase hazardous materials over $2,500 and input materials through CHRIMP.
- Track hazardous material and chemical quantities issued to specific work centers using HSMS.
- Track Toxic Release Inventory (TRI) and Hazardous Air Pollutants chemical usage.
- Track costs avoided by the return and reissue of partially used hazardous material containers.
- Coordinate approval of new hazardous materials for use by a Work Center.
- Minimize expired-shelf-life hazardous material disposal by: 1) tracking material shelf life; 2) extending material shelf life as appropriate; and 3) finding offsite users of expired shelf life materials.
- Coordinate with the hazardous waste program manager to recover and reissue (when possible) unopened hazardous materials turned in for disposal by Work Centers.

Public Affairs Officer

- Promote P2 and recycling awareness on base in conjunction with the environmental director, P2 program manager and the solid waste/recycling program manager.
- Quarterly publish work center information and status toward program objectives.
- Regularly (quarterly if possible) recognize work centers with the greatest improvement toward the P2 objectives.

Contracting Officer

- Facilitate coordination between contractors and applicable offices for P2 concerns.
- Ensure that construction and maintenance contracts awarded for work at this Activity incorporate P2 training and awareness for all workers.
- Coordinate with Occupational Safety and Health manager and P2 program manager to ensure that construction contractors recycle construction debris and meet other P2 objectives.

2.3 Roles and Responsibilities for P2 Survey Members

Role of Group Leader

- Act as liaison with the Activity.
- Be lead spokesperson at meetings between the team and the authorities at the Activity.

- Select the survey team members. This is done based on the candidate's knowledge of the Activity and the area of expertise of the team members.
- Be responsible for the provision of information about unique requirements, regulations, and laws affecting the Activity.
- Be responsible for resolving conflicts both within the team and with the Activity personnel.

Role of Team Leader

- Act as lead spokesman for the survey team in each shop visited.
- Serve as representative for the team at meetings with the group leader when it is unnecessary to have the entire group present.
- Be responsible for taking notes about the processes under study. These notes shall be transferred to electronic format at the end of each day.
- Be a problem solver for the team at the shop sites, and be the one to bring problems to the attention of the group leader, when necessary.
- Let the team know what is expected from them.

Role of Team Member

- Be an active participant of the survey team in each shop visited.
- Serve as assistant to the team leader.
- Be supplemental note taker to the team leader. This ensures that important items are not left out of the report.
- Serve as representative at collective meetings of the P2 team as required.
- Contribute to the P2 team for your particular area of expertise and in putting the report together.
- Work the schedule required by the team.
- Fulfill the role required.

Deputy Environmental Director

- Provide the team members and team leader with a copy of all requested plans and permits.
- Be available for questions related to each of the respective media areas.
- Provide the team leader with a list of points of contact for each media area of each shop.
- Guide and escort to facilitate access to shop survey sites.
- Function as lead speaker to introduce the team to the shop foremen.
- Notify the shop areas in advance of planned visits.

3.0 IMPLEMENTATION PLAN

Section 3.0, Implementation Plan shall be used to track metrics and ensure that pollution prevention initiatives in the NAS JRB Fort Worth P2MP are actively pursued and are meeting their objectives. Based on the field survey findings, eight new P2 opportunities were identified. Most of the opportunities are presented in the form of technical initiatives. Five of the initiatives are basewide and three are specific to one or more Work Centers.

Of the nine P2 recommendations listed in the 2003 P2MP, survey data indicated that two of the previous P2 initiatives were implemented, three were partially implemented and four were either not yet implemented or were tried and abandoned. The status of each previous initiative is shown in Table 3-1.

Table 3-1
Status of 2003 P2 Initiatives

Status	2003 P2 Recommendation	Comments and Barriers to Implementation
Partially Implemented	Expand shop towel laundering and absorbent recycling programs	Barrier - identifying a single vendor for all tenants on base.
Implemented	Paint gun washer training or replacement w/inline filtration units	This initiative is fully implemented.
Implemented	Alternative to AFFF for firefighting–Micro-Blaze	The fire department has adopted Micro Blaze to the extent possible.
Not Implemented	Use of bio-diesel	Barrier - locating sources of bio-diesel for use on base.
Not Implemented	Jet fuel reclamation and reuse onsite	Installation does not have filtering system to recycle jet fuel to specifications.
Partially Implemented	Smart Washer, Ozzy Juice for parts washers in lieu of Safety Kleen	Barrier - the cleaning ability of Ozzy Juice for certain kinds of heavy grease and lubricants.
Not Implemented	Spill waste minimization with Imbiber Bead technology	Barriers - cost and not well accepted by Work Centers.
Not Implemented	Super flight line electrical distribution system	Barriers - included short electrical cord length of units and need to store and manage cords
Partially Implemented	Hydraulic fluid recyclers	Implemented at Work Centers and tenant commands where economically feasible.

Notes:
AFFF = aqueous film forming foam

Sections 3.1 to 3.8 outline the new and retained programmatic and technical initiatives recommended for the 2006 P2MP. Table 3-2 includes the objective of each initiative, and the environmental media area(s) affected by each initiative.

The Implementation Plan also presents the following information for each programmatic or technical initiative to be implemented:

- Objective
- Metric used to measure success and the format in which to present the data

- Work centers affected
- Detailed description
- POA&M detailing the action that is to occur, personnel responsible for the action, estimated start and completion dates for each action

Table 3-2
PROGRAMMATIC INITIATIVE AND TECHNICAL OBJECTIVES

	Initiative	Objective	HAZMAT	Water Usage Wastewater Generation	Air Emissions	Solid Waste	Hazardous Waste	Resource Conservation
Programmatic /Technical Initiatives	3.1 Implement Basewide rag laundering program.	Reduce rag solid and hazardous waste stream. Conserve resources.				✓	✓	✓
	3.2 Reassignment and repair of PPEP and P2 Equipment.	Multimedia impact described in Initiative.	✓	✓	✓	✓	✓	
	3.3 Procure alternative fuel forklifts through attrition.	Reduce air emissions and solid and hazardous waste.			✓	✓	✓	✓
	3.4 Replace gasoline fueled pickups with hybrid pickups through attrition.	Purchase hybrid pickups to replace gasoline powered pickups as needed.			✓			✓
	3.5 Purchase a filter crusher.	Purchase and install a filter crusher at AIMD 900.	✓			✓	✓	✓
	3.6 Expand lubricant analysis program.	Use Marine's lubricant analysis program as a model and expand to other work centers on base.	✓			✓		✓
	3.7 Utilize rechargeable flashlights.	Utilize rechargeable flashlights in work centers and tenant commands with 100 or more flashlights	✓			✓	✓	✓
	3.8 Sort and recycle plastic and aluminum cans	Reduce solid waste by recycling. Derive funding for Recycling Center by selling materials.				✓		✓

Notes:

AIMD = Air Intermediate Maintenance Detachment

Shaded boxes indicate that a media is impacted by the initiative.

3.1 Implement Basewide Rag Laundering Program

Objective

- Reduce volume of hazardous waste by laundering rags instead of incinerating.
- Reduce volume of nonhazardous waste by laundering rags instead of incinerating.
- Conserve resources through reuse instead of incineration (recycle).

Work Centers Affected

Basewide

Project Description

Based on discussions with base personnel, and review of the 2003 P2 Plan Update, NAS JRB Fort Worth oily rag generation has increased from approximately 30,000 pounds in 1999 to approximately 45,000 pounds in 2005.

Currently, NAS JRB Fort Worth only launders a portion of the shop towels used in its work centers. Based on the 2006 P2 field survey, 49 of the 105 work centers (47%) participated in a rag laundering program. However, the work centers (and associated tenant commands) that laundered rags managed their own laundering programs. Laundered rags are obtained primarily from Aramark.

Work centers that do not launder rags obtain them from Supply and dispose of them through Environmental as a low-grade fuel. This includes approximately 45,000 pounds of non-hazardous waste rags and 524 pounds (2005 State of Texas Electronic Environmental Reporting System Report) of hazardous waste rags. Laundered rags would be reused, which is a preferred method of pollution prevention.

Use of a laundry service that provides an inventory of rags is recommended. Advantages of such a service would be a higher and more consistent quality of rags, availability of white or red rags from one vendor, and the reduction of a waste stream. In addition, the selected vendor recycles its rag cleaning solvent. Waste oils laundered from the rags are also recycled as low-grade fuel thus allowing NAS JRB Fort Worth to utilize a “Green” vendor.

If the use of a rag service is selected, the service provider recommended for this contract is Brent Industries, Inc. Brent Industries provides rag recycling service for Dobbins Air Force Base, Robbins

Air Force Base, and several Missouri and Texas Air National Guard facilities. Brent Industries' plant for recycling rags is in Bartlesville, Oklahoma, and can provide a quick turnaround time for NAS JRB Fort Worth. The cost for an initial 10,000-rag inventory is $1,785. This price includes 10,000 rags at a price of $175 per thousand and a $35 delivery fee. Rags are delivered in 55-gallon drums, eliminating the need for NAS JRB Fort Worth to purchase drums for storage at work centers or to return them to Brent. Laundering is included in the $175/1,000 rags price. Rag management costs are nearly identical; $1.59/lb for laundering versus $1.53/lb for incineration. A breakdown of costs and a life cycle costs analysis for this initiative is presented in Appendix G.

It is recommended that HAZMINCEN be the account manager for this project and be the turn-in and issue point for the rest of the Activity. With one organization responsible for this project, the contract cost can be reduced by managing only one contract, by reducing the number of stops that Brent Industries will have to make on base (1 versus 100+), and an accurate inventory of rags can be maintained.

The vendor identified for this initiative is:

Brent Industries
Bartlesville, Oklahoma
Mr. Isidro Rey
(800) 725-4568

Regulatory Driver

RCRA 40 CFR 261/262
OPNAVINST 5090.1B, CH-4, Chapter 14
Executive Order 13101

Metric and Tracking

Metrics for this initiative include tracking work centers using the laundering service and quantities of solid and hazardous waste rags incinerated. As more work centers use the laundering program, pounds of incinerated rags will be reduced.

PLAN OF ACTION

Action	Responsibility	Estimated Start	Completion Date	Notes
Review Navy rag contract	Contracting	January 2007		
Estimate cost and budget	P2 Program Coordinator	April 2007		
Award contract and implement initiative	Contracting	July 2007		
Evaluate minimization	P2 Program Coordinator	March 2008		One evaluation in March and one in September

Expected Progress Collect, Clean, and Reuse Contaminated Rags

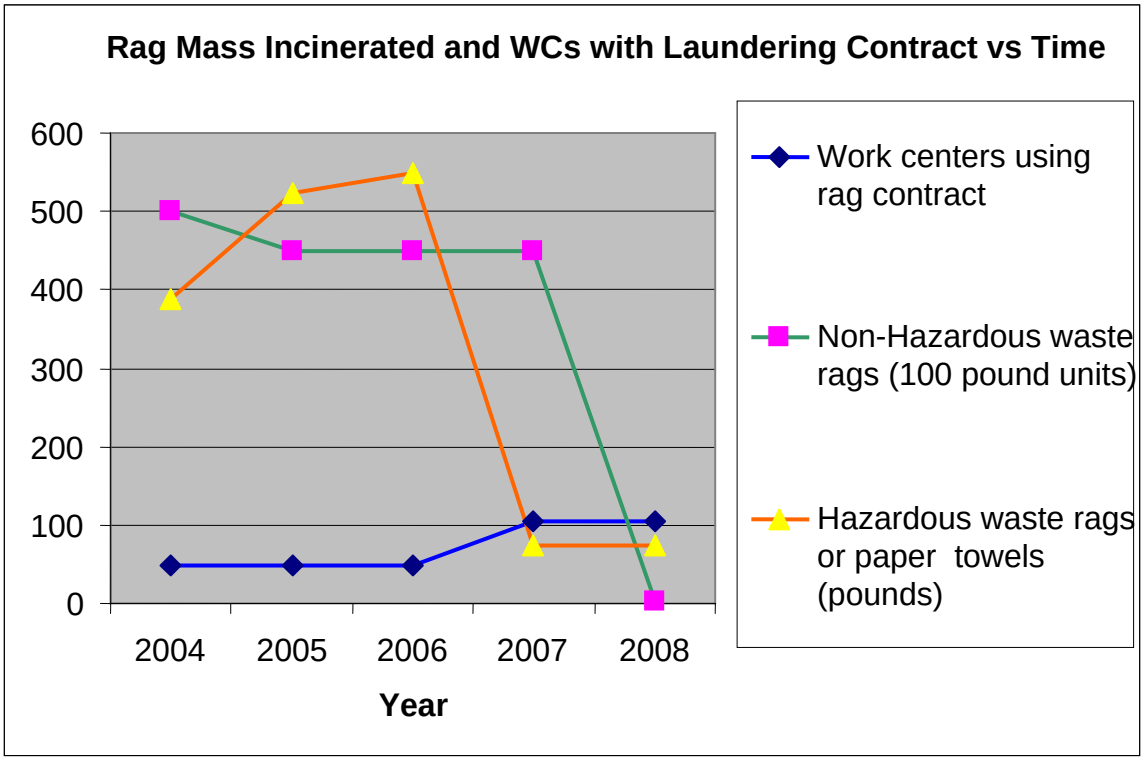
The goal of this initiative is to have all work centers using a rag laundry service by 2008.

The objective of this initiative is to reduce the cost to manage nonhazardous and hazardous oily rags and minimize paper towel use. Rags that are laundered by a qualified laundry service that discharges wash water to a publicly owned treatment works are exempt as a hazardous waste.

This metric is intended to track quantities of nonhazardous and hazardous waste rags incinerated as more work centers use rag laundry contracts.

Expected Outcome for Initiative 3.1

Year	Number of work centers using a rag laundry contract	Nonhazardous waste rags incinerated (100 pound units)	Hazardous waste rags incinerated (pounds)
2004	49	500	387
2005	49	450	524
2006	49	450	550
2007	105	450	75
2008	105	3	75



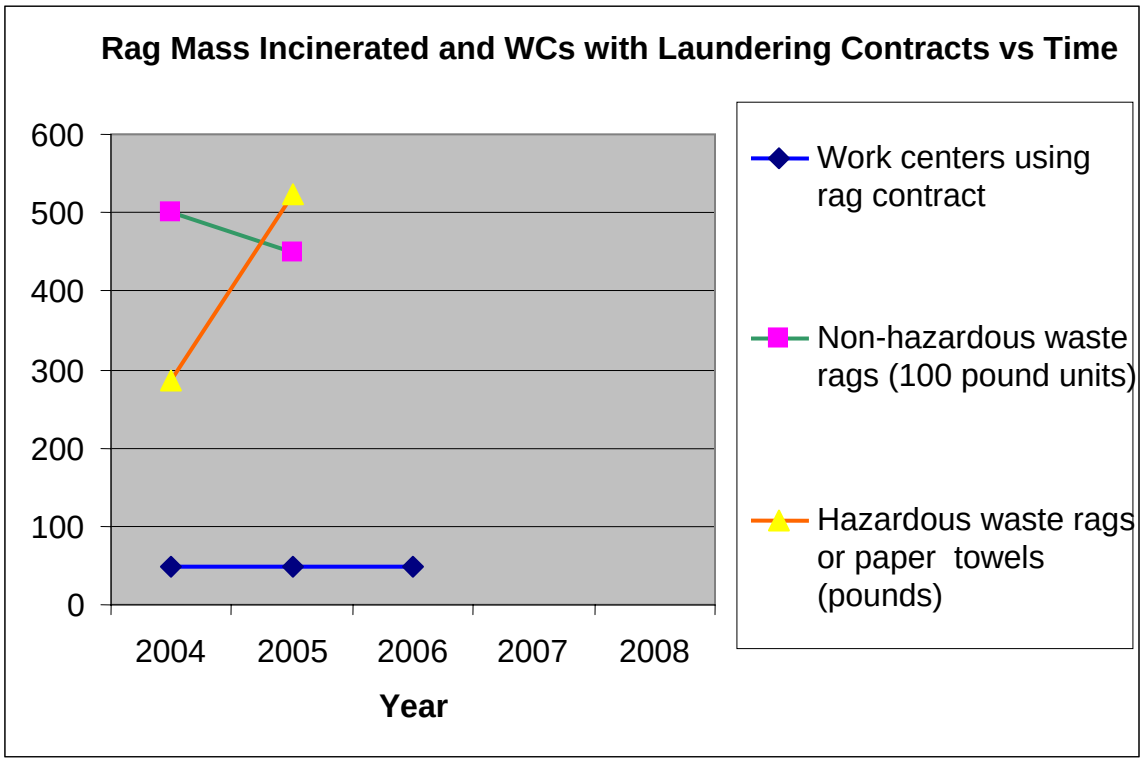
Actual Progress Collect, Clean, and Reuse Contaminated Rags

The goal of this initiative is to have all work centers using a rag laundry service by 2008

The objective of this initiative is to reduce the cost to manage nonhazardous used rags and minimize hazardous waste rag or paper towel use. Rags that are laundered by a qualified laundry service that discharges wash water to a publicly owned treatment works are exempt as a hazardous waste.

This metric is intended to track quantities of hazardous waste rags disposed as more work centers use rag laundry contracts.

Year	Number of work centers using a rag laundry contract	Nonhazardous waste rags (100 pound units)	Hazardous waste rags or paper towels (pounds)
2004	49	500	287
2005	49	450	524
2006	49		
2007			
2008			



3.2 Reassignment or Repair of PPEP and P2 Equipment

Objectives

- Minimize compliance points that generate hazardous waste.
- Reduce water usage.
- Reduce volume of petroleum based parts cleaning solvents being managed.
- Reduce air emissions by reducing the number of solvent washers.
- Reduce the quantity of solvent being managed.
- Avoid costs for new equipment purchases.
- Save time by utilizing equipment already on base.

Work Centers or Tenants Affected

AIMD 910	AIMD 930	AIMD 413
AIMD 920	AIMD 950	AIMD 51B
AIMD 530	MAG41 (VMGR 234)	AAFRESMUN
AAFRESNDI	MAGATCM	
VMGR	DynCorp	

Project Description

A number of pieces of PPEP and P2 equipment that were not being used were identified during the site survey. Equipment was not being used primarily because work centers had eliminated the need for it or because it was inoperable. The initiative entails reassigning or repairing PPEP or P2 equipment to obtain use from it.

This initiative lists PPEP or P2 equipment that was not being used. It also lists the location of the equipment, the type and model (if available) of an alternate site for its use, and the area of savings/reduction.

Regulatory Driver

RCRA [40 CFR 262.11, 262.34]

Table of PPEP and P2 Equipment Not Being Utilized

Equipment	Brand/Model	Location	Reason not being used	Alternative Work Center (WC)	P2 Media
Aqueous Parts Washer	Best Engineering	AIMD 413	Using other parts washer		Haz Waste reduction
Aqueous Parts Washer	Tornado	AIMD 413	Using other parts washer		
Aqueous Parts Washer	Smart Washer	MWSS	Not needed		Haz Waste
Recycling wash rack	N/A	AIMD 900	Inoperable	N/A	Wash water reduction
Recycling wash rack	N/A	AFRESMUN	Inoperable	N/A	Wash water reduction
Paint Gun Cleaning Machine	Unknown	DynCorp	Inoperable	AIMD 51B	Haz Waste reduction
Paint Gun Cleaning Machine	UniRam	VMGR 234 12C	Not Implemented	N/A	Haz Waste Reduction
Paint Stripper with Solvent Recycle Capability	Unknown	AIMD 51B	Personnel Lack Training	N/A	Haz Waste Reduction
Water treatment unit (NDI)	RGF	AIMD 530	Inoperable	AIMD 530 AFRESNDI	Waste water reduction
Antifreeze Recycler	DMI PN 5514	MACS24	Not Implemented	AFRESLGTM	Nonhaz Waste Reduction

Discussion

A. **Aqueous Parts Washer** AIMD 413 currently has three parts washers. The work center (WC) is using a parts washer that contains Eversolv 143, a petroleum-based parts cleaner. The WC could use one of the two hot water parts cleaners (Best Engineering and Tornado) and eliminate the petroleum solvent. The remaining aqueous parts washer could be reassigned to another work center that also uses a petroleum-based solvent washer.

B. **Recycling Wash Rack** AIMD 900 has a wash rack that recycles water. According to WC personnel, the wash rack is inoperable. As a result, parts and equipment are being taken to the wash rack at VMFA 112. This activity adds labor and fuel costs to the AIMD 900 operation and generates wastewater that could be recycled. The wash rack at AIMD should be evaluated and repaired.

C. **Recycling Wash Rack** AFRESMUN has a wash rack that recycles water. According to WC personnel, the wash rack is inoperable. As a result, trailers and other equipment are washed at the TANG wash rack next door. Although TANG is close to the AFRESMUN operation, wastewater is being generated and not recycled. The wash rack at AFRESMUN should be evaluated and repaired.

D. **Paint Gun Cleaner** DynCorp has a high-volume, low-pressure paint gun cleaning machine that is not being used. The 2003 P2 Plan Update recommended properly installing the machine and training DynCorp personnel on its use to prevent hand cleaning and reduce solvent use and air emissions. Since DynCorp is a contractor, procurement factors would have to be considered prior to authorizing training.

   If DynCorp is not going to utilize the paint gun cleaning machine, it should be reassigned to AIMD 51B. AIMD 51B indicated an interest in a paint gun cleaner during the site survey.

E. **Paint Gun Cleaning Machine** The VMGR 234-12C work center has a UniRam paint gun cleaning machine. The equipment is installed and provided with electrical power, but it is not being used. Barriers to using the equipment should be investigated and resolved and the machine put into use.

F. **Paint Stripping Unit with Tank** Work center AIMD 51B has a paint stripping unit equipped with a tank. The stripper unit is not being used due to lack of training for work center personnel. Work center personnel should be trained on use of the equipment.

G. **NDI Water Treatment Unit** AIMD 530 has an RGF water treatment unit on its fluorescent penetrant unit. The water treatment unit is not operable; therefore AIMD 530 is using field methods in the shop. On occasion, AIMD 530 sends large parts to AFRESNDI, 3/8-mile distance, for fluorescent penetrant inspection. In addition, AFRESNDI is outside the security fence of the runway area and AIMD530 is inside the security fence.

AFRESNDI personnel have expressed an interest in acquiring a water treatment unit for their fluorescent inspection operation. Currently, this WC drums its water and penetrant mixture from their tank and disposes of approximately 450 gallons per year.

Repair and recertification of the RGF unit and training of personnel at AIMD 530 would accomplish two tasks. First, AIMD 530 would be able to operate their fluorescent penetrant unit and not rely on field techniques. Second, AFRESNDI could continue to drum their penetrant/water mixture, but could take it to AIMD 530 quarterly and clean the penetrant from the penetrant/water mixture. The clean water could be discharged to the sanitary sewer at AIMD530 or returned to AFRESNDI for reuse thus reducing waste disposal. Since the used penetrant is not a hazardous waste, the water would not be “treated” according to RCRA.

H. **Antifreeze Recycle** MACS24 has an antifreeze recycler equipped with a triple filtration system. The work center has not used the system due to the small quantities of antifreeze processed. This unit could be relocated to the AFRES LGTM work center and used to recycle antifreeze in the vehicle maintenance shop.

I. **Additional Equipment** Additional PPEP equipment identified during the site survey as not being utilized includes the following:

A. **SmartWasher** aqueous parts washer at MWSS
B. **Refrigerant Recycler** at AIMD 900
C. **Refrigerator for Adhesives** at AIMD 51A

The P2 Program Manager should keep a list of PPEP or other P2 equipment that is not utilized. As requests for equipment are made or equipment needs are noted, the P2 Program Manager should check the list against the list of on-base equipment. This would avoid costs associated with equipment purchase.

Metric and Tracking

No metric developed for this initiative.

PLAN OF ACTION

Action	Responsibility	Estimated Start	Completion Date	Notes
Obtain approval to reassign or repair PPEP or P2 equipment.	P2 Program Coordinator	Jan. 2007		Implement based on schedule to meet work center needs.
Instruct tenants and shop personnel to reassign or repair PPEP or P2 equipment.	Tenant HAZMAT Coordinator and shop personnel	Dec. 2008		
Inspect to verify equipment usage.	P2 Program Coordinator	Jan. 2009		Inspect at intervals based on equipment reassignment and repair schedule.

3.3 Procure Alternative Fuel Forklifts Through Attrition

Objective

This objective supports the goal of reducing air emissions by replacing gasoline and diesel forklifts with propane forklifts, which operate cleaner. An added benefit of this objective will be cleaner indoor air at warehousing locations on base, and reduced fuel costs.

Work Centers Affected

Basewide

Project Description

NAS JRB Fort Worth operates 104 General Services Administration (GSA) vehicles which include forklifts. Forklifts at NAS JRB Fort Worth are fueled by battery, gasoline, or diesel.

This initiative implements the use of alternatively fueled propane forklifts. The U.S. Department of Energy (USDOE), its national laboratories and the domestic transportation industry are partnering to develop advanced transportation technologies and alternatively fueled vehicles (AFVs) for the public. Technologies such as nickel-hydride batteries, nitrogen oxides reduction technologies, and other transportation technologies have begun to help the Unites States decrease its use of petroleum fuels. The USDOE classifies the following fuels as alternative fuels: bio diesel, electricity, ethanol, hydrogen, methanol, natural gas (compressed and liquefied), propane (liquefied and petroleum gas), and solar energy. Using these alternative fuels can significantly reduce toxic compounds and particulates released to ambient air, and vastly improve overall air quality.

The preferred method is to replace nonelectric forklifts with leased propane-fueled forklifts. Forklifts should be replaced through attrition. Attrition assumes that the current forklifts will have no residual value when replaced.

Forklifts can be leased on an annual basis. According to the National Propane Gas Association, propane costs about $1.10 per gallon which is 60% less than the approximate cost of gasoline (e.g., $2.72 per gallon). Fuel distributors will set prefabricated fuel cylinder racks at no cost.

One forklift distributor noted that maintenance costs for propane-fueled forklifts should be about 50% less than for gasoline or diesel forklifts. The service life of a propane-fueled forklift is expected to be 2-3 years longer than for gasoline or diesel forklifts. Furthermore, propane

eliminates any of the engine problems associated with carbon fouling, and a propane engine does not require a fuel filter.

Appendix G contains a life cycle cost analysis for this technical initiative and indicates that a cost avoidance of $471 per year per unit will be realized from the use of propane-fueled forklifts over gasoline-powered forklifts.

One vendor identified for this initiative is:
Sunbelt Industrial Trucks
1716 Terra Colony Court
Dallas, Texas 75212
(214) 819-4180
Mr. Ted Swinford

Regulatory Driver

Executive Order 13149

OPNAVINST 5090.1B

Metric and Tracking

Track number of propane forklifts versus forklifts powered by other means.

PLAN OF ACTION

Action	Responsibility	Estimated Start	Completion Date	Notes
Determine number of gasoline and diesel forklifts on base.	P2 Manager	Oct. 2006		
Work with Contracts to specify propane forklifts for future leases.	P2 Manager	Dec. 2006		
Identify propane forklift vendor.	Contract Manager	Dec. 2006		
Begin leasing propane forklifts.	Contract Manager	March 2007		

3.4 Procure Hybrid AFV Pickups Through Attrition

Objective

Reduce fuel consumption and air emissions by replacing gasoline-powered light-duty pickups with hybrid twins.

Work Centers Affected

Basewide

Project Description

In compliance with the Energy Policy Act and EO 13149, the Navy has been placing AFVs at Activities that have 100 or more light duty vehicles. The USDOE, its national laboratories, and the domestic transportation industry are partnering to develop advanced transportation technologies and AFVs for the public. Technologies such as nickel-hydride batteries, nitrogen oxides reduction technologies, and other transportation technologies have begun to help the United States decrease its use of petroleum fuels. The USDOE classifies the following fuels as alternative fuel: bio diesel, electricity, ethanol, hydrogen, methanol, natural, gas (compressed and liquefied), propane (liquefied petroleum gas), and solar energy. Using these alternative fuels can significantly reduce toxic compounds and particulates released to ambient air and vastly improve overall air quality.

The recommended initiative is to purchase light-duty hybrid pickups. The Chevrolet Silverado 1500 is available as a hybrid and is called the Chevrolet Silverado C15. The C15 averages 18 miles per gallon in the city and 21 miles per gallon on the highway according to the U.S. Environmental Protection Agency (USEPA) Model Year 2006 Fuel Economy Guide. Fuel usage cost is reduced from $1,835 per year for the gasoline model to $1,736 per year for the hybrid model. According to one dealer, vehicle life is anticipated to extend beyond the current 7 years to 7.5 years for the hybrid pickup.

Appendix F provides a life cycle costs analysis for this technical initiative. A cost avoidance of $317 per year is realized over the lifetime of the vehicle, which offers a payback on investment of 3.98 years.

One vendor was identified for this initiative:

Graff Chevrolet
1400 East Main
Grand Prairie, Texas 75050
(972) 343-1422
Mr. James Powell

Regulatory Driver

Executive Order 13149

Metric and Tracking

No metric developed for this initiative.

PLAN OF ACTION

Action	Responsibility	Estimated Start	Actual Completion	Notes
Determine number of gasoline and diesel pickups on base.	P2 Manager	Jan. 2007		
Work with Contracts to specify hybrid pickups for future leases.	P2 Manager	March 2007		
Identify hybrid pickup vendor.	Contract Manager	July 2007		
Begin purchasing hybrid pickups.	Contract Manager	Dec. 2007		

3.5 Purchase An Oil Filter Crusher for TANG

Objective

Reduce solid waste by maximizing the number of oil filters in a drum for offsite recycling. Reduce liquid waste in oil filter drums by draining and pressing oil out of filter material.

Work Centers Affected

TANG 244 Phase Dock
TANG AGE

Project Description

Acquire Oberg oil filter crusher for TANG operation. TANG 244 is in Building 1676 and TANG AGE is in Building 4160. The two buildings are across Taxiway 194 from each other and could easily share a crusher.

The Oberg P-300L filter crusher retails for $6,595, but is available on GSA contract GS-07F-9984H for approximately $3,319.

Oil filter crushers are identified as P2 equipment. Filter crushers allow work center personnel to place three to four times the number of filters in a drum as compared to uncrushed filters. Oil filter recycling vendors charge for services based on drum weight, not by individual drum. NAS JRB Fort Worth would realize a reduction in the number of drums purchased for filter recycling by three or four times. In addition, filter crushers remove and store excess oil from the filters, minimizing the weight of each drum and avoiding cost. This cost avoidance increases when oils are picked up by recyclers that pay for used oil.

One vendor was identified for this initiative:
Oberg Industries
(800) 848-8228
GSA Contract: GS-07F-9984H

Regulatory Driver

Executive Order 13148
OPNAVINST 5090.1B

Metric and Tracking

No metric was identified for this initiative.

PLAN OF ACTION

Action	Responsibility	Estimated Start	Actual Completion	Notes
Identify vendor	P2 Manager	Jan. 2007		
Obtain funding	P2 Manager	July 2007		
Order equipment	Contract Manager	Sept. 2007		
Accept delivery of equipment	Contract Manager	Dec. 2007		

3.6 Expand the Lubricant Analysis Program

Objective

Reduce used oil, oil filters, new oil consumption, and labor for lubricant change out by reducing the frequency of oil changes.

Work Centers Affected

Work centers that use heavy equipment, forklifts, small tractors, and Ground Support Equipment cars.

Project Description

The P2 Plan 2003 Update included an initiative to start a lubricant analysis program. One work center, MWSS473, was identified during the 2006 site survey as participating in a lubricant analysis program. The MWSS473 program can be used as a model to expand the program basewide. In a lubricant analysis program, testing is used to determine lubricant effectiveness. Samples of lubricant are collected and can be analyzed in the field. Another option is to send samples to a laboratory for testing and analysis. Laboratory testing and analysis eliminates the need to purchase equipment and train personnel. However, off-base lab testing can require up to two weeks lead time.

Equipment that could qualify under this program includes cars, pickup trucks, heavy equipment, forklifts, and generators. It is estimated that a 50% reduction in used oil, used filters, replacement oil, and oil change labor would occur.

Appendix G includes a life cycle cost analysis for lubricant testing and analysis.

Vendors identified for this technical initiative include:

Predict Technologies
9555 Rockside Road
Suite 350
Cleveland, OH 44125
(800) 543-8786

Halliburton NUS
5909-C Hampton Oaks Parkway
Tampa, FL 33610

Regulatory Driver

OPNAVINST 5090.1B

Metric and Tracking

No metric developed for this initiative.

PLAN OF ACTION

Action	Responsibility	Estimated Start	Completion Date	Notes
Review lubricant analysis program at MWSS473.	P2 Program Manager	July 2007		
Arrange for lubricant analysis testing to begin basewide.	P2 Program Manager	Sept. 2007		
Train work center personnel on new process.	P2 Program Manager, Vendor	Nov.2007		
Implement new program.	P2 Program Manager	Jan. 2008		
Review implementation and obtain feedback from work center personnel.	P2 Program Manager	July 2008		
Develop lessons learned.	P2 Program Manager	July 2008		

3.7 Use Rechargeable Flashlights

Objective

Use rechargeable flashlights in tenant commands or large work centers to reduce battery (universal) waste stream, reduce solid waste stream through equipment longevity, and provide cost avoidance for equipment.

Work Centers Affected

Activity work centers and/or tenant commands that utilize 100 or more flashlights

Project Description

Acquire rechargeable flashlights for large work centers or tenant commands that use 100 or more flashlights. During the field survey, two or three D-cell flashlights were observed in tool boxes. Replacement flashlights can be stored in work center tool rooms on chargers, similar to radios, hand tools, and field equipment. Therefore, the replacement rate should be three rechargeable flashlights per 20 low-quality individual flashlights. Flashlights are currently obtained through supply, and batteries are obtained from HAZMINCEN. Used alkaline batteries are exchanged 1 for 1 from the tool room when flashlights are reloaded.

One vendor offers high-quality rechargeable flashlights that routinely have an operational life of 10 years. Low-quality flashlights observed at many work centers at NAS JRB Fort Worth have operational lives of approximately one year.

Rechargeable flashlights use Ni-Cad batteries with operational lives of two to three years, while D-cell alkaline batteries usually last 1.5 months. Therefore, one Ni-Cad battery will be generated as waste every 2.5 years while 20 D-cell alkaline batteries will be generated from an equivalent (two-cell) flashlight during the same time period.

Regulatory Driver

Executive Order 13148
OPNAVINST 5090.1B

Metric and Tracking

The objective of this initiative is to reduce alkaline battery waste and solid waste (used flashlights) and avoid disposal and administrative costs. Progress toward this objective may be monitored by periodically tracking alkaline battery purchases. No formal metric was developed for this initiative.

PLAN OF ACTION

Action	Responsibility	Estimated Start	Completion Date	Notes
Identify tenant commands or work centers that utilize 100 or more flashlights.	P2 Program Manager	July 2007		
Identify and contact vendor that can provide high-quality rechargeable flashlights.	P2 Program Manager	Oct. 2007		
Obtain pricing from vendor and determine replacement schedule for eligible tenant commands and work centers.	P2 Program Manager & Contracting Manager	Jan. 2008		
Order and supply rechargeable flashlights to tenant commands or work centers.	Contracting & Supply Managers	May 2008		

3.8 Sort and Recycle Plastic and Aluminum Cans

Objective

Divert recyclable plastic and aluminum cans from disposal.

Work Centers Affected

Basewide

Project Description

The Recycle Center currently sorts, stores, and markets cardboard, office paper, wooden pallets, and metal. In addition, the center grinds yard waste into landscape mulch for use on base. This initiative adds plastic and aluminum to the compliment of already recycled materials. Site survey results indicate that only 33% (1 in 3) of work centers recycled aluminum food and drink containers. Very few work centers were observed recycling plastic. Solid waste diversion will be increased by including these two easily captured materials.

The P2 program manager shall work with Recycle Center personnel and the recycle contractor to: a) promote plastic and aluminum can recycling on base, and b) provide recycle bins for plastic and aluminum cans, if necessary. A promotional flyer from the Naval Construction Battalion Center (NCBC) Gulfport P2 Plan was modified and is included in this initiative. Promotional and general information can also be accessed on the following Web sites:

- http://www.texasrecyclesday.org
- http://www.p2.org/p2week/index.cfm
- http://p2library.nfesc.navy.mil/P2_Opportunity_Handbook/7_I_A_7.html
- http://p2library.nfesc.navy.mil/P2_Opportunity_Handbook/7_I_A_2.html

Recycling can be promoted on specified “environmental days” like Texas Recycles Day on November 15 each year and National Pollution Prevention Week, which occurs during the third full week of September each year.

Areas of high personnel density should be targeted for this initiative. These areas include bachelor quarters, work centers, base offices, recreational facilities, on-base restaurants, etc. Recycle Center personnel already make rounds picking up recyclables from these areas and could easily include one or two extra bins at selected locations.

Regulatory Driver

Executive Order 13101

OPNAVINST 5090.1B, CH- 4, Chapter 14

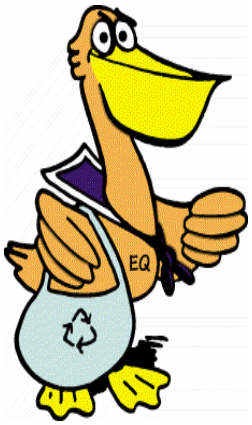
Metric and Tracking

Since plastic and aluminum do not require sorting, the metric of tracking tons of solid waste recycled and tons of solid waste disposed may be used. However, it must be noted that although they are relatively valuable, these two materials may only increase recyclable solid waste by 1%. An alternative metric would include sorting these materials at the recycle center, which would allow the P2 program manager to track diversion more closely.

PLAN OF ACTION

Action	Responsibility	Estimated Start	Actual Completion	Notes
Request additional recycle bins from contractor.	P2 Program Coordinator	Jan. 2007		
Produce and distribute pamphlets, write article for base newspaper promoting program.	P2 Program Coordinator	May 2007		
Distribute recycle bins	Recycle Center Personnel	Aug. 2007	Ongoing	
Document increased waste diversion (P2ADS).	P2 Program Coordinator	Aug. 2007	Ongoing	P2 Program Manager may opt to sort materials at recycle center at selected periods of time or on a routine basis to track increases or decreases in diversion of these materials.

Recycling Facts



Aluminum

- Producing a can from recycled aluminum saves 95% of the energy required to make a new can from raw materials. This is enough energy to run a TV for three hours.
- Four pounds of ore are saved for every pound of aluminum recycled.
- Enough aluminum is thrown away to rebuild our commercial air fleet four times every year.

Plastic

- Plastic milk containers are now only half the weight that they were in 1960.
- If we recycled every plastic bottle we used, we would keep 2 billion tons of plastic out of landfills.
- According to the USEPA, recycling a pound of plastic saves approximately 12,000 British thermal units.
- We use enough plastic wrap to cover all of Texas every year.

4.0 PROJECT FUNDING

Section 4 details how funding may be obtained to execute projects detailed in the Implementation Plan, Sections 3.1 - 3.8.

P2 funding sources at NAS JRB Fort Worth vary due to multiple branches of the armed services being represented on base. As host branch, the Navy is the primary source of P2 funding for itself, TANG, and the Marine Corps. The Air Force funds projects for AFRES.

The primary source of funding will be the Navy PPEP and the EPR system. In the past, funding has also been obtained from the OMNR. Figure 4.1 is a flow chart illustrating how funding may be obtained through these programs. PPEP funds P2 equipment and installation only and will not fund other improvements such as electrical service or building upgrades/changes (site preparation) that are sometimes needed to facilitate installation and implementation of new equipment. Site preparation costs must be funded through other sources such as EPR, OMNR, and maintenance ("special project") resources, or, in extreme cases, Military Construction (MCON) programming. In some circumstances, availability of PPEP resources can be contingent on receiving EPR or other funding to provide a complete and usable product.

PPEP is a centrally funded Navy program that procures, delivers, and installs P2 equipment at Navy shore activities (NSA). PPEP equipment has been tested and approved for Navy use and equipment available through PPEP can be requested in accordance with Chief of Naval Operations (CNO) instructions for acquisition and delivery by central procurement agents (i.e., NSA does not have to get resources or perform the acquisition for equipment approved through the PPEP). Information on the PPEP is available online at http://www.lakehurst.navy.mil/p2/index.htm. Details of funding and PPEP guidance are in the Standard Operating Procedure linked to the previous site and are also available online at http://www.lakehurst.navy.mil/p2/pdf/ppep_flowchart.pdf. A printed copy is provided at the end of this section.

Guidance on how to submit PPEP equipment requests is sent out annually by N451 in November and equipment requests from claimants are due by the following February 15 . These requests cover the next four years. The NAS JRB Fort Worth P2 program manager will coordinate all PPEP funding requests. Each branch, Navy tenant, and department should draft PPEP requests and submit drafts via the chain of command to the NAS JRB Fort Worth P2 program manager by mid-January of each year. A brief report summarizing the need for the project and the anticipated benefits should be submitted with each request from a department or tenant. A return-on-investment calculation should also be submitted summarizing the anticipated financial benefit. The P2 program manager will prioritize requests such that NAS JRB Fort Worth can submit the PPEP

request in accordance with the CNO's guidance. Notification of equipment approvals is provided in June. After the equipment is delivered and installed, the receiving department or tenant should provide input to the NAS JRB Fort Worth P2 program manager so that he/she can provide annual follow-up to the PPEP regarding the realized benefit and viability of the equipment.

The PPEP pays for equipment and installation. However, it does not pay for site preparation or maintenance of the equipment. Site preparation must be paid for out of Other Procurement—Navy (OPN) funding, and operation and maintenance must be paid for out of OMNR funding. In addition, all P2 initiatives that are not equipment related must be paid for out of OMNR funding.

P2 project funding requests for the next 2 to 4 years are tracked through the EPR system. The EPR system is at http://www.eprweb.navy.mil and can only be accessed through a secure Navy Internet connection. After the NAS JRB Fort Worth P2 program manager has identified, evaluated, and approved a P2 project, it is entered into the EPR system and given an EPR number. The funding request is then reviewed by the environmental director, commander of the Naval Reserve Force Command, and CNO for approval using the EPR system. An "EPR Guidebook" is available to assist with data entry and protocol for using the system. Status of project funding can be monitored through the EPR system. The user must update the EPR system to indicate that the project has been completed once funding is approved and implemented.

Typically, EPRs for new requirements must be submitted at least three years (current fiscal year plus two) prior to the anticipated need for the resources. Resource requirements that are more urgent generally require identification over less critical projects (with programmed funding) to serve as offsets. If no such sacrificial projects are available within NAS JRB Fort Worth, the Commander, Naval Reserve Forces (CNRF) will determine whether resources can be made available from resources originally programmed for another installation within the CNRF area of responsibility. If a requirement is critical and cannot be met by funds available within the region, the major claimant will examine funding priorities across its entire area of responsibility; persistent critical requirements can be elevated to the CNO for worldwide funding priority consideration. The level of scrutiny and demand for detailed supporting information typically increases with each escalation in command level at which resources must be sought.

In general, funding must be sought via the correct avenue for a particular purpose. MCON Funds are for projects costing $1 million or more and must be individually approved by congressional action. The initiation of an MCON project begins about five years before construction, with Activity preparation of a 1391 project form for submittal through Southern Division, Naval Facilities Engineering Command (NAVFAC EFD SOUTH) (or the form can be developed with assistance of Southern Division). Construction requirements less than MCON scope do not require specific line-

item congressional approval and can be funded as special projects, with less elaborate documentation requirements, developed through coordination with NAVFAC EFD SOUTH or the Public Works Center. Individual items of equipment costing $20,000 or more (unit price) must seek OPN funding via the owning Activity's chain of command. Small projects not fitting the other (more constrained) categories may seek funding through the Activity's OMNR budget over which the Activity's CO has significant discretionary control. PPEP equipment requests serve as a basis for centralized funding and acquisition without distribution of financial resources to the Activity level. Projects other than for such equipment (including those for necessary site preparation to accommodate PPEP equipment needs) submitted through the EPR system are generally for increases to the requesting Activity's OMNR account.

P2 Funding Flow Chart

Figure 4.1

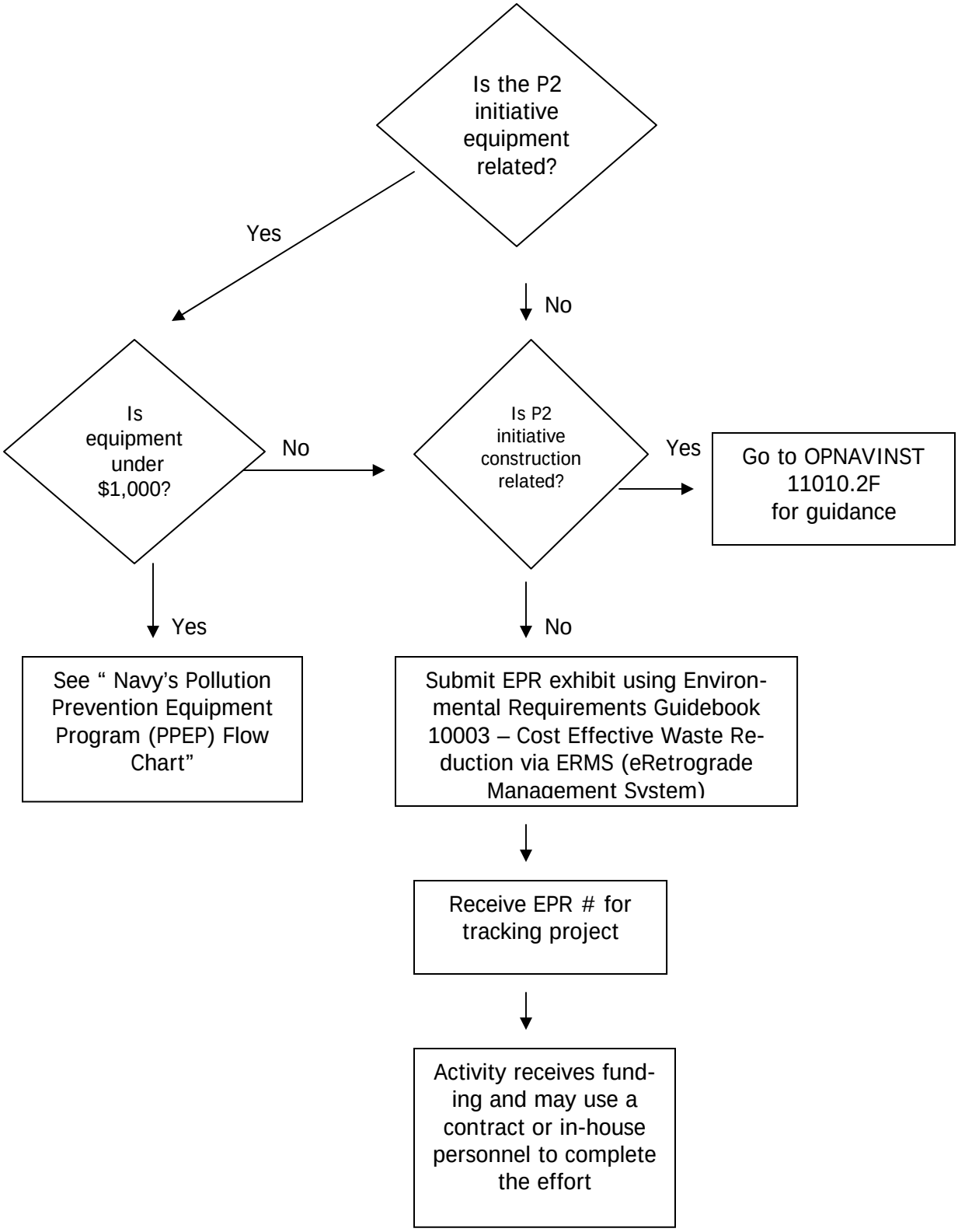


Figure 4-2
Navy's Pollution Prevention Equipment Program (PPEP) Flow Chart

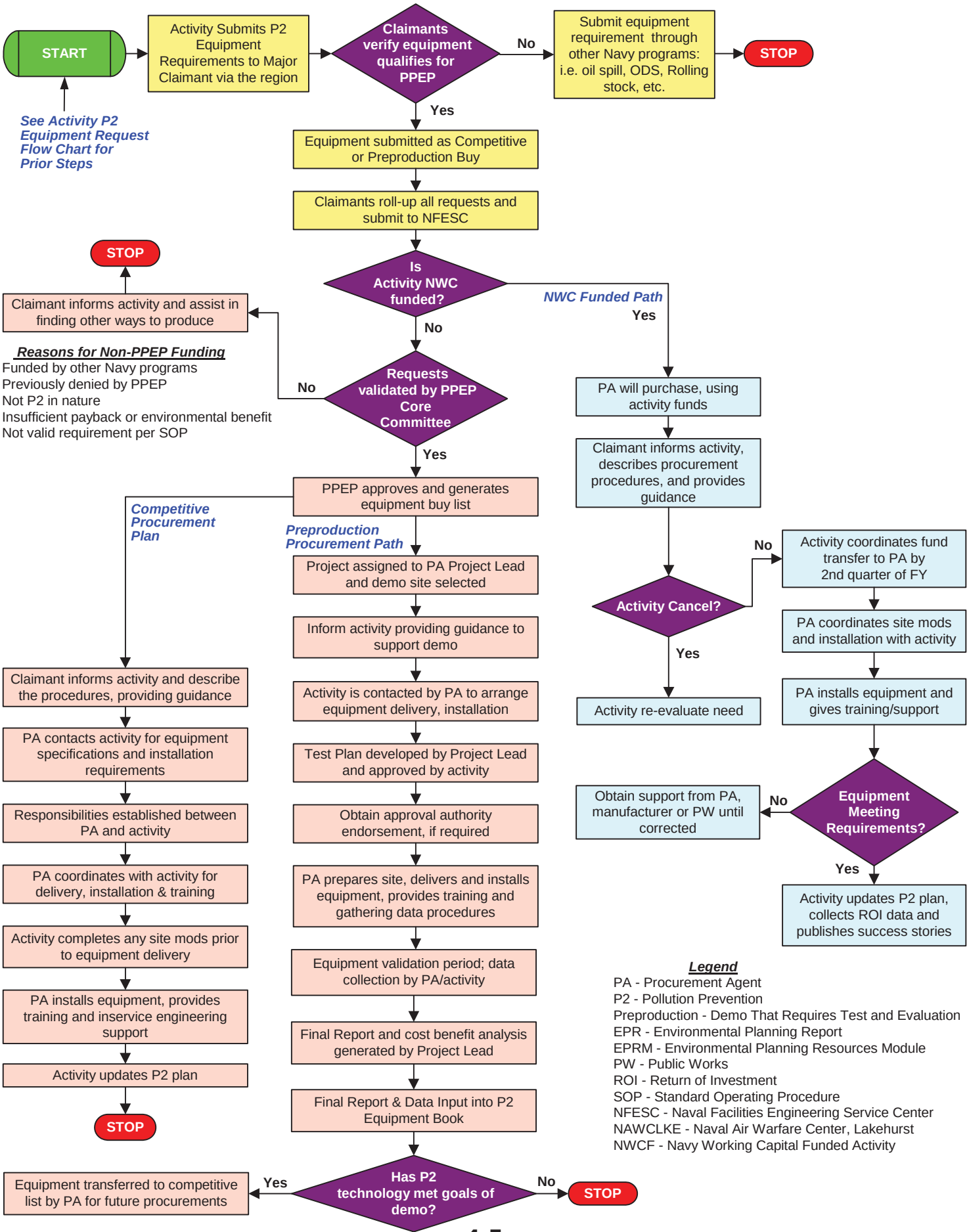
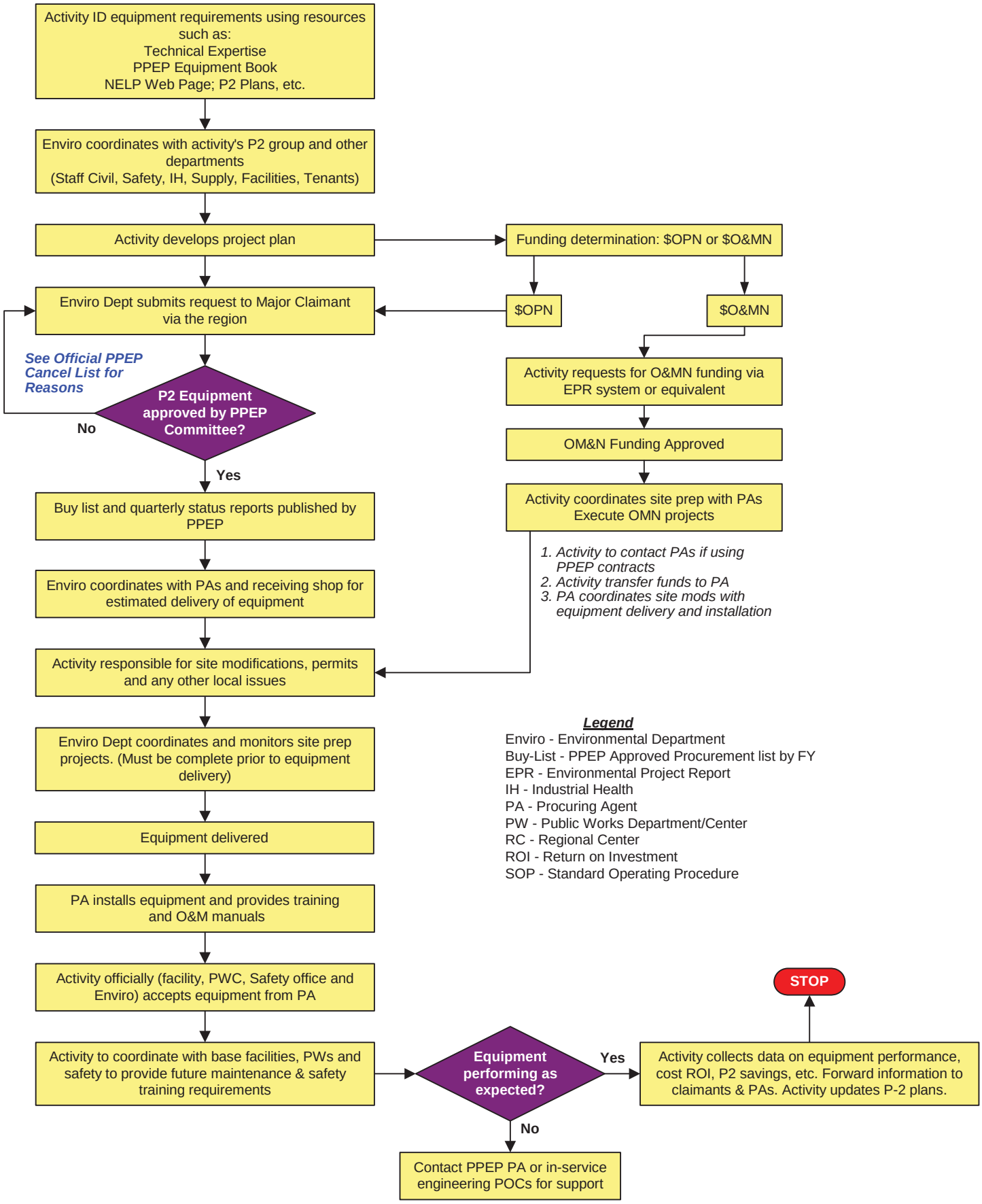


Figure 4-3

Navy's PPEP - Activity P2 Equipment Request Flow Chart



POLLUTION PREVENTION MANAGEMENT PLAN
NAVAL AIR STATION JOINT RESERVE BASE
FORT WORTH, TEXAS

VOLUME II

Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Engineering Field Division South
Charleston, SC

Reviewed and Updated by:

4545 Fuller Drive, Suite 342
Irving, TX 75038
(972) 791-3222

October 2006

VOLUME II

REFERENCE DOCUMENT

The second volume of the Pollution Prevention Management Plan (P2MP) Volume II is called the Reference Document and contains eight appendices (A through H). Volume II consists of the forms, updated work center reports, and other data generated during the site survey and subsequent interviews, and through research. Data contained in Volume II was used to update the 2006 P2MP. The Reference Document should be periodically reviewed, validated, and updated as necessary. It will be the basis for future P2MP updates.

Appendices included in the Reference Document are:

A. Media Maps
B. Media Matrix
C. NAS JRB Fort Worth Work Center Questionnaire
D. Work Centers with phone numbers
E. List of P2 Initiatives –Rankings
F. Costs for P2 Initiatives
G. Work Center Reports
H. Previous Pollution Prevention Program at NAS JRB Fort Worth

ACRONYMS AND ABBREVIATIONS VOLUME II*

*Refer to Appendix D for base work center acronyms.

AFFF	Aqueous Film Forming Foam
AFV	Alternatively Fueled Vehicle
AIMM to SCORE	Assess, Implement, Manage, and Measure to achieve Sustained Compliance and Operational Readiness for Environmental Excellence
AUL	Authorized User List
BASH	Bird Aircraft Strike Hazard
CHRIMP	Consolidated Hazardous Material Reutilization and Inventory Management Program
C&D	Construction and Demolition
CNO	Chief of Naval Operations
CNRF	Commander, Naval Reserve Forces
CNRSE	Commander, Navy Region Southeast
CO	Commanding Officer
DoD	Department of Defense
DODINST	Department of Defense Instruction
DON	Department of the Navy
DVD	Direct Vendor Deliveries
ECE	Environmental Compliance Evaluation
EO	Executive Order
EMS	Environmental Management System
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPR	Environmental Project Requirement
EQA	Environmental Quality Audit
GSA	General Services Administration
GSE	Ground Support Equipment
HAP	Hazardous Air Pollutant
HAZMAT	Hazardous Material
HAZMINCEN	Hazardous Materials Minimization Center
HMMP	Hazardous Material Management Program
HSMS	Hazardous Substance Management System
HVLP	High Volume Low Pressure
HW	Hazardous Waste

HWMP	Hazardous Waste Management Plan
IAP	Internal Assessment Plan
INRMP	Integrated Natural Resources Management Plan
IR	Installation Restoration
ISSA	Inter-Service Support Agreement
JRB	Joint Reserve Base
MCON	Military Construction
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSDS	Material Safety Data Sheet
NAS	Naval Air Station
NAVFAC EFD SOUTH	Naval Facilities Engineering Command, Southern Division
NCBC	Naval Construction Battalion Center
ODS	Ozone Depleting Substances
OMNR	Operation and Maintenance, Naval Reserve
OPN	Other Procurement - Navy
OPNAVINST	Chief of Naval Operations Instruction
PAO	Public Affairs Officer
P2	Pollution Prevention
P2ADS	Pollution Prevention Annual Data Summary
P2MP	Pollution Prevention Management Plan
P2MS	Pollution Prevention Management System
PM	Preventive Maintenance
POA&M	Plan of Action and Milestones
POL	petroleum, oil, and lubricants
PPEP	Pollution Prevention Equipment Program
POC	Point of Contact
PWC	Public Works Center
PWO	Public Works Officer
ROICC	Resident Officer in Charge of Construction
RCRA	Resource Conservation and Recovery Act
SPCC	Spill Prevention Control and Countermeasures
STEERS	State of Texas Electronic Environmental Reporting System
SWPPP	Storm Water Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
TRI	Toxic Release Inventory
USDOE	United States Department of Energy

UST	Underground Storage Tank
WC	Work Center
WRPA	Waste Reduction Policy Act

Appendix A
Media Maps

Appendix A

Media Maps

Index

Air Media Map Development A-1
Energy and Water Media Map Development A-6
Hazardous Materials Media Map A-9
Hazardous Waste Media Map Development A-12
Natural Resources Media Map A-16
Pesticide Media Map Development A-18
SPCC Media Map A-20
Storm Water Media Map Development A-23
Solid Waste Media Map A-27
Water/Wastewater Media Map A-30

Air Media Map Development

Areas of interest identified in this media map were taken from three sources; *2002 Stationary Air Emissions Inventory Naval Air Station Joint Reserve Base Fort Worth, Texas, July 2003,* the *Integrated Contingency Plan Naval Air Station Joint Reserve Base, Fort Worth, Texas January 2003* and work centers surveyed during this Pollution Prevention Management Plan (P2MP) update. Work centers surveyed during the P2MP update include those that were listed in the previous P2MP and those identified as “new” work centers during the site survey. Work centers are listed in Appendix G and may not include all the areas of interest listed in this media map.

Opportunities for future pollution prevention initiatives were selected from the reports referenced above and the 2003 P2MP update. Areas that have the potential to generate significant air discharges are listed. Initiatives derived from this P2MP update are discussed in Volume I, Section 3.0 of this report.

Air Media Map

Areas of Interest: (Physical location, building, shop/work center)

- **Bulk aboveground fuel tanks (Jet kerosene [JP-8])**
  - TT1069 3.5M gallons
  - TT1156 840,000 gallons
  - TT1157 840,000 gallons
- **40 Backup generators (36 Diesel, 4 Gasoline)**
- **10 Diesel pumps**
- **Painting (Corrosion Control)**
  - Building 1027 VMFA-112
  - Building 1027 VR-59
  - Building 1027 VF-201
  - Building 1027 VMGR-234
  - Building 1060 AIMD Paint Booth
  - Building 1676 TANG Air Conditioning
  - Building 1674 TANG Paint Booth
  - Building 4243 MACS-24 Aerosol
  - Building 1401 DynCorp Paint Booth
- **Solvent Usage**
  - Building 1027 VMFA-112 Hand Application
  - Building 1048 VMFA-112 Hand Application
  - Building 1027 VR-59 Hand Application
  - Building 1050 VR-59 Hand Application
  - Building 1027 VFA-201 Hand Application
  - Building 1050 VFA-201 Hand Application
  - Building 1027 VMGR-234 Hand Application
  - Building 1050 VMGR-234 Hand Application
  - Building 1060 AIMD 500 Hand Application, Solvent Washer, Paint Gun Cleaner
  - Building 4160 TANG AGE Solvent Washer
  - Building 1405 Raytheon Solvent Washer
  - Building 1145 MWR Auto Hobby Solvent Washer
  - Building 4243 MACS-24 Solvent Washer
  - Building 4210 14th Marines Solvent Washer
  - Building 4210 MWSS-471 Solvent Washer
  - Building 1675 TANG Solvent Washer (2)
  - Building 1191 TANG Transportation Solvent Washer
  - Building 1676/1675 TANG A/C Hand Application
  - Building 1401 AIMD 900 Paint Gun Cleaner
  - Building 1401 DynCorp Paint Gun Cleaner
  - Building 1418 AIMD 500 Dip Tank

  - Building 1414 AIMD 900 Solvent Washer
  - Building 1050 VMGR-234 Paint Gun Cleaner
  - Building 1050 VR-59 Paint Gun Cleaner
  - Building 1403 VFA-201 Paint Gun Cleaner
- **Blasting Media**
  - Building 1401 DynCorp Abrasive Blasting Room
  - Building 1401 DynCorp Glove Box (2)
  - Building 1060 AIMD 500 Glove Box (2)
  - Building 1675 TANG Structural Glove Box
- **F404 Engine Testing at Building 4260 AIMD 400 Hush House**
- **Underground Storage Tanks**
  - Building 1170 (2-2,000 gallon Jet kerosene [JP-8])
- **Aboveground Storage Tanks (Stationary)**
  - 21 Diesel
  - 6 MoGas
  - 8 JP-8
- **Annual grass burn area (2-5 acres) for air show**.

Base Point of Contact

Air Program Manager (817) 782-6470

Actual P2 Successes

- All nonmission critical uses of Class I ozone depleting substances ODSs have been eliminated. Two or three products are still utilized, but account for 3 to 4 pounds per year
- Developed written standard operating procedures for HAZMINCEN to account for hazardous materials that are issued
- TRI chemicals are not used in sufficient quantities to trip Emergency Planning and Community Right-to-Know Act (EPCRA) Section 313 reporting requirements
- Reduced methyl ethyl ketone MEK usage from over 3,000 pounds per year in 2000 to 400 pounds per year in 2002

Previous P2 Recommendations

- Utilize SFLEDS to replace diesel power plants
- Use bio diesel

Opportunities for Further P2 Initiatives

- Track emissions from emergency generators through Public Works by keeping logs of maintenance and emergency use.

- Procure alternative fueled propane forklifts to replace gasoline and diesel forklifts through attrition.
- Procure hybrid pickups to replace light duty gasoline and diesel pickups through attrition.

Effective Metrics

- Fuel usage per year (gallons/year)
- Natural Gas consumption (cubic meters/year)
- Volatile Organic Compounds emissions (tons/year)
- Hazardous Air Pollutants (ton/year)

Points of Compliance **-** Not defined during this update

Air Permit -

NAS JRB Fort Worth operates under two separate Texas Commission on Environmental Quality (TCEQ) accounts; one covers the 301 Fighter Wing and one covers the rest of the base. As a result, NAS JRB Fort Worth is not considered a major source under current TCEQ regulations and is not required to apply for a Title V operating permit. However, many operations such as paint booths and solvent washers operate under standard exemptions, which are termed “Permit by Rule” (PBR) by TCEQ. Most PBRs stipulate that usage records be kept at work centers for inspection by the state, but formal reporting to TCEQ is not required.

Source Documents:

Plans –

Integrated Contingency Plan Naval Air Station Joint Reserve Base, Fort Worth, Texas January 2003.

EPCRA Section 313 Compliance for Naval Air Station Joint Reserve Base (NAS JRB) Ft. Worth, Texas Calendar year 2004, June 28, 2005.

2002 Stationary Air Emissions Inventory Naval Air Station and Joint Reserve Base Fort Worth, Texas (July 2003)

Naval Air Station – Joint Reserve Base Fort Worth, Texas Pollution Prevention Plan, September 2003.

Surveys/Studies

None reviewed.

Environmental Compliance Evaluations - None reviewed for this update

Environmental Project Requirements - None reviewed for this update

Energy and Water Media Map Development

The 2006 field survey included searching for areas of high energy and water usage. Four wash racks were located during the survey. Interviews with the Public Works Office electrical engineer and civil engineer are recommended as starting points to identify current and future electricity and water requirements for NAS JRB Fort Worth. Actual P2 successes were water and energy projects identified during the field survey and discussions with Environmental Department personnel. Metrics selected are traditional units of consumption that can be taken from billing records.

Energy & Water Media Map

Areas of Interest

Aircraft washing pad
Wash rack at VMFA 112
Wash rack at AIMD 900
Wash rack at AFRESMUN
Navy wash rack at Building 3359

Base Point of Contact

Environmental Department (817) 782-6470

Actual P2 Successes

- Replaced T-12 ballasts and lights with T-8 ballasts and lights in most buildings on base.
- Installed solar lighting panels on lights at estimated 10% to 15% of base parking lots.
- Utilize electric carts for on-base transportation.
- Installed water recycling wash racks at AIMD 900 and AFRESMUN. At the time of the field survey, these wash racks were not operable. Initiative 3.2 of the Implementation Plan recommends repairing the two wash racks.
- Installation of low-flow faucets and low-flush toilets in base restrooms

Previous P2 Recommendations

None identified

Opportunities for Further P2 Initiatives

- Increase usage of solar cells for parking lot lighting.
- Energy efficient designs for new construction.
- Alternative fuel and hybrid vehicles

Effective Metrics

- Mega watt hour/month (Electricity)
- Million gallons/month (Water)

Points of Compliance

Permits -.

Source Documents:

Plans –

NAS JRB Fort Worth, Texas Pollution Prevention Plan (September 2003)

Surveys/Studies - None

Environmental Compliance Evaluations - None

Environmental Project Requirements - None

Hazardous Materials Media Map

Areas of interest in this media map were identified during field survey interviews with HAZMINCEN personnel and work center personnel who procure, store, manage, or use hazardous materials. Base points of contact were identified as primary hazardous material managers. Actual successes are efforts documented in previous pollution prevention plans. Metrics selected are quantities that can be obtained from hazardous material and disposal records currently tabulated at NAS JRB Fort Worth.

Hazardous Materials Media Map

Areas of Interest:

- HAZMINCEN
- Work centers that utilize hazardous materials and their associated tool rooms

Base Point of Contact

- HAZMINCEN supervisor (817) 782-7546
- Environmental Department (817) 782-6470

Actual P2 Successes

- Developed a written standard operating procedure for reduction in expired-shelf-life materials
- Expired-shelf-life materials are offered to Restore and Habitat for Humanity, off-base charitable organizations. The Defense Supply Center Richmond's Web site is also used to redistribute material.
- HAZMINCEN personnel perform locker checks at work centers to identify expired material.
- HAZMINCEN procures nonsolvent aircraft soap for distribution on base.
- Low volatile organic compound Eco-sure aerosol paints are used on base.
- HAZMINCEN procures ODS free versions of Break-free, CLP compound and coating compounds for distribution on base.
- Empty metal hazmat containers from base work centers are returned to HAZMINCEN where they are crushed and recycled through the base's recycling program.

Previous P2 Recommendations

- Utilize Smart Washer/Ozzy Juice for parts washers.
- Formalize a standard operating procedure for minimizing expired-shelf-life material.
- Paint gun washer training.

Opportunities for Further P2 Initiatives

- Periodic review of the authorized use list and substitution of less hazardous materials
- Ensure open purchase of hazardous materials are accounted through Hazardous Substance Management System

Effective Metrics

- Hazardous material expiring (pounds/year)
- Hazardous material recycled (tons/year)

Points of Compliance – None Identified

Source Documents:

Plans –
NAS JRB Fort Worth, Texas Hazardous Waste Management Plan (March 2002)
NAS JRB Fort Worth, Texas Pollution Prevention Plan (September 2003)

Surveys/Studies -
Emergency Planning and Community Right-to-Know Act 312 and 313 Reports

Environmental Compliance Evaluations - None Reviewed

Environmental Project Requirements - None Reviewed

Hazardous Waste Media Map Development

The areas of interest in this media map were taken from work centers listed in Appendix G that currently generate hazardous waste and hazardous waste accumulation areas identified in the NAS JRB Hazardous Waste Management Plan. Future plan updates should include new work centers to be all-inclusive. Actual successes and previous recommendations are documented in earlier pollution prevention plans. Opportunities for future successes were identified from field interviews of work centers surveyed in Appendix G. Data for effective metrics is the same as data required to complete annual hazardous and solid waste reports. NAS JRB Fort Worth points of compliance are work processes generating waste, 35 hazardous waste satellites, and one less-than-90-day accumulation area identified in the Hazardous Waste Management Plan.

Hazardous Waste Media Map

Areas of Interest:

- Work processes at work centers listed in Appendix G that generate hazardous waste. Look for opportunities to eliminate or reduce hazardous waste.
- 35 hazardous waste satellite accumulation areas. See location map in NAS JRB Hazardous Waste Management Plan.
- 1 less-than-90-day accumulation area (Building 1347)

Base Point of Contact

Hazardous Waste Program Manager (817) 782-6470

Actual P2 Successes

- Procurement and use of pollution prevention equipment
- Material substitutions
- Recycling (paint booth bead blast media)
- Work process changes
- On-base customers a sought for unused hazardous materials. If these customers cannot be identified, unused hazardous materials are offered to Restore, a charitable organization. This reduces waste streams and diverts disposal costs.
- Vinyl stenciling is used at several AIMD and VFMA work centers to reduce paint waste.

Previous P2 Recommendations

- Offsite recycling and beneficial reuse of wastes
- Collect and recycle spent antifreeze.
- Recycle/reuse used oil, fuel, and petroleum, oil, and lubricants.
- Recycle universal waste batteries.
- Replace solvent cleaning with aqueous solution cleaning.
- Utilize reconditioned drums for waste storage when feasible.
- Collect and puncture aerosol cans.
- Convert photo lab to an entirely digital process.
- Switch to nonhazardous Break-free products.

Opportunities for Further P2 Initiatives

- Implement basewide rag laundering program.

- Procurement and use of pollution prevention equipment.
- Material substitutions
- Work process changes
- Re-evaluate and document exemptions for waste streams.

Effective Metrics

- Hazardous waste generated (pounds/year)
- Hazardous waste recycled (pounds/year)
- Hazardous waste disposed of offsite (pounds/year)

Points of Compliance

- 1 less-than-90-day accumulation area
- 35 satellite accumulation Areas
- Work processes generating hazardous waste

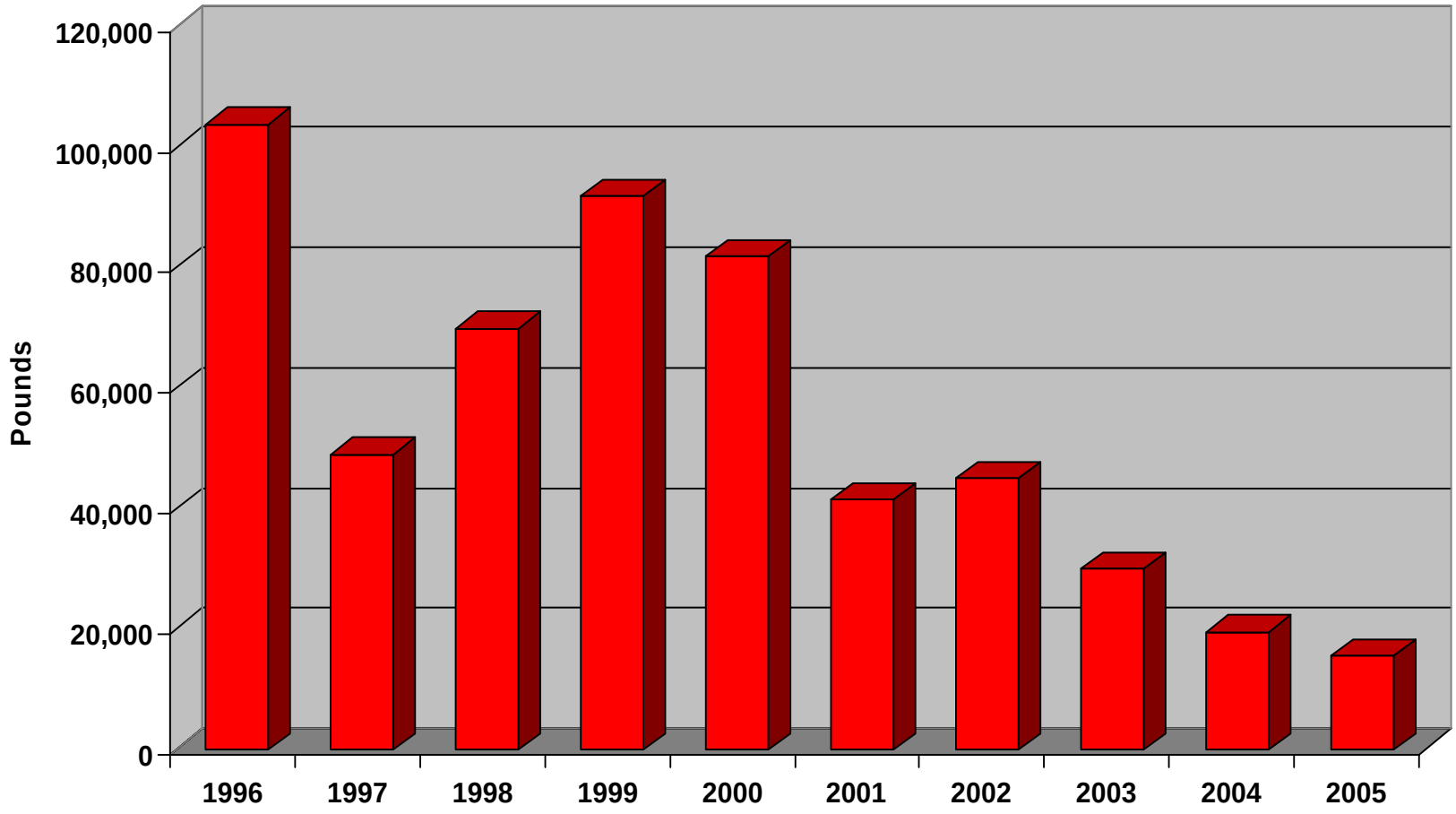
Permits **-** None

Source Documents

NAS JRB Fort Worth, Texas Hazardous Waste Management Plan (March 2002)
NAS JRB Fort Worth, Texas Pollution Prevention Plan (September 2003)

Surveys/Studies -
Environmental Compliance Evaluations - Not reviewed

Environmental Project Requirements - Not reviewed



Data from Annual STEERS Reports and the 2000 and 2003 P2 Plan Update.
Includes only RCRA Hazardous Waste.

Figure A-1
NAS JRB Ft. Worth
Hazardous Waste Generation

Natural Resources Media Map

Areas of Interest:

Landscaped areas
Nonlandscaped areas surrounding runways and along Lake Worth

Base Point of Contact

Environmental Department (817) 782-6470

Actual P2 Successes

$1.4 million project to reseed areas south of runway with native grasses. This project stabilizes the soil, reducing sediment runoff, and reintroduces native plant species to the base.

Previous P2 Recommendations

- Mow grass to appropriate height depending upon location on the installation (bird aircraft strike hazard areas for example).
- Utilize organic fertilizers at rates determined by soil test.
- Properly use of pesticides for weed and insect control.
- Utilize jute mesh or Enkamat for erosion repair.
- If possible, do not remove mature trees (greater than 20 inches in diameter at 4 feet height) from the installation.

Opportunities for Further P2 Initiatives

- Minimize ground disturbance during construction activities. Utilize paved roads to the maximum extent possible, thus minimizing compaction of the ground and reducing plant (grass) growth.
- Investigate opportunities to use less toxic pesticides and herbicides.
- Utilize native, drought-tolerant grasses and trees for installation in yard areas.

Effective Metrics

- Water usage
- Pesticide/herbicide procurement

Points of Compliance

None identified

***Permits* -**

None

***Source Documents*:**

***Plans* -**

Integrated Natural Resources Management Plan, 2004 Update, Naval Air Station Joint Reserve Base, Fort Worth, Texas.

***Surveys/Studies* -**

None

Environmental Compliance Evaluations –

None

***Environmental Project Requirements* –**

None

Pesticide Media Map Development

NAS JRB Fort Worth contracts pesticide application to vendors. The contract is monitored by the Public Works Contract Surveillance office. Actual successes are documented in previous P2 plan updates and were verified through interviews with Public Works personnel.

Reduction in use of pesticide is a practical metric selected for pest management. This metric may be tracked by reviewing vendor service call records, which include quantities of material applied. Opportunities to reduce quantities of pesticides used or required for effective pest management were discussed with Public Works personnel.

Pesticide Media Map

Areas of Interest:

- Base buildings
- Landscaped areas

Base Point of Contact

Public Works Contract Surveillance (817) 782-6272

Actual P2 Successes

- Treatment of individual ant mounds as opposed to general broadcasting of baits
- Inspect base for mosquito breeding areas and clean up to reduce the need to treat water for larvae
- Utilize off-base contractor to minimize pesticide and herbicide storage on base.
- Instituted the "Green Chemical" concept whereby the lowest toxicity chemicals are required by contract
- Utilize mechanical treatments such as glue boards and traps (manual and electric) for rodent control
- Integrated pest management using scheduled monitoring for pest and selective treatment in lieu of prescheduled application of chemicals
- Utilize 1st Lieutenants group for landscape maintenance and do not allow application of chemicals by this group

Previous P2 Recommendations

- None noted.

Opportunities for Further P2 Initiatives

- Require contractor to utilize hot water injection for fire ant control

Effective Metrics

- Usage rates per year

Points of Compliance

Permits- None identified.

Source Documents

Plans- NAS JRB Fort Worth's Pesticide Management Plan, January 2000.
The Pesticide Management Plan is currently being updated with an expected completion date of 2006.

Surveys/Studies - None identified for this update

Environmental Compliance Evaluations - Not reviewed for this update

Environmental Project Requirements - Not reviewed for this update

Spill Prevention, Control, and Countermeasure Media Map

The areas of interest identified in this media map were taken from NAS JRB Fort Worth Integrated Contingency (IC) Plan, which addresses spill prevention, response actions, containment, and cleanup. Previous recommendations are identified in the current IC Plan. Opportunities for future P2 initiatives are identified in the current IC Plan or are recommendations that have been successful at other Navy facilities. Effective metrics for measuring the successes of the IC program and evaluating the program's potential to prevent pollution are suggested measures of merit and should be included as successes on future P2 plan updates.

Spill Prevention, Control, and Countermeasure Media Map

Areas of Interest:

- Bulk Fuel Storage Tank Farm (Building 1158)
- Military Vehicle Gas Station (Building 1064) – Fuel tanks at this location were being removed during the site survey
- Tanker Parking Area (Building 1101)
- GSE Fueling Station (Building 1632)
- 301 Fuel Cell Repair Shop (Building 1656)
- HAZMIN Center (Buildings 1266, 1267, 1269, 1270)
- Hazardous Waste less-than-90-Day Accumulation Site (Building 1347)
- NEX (Formerly AAFES) Gas Station
- TANG AGE Fueling Station (Building 4160)
- AIMD Engine Test Cells and Hush House (Buildings 4258 and 4259)
- Fuel aboveground storage tanks (ASTs) (Buildings 1000, 1002, 1040, 1212, 1230, 1425, 1629, 1730, 3359, 4111, 4127, 4135, 4141, 4145, 4146, and 4155)
- Emergency Generator Belly Tanks (Buildings 1082, 1150, 1170, 1212, 1251, 1425, 1427, 1560, 1720, ad 4193)
- Twenty-one bulk petroleum, oil, and lubricants storage areas
- Twenty-four waste oil and fuel ASTs, drums, bowsers.

Base Point of Contact

Environmental (817-782-6470)
(24 Hour) NAS JRB Fort Worth Quarterdeck (817-782-7152/3)
Spill response or spill reporting (Fire Department—call 911 on base)

Actual P2 Successes

- Removal of fuel tanks at Building 1064
- The large aircraft wash rack on the runway is valved such that wash water goes to sanitary sewers and storm water goes to storm sewers. Valves at the wash rack could be manipulated to capture a fuel or oil spill from aircraft.

Previous P2 Recommendations

- Fire pull boxes located near the Bulk Fuel Storage Farm Loading/Unloading Facility fuel rack were inoperable. The boxes were under repair at the time of the IC report field survey.
- Consider construction of one or more concrete parking areas with containment berms to provide secondary containment for bowsers when not in use.

Opportunities for Further P2 Initiatives

- Design and schedule a mock spill drill as a training exercise for the Spill Prevention Plan to evaluate the effectiveness of spill equipment and response personnel preparedness. Spill drill exercise should include: detection of a release, identification/characterization, containment, recovery, and reporting.

Effective Metrics

- Number of spills
- Quantity of oil released
- Mock drill scoring

Points of Compliance

Permits - None identified for this update

Source Documents

Plans – NAS JRB Fort Worth's Integrated Contingency Plan, January 2003

Surveys/Studies - None reviewed for this update

Environmental Compliance Evaluations -

None

Environmental Project Requirements **–**

None

Storm Water Media Map Development

Areas of interest in this media map are identified in the *Stormwater Pollution Prevention Plan Naval Air Station Joint Reserve Base (NAS-JRB) Fort Worth, Texas (August 2003)* as areas where storm water run off is significant and has the potential to impact the quality of storm water. Previous P2 recommendations are from the NAS JRB Fort Worth Storm Water Pollution Prevention Plan.

Storm Water Media Map

Areas of Interest:

- Public Works Recycling Center/Grounds Maintenance Site Map
- Public Works Environmental HAZMIN Central Distribution Center
- Public Works Environmental HAZ 90-Day Waste Storage
- Supply Central Shipping/Receiving
- Seabee's Buildings 1356, 1359, 1360, 1364, 1370 & 1372
- Petroleum, Oil, and Lubricants (POL) OPS Refueling Vehicle Parking
- POL OPS Fuel Truck Loading/Unloading Facility
- POL OPS Military Vehicle Gas Station – Being Razed during site visit
- POL OPS Bulk Fuel Storage Tank Farm
- 301st GSE Vehicle Maintenance
- 301st GSE Fueling Station
- 301st Fuel Cell Repair Shop
- 301st Jet Engine Test Cell
- 301st Joint Vehicle Maintenance Operation
- 14th USMCR Vehicle Maintenance
- VMFA-112 USMCR Building 1048
- AIMD Buildings 1401, 1414 1418, 1420 & 1435
- AIMD Outside Storage Area
- AIMD Engine Test Facilities
- VFA-201 USNR Buildings 1402 & 1403
- TANG Buildings 1671, 1673, (Supply) 1674, 1675, 1676, (Hangars) 4160 and 4161 (GES Storage)
- AAFES Commissary
- AAFES Exchange
- AAFES Exchange Gas Station
- MWR Auto Hobby Shop
- MWSS-473 USMCR Supply Building 1410

Base Point of Contact

Storm Water Program Manager (Environmental) (817) 782-6470

***Actual P2 Successes* –**

- $1.4 million soil erosion project on the south end of the runway. This project included planting natural grasses that stabilize soil and reduce sediment runoff with minor upkeep.

- The large aircraft wash rack on the runway is valved such that wash water goes to sanitary sewers and storm water goes to storm sewers
- The aircraft de-icing pad has a sump to capture de-icing fluid and prevent discharge to storm sewers.

Previous P2 Recommendations

- Dumpster lids are to remain closed at all times to prevent rainfall from coming in contact with contents.
- Signs should be posted at each containment basin indicating proper operating procedures for discharge.
- Containment basins should be included in the quarterly site inspection.

Opportunities for Further P2 Initiatives

- Identify sources of pollution potentially affecting the quality of storm water discharges.
- Include Best Management Practices (BMPs) from NAS JRB Fort Worth's Storm Water Management Plan in environment training.
- Interview work center personnel to ensure Storm Water Pollution Prevention BMPs are being implemented.
- Review Texas Commission on Environmental Quality Storm Water Regulations to ensure compliance.

Effective Metrics

No effective metrics have been identified in this P2 Plan update to evaluate P2 success for Storm Water Media.

Points of Compliance
Permits-

- **Federal**: Baseline Storm Water General Permit [40 CFR 122.26]
- **Texas:** Texas Pollutant Discharge Elimination System (TPDES) General Permit No. TXR050000 Related to Storm Water Discharges Associated with Industrial Activity
- **Federal:** Construction Storm Water General Permit
- **Texas:** TPDES General Permit TXR150000 Related to Discharges From Construction Activities

Source Documents

Plans – NAS JRB Fort Worth's Storm Water Pollution Prevention Plan

Surveys/Studies - None reviewed for this update.

Environmental Compliance Evaluations - None reviewed for this media.

Environmental Project Requirements - None identified for this update.

Solid Waste Media Map

Areas of Interest:

- Recycle Center
- ROICC Contracting Office and construction sites
- Family housing and bachelors' quarters
- Community Facilities (NEX, Commissary)
- Landscape areas

Base Point of Contact

- Solid Waste/Recycling Program Manager (817) 782-6470

Actual P2 Successes

- Increased recycling of C&D debris from zero in 1999 to 21,365.5 tons in 2004.
- Changed recycling vendor so that turnkey operation is attained. The vendor supplies collection containers and transportation to the processing facility at no cost to the installation.
- The installation's recycling operations are currently being performed by the 1st Lieutenant's Office resulting in zero funding needed for manpower.
- The base Solid Waste/Recycling program manager has developed and implemented a Waste Tracker Sheet for use by ROICC and public works contractors. The system helps contractors and base personnel track C&D recycling more efficiently.

Previous P2 Recommendations

- Keep a waste container year-round at the Recycling Center for the landscape maintenance contractor to use for disposal of yard waste materials.
- Allow grass clippings to remain on the ground instead of bagging.
- Provide source reduction and reuse training.
- Use supplies and material more efficiently, e.g., double-sided photocopying.

Opportunities for Further P2 Initiatives

- Review construction contracts before award for recycling opportunities and ensure NAVFAC Guide Specification 01572B is included in issuance for bid.
- Collect and recycle glass. This includes providing glass recycle containers at strategic locations.
- Periodically inspect base buildings for recycling containers to ensure that recycle bins are present in sufficient numbers and being utilized.

Effective Metrics

- Weight of materials recycled (tons each material).
- Weight of materials sold through Direct Sales (tons)

Points of Compliance

Permits - None identified for this update

Source Documents

Plans
NAS JRB Fort Worth's Solid Waste Management Plan, October 2002

Surveys/Studies -

Environmental Compliance Evaluations - Not reviewed for this media for this update

Environmental Project Requirements - None reviewed for this update

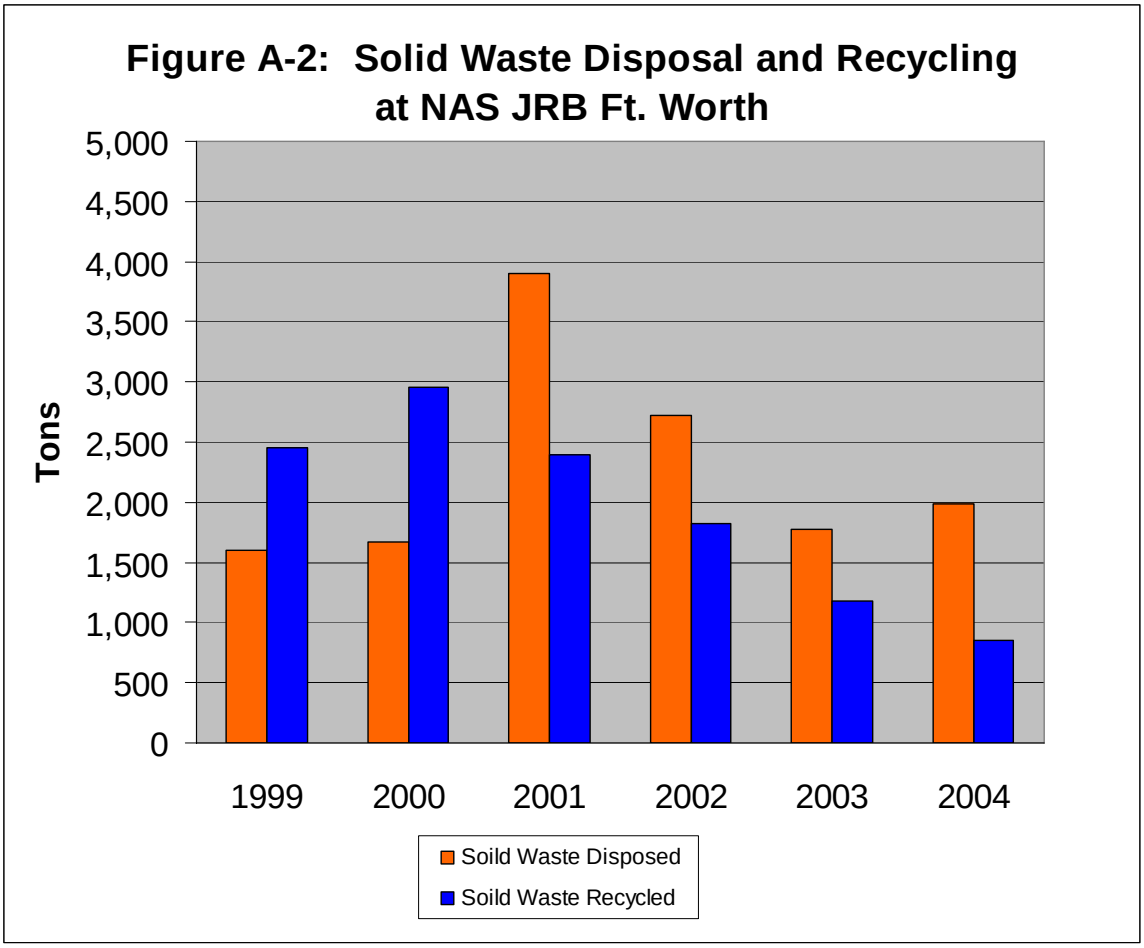


Figure A-2: Solid Waste Disposal and Recycling at NAS JRB Ft. Worth
Tons
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1999
2000
2001
2002
2003
2004
Soild Waste Disposed
Soild Waste Recycled

Water/Wastewater Media Map

Areas of Interest:

- Waste water treatment services are provided by the city of Fort Worth.
- Equipment wash racks

Base Point of Contact

Waste Water Program Manager (Environmental) (817)-782-6470

Actual P2 Successes

- Closed-loop wash rack located at AIMD-900 (Building 1414).
- Closed-loop wash rack located at AFRES 301 (Building 3355).
- Closed-loop wash rack located at AFRES 301 (Building 1602)
- Wash rack with oil-water separator located adjacent to AFRES 301 (Building 3355)
- Construction of a new Aircraft Wash Rack with pre-treatment capabilities is under way
- Low-flow water faucets and toilets in numerous buildings
- The large aircraft wash rack on the runway is valved such that wash water goes to sanitary sewers and storm water goes to storm sewers.

Previous P2 Recommendations

- None identified in this media for this update

Opportunities for Further P2 Initiatives

- Use of low-flow showers
- Use of low-volume toilets
- Repair AIMD 900 closed-loop wash rack at Building 1414
- Repair AFRES 301 closed-loop wash rack at Building 3355

Effective Metrics

- Units of water consumed (1,000 gallons/unit)
- Monitor cost for sewage services

Points of Compliance

Permits – None identified

***Source Documents* -**

Plans-

Storm Water Pollution Prevention Plan, Naval Air Station Joint Reserve Base Fort Worth (August 2003)

***Surveys/Studies* -**

Environmental Compliance Evaluations - Not reviewed for this update

***Environmental Project Requirements* -** Not reviewed for this update

Appendix B
Media Matrix

Media Matrix

The Media Matrix is a tabulation of work centers at the base that have multiple processes and/or a high potential to generate pollution in multiple media. The table was developed to assist in the field survey that was conducted to update the P2MP by highlighting areas of significance. It is also a tool to assist in reaching a consensus on focusing P2 initiatives.

Data gathered during the site survey has been used to update the original matrix. The matrix in its current form can be utilized as a starting point for focusing future P2MP updates or for periodic work center surveys. Media areas that are colored in on the matrix indicate a work center has the potential to impact that media. The matrix is a compilation of site survey data, a review of media plans, and knowledge of program successes and failures at NAS JRB Fort Worth.

The matrix is designed to be a dynamic document. As such, future updates to this plan and periodic work center surveys conducted prior to the next update should expand or reduce the matrix as necessary.

Media Matrix

	Air	Energy	HAZMAT	Haz Waste	Storm H2O	Solid Waste	SPCC
Work Centers							
AFRESAC							
AFRESAGE							
AFRESAIS							
AFRESAS							
AFRESCC							
AFRESECM							
AFRESEE Egress							
AFRESEE Electrical and Environmental							
AFRESEE Batteries							
AFRESELE							
AFRESFLM							
AFRESFS							
AFRESJEM							
AFRESMUN							
AFRESMXA							
AFRESNDI							
AFRESPNE							
AFRESPP							
AFRESPS							
AFRESSS							
AFRESSTR							
AFRESVM							
AFRESWF							
AIMD413							
AIMD41L							
AIMD41U							
AIMD51A							
AIMD51B							
AIMD530							
AIMD610							
AIMD620							
AIMD63E							
AIMD640							
AIMD650							
AIMD670							
AIMD69B							
AIMD810A							

	Air	Energy	HAZMAT	Haz Waste	Storm H2O	Solid Waste	SPCC
AIMD810B							
AIMD810C							
AIMD820							
AIMD910							
AIMD920							
AIMD930							
AIMD950							
AIMD990							
Dental/Medical							
DRP-33							
GEMD							
HAZMINCEN							
MAG4112A							
MAG4112C							
MAG41AV							
MAG41LD							
MAGATCM							
MAGEMB							
MWRHOBBY							
MWSSHE							
MWSSNBC							
MWSSUT							
NAVYBF							
OPSFIRE							
OPS Small Arms							
PWAC							
PWBOILER							
PWCARPTY							
PWPIPE							
PWROAD							
PWSLFHLP							
STAWEAP							
TANG224							
TANG241							
TANG242							
TANG243							
TANG244							
TANG248							
TANG707							
TANG722							
TANGAGE							
TANGELEC							

	Air	Energy	HAZMAT	Haz Waste	Storm H2O	Solid Waste	SPCC
TANGHYD							
TANGLGMP							
TANGMACH							
TANGTIRE							
VFA201-110							
VFA201-120							
VFA201-12C							
VFA201-13A							
VFA201-13B							
VFA201-210							
VFA201-220							
VFA201-230							
VFA201-310							
VMFA12C							
VMFAAF							
VMFAELEC							
VMFAFE							
VMFAORD							
VMFAPL							
VMFARAD							
VMFASEAT							
VR59110/310							
VR59120							
VR59130							
VR59200							

Appendix C
Work Center Questionnaire

Shop ID: _____

NAS JRB Work Center Questionnaire

Work Center: _____ **Prepared By:** _____
Date: _____

Part 1: Work Center (WC) Report

Prior to entering work center, review "Work Centers and Data" sheet & determine media areas of concern.

Is this a new Work Center (WC) Report? Yes No

Has every item on every page of the WC Report been discussed and modified/verified?
Yes No

Make certain to get detailed "Shop Product" and "Process Performed" Information.

Did you address every item on the WC Report? Yes No

Are there any new shops or processes identified during the shop survey? Yes No

If yes, what are they?

Did you review the Material Inventory by Work Center Report printed from HSMS with Shop point of contact? Yes No

Do all hazardous materials have HSMS barcodes? Yes No

Attach list of hazardous materials without barcodes.

Does the shop have Pollution Prevention Equipment Program (PPEP) equipment?
Yes No

If yes, does it have a sticker? Yes No If no, place sticker on equipment.

Is PPEP Equipment used? Yes No If no, determine why.

Part 2: Additional Observations

Comment on housekeeping. Note staining, absorbent pads under equipment, leaking equipment, etc.

Note any floor drains and ask about connections.

Part 3: Additional Questions for Interview

What changes have been made in this WC since the 2003 Update?

Is there a MILSPEC or technical publication associated with shop processes? If so list publications.

Shop ID: _____

What wastes from this shop are recycled? (Circle if yes): Paper - Cardboard - Plastic - Plastic drink bottles - Aluminum cans – Metal – Scrap wood Rags – Pallets. Where are bins located?

Shop HAZMAT coordinator:

Shop training coordinator:

Training type and frequency:

Are you familiar with the P2 goals for this shop? What are they?

What training have you received on HAZMAT, waste disposal, recycling, waste minimization, P2?

Do you have a copy of the P2 plan or your shop's portion of it (WC report)? (Ask to see it.)

What do you think could be done to reduce the HAZMAT used in this shop? To reduce the waste generated in this shop? What would you be willing to change?

What do you think could be done to make this shop safer, more efficient, or better? If you could make a change, what would it be?

Part 4: Summarize most-important findings on this shop to share with team members.

Appendix D
Table of Work Centers with Points of Contact

Department	Work Center I.D.	Shop Name	Building Number	Work Center Name	Contact Person	Phone (817) 782-
301 AMXS	AFRES 301 AMXS	Flight Line Maintenance	1655	AFRESMXA	SMSgt Claus Winter	7884
301 Logistics Group	AFRES 301 LGMCE	Electrical and Environmental	1628, Rm 8	AFRESEE	James Grudosky	7104
301 Logistics Group	AFRES 301 LGMCF	Fuel Systems/ Hydrazine Maintenance Facility	1656	AFRESFS	Mike Withers	7657
301 Logistics Group	AFRES 301 LGMFE	Survival Equipment Shop	1650	AFRESSS	Jose Rodriguez	7016
301 Logistics Group	AFRES 301 LGMFN	Non-Destructive Inspection	1650	AFRESNDI	Kevin Nelson	7767
301 Logistics Group	AFRES 301 LGMR	Armament Systems	1648	AFRESAS	Bobby Graham	5237/ 7828
301 Logistics Group	AFRES 301 LGMVT	Avionics Intermediate Shop	1649	AFRESAIS	Ron Kopystecki	7844
301 Logistics Group	AFRES 301 LGMWS	Munitions Flight	3355	AFRESMUN	MSgt Felix Avalos	7268
301 Logistics Group	AFRES 301 LGTM	Vehicle Maintenance	1191/ 1194	AFRESVM	Mike Carocci (Supervisor), Tim Green (Hazmat Representative), Matt Sherman	7195
301 MSX/GMU	AFRES 301 LGMVE	Electronic Countermeasures	1650	AFRESECM	Craig Harris	5294
301 MSX/LGMPE	AFRES 301 LGMPE	Jet Engine Shop	1655	AFRESJEM	Wayne Cox	7929
301 MXS/MXMAI	AFRES 301 MXS	Inspection Flight	1643	AFRESFLM	Martin Drewek	3717
301 Support Group	AFRES 301 SPTG/CEO	Air Conditioning Shop	1217	AFRESAC	Charles Kelly	5723
301 Support Group	AFRES 301 SPTG/CEO	Electric Shop	1217	AFRESELE	Charles Kelly	5723
301 Support Group	AFRES 301 SPTG/CEO	Pipe Shop	1217	AFRESPS	Rich Bryan	5687
301 Support Group	AFRES 301 SPTG/CEO	Power Production	1213	AFRESPP	Bobby Brown	3847
457 FS/DOMW	AFRES 301 MAOW	Weapons Flight	1655	AFRESWF	Terry Ryan	7904
AFRES	301 LGMCE	Egress	1628	AFRESEE	Senior Master Sergeant Frank Gum	7037

Department	Work Center I.D.	Shop Name	Building Number	Work Center Name	Contact Person	Phone (817) 782-
AFRES	301 LGMCE	Electrical and Environmental	1643, Room 8	AFRESEE	Senior Master Sergeant Frank Gum	7037
AFRES	301 LGMCP	Pnuedraulics	1655	AFRESPNE	Senior Master Sergeant Frank Gum	7037
AFRES	301 LGMFS	AGE (Aircraft Ground Equipment) Flight	1628	AFRESCC	Ray Schecter	7083/ 7031
AFRES	301 LGMFS	Structural	1643	AFRESSTR	Ray Schecter	7083
AFRES	301 LGMG	AGE (Aircraft Ground Equipment) Flight	1602	AFRESAGE	Master Sergeant Raymond Russell	7168
AIMD	413	Afterburner Repair	1418	AIMD413	Calvin Bates	5697
AIMD	41L-F404	F404 Engine Shop	1420	AIMD41U	P.O. Gandy	7624
AIMD	41L-T56	Component Repair	1418	AIMD41L	GSgt. McElvain	6023
AIMD	51A	Sheet Metal Shop	1060	AIMD51A	Sgt Matijebic, Sgt Atwood	7621
AIMD	51B	Paint Shop	1060	AIMD51B	Corporal Gahring	7582
AIMD	530	Non-Destructive Inspection Lab	1414	AIMD530	AM2 Trubee	7774
AIMD	610	Comm/Nav	1055	AIMD610	AT3 Gladney	6280
AIMD	620	Electric Shop	1055	AIMD620	AE2 Sing	6353
AIMD	63E	APG-63 Radar Shop	1055	AIMD63E	AT2 Frick	7150
AIMD	640	Electronic Countermeasures	1055	AIMD640	AT2 Bendu	6234
AIMD	650	CASS	1055	AIMD650	AT1 Gilbreath	7150
AIMD	670	Calibration Lab	1445	AIMD670	AT1 Webb	6193
AIMD	69B	2M Micro Miniature Repair	1055	AIMD690	AE2 Dudley	6281
AIMD	810A	Parachute Maintenance	1024	AIMD810A	PR1 Leake	7772
AIMD	810B	Flotation Gear Shop	1024	AIMD810B	PR1 Leake	7772
AIMD	810C	Oxygen Support Systems	1024	AIMD810C	PR1 Leake	7772
AIMD	820	LOX Farm	1024	AIMD820	WS7 Lane Herchberger	5292
AIMD	910	Ground Support Equipment (GSE) Gas Engine Repair Branch	1414	AIMD910	AS1 Williams	7728
AIMD	920	Ground Support Equipment (GSE) Structure/ Hydraulic Shop	1414	AIMD920	AS1 Williams	7728
AIMD	930	GSE Electric Repair/ AC Shop	1414	AIMD930	AS1 Williams	7728
AIMD	950	Ground Support Equipment (GSE)	1414	AIMD950	AS1 Williams	7728

Department	Work Center I.D.	Shop Name	Building Number	Work Center Name	Contact Person	Phone (817) 782-
		Periodic Maintenance				
AIMD	990	Mobile Facilities Maintenance		AIMD990	P.O. Abbott	5845
AIMD	DYNCORP DRP-33	GSE- DynCorp	1401	DRP-33	Mark Wagner	7865
Branch Health Clinic	DENTAL	Dental Lab/ Radiology	1711	Dental/Medical	Chief Balazs	5917
Detachment A	MACS24	Air Traffic Control Maintenance	4242, 4245, 4246	MAGATCM Det A	MSgt Brand	7249
Environmental	HAZMIN CENTER	Hazmin Center	1619	Hazmin Center	SK1 Hubbell	7548
Fuels (707FO)	TANG707	Fuel Supply	1101	TANG707	Tech Sgt. Allen Douglas	817-852-3574
MWR	MWR	Auto Hobby Shop	1145	MWRHOBBY	Allan Taylor	6375
MWSS 473 Det B	MWSS- HEAVY EQUIPMENT SHOP	Heavy Equipment Shop	1410	MWSSHE	Sgt. Toliver	2829
MWSS 473 Det B	MWSS- NBC SHOP	Nuclear, Biological, Chemical Warfare Shop	1410	MWSSNBC	Sgt. Law	2804
MWSS 473 Det B	MWSS- UTILITIES SHOP	Utilities	1410	MWSSUT	SSgt. Nicholas	2831
Operations	GEMD	Ground Electronic Maintenance Department	1422	GEMD	ET2 Bangston	7842
Operations	NAVYBF	Base Fuels	1101	NAVYBF	P.O. Johnson	7661
Operations	OPSFIRE	Fire Department	1425	OPSFIRE	Fire Chief Murray Stephen Thrall	6331 6335
Operations	OPSWFA	Station Weapons	3355	STAWEAP	A02 Chance Chief Forsythe	7779 7185
Operations	SMALL ARMS RANGE	Small Arms Range	1345	Small Arms Range	A01 Masseau	3918
Public Works (PWC)	AIR CONDITIONING SHOP	Air Conditioning Shop	1217	PWAC	Charles Kelly	5723
Public Works (PWC)	BOILER SHOP	Boiler Shop	1217	PWBOILER	Dave Walker Jeff Robertson	7174
Public Works (PWC)	CARPENTRY SHOP	Carpentry Shop	1217	PWCARPTY	Bill Johnson	5267
Public Works (PWC)	PIPE SHOP/ PLUMBING	Pipe Shop/ Plumbing	1217	PWPIPE	Rich Bryan Ron Allen	5687
Public Works	PUBLIC WORKS	Roads and Grounds	1213	PWROAD	Eddie Edwards	7188

Department	Work Center I.D.	Shop Name	Building Number	Work Center Name	Contact Person	Phone (817) 782-
(PWC)					Herb Brooks	
Public Works (PWC)	PWDSEA	Seabees Self Help	1217	PWSLFHLP	UT1 Ferguson	7160
TANG	241EE	Electro/ Environmental	4160	TANGELEC	Thomas Crieger	3532
TANG	241FS	Fuel Cell	1675	TANG241	Trey McKinney	817-852-3639
TANG	241HS	Hydraulic Shop	1675	TANGHYD	MSGT Charles Barnett SSGT Jeremy Bingham	817-852-3537
TANG	241TS	Wheel/ Tire Repair and Reclamation Shop	1430	TANGTIRE	SMSGT Dan Sheppard	817-852-3534
TANG	242P	Propulsion	1675	LGMP	SMS Arnold Flores	817-852-3540
TANG	243MS	Machine Shop	1675	TANGMACH	TSGT James Meadows MSGT Jayson Deleon	817-852-3536
TANG	243NDI	Non-Destructive Inspection Shop	1675	TANG243	MSGT Bill Freeman	817-852-3545
TANG	244OM	Phase Dock	1676	TANG244	Mike Brewster Sean Almy	817-852-3523
TANG	246AG	Aerospace Ground Equipment (AGE)	4160	TANGAGE	Jeff Ray	817-852-3528
TANG	248AN	Avionics	1675	TANG248	MS Charles Chavers	3518
TANG	722RG	Roads and Grounds	1671	TANG722	Mr. Danny Hance	817-852-3629
TANG	Security Police	Weapons	4175	TANG224	MSGT David Rogers TSGT Aubrey Beaver	817-852-3491 817-852-3482
TANG	Structural Repair	Structural Repair/ Corrosion Control	1675	TANG242	Tracy Craft	817-852-3544
VFA-201	110	Power Plants	1403	VFA201-110	AD2 Thomas	6363 x269
VFA-201	120	Airframes	1403	VFA201-120	AM1 Duntley	6363 x270
VFA-201	12C	Corrosion Control	1403/ 1414	VFA201-12C	AD2 Wright	6363 x279/ 280
VFA-201	13A	Pilot Survival Equipment	1403	VFA201-13A	PR1 Black	6363 x272
VFA-201	13B	Pilot Egress Equipment (Seat Shop)	1403/ 1414	VFA201-13B	AME2 Morris	6363 x273
VFA-201	210	Integrated Weapons Teams (IWT)	1403	VFA201-210	AT2 Summerhays	6363 x274
VFA-201	220	Electrical Shop	1403	VFA201-220	AE2 Stone	6363 x275
VFA-201	230	Ordnance	1403	VFA201-230	PO Sanchez	6363 x276
VFA-201	310	Line Shop	1403	VFA21-310	AM1 Erisman	6363 x278
VMFA-112	120	Airframes Shop	1048	VMFAAF	Gunnery Sgt. Miale	2886

Department	Work Center I.D.	Shop Name	Building Number	Work Center Name	Contact Person	Phone (817) 782-
VMFA-112	12C	Corrosion Control	1048	VMFA12C	Sgt Gause	2881
VMFA-112	13A	Flight Equipment Shop	1048	VMFAFE	SSgt. McDonald	2880
VMFA-112	13B	Seat Shop	1048	VMFASEAT	Sgt. Thornberg	2885
VMFA-112	220	Electric Shop	1048	VMFAELEC	Sgt. Wise	2883
VMFA-112	230	Ordnance Shop	1048	VMFAORD	Sgt. Rojas	2865
VMFA-112	310	Power Line	1048	VMFAPL	Sgt. Erpelding	2873
VMFA-112	RADAR SHOP	Radar Shop	1048	VMFARAD	Sgt. Garcia	2883
VMGR234	12A	Airframes	1050	MAG4112A	Cpl Collins	2924
VMGR234	12C	Corrosion Control	1050	MAG4112C	Cpl Collins	2924
VMGR234	210	Avionics Shop	1050	MAG41AV	Sgt. Long	2929
VMGR234	310	Line Division	1050	MAG41LD	SSgt. Tauch	2925
VMGR234	EMBARKATION	Embarkation	1050	MAGEMB	Sgt. Cacerres	2947/ 2908
VR-59	110/ 310	Power Line	1050	VR59110/310	AE1 Warren	5412 x644
VR-59	120	Airframes/ Corrosion Control	1050	VR59120	AM1 Alanis	3501
VR-59	130	Survival	1050	VR59130	PR2 Hicks	5411 x623
VR-59	200	Electronics/ Aviation	1050	VR59200	AT1 Sopiak	5411 x642

Appendix E
Master List of P2 Initiatives

List of P2 Initiatives and Rankings

Initiatives identified in the 2003 P2MP were reviewed and one was retained for this P2MP update. Initiatives recommended in this update (Section 3.0) are presented in Table E-1. Initiatives are ranked 1 through 8. Ranking is determined according to the process described in Section 2.1 (Pollution Prevention Management System) of Volume I and includes:

- Initiative Objective
- Start and Completion Dates
- Impact Rating (1-5)

Table E-1
Planned P2 Initiatives 2006 P2MP by Priority

Rank	Initiative	Objective	Start Date	Completion Date	Impact Rating
1	Rag Laundering	Reduce Solid and Hazardous Waste	Jan. 2007	July 2007	5
2	Reassign and repair PPEP & P2 equipment	Numerous (See Section 3.0)	Jan. 2007	Dec. 2008	5
3	Lease propane forklifts	Reduce air emissions	Oct. 2006	March 2007	4
4	Procure hybrid fueled pickups	Reduce air emissions	Jan. 2007	Dec. 2007	4
5	Purchase filter crusher	Reduce solid waste	July 2007	Dec. 2007	4
6	Expand lube analysis program	Reduce solid waste	July 2007	Jan. 2008	5
7	Rechargeable flashlights	Reduce solid waste & conserve resources	July 2007	May 2008	4
8	Recycle plastic, glass, aluminum	Reduce solid waste	Jan. 2007	Aug. 2007	4

Table E-2 lists initiatives identified in the 2003 P2MP update. Initiatives are listed in the same order as described in the 2003 P2MP.

Table E-2
Status of Previous P2 Initiatives 2003 P2MP

Number	Initiative	Objective	Status	Barriers	Year
1	Rag Laundering	Reduce Solid and Hazardous Waste	Partial	Rag Quality	2000 2003
2	Improve fluorescent lamp handling	Conserve energy	Implemented	None	2000
3	Recycle antifreeze from continuous sources	Reduce waste	Implemented	None	2000
4	Recycle antifreeze from intermittent sources	Reduce waste	Implemented	None	2000
5	Paint gun cleaners with distillation units	Reduce solvent use	Implemented	None	2000
6	HAZMINCEN reutilization	Reduce solid & hazardous waste	Implemented	None	2000
7	Use Mini-Max steam cleaners	Reduce solvent use	Implemented	None	2000
8	Use solvent substitutes for MEK	Reduce air emissions Reduce MEK usage	Implemented	Technical Specifications	2000
9	Periodic survey of work centers	Reduce pollution in all media	Not Implemented	Personnel requirements	2000 2003
10	Hydraulic fluid particle counter	Reduce used oil	Implemented	None	2000
11	Paint gun washer training	Reduce solvent usage	Implemented	None	2003
12	Formal SOP for minimizing expired-shelf-life materials	Reduce hazardous waste	Implemented	None	2003
13	Alternative to AFFF for firefighting	Use less toxic material	Implemented	None	2003
14	Use of bio diesel	Reduce air emissions Conserve energy	Not Implemented	Cost	2003
15	Jet fuel reclamation	Reduce waste stream	Not implemented	Cost Fuel Spills	2003
16	Smart washer and Ozzy Juice	Reduce hazardous waste	Partial	Cleaning Ability	2003
17	Imbiber bead technology for oil spill cleanup	Reduce oily waste	Not Implemented	Cost Performance	2003
18	SFLEDS	Reduce air emissions	Not Implemented	Impractical	2003
19	Hydraulic fluid recyclers	Reduce used oil	Implemented	None	2003

Appendix F
Programmatic and Life Cycle Costs

Costs for P2 Initiatives

One step used to help determine the feasibility of P2 initiatives is that of calculating costs. Costs vary depending on the type of initiative being considered for implementation. Initiatives can be separated into two types; programmatic and technical. Programmatic initiatives include activities such as training or promoting a program and are often imbedded in or supplement an existing program like safety training or the recycling program. Technical initiatives differ from programmatic initiatives in that they require a change in technology or process. Technical initiative costs are generally more easily quantified since they include things like equipment purchases and material substitutions for which life-cycle costs can be estimated.

This appendix contains both programmatic costing and technical life-cycle costing. Technical initiatives are labeled in this appendix with the following header:

- *Life-Cycle Costing for Technical Initiative*

Programmatic initiatives are labeled in this appendix in the following manner:

- *Programmatic Initiative Cost Considerations*

Although both types of initiatives are included in this appendix, they could be separated into individual appendices in future updates if the number if initiatives increases.

Cost Factors for Programmatic Initiatives

Costs for programmatic initiatives are sometimes difficult to quantify due to the high number of factors that contribute to the estimate. Some factors are difficult to quantify because they are not monitored closely or are not readily available for

review and are therefore adsorbed in overhead or other facility operating funds. However, quantifying these costs in general terms assists in identifying root-cause solutions that have long-lasting benefits and the potential to exceed dollar and time savings of technical initiatives.

Programmatic costs may be minimized through understanding cost factors and careful program manager oversight. Examples of programmatic initiative cost may be training expense, labor, administrative overhead, and contracted services.

Life-Cycle Costing

Life-cycle costing (LCC) is computed for initiatives selected during the process to prioritize projects. Calculating LCC allows the P2 program manager and other stakeholders to budget future costs. Life-cycle costs that have been previously prepared for PPEP equipment have been used in this plan update when available. In general, LCC for a new technical initiative may be calculated by:

$$LCC = P + \Sigma\ (O * t)$$

where:
P = Capital Costs + Installation Costs
Σ= Sum over the lifetime, from year 1 to year N*, where N = Expected Life of Equipment
O = Annual Operating Expenses and Maintenance
t = Expected Life of Equipment

Capital and installation costs include costs to purchase and installation of equipment, materials required to operate equipment, and installing infrastructure such as electricity and water. In general capital and installation costs are “start-up costs.”

Annual Operation and Maintenance Costs include:

- Repair Costs – Labor and material cost for repairs
- Consumable Costs – Cost of materials added to process, such as fluids or filters

- Permit Fees – Cost of permit if one is required
- Waste Disposal Costs

Some operation and maintenance costs can be obtained from manufacturers.

Example:

Based on the Prioritization Step, a decision was made to purchase an air-assisted airless paint sprayer. The life-cycle cost is $22,750.

- Purchase Price of the Air-Assisted Airless Paint Sprayer = $10,000
- Life Expectancy of Air-Assisted Airless Paint Sprayer = 15 years
- Annual Operating Expenses and Maintenance
    - New Oil Filter = $100
    - Oil = $50
    - Paint Waste = $200
    - Air Permit = $200
    - Repair Costs = $300

$$LCC = \$10,000 + \Sigma\ (850*15) = \$\ 22,750$$

Based upon this calculation, base personnel need to POM $850/year for Operating and Maintenance for the next 15 years. During the POM process you may want to assume a 2% rate of inflation.

Life-Cycle Costing for Technical Initiative

3.1 COLLECT, CLEAN, AND REUSE CONTAMINATED RAGS

Discussion:
The objective of this initiative is to eliminate solid and hazardous waste streams associated with soiled rags.

Based on information provided by base personnel, NAS JRB Fort Worth generated 45,000 pounds of oil rags in 2005 at a cost of $43,168. The 2006 field survey indicated that 49 of 105 work centers (47%) were participating in a rag laundering program, but were managing their own programs. The remaining 53% of work centers are obtaining rags from HAZMINCEN and exchanging them when soiled.

This initiative consolidates the rag laundering program into HAZMINCEN. HAZMINCEN will distribute clean rags in exchange for oily rags. The selected vendor (Brent Industries is recommended) will make one pick up at HAZWASTE on an as-needed basis to pick up oily rags and deliver clean rags to HAZMINCEN, eliminating multiple stops on base.

Why collect, clean, and reuse contaminated rags?

- Minimize solid waste generated at work centers using rags by cleaning, not incinerating.
- Conserve resources (rags and cleaning solutions) by not incinerating used rags and by recycling rag cleaning solutions.
- Laundering is turnkey. Incineration requires labor to purchase replacement rags and drums on a regular basis.
- Incineration produces air emissions, while laundering minimizes air emissions by recycling cleaning solutions.

Costs associated with using a rag laundry service

- The cost for a 10,000-rag inventory is $0.17 for each towel ($0.03/week).
- Cost to launder one drum of oily rags is $175. One drum contains 1,000 rags.
- A $35 transportation fee is charged by the vendor for each round trip to the base.

Benefits gained from using a rag laundry service

- Rags supplied by a laundry service are high-quality rags.
- Help meet solid waste and hazardous waste reduction goals for the Activity.

- Maintain similar cost of nonhazardous rag management while conserving resources and eliminating emissions via incineration.
- Rags laundered by a qualified rag recycler are exempt from regulation as a hazardous waste when discharged wash water is treated by a publicly owned treatment facility. This may eliminate this waste stream.

Value of Life-Cycle-Cost Analysis

Select the most environmentally friendly and cost effective waste management practice where rags are used.

Economic Analysis for Rag Laundering
Information provided below was generated via interviews with potential vendors and Activity personnel.

Assumptions:

1. Rags absorb 50% of their dry weight in oil.
2. Drums contain 100% rags. No absorbent pads are included.
3. 1,000 clean rags in a metal drum weighs 110 pounds. The weight is 66 pounds rags and 45 pounds per drum.

Incineration of Nonhazardous Rags

10,000 rag inventory (one-time cost)	$518
Cost to dispose of rags (2005 Data)	$43,168
Rag weight in drums (Saturated – 2005 Data)	45,000 lbs
Cost per pound disposal of saturated rags	$0.96
Cost of new rags (30,000 lbs annually) to replace disposed rags	$1,554
Cost for drums to contain waste rags annually (30 drums)	$900

Laundering of Nonhazardous Rags

10,000 rag inventory (one-time cost; drum provided by vendor)	$1,785
Cost to launder 45,000 pounds of soiled rags	$47,727
Cost per pound laundering of saturated rags	$1.06
Cost per pound purchase of new rags (30,000 lbs)	$0
Cost for drums to contain waste rags annually	$0

Cost per year	**Laundering**	**Incineration**
Launder/Dispose	$47,727	$43,168
Inventory Cost	$1,785	$518
Cost for new rags (annually)	$0	$1,554
Cost for drums	$0	$900
Total Costs for Year 1	$49,512	$46,140
Total Recurring Annual Costs	$47,727	$46,140

Economic Summary

Annual cost for Laundering	$47,727
Annual cost for Incineration	$46,140
Annual Difference	$1,587
Payback Period for Investment in Equipment/Process in years:	

Programmatic Initiative Cost Considerations

3.2 REASSIGNMENT AND REPAIR OF PPEP AND P2 EQUIPMENT

Discussion:

The 2006 field survey identified 10 pieces of PPEP or P2 equipment that were not being utilized. Some equipment was not operable, and other equipment was not needed or not implemented at the work center for which it was purchased.

Implementing this initiative would relocate or repair unused PPEP and P2 equipment and provide training to work center personnel.

Benefits of reassigning and repairing PPEP and P2 equipment

- Minimize compliance points that generate hazardous and solid waste
- Reduce water usage
- Reduce volume of petroleum based parts cleaning solvents being managed
- Reduce air emissions by reducing the number of solvent washers
- Reduce the quantity of solvent being managed
- Cost avoidance for disposal of oily water waste stream
- Cost avoidance for new equipment purchases
- Save on contracted services time saved by utilizing equipment already present on base

Cost associated with reassignment and repair of PPEP and P2 equipment

- Installation costs at new location for equipment
- Equipment recertification for operation may be required
- Training cost at new location
- Evaluation and repair costs for wash racks and NDI water treatment unit
- Administrative overhead for P2 program manager to monitor initiative

Annual Cost

Annualized costs for this initiative are very difficult to determine. Each piece of equipment will need to be individually evaluated. Evaluation should include repair cost, and perhaps cost to recertify for operation. The work center that will be receiving equipment will need to be evaluated for space availability, available infrastructure (electricity, water source, etc). Work center personnel will require training for reassigned equipment. The P2 program manager should avoid excessive time spent on determining a precise cost for this initiative until a preliminary assessment for each piece of equipment is completed. This will help

prioritize which equipment is suitable for reassignment or repair and avoid increasing the cost of this initiative.

Payback from this initiative could be high just in the cost savings gained by reusing rather than purchasing new equipment. No metrics were identified for this initiative.

Preliminary assessment costs could be estimated utilizing the programmatic initiative costs consideration model below. The model should be modified as needed to obtain a reasonably precise estimate. This model could be compared to a similar model that includes cost of equipment purchase.

***Total Cost* = (Equipment repair cost + Installation cost [Infrastructure] + Relocation costs + Training Labor Hours Cost + Equipment recertification cost + Administrative overhead) – Waste disposal cost.**

Life-Cycle Costing for Technical Initiative

3.3 PROCURE ALTERNATIVE FUEL FORKLIFTS THROUGH ATTRITION

Discussion:
Use alternatively fueled forklifts. The U.S. Department of Energy (USDOE), its national laboratories, and the domestic transportation industry are partnering to develop advanced transportation technologies and alternatively fueled vehicles (AFVs) for the public. Technologies such as nickel-hydride batteries, nitrogen oxides reduction technologies, and other transportation technologies have begun to help the Unites States decrease its use of petroleum fuels. The USDOE classifies the following fuels as alternative fuels: bio diesel, electricity, ethanol, hydrogen, methanol, natural gas (compressed and liquefied), propane (liquefied and petroleum gas), and solar energy. Using these alternative fuels can significantly reduce toxic compounds and particulates released to ambient air, and vastly improve overall air quality.

The preferred method is to replace nonelectric forklifts with leased propane-fueled forklifts. Forklifts should be replaced through attrition. Attrition assumes that the current forklifts will have no residual value when replaced.

Forklifts can be leased on an annual basis. According to the National Propane Gas Association, propane costs about $1.10 per gallon which is 60% less than the approximate cost of gasoline (e.g., $2.72 per gallon). Fuel distributors will set prefabricated fuel cylinder racks at no cost.

One forklift distributor noted that maintenance costs for propane-fueled forklifts should be about 50% less than for gasoline or diesel forklifts. The service life of a propane-fueled forklift is expected to be 2-3 years longer than for gasoline or diesel forklifts. Furthermore, propane eliminates any of the engine problems associated with carbon fouling, and a propane engine does not require a fuel filter.

The less preferred method of replacement would be to purchase propane conversion kits. For at least one brand of gasoline and diesel forklift, there is an available conversion kit.

Why use alternative fuel forklifts?

- Reduced fuel costs
- Reduced maintenance costs (50% less)
- Reduced air emissions (total weighted air toxics are 69% less than gasoline)
- Improved air quality
- Compliance with EO 13149

Cost factors associated with using alternative fuel forklifts

- Lease cost
- Fuel cost
- Space for installation of a rack for propane fuel canisters
- Maintenance contract ($59 plus parts every 90 days)

Value of Life-Cycle Cost Analysis

Select most cost-effective and environmentally friendly forklifts.

Economic Analysis for Alternative Fuel Forklift
The information provided below was generated via internet and interviews with potential vendors.

Assumptions:
1. Contracting costs for gasoline and alternative fuel forklifts is the same.
2. Space is available to set a propane canister rack.
3. The vendor will set the fuel canister rack at no cost.
4. Maintenance calls and parts are $59 each for both types of forklifts. Therefore, each service call costs $118.

Gasoline Forklift

Maintenance per year ($59 service call + parts @ 6 times /year)	$708
Fuel per year (500 hours operation @ $2.72/gallon)	$194
Lease cost per year	$3,840

Alternative Fuel Forklift

Maintenance per year ($59 service call + parts @ 4 times/year)	$472
Fuel per year (500 hours operation @ $1.10/gallon)	$79
Lease cost per year	$3,720

Cost per year	**Propane**	**Gasoline**
Maintenance	$472	$708
Fuel Costs	$79	$194
Lease (annually, based on 5-year lease)	$3,720	$3,840
Total Yearly Costs	$4,271	$4,742

Economic Summary

Annual cost for Alternative Fuel Propane Forklift	$4,271
Annual cost for Gasoline Forklift	$4,742
Annual Difference per Unit	$471

Payback Period for Investment in Equipment/Process in years: N/A

Life-Cycle Costing for Technical Initiative

3.4 REPLACE GASOLINE PICKUPS WITH HYBRID PICKUPS THROUGH ATTRITION

Discussion:
The objective of this initiative is to reduce air emissions and conserve resources (gasoline).

In compliance with the Energy Policy Act and EO 13149, the Navy has been placing Alternative Fuel Vehicles (AFVs) at activities that have 100 or more light-duty vehicles. The USDOE classifies the following fuels as alternative fuel: bio diesel, electricity, ethanol, hydrogen, methanol, natural, gas (compressed and liquefied), propane (liquefied petroleum gas), and solar energy. Using these alternative fuels can significantly reduce toxic compounds and particulates released to ambient air and vastly improve overall air quality.

The recommended initiative is to purchase for base usage, light-duty hybrid pickups. The Chevrolet Silverado 1500 is available as a hybrid and is called the Chevrolet Silverado C15. The C15 averages 18 miles per gallon city and 21 miles per gallon highway according to the U.S. Environmental Protection Agency (USEPA) Model Year 2006 Fuel Economy Guide. Fuel usage is reduced from $1,835 per year for the gasoline model to $1,736 per year for the hybrid model. According to one dealer, vehicle life is anticipated to extend beyond the current 7 years to 7.5 years for the hybrid pickup.

Why use hybrid pickups?

- Hybrid pickups are classified as Tier2 (CFF LEV) vehicles, thus producing lower emissions than their gasoline twins.
- Hybrid pickups have the same power rating as gasoline counterparts.
- Hybrid pickups are more fuel efficient than their gasoline twins.
- Hybrid pickups have a slightly longer expected vehicle life according to one vendor; 7.5 years versus 7 years for the gasoline twin.

Cost associated with hybrid pickups

- Initial equipment cost is approximately $365 higher than the gasoline twin.

Benefits of using hybrid pickups

- Hybrid vehicles have lower emissions than gasoline twins.
- Better fuel economy conserves resources (gasoline) and avoids fuel cost.

- Public relations for the Activity are improved within the community.

Value of Life Cycle Cost Analysis

Select the most cost effective and environmentally friendly pickup. Cost benefits from reduced fuel consumption can be identified.

Economic Analysis Hybrid Pickup

The information provided below was generated via interviews with potential vendors, USEPA Web site and General Motors Web site. This analysis was performed for the Chevrolet Silverado 1500 gasoline and Silverado C15 hybrid (gasoline) light-duty pickups.

	Gasoline	**Hybrid**
Vehicle cost – Extended cab with standard options (Vendor)	$27,980	$28,345
Expected life of vehicle (Vendor)	7 years	7.5 years
Fuel costs for 1 year (USEPA Estimate)	$1,835	$1,736
Fuel cost over life of vehicle	$12,845	$13,020
Maintenance cost per year (Vendor Estimate)	$1,500	$1,500
Maintenance over life of vehicle	$10,500	$11,250
Total cost over life of vehicle	$51,352	$52,615
Total Annual Expected Cost Based on Expected Vehicle Life	**$7,332**	**$7,015**

Economic Summary

Annual cost for Silverado 1500 Gasoline Pickup	$7,332
Annual cost for Silverado C15 Hybrid (Gasoline Twin)	$7,015
Annual Difference	$317
Payback Period for Investment in Equipment in years:	3.98 years

Life-Cycle Costing for Technical Initiative

3.5 PURCHASE A FILTER CRUSHER

Discussion:

The objective of this initiative is to reduce solid waste by maximizing the number of filters that can be placed in a 55-gallon drum for metal recycling.

Acquire an Oberg oil filter crusher for Texas Air National Guard (TANG) operation. TANG 244 is located in Building 1676 and TANG AGE is located in Building 4160. The two buildings are across Taxiway 194 from each other and could easily share a crusher.

The Oberg P-300L filter crusher retails for $6,595, but is available on GSA contract GS-07F-9984H for approximately $3,319.

Oil filter crushers are readily identified as P2 equipment. Filter crushers allow work center personnel to place four times the number of filters in a drum as compared to uncrushed filters. Therefore, NAS JRB Fort Worth would reduce the number of drums purchased for filter recycling by four times. In addition, filter crushers remove and store excess oil from the filters, minimizing the weight of each drum and avoiding cost. This cost avoidance increases when oils are picked up by recyclers that pay the base for used oil. This initiative assumes NAS JRB Fort Worth pays for oil filter recycling based on drum weight. However, if filter recyclers are paid by the drum, recycling costs will be reduced by up to 4 times.

Why use filter crushers?

- Maximize the number of filters placed in drums, up to 3 or 4 times as many crushed filters as uncrushed.
- Remove maximum amount of oil from filter prior to placing in drum. This maximizes oil volume for recycling and can offset costs.

Costs associated with oil filter crushers

- Initial equipment cost is approximately $3,319.
- Space is required for the equipment.
- Electric lines and plug must be installed for operation.
- Training users.

Benefits of using oil filter crusher

- Reduce solid waste stream
- Reduce number of pickups by waste vendor
- Maximize oil for recycling, thus maximizing return

Value of Life Cycle Cost Analysis

Determine equipment cost for budgeting purposes.

Economic Analysis Filter Crusher

The information provided below was generated via interviews with a potential vendor. This analysis was performed for the Oberg P-300L filter crusher.

Assumptions:

1. Disposal costs are based on pounds. Therefore, cost avoidance will based on the number of drums used to contain filters and a reduction in transportation costs.
2. TANG will crush 3,200 filter per year.
3. Reclaim an average of 1 gallon of oil from every 8 filters at $0.10 per gallon.

	Crushed Filters	**Uncrushed Filters**
Cost of filter crusher (Vendor)	$3,319	$0
Freight Cost	$700	$0
Installation	$1,000	$0
Expected life of crusher (Vendor)	15 years	0
Number of filters placed in drum (Vendor)	800	200
Number of drums required to dispose of 3,200 filters.	4	16
Drum cost to contain 3,200 filters.	$140	$560
Oil reclamation on 3,200 filters at $0.10/gallon	$40	$0

Economic Summary

Cost to contain 3,200 **uncrushed** filters	$560
Cost to contain 3,200 **crushed** filters, minus oil reclamation	$100
Cost Difference	$460
Payback Period for Investment in Equipment in years:	10.90 years

Life-Cycle Costing for Technical Initiative

3.6 EXPAND LUBRICANT ANALYSIS PROGRAM

Discussion:
The objective of this initiative is to reduce the volume of used oil generated on base and avoid labor and materials replacement costs associated with lubricant change-out.

Why expand a lubricant analysis program?

- The program already exists and is successful.
- It will be easily implemented.

Cost associated with lubricant analysis

- Oil analysis fee
- Oil analysis labor

Benefits of lubricant analysis

- Reduced frequency of engine oil changes
- Reduced generation of used oil and oil filters
- Reduced materials purchase for new oil and new filters (cost avoidance)
- Reduced labor to change out oil
- Compliance with EO13149

Value of Life Cycle Cost Analysis
Select the most cost-effective and environmentally friendly lubricant change-out method. Cost benefits from reduced used oil and filter generation can be identified.

Economic Analysis Lubricant Analysis Program
The information provided below was generated via Joint Services Pollution Prevention Opportunity Handbook and OPNAV Instruction 4790.16.

	Large Vehicle	Small Vehicle	Generator
Oil	$24.00	$12.00	$36.00
Oil Filter	$150.00	$30.00	$70.00
Oil Change Labor	$100.00	$50.00	$100.00
Total Cost	$274.00	$92.00	$206.00
Oil Analysis Fee	$25.00	$25.00	$25.00
Oil Analysis Labor	$25.00	$25.00	$25.00
Cost Savings for Each Change Out Avoided	$224.00	$42.00	$156.00

Life-Cycle Costing for Technical Initiative

3.7 UTILIZE RECHARGEABLE FLASHLIGHTS

Discussion:
Field survey results indicate than almost all work centers utilize flashlights. Some work centers were observed to maintain between 100 and 150 flashlights. Individual tool boxes were observed to contain up to three flashlights each. Flashlights observed in work centers were low quality, primarily 8 to 12 inches long, and utilized 2 or 4 C-cell or D-cell batteries. Work center personnel are required to exchange spent batteries 1-for-1 with the tool room.

Utilizing equivalent size rechargeable flashlights would reduce the volume of batteries disposed. High-quality rechargeable flashlights carry limited lifetime warranties and according to one vendor routinely last 10 years. Rechargeable flashlights could be kept in the tool room to ensure longevity and proper recharging. Long life would drastically reduce the number of flashlights disposed as solid waste. Work centers are acclimated to checking out rechargeable tools such as radios, hand tools, and field equipment.

Why use rechargeable flashlights?

- Reduced battery waste, battery disposal cost, and battery replacement cost.
- Higher quality flashlights.
- Reduced flashlight replacement cost, which reduces solid waste due to poor quality.
- Rechargeable batteries have a 2-3 year life span.
- Reduce the number of flashlights in work centers by a factor of 6.7.
- Work center personnel are acclimated to checking out and using rechargeable tools.

Cost factors associated with using rechargeable flashlights

- Purchase cost is much greater, up to 10 times higher.
- Long life means that bulbs must be periodically replaced.
- Recharging stands.
- Rechargeable battery cost is much greater per unit, up to 10 times higher.

Value of Life-Cycle Cost Analysis
Select most cost-effective and environmentally friendly flashlights.

Economic Analysis for Rechargeable Flashlights
The information provided below was generated via site survey observations, the Internet, and interviews with a potential vendor.

Assumptions:
1. High-quality rechargeable flashlights last 8 years on average. Low-quality flashlights last 1 year on average.
2. Space is available to set up recharging stations.
3. Rechargeable batteries last 2.5 years, while D-cells last 1.5 months.
4. Bulbs in rechargeable flashlights last 5 years and cost $4 each.
5. A shop utilizing 100 personal flashlights (low quality) will utilize 10 rechargeable flashlights stored in the tool room.
6. Rechargeable flashlight kits cost $80, while D-cell flashlights with batteries cost $8 each.
7. This analysis does not include disposal costs for batteries.

D-Cell Flashlights (100 for large Work Center)

Cost to supply 100 flashlights to a work center for one year.	$800
Battery cost for one year (8 batteries /year/flashlight @ $1.00 ea)	$400
Recurring Costs (Annually adjusted over 10 years)	
Flashlights	$800
Batteries (8 per light equivalent assuming 6-month flashlight life)	$400

Rechargeable Flashlights (15 for large Work Center)

Initial cost for 10 rechargeable flashlight kits (Flashlight, battery, charger).	$1,200
Recurring Costs (Annually adjusted over 10 years)	
Flashlights and chargers	$120
Batteries (four per flashlight assuming 2.5-year life)	$138
Bulbs (2 per flashlight assuming 5-year life)	$12

Cost	**Recharge**	**D-Cell**
Initial year expense	$1,200	$1,200
Second year expenses	$260	$1,200
5-year cost	$2,240	$6,000
10-year costs	$3,540	$12,000

Economic Summary

Rechargeable flashlights 10-year costs	$3,540
D-cell flashlights 10-year costs	$12,000
Annual Difference Beginning on Year Two	$846
Payback Period for Investment in Equipment/Process in years:	2.22

Life-Cycle Costing for Technical Initiative

3.7 SORT AND RECYCLE CLEAR PLASTIC AND ALUMINUM CANS

Discussion:

The objective of this initiative is to divert 50% or greater of recyclable clear plastic and aluminum cans generated annually from disposal. The base already has a Recycle Center and space is available to sort and store additional materials. The 1st Lieutenants Group provides labor for the center.

Recycle bins are already set around the base by Recycle Center personnel. Additional bins can easily be distributed. Bins are picked up regularly and additional bins can be picked up at almost no cost. The base already has a contract with a vendor.

Why recycle?

- Reduce solid waste disposal cost
- Conserve natural resources
- Comply with EO 13148

Cost factors to sort and recycle plastic and aluminum cans

- Sorting
- Temporary Storage
- Marketing
- Accounting
- Transportation
- Revenue
- Disposal

Sorting = Labor cost to segregate like materials. ($72/ton)

Temporary Storage = Cost to house collected materials until marketable quantities make transportation economical. ($0/cy). Solid waste not recycled would otherwise require accumulation and management as a solid waste.

Marketing = Cost to solicit buyers for recyclables. ($200/Product)

Transportation = Cost for pickup and delivery of the recyclable material. This cost may be a buyer expense if transportation is a condition of the sale. ($12.50/ton)

Accounting = Cost to maintain records of materials transactions. ($3,900/year)

Revenue = Money received from sale of recyclable materials.
Clear Plastic = $360/ton
Aluminum cans = $1,100/ton

Disposal = Cost to dispose of solid waste and or hazardous waste. It is assumed that all materials recycled or reclaimed would otherwise be disposed. ($30/ton)

Economic Analysis Recycling Plastic, Glass and Aluminum Cans
The information provided below was generated via Connecticut Metal Recyclers and Recyclers World Internet pages.

Assumptions: 1. NAS JRB will generate 10 tons of each material per year.	**Aluminum Cans**	**Plastic**
Sorting	$720	$720
Temporary Storage	$0	$0
Marketing (Find a vendor, promote the program)	$100	$100
Transportation	$125	$125
Accounting	$1,300	$1,300
Revenue	$11,000	$3,600
Disposal	$300	$300.
Net Cost or Savings for Each Recyclable Material	$9,055	$1,655

Value of Life Cycle Cost Analysis
Annualized cost for this initiative is difficult to determine since many costs are not readily quantifiable. This is due to costs not being tracked or because costs are commingled with other expenses. One metric for this initiative is to track the volume of each material segregated and recycled.

Life-Cycle Cost (LCC) = (Revenue + Disposal) - (Sorting + Storage +Marketing + Transportation +Accounting)

Appendix G
Work Center Reports

BRANCH DENTAL CLINIC - DENTAL

COMMAND:
DEPT: Branch Health Clinic
WORK CENTER: Dental/Medical
SHOP NAME: Dental Lab/Radiology
BUILDING #: 1711
SHOP POC AND PHONE #: Chief Balazs, (817) 782-5917

WORK CENTER DESCRIPTION

This work center provides dental and medical X-rays as needed for eligible personnel at NAJ JRB Fort Worth. The dental and medical labs X-ray developer units are the partially sealed Konika SRX-301. Developer is discharged to the sanitary sewer. Fixer is collected from both clinics and filtered for silver capture at the Medical clinic. Filtered fixer is discharged to the sanitary sewer. Fixer filters are sent to DRMO for silver recovery.

The primary process performed in the Dental/Medical Lab is:

- **X-Ray Development**

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

To be determined after assessment of priority P2 opportunities for NAS JRB Fort Worth.

CURRENT P2 PRACTICES & EQUIPMENT

- Partially closed X-ray developer unit with filters sent offsite for silver recovery.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Consider future conversion to digital X-ray imaging technology such as Kodak CR7400 for dental radiology. Additionally, Kodak produces a DRYVIEW laser imaging system to replace wet chemical film developing.

X-RAY DEVELOPING

PROCESS DESCRIPTION
X-rays are developed in a self-contained unit.

Base Process ID#: DENTAL/MEDICAL-01

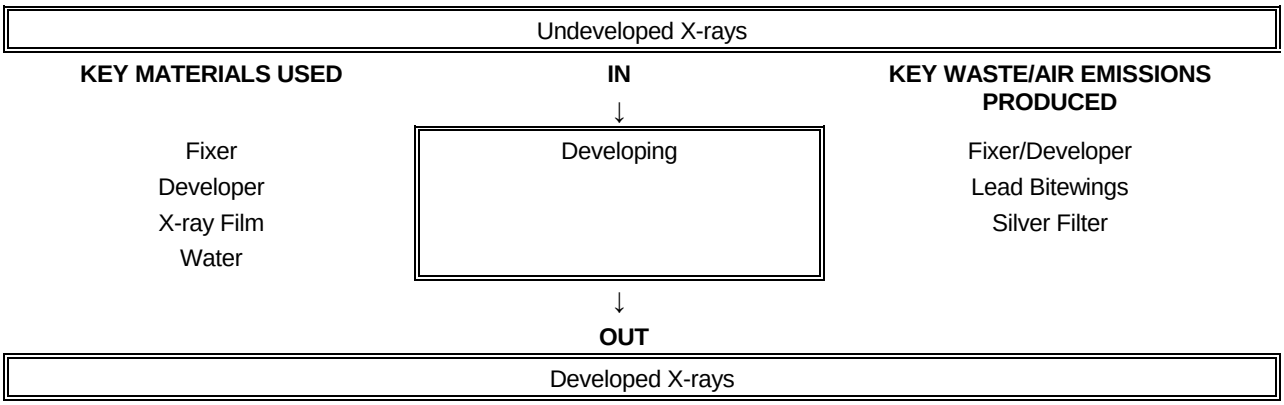
HSMS Code: DENTAL/MEDICAL

Substrate: Polyester Film

MRC/Technical Publication: NA

P2 Environmental Equipment Used in Process:
Automatic X-ray Developer – Konika SRX-301

PROCESS FLOW DIAGRAM:



ENVIRONMENTAL-HAZARDOUS MATERIALS MINIMIZATION CENTER

COMMAND: Navy
DEPT: Environmental
BUILDING #: 1619
SHOP POC AND PHONE #: SK1 Hubbell (817) 782-7548

WORK CENTER DESCRIPTION

This shop is responsible for receiving, storing and distributing hazardous materials used on base. Work centers rely on the Hazardous Materials Minimization Center (HazMinCen) to supply hazardous materials such that the need for hazardous material storage in shops is kept to an absolute minimum. Also, work centers return partially used containers of hazardous materials to the HazMinCen. They are then reissued to optimize material usage (i.e., reduced need to purchase new items and reduced waste generation associated with hazardous material disposal).

All of the work centers on base participate in the CHRIMP (i.e., the Consolidated Hazardous Material Reutilization and Inventory Management Program). The Hazardous Substance Management System (HSMS) is used to track hazardous material issues, storage, and Authorized User Lists (AULs).

This work center maintains proper storage for the hazmat it carries, and has also been made responsible for maintaining the HazWaste storage area.

The primary process performed in the HazMinCen is:

- **Hazardous Material Distribution and Tracking**

Pollution prevention (P2) practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Work with the Fleet Industrial Supply Center (FISC) to obtain free issue items and distribute unneeded hazmat with other Navy and DoD facilities. The HazMinCen has obtained the list of free issue items and plans to continue to work with FISC as this program evolves.

CURRENT P2 PRACTICES & EQUIPMENT

- Empty hazardous material containers must be returned to the HazMinCen. The HazMinCen ensures that these containers are sent to the Environmental Department's recycling program as appropriate.
- The HazMinCen has a written detailed operating procedure for extending hazmat shelf life.
- The HazMinCen is aware of and utilizes the Defense Supply Center Richmond's Web site for help in checking if shelf-life extensions have been granted on individual hazardous materials (http://www.shelflife.hq.dla.mil/), when needed.
- In addition to locker checks conducted by the Safety Department, HazMinCen personnel perform locker checks for outdated hazmat. They visit 100% of the lockers every 6 months.
- Approval process for new hazmat items requires signoff by the HazMinCen, Safety, Environmental, and Occupational Health departments.

- Now using “non-solvent based” aircraft washing soaps.
- Low VOC aerosol spray paints by Eco-Sure are used in place of some traditional aerosol paints.
- Nonextendable material approaching its shelf life is open for issue to any shop on base that can use the material. If the material cannot be used on base it is returned to the inventory control point and made available to other installations to avoid disposal of large quantities of waste.
- The HazMinCen has minimized use of materials with nonextendable shelf life.
- This HazMinCen also gives materials approaching shelf life to Habitat for Humanity.
- Implemented many material substitutes since 2000 P2 Plan Update including:
  - Non-Ozone Depleting Substance (ODS) formulation of Break-Free.
  - Non-ODS CLP compound.
  - Non-Lead based traffic paint
  - Non-ODS coating compounds
  - Avionics cleaner that does not contain 1,1,1-trichloroethane.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Purchasing antifreeze that has been recycled offsite, again to support the initiative to purchase items with recycled content under Executive Order 13101.

HAZARDOUS MATERIAL DISTRIBUTION AND TRACKING

PROCESS DESCRIPTION

The HazMinCen provides hazardous materials to 40 units with 120-130 work centers. The center orders, stores, distributes, and tracks the hazmat issued, and receives empty containers when the material has been used.

Material is ordered from various vendors, stored at the HazMinCen, and tracked using HSMS. Designated hazmat coordinators for each shop are responsible for coming to the HazMinCen to check out new, unopened hazardous materials—known as “Class A” items—and returning unused or partially used materials if they are in good condition. The designated hazmat coordinators maintain supplies of hazardous materials needed in central lockers for checkout, use, and return by each shop. Activities are required to return empty containers to the HazMinCen before issue of more hazmat. If empty containers are not returned, the activity is cut off from ordering more material. Containers are tracked using a barcode system that facilitates identification of shops that have outdated material. HazMinCen personnel run an outstanding container report on the shop requesting material to verify previously checked out materials have been returned. Monthly meetings with shop hazmat coordinators are held to discuss outstanding materials and proper procedures.

Usable material is accepted back from the work centers, although in actual practice most of the material is used up and the majority of returns are empty containers. Partial or unused containers of material, known as “cost avoided” items, are “reissued” free of charge to any shop on base.

Material orders from an activity are typically filled within 24 hours unless the product is not on the AUL (needs to be approved by the shop supervisor, Tenant Hazmat Coordinator, Safety, HazMin, Occupational Health, and the Environmental Department) or is not in the HazMinCen’s inventory. Work Centers have IMPAC cards, but have been instructed not to use them to purchase hazardous materials.

The HazMinCen has designated storage areas for its materials: a battery and battery fluid storage room; a room with containment for oils; an acids and corrosives room; a climate-controlled room for adhesives; drum storage building with containment; and regular storage rooms. Most batteries are issued through main supply, since they are self-contained and, therefore, not considered hazmat.

Empty containers are required to be returned free of hazmat residue. The HazMinCen will puncture aerosol cans. Empty containers made of recyclable materials are forwarded to the recycling center.

HSMS reviews are conducted on a monthly basis to ensure items have not reached their shelf life. If an item has reached its shelf life, a determination will be made whether or not the shelf life can be extended depending on the code associated with the shelf life. If a nonextendable material is approaching its shelf life, the material will be turned into the DoD Supply system and made available to other installations. Expired and nonusable material will be considered waste and handled by the HazWaste Department. The HazMinCen has minimized nonextendable shelf life material in recent years.

Base Process ID #: HAZMAT 01

HSMS Code: SR-11-99

Substrate: Not Applicable

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Two aerosol can puncturing units; designated storage areas with containment or climate control, as appropriate to the material being stored.

PROCESS FLOW DIAGRAM:

Hazardous Materials

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
	↓	
	Storage at HazMinCen	Shelf life Expired HazMat – to HazWaste
	↓	
	Distribution to Work centers	
	↓	
	Return of Empty Containers and Partially Full Containers	Empty metal & plastic containers – recycled Empty aerosol cans – punctured & recycled Other empty containers - to solid waste
	↓	
	ReIssue Partially Full Containers	
	↓	
	Return of Empty Containers	

MWR - AUTO HOBBY SHOP

COMMAND: Morale, Welfare, and Recreation
DEPT: MWR
WORK CENTER: MWRHOBBY
SHOP NAME: Auto Hobby Shop
BUILDING #: 1145
SHOP POC AND PHONE #: Allan Taylor, (817) 782-6375

WORK CENTER DESCRIPTION

The Auto Hobby shop provides a facility for military personnel to repair and perform scheduled or unscheduled maintenance on privately owned vehicles (POV). Patrons are responsible for bringing in their own fluids and other materials while this shop properly disposes of the waste generated. Work performed by patrons includes turning rotors, changing and balancing tires, changing oil, flushing radiators, and general vehicle maintenance. The equipment used to perform these services and the car wash bay attached to building 1145 is maintained by the Auto Hobby personnel. The car wash bay has been shut down for at least a year and is not scheduled to reopen until the wash bay equipment has been repaired and the gas boiler replaced. Outdoor Rec Issue equipment is also maintained and stored here. This equipment includes trailers, boats, camping gear, sports equipment, tables, and chairs.

The primary process performed in the Auto Hobby Shop is:

- **Facility and Equipment maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

  This recommendation has not been implemented in this shop, but could be. Currently the Auto Hobby Shop uses paper towels or scrap rags, but personnel were open to the idea of using recyclable rags.

CURRENT P2 PRACTICES & EQUIPMENT

- Oil filters are drained to collect excess oil and crushed to reduce the volume of waste.
- Used oil filters are combined with other used oil filters (crushed or noncrushed) from around base and sent offsite for recycling.
- Oil containers are drained over used oil drums to collect additional oil that is sold offsite for energy recovery.
- Parts washer is equipped with 3 filters to thoroughly clean the solvent and reduce fluid change-outs. This reduces the amount of solvent waste and purchase.
-
- Dry Sweep is reused several times for spill cleanup before considered waste. This reduces material purchase and amount of absorbent waste generated.
- The wash rack and drains at the auto hobby shop garage doorways drain to an oil-water separator, which is maintained by the base public works department.
- A portable waste oil collection tank is used to drain small stations and transfer oil to the larger used oil tank in containment behind the shop.

PARTICIPATION IN BASEWIDE P2 PROGRAMS`

Launderable Red Rags – no, but would be willing to try this option

HazMat obtained from HazMinCen – no

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Consider closed-loop water recycling system for car wash bays. If excessive amounts of water are used in the cleaning of POVs, this opportunity would be justified since the cost of water would be reduced. This effort also helps in the conservation of water.
- Battery storage area. There is not currently a single location for storing batteries, and they are stored in several rooms and locations around the shop. A single, controlled, out-of-the-way safe area for battery storage should be designated.

FACILITY AND EQUIPMENT MAINTENANCE

PROCESS DESCRIPTION

Personnel at the Auto Hobby shop maintain the facility and the equipment used to service vehicles and assist patrons in maintaining their POVs. Patrons have the ability to perform oil changes, fluid flushes, tire rotations, brake cleanings, and minor engine repair. In order to perform this work, patrons are responsible for bringing in their own fluids, parts, and materials and leaving the wastes generated for proper disposal. Oil filters are to be drained and crushed; all used oils and antifreeze are collected for offsite disposal.

Recreation equipment is maintained by the Auto Hobby personnel. Maintenance includes filling of fluids and washing of equipment. Recreational equipment and POVs are washed with soap and water in the car wash that is at the far end of building 1145.

Base Process ID #: MWRHOBBY01

HSMS Code: SR-02-00

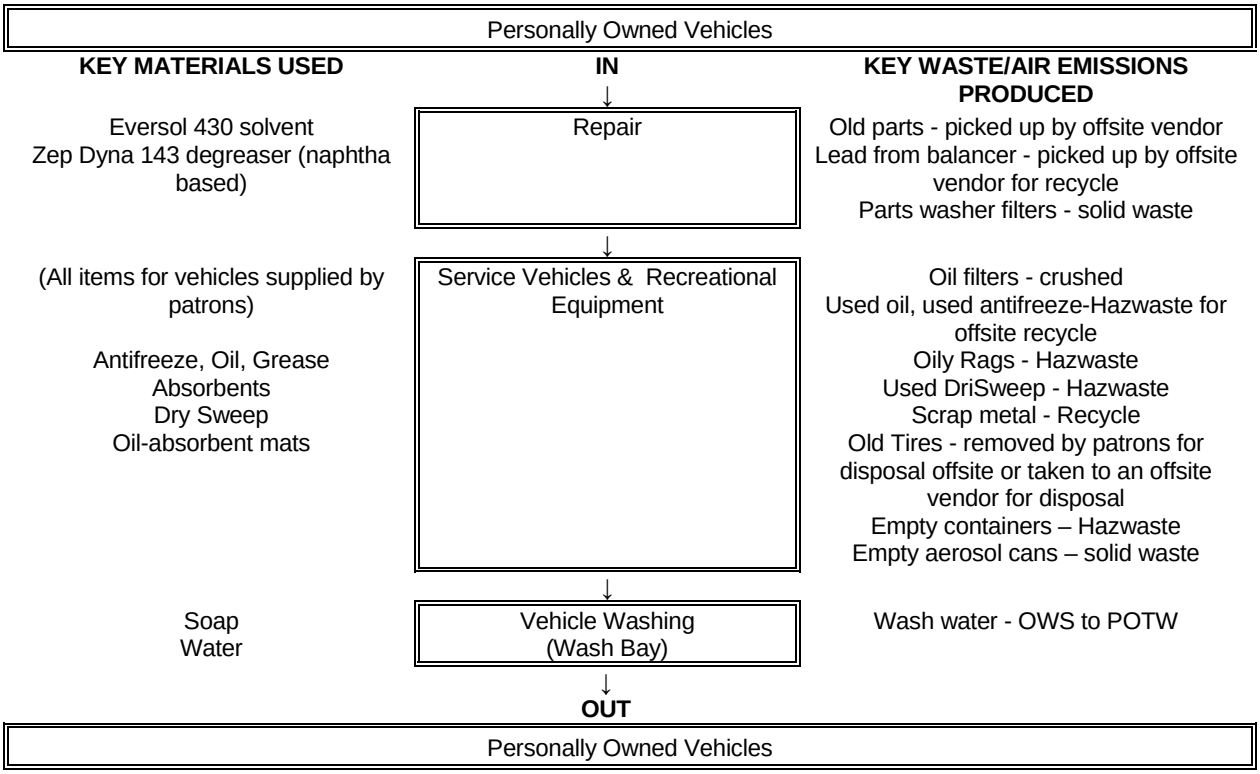
Substrate: Various

MRC/Technical Publication:

P2/Environmental Equipment Used in Process:

Oberg Oil Filter Crusher, Self-Cleaning Parts Washer w/ Zep Dyan 143 degreaser solvent; antifreeze drain station; six oil drain stations

PROCESS FLOW DIAGRAM:



AFRES

AFRES 301 SPTG/CEO – AIR-CONDITIONING SHOP

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Support Group (301 SPTG/CEO)
WORK CENTER:	AFRESAC
SHOP NAME:	Air-Conditioning Shop
BUILDING #:	1217
SHOP POC AND PHONE #:	Charles Kelly, (817) 782-5723

WORK CENTER DESCRIPTION

This shop maintains and repairs refrigeration and air-conditioning (AC) units for the 301st AFRES. Major replacement of AC units is done by contract. This shop and the equivalent Navy shops were combined in May 2003. Typical maintenance/repair tasks include AC coil cleaning, recovering/charging AC units, replacing AC units or components, and soldering copper tubing in AC unit. This shop is maintained by both the Navy and Air Force personnel. It no longer serviced ice machines/refrigerators. Under contract, a 25-ton unit was replaced in Building 1191. Currently, a major rehab is replacing AC units at Buildings 1790 and 1792.

The primary process performed in the AC shop is:

- **Air-Conditioning Unit Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed of (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Replaced all CFC-12 units.
- Replacing CFC-22 units when replacement is necessary.
- Recycle metal containers.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified

MAINTAIN AC/REFRIGERATION

PROCESS DESCRIPTION
This shop maintains refrigeration and AC units. Tasks include coil cleaning, recovering/charging, replacing AC units/components, and soldering copper tubing.

Base Process ID #: AFRESAC-01

HSMS Code: SR-04-02

Substrate: Various

MRC/Technical Publication: Various

P2/Environmental Equipment Used in Process:
Freon Recovery Machine and Tank – CFC-22 is used in AC units. No C-12 units remain.

PROCESS FLOW DIAGRAM:

AC/Refrigeration Maintenance Request

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Freon R-22; Freon R134a; Vacuum Pump Oil	Charge Unit/Reclaim Freon	Rags with Oil
Compressor Oil	Replace AC Unit or Component	Metal Containers
Simple Green	Clean Ac Unit Coils	Plastic Containers
Solder; Flux	Solder AC Unit Piping	
Grease; Penetrating Oil	Grease/Lube Components	Metal Containers; Rags with Oil

OUT

Completed AC/Refrigeration Maintenance Request

AFRES 301 LGMG – AGE FLIGHT

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMG)
WORK CENTER:	AFRESAGE
SHOP NAME:	AGE (Aircraft Ground Equipment) Flight
BUILDING #:	1602
SHOP POC AND PHONE #:	Master Sergeant Raymond Russell, (817) 782-7168

WORK CENTER DESCRIPTION

This shop performs maintenance of aerospace ground equipment (AGE). This involves washing, corrosion repair/repainting, lubrication, and fluid changes.

The primary process performed in the AGE shop is:

- **AGE Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider onsite recycling of hydraulic fluid as is performed by the AIMD 920 Structure/Hydraulic shop. Contaminated hydraulic fluid is cycled through a hydraulic fluid purifier unit as opposed to purging the systems and disposing the hydraulic fluid as waste. Use of the purifier reduces the amount of fresh hydraulic fluid needed and reduces waste disposal costs since the fluid is recycled.

- Construction of awnings for equipment storage will reduce painting requirements for stored equipment. One 100-by-70-foot awning is being constructed on one side of the building, and one 12-by-85-foot awning on the back.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Use oil filter crusher to recycle metal more easily.
- Use new Inland Technology with Breakthrough solvent with filters to minimize solvent waste generation. This replaces a Safety Kleen parts cleaner.

- Use covered wash rack, which drains to oil-water separator. Roof, slope, and sides keep storm water from draining to oil-water separator.
- All AGE equipment now uses HFC-134a in place of former CFC-12.
- Use propylene glycol in place of ethylene glycol where permitted by TO.
- Use non-ODS lubricants.
- Have PIG spill kit for oil releases, and two acid spill kits.
- Reclaimed JP-8 that is removed from planes is used in AGE equipment.
- Spent oil tanks and drums are in containment.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Consider use of Reclaimed JP-8 for AGE fueling.

AEROSPACE GROUND EQUIPMENT (AGE) MAINTENANCE

PROCESS DESCRIPTION
AGE equipment is cleaned, inspected, and lubricated as necessary. Corrosion is removed and area repainted when identified.

Base Process ID #: AFRESAGE-01

HSMS Code: ID-23-00

Substrate: Metals (mostly steel)

MRC/Technical Publication: **Several**

P2/Environmental Equipment Used in Process:
Oil Filter Crusher; Inland Technology with Breakthrough solvent (or ZEP Dyna 680-T2) with filters; containment systems for oils; oil-water separator for wash rack; awnings for equipment storage.

PROCESS FLOW DIAGRAM:

AGE Requiring Maintenance

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Inspect	None
None	Disassemble	Oil; Hydraulic Fluid; Batteries; Antifreeze
Adhesive; Rags; Sealant; Transmission Fluid; Paint (Touch-Up)	Repair	Rags with Oil; Solvent; Lube Oil; Absorbent Materials; Oil & Fuel Filters
Hydraulic Fluid; Oil; Grease	Lubrication	Metal Containers
Paint	Reassemble	Metal Containers
Antifreeze; JP-8	Inspect and Test	None

OUT

Maintained AGE

AFRES 301 LGMR – ARMAMENT SYSTEMS

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMWA)
WORK CENTER:	AFRESAS
SHOP NAME:	Armament Systems
BUILDING #:	1648
SHOP POC AND PHONE #:	Bobby Graham, (817) 782-5237/7828

WORK CENTER DESCRIPTION

This shop provides general maintenance of the weapons systems on the F-16 aircraft. Equipment includes Alternate Mission Equipment (AME), pylons, ejectors, and laser guided equipment. Processes performed include cleaning, repairing, and spot painting of the weapons systems.

The primary process performed in the Armament Systems shop is:

- **Weapons Systems Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider Simple Green to replace PD680 Type II Solvent.
- Consider using Sem Pens or blotter bottles to replace aerosols for small touch-up jobs.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Recycle metal containers.
- Removed Safety Kleen parts washer and replaced with Inland Technology Washer with filters using Breakthrough solvent.
- Removed Elantra Automotive Parts Washer and replaced with Better Engineering aqueous parts washer.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable White Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

MAINTAIN WEAPONS SYSTEMS

PROCESS DESCRIPTION

Base Process ID #: AFRESAS-01

HSMS Code: ML-02-00

Substrate: Weapons Systems

MRC/Technical Publication: Owners Manuals, T.O. IF-16c-9456-30-4

P2/Environmental Equipment Used in Process:
Inland Technology with filter using Breakthrough solvent; Better Engineering aqueous parts washer.

PROCESS FLOW DIAGRAM:

Gun Systems to be Cleaned and Maintained

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Aqueous Cleaner, Corrosion Preventive Compound Dermaplus, Cleaning Compound, Clean-All Purpose Grease, Breakthrough Solvent, Rags	Cleaning	Gloves and Brushes Aqueous Cleaner Rags w/ Grease, POLs, Solvents, & Cleaners - HazWaste Center Empty Containers - HazMinCen
Compound Sealant, Sealant, Tape Soldering Flux Liquid Edge Sealer Break-Free CLP Antiseize Compound Sealing Compound Blue Adhesive Epoxy Silicone Compound Lubricating Oil Sealing Compound Adhesive Epoxy, Rags	Repairing	Empty Containers - HazMinCen Rags w/ Grease, POLS, & Solvents - HazWaste Center Air Emissions - Soldering
Flat Black Flat White Flat Grey Coating Compound	Painting	Empty Aerosol Cans - HazMinCen Air Emissions - Paint

↓

OUT

Cleaned and Maintained Weapons Systems

AFRES 301 LGMVT – AVIONICS-INTERMEDIATE

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXMV)
WORK CENTER:	AFRESAIS
SHOP NAME:	Avionics Intermediate Shop
BUILDING #:	1649
SHOP POC AND PHONE #:	Ron Kopystecki, (817) 782-7844

WORK CENTER DESCRIPTION

This shop tests, repairs, and cleans black boxes for the F-16 aircraft. The testing consists of running software programs and performing isolation procedures. This shop identifies problems and can perform very limited repairs. When defects are diagnosed, the equipment is usually changed out.

The primary process performed in the Avionics shop is:

- **Black Box Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- None identified

CURRENT P2 PRACTICES & EQUIPMENT

- One gallon of vacuum pump oil is produced each year during maintenance of pump. Oil is exchanged 1 for 1 with Haz Mart.
- Recycle metal containers.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat containers returned to HazMinCen – yes

Cardboard, paper, plastic, aluminum cans picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified

MAINTAIN AIRCRAFT BLACK BOXES

PROCESS DESCRIPTION
Diagnostic tests are run on Black Boxes. Minor repairs are performed. The units are brush cleaned with no wipe down and inspected prior to replacement.

Base Process ID #: AFRESAIS-01

HSMS Code: ID-22-00

Substrate: Aircraft Black Boxes

MRC/Technical Publication: Various

P2/Environmental Equipment Used in Process:
None.

PROCESS FLOW DIAGRAM:

Black Box for Servicing

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Test	1 gallon vacuum pump oil per year
Alcohol (Isopropyl and Denatured), Lube Oil; Alpha 100 Flux; Resin Core Solder; Anaerobic Adhesive; 3145RTV; SEM Shred Oil	Repair	Air Emission - Soldering Plastic Containers Metal Containers
Dehydrated Alcohol; Denatured Alcohol; General Purpose Detergent	Clean	Air Emission - Alcohol Plastic Containers
None	Inspect	None

OUT

Serviced Black Box

AFRES 301 LGMFS – CORROSION CONTROL/ METALS TECH

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMFB)
WORK CENTER:	AFRESCC
SHOP NAME:	AGE (Aircraft Ground Equipment) Flight
BUILDING #:	1628
SHOP POC AND PHONE #:	Ray Schechter, (817) 782-7083/7031

WORK CENTER DESCRIPTION

This shop is responsible for corrosion control of the F-16 aircraft and other aircraft. This involves removing paint and corrosion using plastic media blasting. The metal is then recoated with polyurethane or epoxy coatings.

The primary processes performed in the Corrosion Control shop are:

- **Paint/Corrosion Removal**
- **Repainting**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider using a lighter weight masking material instead of the plastics and/or paper currently used. Such a material is a very light-weight, slightly clingy material called "Shark Skin." The material costs approximately $11 for 400 feet of material 14 feet wide. The waste volume generated by masking an entire school bus can be crumpled into a ball smaller than a football. Use of this product will help to minimize the amount of RCRA hazardous Paint Trash and Debris that must be disposed.

- Currently, aircraft are painted every three years. This work center will begin using APC paint, which will extend paint life to every six years. F-16 Depot facility will begin stocking the new paint in the next few months. It will take a few years before this P2 practice yields results, but it will eventually result in less painting and fewer emissions.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Using 2 Gerber Decal Machines to reduce the need for spray painting.
- Use Safety-Kleen parts washer for cleaning paint spray guns while minimizing disposal of waste solvent.
- Use HVLP paint guns (five) minimizing VOC release during spray painting.
- Recycle metal containers.
- Replaced products using MEK and toluene, except Safety Kleen thinner 6782 and DynaMold Solvent.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no. Must use lint-free rags in this department.

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes, 90 W oil for compressors is picked up; no antifreeze used.

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Consider using a different paint gun cleaner solvent that does not contain MEK or toluene. The substitute cleaner could be used on a trial basis to see if it works as well as the lacquer thinner.

PAINT/CORROSION REMOVAL

PROCESS DESCRIPTION
Paint/corrosion removal is done using plastic media blasting or by sanding.

Base Process ID #: AFRESCC-01

HSMS Code: ID-01-06

Substrate: Metal

MRC/Technical Publication: Several

P2/Environmental Equipment Used in Process:
Three Titan Glove Box Blast Units with filters; sanding disks and grinders; table saw with vacuum. Baghouse formerly in use is slated for demo.

PROCESS FLOW DIAGRAM:

Aircraft Part Needing Paint Removal		
KEY MATERIALS USED	**IN** ↓	**KEY WASTE/AIR EMISSIONS PRODUCED**
Plastic Bead Media or Sanding	Strip Part ↓	Plastic Media (Paint Contaminated)
None	Inspect ↓	None
	OUT	
Stripped Part		

REPAINTING

PROCESS DESCRIPTION
Once the paint and corrosion are removed from the part, the parts are recoated using primer and polyurethane or epoxy paints. Stenciling on the parts is with spray paint or decals. Paint spray guns are HVLP and are cleaned in a paint gun cleaner using lacquer thinner.

Base Process ID #: AFRESCC-02

HSMS Code: ID-05-01

Substrate: Metal and Nonmetal

MRC/Technical Publication: Several

P2/Environmental Equipment Used in Process:
Safety Kleen Lacquer Thinner Solvent Spray Gun Cleaner; Large Spray Booth; 5-HVLP Paint Guns; 2 Geiler Decal Machines shared with the Navy.

PROCESS FLOW DIAGRAM:

Aircraft Part Ready for Painting

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Polyurethane Paint; Base Coat; Top Coat; Epoxy Primer Respirators	Paint Part	Paint Cans; Rags with Paint; Liquid Paint Waste; Paint Solids; Air Emissions - Painting; Used Filters & Respirator Filters
None	Inspect	None
Lacquer Thinner Dynamo Solvent Isopropyl Alcohol	Clean-Up Equipment	Dirty Solvent Filters Isopropyl Alcohol Rags with Solvent, Alcohol Metal Containers

OUT

Painted Aircraft Part

AFRES 301 LGMCE – EGRESS

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMCE)
WORK CENTER:	AFRESEE
SHOP NAME:	Egress
BUILDING #:	1628
SHOP POC AND PHONE #:	Senior Master Sergeant Frank Gum, (817) 782-7037

WORK CENTER DESCRIPTION

This shop performs maintenance and repair of ACES-2 ejector seats for F-16s and F-15s.

The primary process performed in the Egress shop is:

- **Ejector Seat Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Use launderable red rags.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified.

MAINTAIN EJECTOR SEATS

PROCESS DESCRIPTION
Maintain ejector seats. Explosive devices used in ejection have to be replaced periodically or the seat may have breakage. This shop removes the seats from the plane, conducts required maintenance, and replaces the repaired seats on the plane. Explosives are ordered through Munitions and stored briefly in the work center before use.

Base Process ID #: AFRESEE-01

HSMS Code: ID-23-08

Substrate: NA

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None noted.

PROCESS FLOW DIAGRAM:

Ejector Seat Requiring Maintenance

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Identify Maintenance Needs	None
None	Remove and replace components	None
Grease; torque stripe; RTV; explosives	Grease fittings; Replace explosive devices	Recyclable rags; Containers to HazMinCen; Explosives to Munitions Storage area and then to manufacturer
None	Reassemble	None
None	Inspections	None
None	Return to Plane	None

OUT

Maintained Ejector Seat

AFRES 301 LGMCE – ELECTRICAL AND ENVIRONMENTAL

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMCE)
WORK CENTER:	AFRESEE
SHOP NAME:	Electrical and Environmental
BUILDING #:	1628, Room 8
SHOP POC AND PHONE #:	James Grudosky, (817) 782-7104

WORK CENTER DESCRIPTION

This shop performs maintenance and checks on batteries for the F-16 aircraft. The older Ni-Cad batteries are being phased out. They are being replaced by sealed lead acid batteries.

The primary process performed in the Electrical and Environmental shop is:

- **Battery Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Replaced CFC containing electrical contact cleaner with isopropyl alcohol.
- Phasing out Ni-Cad batteries with sealed lead acid batteries.
- Recycle metal containers.
- Have deployable Halon/1301 recovery unit.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified.

MAINTAIN BATTERIES

PROCESS DESCRIPTION

Maintain batteries. Ni-Cad batteries are being replaced with sealed lead acid batteries.

Base Process ID #: AFRESEE-01

HSMS Code: ID-23-08

Substrate: NA

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Halon 1301 recovery unit (for use during deployment).

PROCESS FLOW DIAGRAM:

Battery Requiring Maintenance

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Alcohol	Clean	Rags with Cleaner; Aerosol Cans; Metal Containers
None	Charge	None
Adhesive; Sealing Compound; Grease; Solder	Inspect/Maintain	Cardboard; Phase Out Ni-Cad Batteries; Lead Acid Batteries

↓

OUT

Recharged Battery

AFRES 301 LGMCE – ELECTRICAL AND ENVIRONMENTAL

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMCE)
WORK CENTER:	AFRESEE
SHOP NAME:	Electrical and Environmental
BUILDING #:	1643, Room 8
SHOP POC AND PHONE #:	Senior Master Sergeant Frank Gum, (817) 782-7037

WORK CENTER DESCRIPTION

This shop performs maintenance and checks on batteries for the F-16 aircraft. The shop also maintains aircraft ducting, and maintains the compressed gases needed for the aircraft.

The primary processes performed in the Electrical and Environmental shop are:

- **Battery Maintenance**
- **Maintain Compressed Gas Carts and Cylinders**
- **Duct Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Replaced CFC containing electrical contact cleaner with isopropyl alcohol.
- Replaced Ni-Cad batteries with sealed lead acid batteries.
- Recycle metal containers.
- Have deployable Halon/1301 recovery unit.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified.

MAINTAIN BATTERIES

PROCESS DESCRIPTION
Maintain batteries. New sealed lead-acid batteries boxed in cardboard are obtained through Supply. The old batteries are placed in the cardboard and turned in to Supply. The batteries have a four-year life, and the work center produces about 2 or 3 spent batteries per year. New batteries may be treated with silicon to keep dust out. New batteries are checked to make sure they are good.

Base Process ID #: AFRESEE-01

HSMS Code: ID-23-08

Substrate: NA

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
One Halon 1301 recovery unit (for use during deployment).

PROCESS FLOW DIAGRAM:

Battery Requiring Maintenance

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
	↓	
Clean Rag	Wipe with Dry Rag	Recyclable Rags
	↓	
None	Charge	None
	↓	
Clear silicon	Inspect/Maintain	Spent Lead Acid Batteries
	↓	
	OUT	

Recharged Battery

MAINTAIN COMPRESSED GAS CARTS & CYLINDERS

PROCESS DESCRIPTION

Nitrogen carts that are leaking or overpressuring are inspected. The problem component is removed and replaced. Leaktec is used to identify leaks. Carts are filled with liquid nitrogen at LOX. This shop also purges liquid oxygen converters on the planes every 180 days, cleaning and testing in the process; and changes out spent life raft carbon dioxide bottles. Shop personnel test icing probes on jets by using Freeze-it, an aerosol that is sprayed onto the probe to see if test light is triggered in the cockpit.

Base Process ID #: AFRESEE-02

HSMS Code:

Substrate: NA

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Nitrogen carts, gas cylinders.

PROCESS FLOW DIAGRAM:

Nitrogen Cart or Gas Cylinder Requiring Maintenance or Refill

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Identify problem or need	None
None	Drain gas cylinder if not empty	Oxygen
Dichlorofluoroethane, LeakCheck LPS high purity no flush cleaner for O2 system	Remove & replace problem components; Clean liquid oxygen converters with dichlorofluoroethane; Use LeakCheck to test	Rags
Nitrogen; oxygen; carbon dioxide	Charge with gas at LOX or on flight line; weigh CO_2 cylinders to check	None

OUT

Maintained Carts and Cylinders

DUCT REPAIR

PROCESS DESCRIPTION
Maintain the environmental ducting on aircraft.

Base Process ID #: AFRESEE-03

HSMS Code:

Substrate: NA

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:

PROCESS FLOW DIAGRAM:

Ductwork Requiring Maintenance

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Isopropyl alcohol	Strip foam off and clean duct	Recyclable Rags
Tape	Add new foam to outside of duct	None
Elastomeric Coating	Apply coating over foam and allow to cure 4 to 6 hours	Spent brush, mixing cup, and brown paper used to catch drips
None	Reinstall duct on aircraft	None

OUT

Maintained Ductwork

AFRES 301 LGMVE – ELECTRONIC COUNTERMEASURES

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 MXS/GMU
WORK CENTER:	AFRESECM
SHOP NAME:	Electronic Countermeasures
BUILDING #:	1650
SHOP POC AND PHONE #:	Craig Harris, (817) 782-5294

WORK CENTER DESCRIPTION

This shop tests and replaces electronic countermeasures packages when malfunctions are identified. This work center performs repairs on the electronic countermeasures equipment.

The primary process performed in the Electronic Countermeasures shop is:

- **Test/Replace/Repair ECM Equipment**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Eliminated isopropyl alcohol by utilizing non-ODS aerosol cleaner.
- Certain parts that are replaced contain precious metals (titanium, platinum) and are exchanged with supply for recycle.
- Use substitute products to replace use of ODSs in materials.
- Recycle metal containers.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, aluminum cans picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None

TEST/REPLACE ECM EQUIPMENT

PROCESS DESCRIPTION
ECM equipment is tested and replaced as necessary. The shop no longer repairs the ECM equipment.

Base Process ID #: AFRESECM-01

HSMS Code:

Substrate: ECM Packages

MRC/Technical Publication: NA

P2/Environmental Equipment Used in Process:
None.

PROCESS FLOW DIAGRAM:

ECM to be Repaired

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Aerosol Cleaner	Disassemble	Metal Container
Cool Part with R22 Freon	Cleaning Contacts	Containers; Metal Containers
Heat Sink Silicone; RTV; Shredder Oil	Repair	Freon in closed system
None	Assemble	None

OUT

ECM Repaired

AFRES 301 SPTG/CEO – ELECTRICAL SHOP

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Support Group (301 SPTG/CEO)
WORK CENTER:	AFRESELE
SHOP NAME:	Electrical Shop
BUILDING #:	1217
SHOP POC AND PHONE #:	Charles Kelly, (817) 782-5723

WORK CENTER DESCRIPTION

This shop provides electrical support for the 301st AFRES. This shop performs maintenance and repair on exit signs, fire alarms, remote control gates, intrusion alarms, and electric doors, and changes light bulbs. This shop is manned by both Navy and Air Force personnel. The Navy and Air Force Shops were being combined in May 2003. Materials are obtained through the HazMin Center except lamps and ballast, which are purchased locally. Used lamps and ballast are returned to Air Force environmental for disposal.

The primary process performed in the Electrical shop is:

- **Electrical Maintenance and Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider replacing incandescent bulbs with compact fluorescent lamps.
- Consider switch to low-mercury “Green End” bulbs.
- Consider use of low-energy luminescent or LED technologies for EXIT lighting.
- Consider non-CFC contact cleaner or IPA.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Collect and recycle scrap metals.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ELECTRICAL MAINTENANCE AND REPAIR

PROCESS DESCRIPTION
This shop maintains and repairs electrical systems including lights, exit signs, fire alarms, remote control gates, intrusion alarm, electric doors, and other electrical systems. Additionally, the shop installs electrical conduit and troubleshoots various electrical motors.

Base Process ID #: AFRESELE-01

HSMS Code: SR-04-99

Substrate: Wire, Electronic Components

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Hand Tools and Meters.

PROCESS FLOW DIAGRAM:

Service Call for Electrician Support

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
	↓	
Replacement Bulbs	Inspect/Test	Bulbs for mercury recycle
	↓	
WD-40 Yellow 77 Contact Cleaner Epoxy Sealant	Clean Repair Lubricate	Aerosol Cans Empty Epoxy Containers
	↓	
	OUT	

Electrician Support Complete

AFRES 301 AMXS – FLIGHT LINE MAINTENANCE

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 AMXS
WORK CENTER:	MXA
SHOP NAME:	Flight Line Maintenance
BUILDING #:	1655
SHOP POC AND PHONE #:	SMSgt Claus Winter, (817) 782-7884

WORK CENTER DESCRIPTION

This shop provides flight line maintenance of F-16 aircraft. The shop removes aircraft panels that require repairs, inspection, or lubrication. The Flight Line Maintenance shop also includes tire change, but wheel and tire maintenance is performed by the Phase Dock shop called Inspection Flight in Building 1643.

The primary process performed in the Flight Line shop is:

- **Flight Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Some synthetic oil is used where permitted by TO reducing the quantity of oil disposed.
- Replaced ODS-containing products by substitution with non-ODS-containing materials.
- Recycling metal containers.
- Small absorbent pads are laundered as part of the AFRES absorbent program.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes (exchange 1/1 with tool room)

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMin Center – yes

Cardboard, paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

FLIGHT MAINTENANCE

PROCESS DESCRIPTION
Flight Line Maintenance involves removal of aircraft panels, inspection and lubrication, as necessary, and reassembly. This work center is separate from the Phase Dock portion of Flight Line Maintenance, which includes the Tool Room and Wheel and Tire Maintenance.

Base Process ID #: FLIGHT LINE-01

HSMS Code: ML-02-00

Substrate: Metal

MRC/Technical Publication: Several

P2/Environmental Equipment Used in Process:
None noted.

PROCESS FLOW DIAGRAM:

Aircraft Needing Inspection on Flight Line

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Pull panels	None
None	Inspect	None
Breakthrough Solvent	Clean	Solvent Filters
Grease; Rags; Silicone Compound; Torque Seal; Filters; Loctite; Primer, Coating; Hysol Adhesive	Lube/Oil	Rags with Oil, Absorbent Material with Oil; Oil Filters; Containers; Oil
Adhesives; Corrosion Preventive Compound (CPC), Rags	Tire Changes	Rags, CPC
JP-8, Rags, Absorbent Pads	Refuel	JP-8, Rags, Absorbent Pads
Hydraulic fluid, Rags	Hydraulic Service	Hydraulic Oil, Rags
Water, Aircraft Soap	Wash Aircraft	Wastewater with Aircraft Soap, Grit, Oil, Grease
	Reassemble	

OUT

Inspected Aircraft

AFRES 301 LGMCF – FUEL SYSTEMS/ HYDRAZINE MAINTENANCE

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMAF)
WORK CENTER:	AFRESFS
SHOP NAME:	Fuel Systems/Hydrazine Maintenance Facility
BUILDING #:	1656
SHOP POC AND PHONE #:	Mike Withers (817) 782-7657

WORK CENTER DESCRIPTION

This shop maintains, inspects, and repairs F-16 aircraft fuel system components as well as the emergency power unit (EPU). The shop is responsible for both internal and external repair and maintenance of fuel systems. The shop also repairs and maintains the EPU.

The primary processes performed in the Fuel Systems shop are:

- **Aircraft Phase Inspection**
- **Emergency Power Unit Inspection**
- **Hydrazine Tank**
- **EPU Cylinder Removal**
- **Fuel Leaks/Class A Check**
- **Fuel Leaks/Class B Check**
- **Fuel Leaks/Class C**
- **Fuel Cell Change**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Collects and manages contaminated JP-8 as used oil for recycle.
- Oil-water separator collects and separates any oil/fuel spills in the hangar.
- Uses Venturi Vacuum to pick up any oil spills, thus allowing for recycle of fluids rather than disposal in absorbent.
- Replaced products using MEK and toluene except for four-part compound cleaning solvent.
- Recycles metal containers.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, metal picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

AIRCRAFT PHASE INSPECTION

PROCESS DESCRIPTION
This process involves the removal of access panels, visual inspection of the fuel systems, repair as necessary, reassembly, and final leak and pressure tests.

Base Process ID #: AFRESFS-01

HSMS Code: ID-23-07

Substrate: Metal

MRC/Technical Publication: Aircraft Phase Inspection

P2/Environmental Equipment Used in Process:
Venturi vacuum to pick up spilled fuel.

PROCESS FLOW DIAGRAM:

Aircraft Phase Inspection

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Aircraft in Fuel Hangar	None
None	Remove Access Panels	None
None	Visual Inspection	None
Petrolatum	Install Access Panels	Rags with Petrolatum - HazWaste Center
Leak Detection Compound	Leak and Pressure Checks	Rags with Leak Detection Compound - HazWaste Center

OUT

Inspected Fuel System

EMERGENCY POWER UNIT INSPECTION

PROCESS DESCRIPTION
This process involves the removal of the sealant, inspection of the unit, cleaning, reapplication of sealant, and leak checking of the system.

Base Process ID #: AFRESFS-02

HSMS Code: ID-23-07

Substrate: Various

MRC/Technical Publication: 2400 Hour Engine Back-Up
Structure 6 Inspection TOIF-16C-6-11

P2/Environmental Equipment Used in Process:
NA

PROCESS FLOW DIAGRAM:

2400-Hour Aircraft Inspection

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Aircraft in Hangar	None
Cleaning Compound	Remove Sealant and Service	Rags with Cleaning Compound - HazWaste Center
None	Inspect	None
Cleaning Compound	Clean Surface	Cheesecloth with Cleaning Compound - HazWaste Center
Sealants	Seal	Rags with Sealants - HazWaste Center Cartridges, Sealants Brush with Sealants
Petrolatum Leak-Detection Compound	Leak Check	Rags with Petroleum & Leak-Detection Compound - HazWaste Center

OUT

Inspected Aircraft Unit

HYDRAZINE TANK (EPU)

PROCESS DESCRIPTION
This process involves disconnecting the EPU, neutralizing/cleaning up hydrazine, checking neutralization, and disposal of water/rags. The hydrazine is now refilled at Lockheed.

Base Process ID #: AFRESFS-03

HSMS Code: ID-23-07

Substrate: Metal

MRC/Technical Publication: EPU Disconnect

P2/Environmental Equipment Used in Process:
Various

PROCESS FLOW DIAGRAM:

EPU for Repair/Maintenance

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Bleach; Water; Orthotolidine	Disconnect EPU	Hydrazine (approx. 2 to 3 drops) Neutralized/Disposed in Wastewater
Bleach; Water; Orthotolidine	Neutralize & Clean Up Hydrazine	Wastewater w/Bleach - HazWaste Center Rags w/Orthotolidine - HazWaste Center
Orthotolidine; Bleach	Check Waste for Neutralization Wastewater in Storage Tank	Wastewater w/Bleach - HazWaste Center Rags w/ Orthotolidine - HazWaste Center
None	Dry Rags for Re-Use	None
None	Environmental Waste Check	None
None	Waste Disposal	None

OUT

EPU Disconnected

EPU CYLINDER REMOVAL

PROCESS DESCRIPTION
This process involves the change of EPU cylinders, including troubleshooting, component removal, and installation of new components.

Base Process ID #: AFRESFS-04

HSMS Code: ID-23-07

Substrate: Metal

MRC/Technical Publication: Component Change to Fuel Tank

P2/Environmental Equipment Used in Process:
Various

PROCESS FLOW DIAGRAM:

Aircraft EPA Needing Cylinder Removed

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Troubleshoot Malfunction	None
None	Remove Component	None
None	Install Component	None

↓

OUT

Repaired EPU on Aircraft

FUEL LEAKS/CLASS A

PROCESS DESCRIPTION
This process involves responding to Class A fuel leaks.

Base Process ID #: AFRESFS-05

HSMS Code: ID-23-07

Substrate: Various

MRC/Technical Publication: Class A Fuel Tank Leaks

P2/Environmental Equipment Used in Process:
Various

PROCESS FLOW DIAGRAM:

Aircraft with Fuel Leak

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Leak-Detection Compound	Detect Leak	Rags w/Leak-Detection Compound - HazWaste Center
Leak-Detection Compound	Isolate Leak	None
Cleaning Compound	Clean Surface	Rags with Cleaning Compound - HazWaste Center
Sealant	Repair Leak	Cartridge Sealant Brush with Sealant
Leak-Detection Compound	Perform Leak Check	Rags w/Leak-Detection Compound - HazWaste Center

OUT

Repaired Aircraft Fuel Leak

FUEL LEAKS/CLASS B

PROCESS DESCRIPTION
This process involves responding to Class B fuel leaks.

Base Process ID #: AFRESFS-06

HSMS Code: ID-23-07

Substrate: Various

MRC/Technical Publication: Class B Fuel Tank Leaks

P2/Environmental Equipment Used in Process:
Various

PROCESS FLOW DIAGRAM:

Leaking Fuel Tank

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Aircraft in Hangar	None
Leak-Detection Compound	Isolate Leak	Rags w/Leak-Detection Compound - HazWaste Center
Cleaning Compound PR 1826 Promotor	Clean Surface	Cheesecloth w/Cleaning Compound & Promotor - HazWaste Center
Sealant B 1/2	Repair Leak	Cartridge Sealant Brush w/Sealant Rag w/Sealant - HazWaste Center
Leak-Detection Compound	Perform Leak Check or Repair	Rags w/Leak-Detection Compound - HazWaste Center

OUT

Repaired Fuel Tank

FUEL LEAKS/CLASS C

PROCESS DESCRIPTION
This process involves responding to Class C fuel leaks.

Base Process ID #: AFRESFS-07

HSMS Code: ID-23-07

Substrate: Various

MRC/Technical Publication: Class C Fuel Tank Leaks

P2/Environmental Equipment Used in Process:
Various

PROCESS FLOW DIAGRAM:

Aircraft with Fuel Leak

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Leak-Detection Compound	Isolate Leak	Rags w/Leak-Detection Compound - HazWaste Center
Cleaning-Compound Promotor	Clean Surface	Rags w/Promotor and Cleaning Compound - HazWaste Center
Sealant	Repair Leak	Cartridge Sealant Brush w/Sealant
Leak-Detection Compound	Perform Leak Check	Rags w/Leak-Detection Compound - HazWaste Center

OUT

Repaired Fuel Leak

FUEL CELL CHANGE

PROCESS DESCRIPTION
This process involves troubleshooting fuel cell, removal of cell, preparing cavity, installing cell, and performing leak check.

Base Process ID #: AFRESFS-08

HSMS Code: ID-23-07

Substrate: NA

MRC/Technical Publication: F-16 Fuel Cell Change

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

F-16 Needing Fuel Cell Change

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Leak-Detection Compound	Troubleshoot Leak	Rags w/Leak-Detection Compound - HazWaste Center
None	Remove Cell	None
Sealant, Primer Sealing Locking & Retaining Compound	Prepare Cavity	Cartridges, Sealant Rags w/Sealing Compound & Primer - HazWaste Center Acid Brushes w/Primer
Petrolatum, Locking & Retaining Compound Sealant, Solvent	Install Cell	Rags w/Solvent - HazWaste Center
Petrolatum and Leak-Detection Compound	Install Access and Leak Check	Rags w/Petrolatum& Leak-Detection Compound, Containers - HazWaste Center

↓

OUT

Change F-16 Fuel Cell

AFRES 301 LGMPE – JET ENGINE SHOP

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 MSX/LGMPE
WORK CENTER:	AFRESJEM
SHOP NAME:	Jet Engine Shop
BUILDING #:	1655
SHOP POC AND PHONE #:	Wayne Cox (817) 782-7929

WORK CENTER DESCRIPTION

This shop performs intermediate maintenance on F-16 aircraft engineers. The shop breaks down the F-16's turbine engines for routine servicing.

The primary process performed in the Jet Engine shop is:

- **Intermediate Engine Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Recycles metal containers.
- Recycles oil filters.
- Collects and recycles contaminated JP-8 and used oil.
- Replaced silicon lubricant containing CFC-11 with non-ODS solvent/propellant.
- Participates in the launderable rag (both red and white) program.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ENGINE REPAIR

PROCESS DESCRIPTION
This shop performs intermediate engine repair on the F-16 aircraft engines. The engines are torn down, repaired, cleaned, inspected, and tested.

Base Process ID #: AFRESJEM-01

HSMS Code: ID-23-10

Substrate: Various

MRC/Technical Publication: Many

P2/Environmental Equipment Used in Process:
Safety Kleen Parts Cleaner (Model 6605)

PROCESS FLOW DIAGRAM:

Engine Needing Service

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Breakfree CLP, Rags, Absorbent Pads	Tear Down	Rags w/Oil & JP-8 - HazWaste Center Absorbent Pads - HazWaste Center
Petrolatum, Extreme Duty Silicon, Layout Dye, Leak Detection Compound, Sealing Compound, RTV 106, Adhesive Rubber Silicone, Antiseize, Absorbent Pads	Repair	Oil Filters - HazWaste Center Used Oil - HazWaste Center Rags w/Oil & JP-8 - HazWaste Center Empty Containers - HazMin Empty Aerosol Cans - HazMin Absorbent Pads - HazWaste Center
Safety Kleen Solvent Isopropyl Alcohol , Rags	Clean	Safety Kleen Solvent Rags w/Safety Kleen Solvent and Isopropyl Alcohol - HazWaste Center Air Emission - Isopropyl Alcohol Empty Containers - HazMin
None	Inspect	None
Lube Oil 10/10, Hydraulic Fluid, Lube Oil 80/90, Grease, Engine Oil	Test Cell	Metal Drums Rags w/Oil & JP-8 - HazWaste Center Used Oil/Hydraulic Fluid - HazWaste Center

OUT

Serviced Engine

AFRES 301 LGMWS – MUNITIONS FLIGHT

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMWS)
WORK CENTER:	AFRESMUN
SHOP NAME:	Munitions Flight
BUILDING #:	3355
SHOP POC AND PHONE #:	MSgt Felix Avalos, (817) 782-7268

WORK CENTER DESCRIPTION

This shop maintains munitions and munitions equipment. The shop performs assembly and servicing of bombs, missiles, and munitions equipment. The trailers for the munitions equipment are washed and maintained. The munitions are inspected and repainted as necessary. When shipped in crates, the crates are stenciled using vinyl stencils. Some limited use of aerosol spray paint is used in stenciling when necessary.

The primary processes performed in the Munitions shop are:

- **Trailer Service**
- **Inert Munitions Inspections**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider use of markers, blotter bottles, and/or rollers to replace aerosol stenciling.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Eliminated need for Safety Kleen solvent washer, thus decreasing the disposal of waste Safety Kleen solvent.
- Process does not include extensive cleaning prior to inspection. Parts washer is not needed and has been eliminated.
- Inspections utilizes stencil machine (Precision) in Building 3368, thus eliminating major painting at Work Center. This has eliminated need for paint spray guns and cleanup solvents.
- Recycles metal parts and containers.

- Wash trailers in rack equipped with water reclamation unit.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – No

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, metal picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – No

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Reprogram Better Engineering unit.

SERVICE TRAILERS

PROCESS DESCRIPTION
Trailers are inspected for corrosion or wear. They are cleaned and repainted (touched up) as necessary. Wheels and wheel bearings are cleaned and lubricated as necessary.

Base Process ID #: AFRESMUN-01

HSMS Code: ML-01-00

Substrate: Steel, Aluminum

MRC/Technical Publication: Several

P2/Environmental Equipment Used in Process:
Better Engineering M-300 LX-P high pressure hot water cleaning unit; Precision stencil machine.

PROCESS FLOW DIAGRAM:

Trailer in for Inspection

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Liquid Soap, Water	Wash	Wastewater
None	Inspect	None
Denatured Alcohol; Grease, A&A; Silicone Brake Fluid; Enamel; Black Lacquer; Green Lube Oil.	Maintain	Tech wipes with Grease and Oil; Brake Fluid; Aerosol Cans
None	Test Drive	None

OUT

Serviced Trailer

INSPECT MUNITIONS

PROCESS DESCRIPTION

Base Process ID #: AFRESMUN-02

HSMS Code: ID-05-07

Substrate: Steel, Aluminum

MRC/Technical Publication: Several

P2/Environmental Equipment Used in Process:
None.

PROCESS FLOW DIAGRAM:

Munitions Inspection/Build-Up

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
	↓	
None	Inspect	None
	↓	
Vinyl Stencils, Lacquer Paint; Enamel Paint	Maintain	Aerosol Cans
	↓	
	OUT	

Inspected Munitions to Storage, Build-Up, or Issue

AFRES 301 LGMFN – NONDESRUCTIVE INSPECTION (NDI)

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMFN)
WORK CENTER:	AFRESNDI
SHOP NAME:	Non-Destructive Inspection
BUILDING #:	1650
SHOP POC AND PHONE #:	Kevin Nelson, (817) 782-7767

WORK CENTER DESCRIPTION

This shop performs nondestructive inspections (NDI) for aircraft and ground equipment in support of the 301st.

The primary process performed in the NDI shop is:

- **Nondestructive Analysis**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Replaced ODS containing materials/penetrants with non-ODS containing products.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, aluminum cans picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Shop personnel indicated an interest in the MagnaPure penetrant wastewater treatment unit. The unit separates penetrant and wastewater allowing water to be discharged to the sanitary sewer. Penetrant is collected for reuse or disposal. Another option is the RGF unit at AIMD 530 (NDI). The RGF unit is not currently working, but if put back into service could potentially be used to process water from AFRES 301 and AIMD 510.

NONDESTRUCTIVE TESTING

PROCESS DESCRIPTION
Parts are cleaned. Various nondestructive tests are performed and inspections conducted. Finally, the part is cleaned with isopropyl alcohol removing any materials applied for the testing.

Base Process ID #: AFRESNDI -01

HSMS Code: ID-14-00, ID-14-02, ID-14-99, and ID-14-04

Substrate: Aluminum, Steel, Titanium

MRC/Technical Publication: 33 B-1-1, 33B-1-11, 33-1-37, 1F-16C-36, 33A6-7-24-1

P2/Environmental Equipment Used in Process:
MA2 Penetrant Line, Magnaflux Magnetic Inspection Unit.

PROCESS FLOW DIAGRAM:

Component Requiring Nondestructive Analysis

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Cleaning Compound; Isopropyl Alcohol	Clean Part	Rags with Alcohol, Water; Rags with Penetrant
Spectrometric Oil; Magne Tech; Penetrant	Appropriate Inspection Conducted	Q-tips
Lens Cleaner	Inspected Component	Penetrant Rinse Water and Rags
Isopropyl Alcohol	Post Clean	Rags with Alcohol

OUT

Inspected Component Out

AFRES 301 MXS – FLIGHT LINE MAINTENANCE

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 MXS/MXMAI
WORK CENTER:	AFRESFLM
SHOP NAME:	Inspection Flight
BUILDING #:	1643
SHOP POC AND PHONE #:	Martin Drewek, (817) 782-3717

WORK CENTER DESCRIPTION

This shop provides Phase Dock maintenance of F-16 aircraft. The shop removes aircraft panels that require repairs, inspection, or lubrication. The Phase Dock shop also includes Wheel and Tire Maintenance.

The primary process performed in the Flight Line shop is:

- **Phase Dock Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Uses Zep brand Z-Green or Aircraft soap in floor cleaner to eliminate floor solvents and reduce water use. Water is discharged to oil-water separator.
- Uses Calla 602 aqueous parts washer in tire wheel shop.
- Uses Inland Technology parts washer with Breakthrough Solvent and solvent filter system ,which minimizes disposal of waste solvent. The prefilter is changed every 1-2 weeks.
- Some synthetic oil is used where permitted by TO reducing the quantity of oil disposed.
- Replaced ODS-containing products by substitution with non-ODS-containing materials (Ecolink brand).
- Recycles metal containers.
- Small absorbent pads are laundered as part of the AFRES absorbent program.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes (White rags)

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, aluminum cans picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified

FLIGHT MAINTENANCE

PROCESS DESCRIPTION
Phase Dock Maintenance involves removal of aircraft panels, inspection and lubrication, as necessary, and reassembly. This work center also includes Wheel and Tire Maintenance.

Base Process ID #: AFRESFLM-01

HSMS Code: ML-02-00

Substrate: Metal

MRC/Technical Publication: Several

P2/Environmental Equipment Used in Process:
Calla 602 hot water parts washer for wheels
Pressure Washer; Inland Parts Washer, model # IT-32DM3 with Breakthrough Solvent.

PROCESS FLOW DIAGRAM:

Aircraft Needing Inspection

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Pull panels	None
None	Inspect	None
Rags, Water, Aircraft soap, Breakthrough Solvent, Isopropyl Alcohol	Clean	Rags, Wastewater, Solvent/Filters, Air emissions from Isopropyl Alcohol
Grease; Rags; Silicone Compound; Torque Seal; Filters; Hydraulic Fluid; Loctite; Primer, Coating; Hysol Adhesive	Lube/Oil	Rags w/Oil, Fuel, & Hydraulic Fluid; Absorbent Material w/Fuel & Oil; Jet Part Washer Cleanout; Fuel Filters; Oil Filters; Containers; Oil; Hydraulic Fluid; Fuel
Adhesives; Corrosion Preventive Compound	Reassemble	None

OUT

Inspected Aircraft

AFRES 301 SPTG/CEO – PIPE SHOP

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Support Group (301 SPTG/CEO)
WORK CENTER:	AFRESPS
SHOP NAME:	Pipe Shop
BUILDING #:	1217
SHOP POC AND PHONE #:	Rich Bryan, (817) 782-5687

WORK CENTER DESCRIPTION

This shop installs/maintains interior water, gas, and sewer piping for the 301st AFRES. Piping types include polyvinyl chloride (PVC), chlorinated polyvinyl chloride, steel, copper, and cast iron. Operations include gluing, soldering, and threading. This shop is manned by both Navy and Air Force personnel. The Navy and Air Force shops were combined in May 2003. Materials with material safety data sheets are purchased through the HazMinCen.

The primary process performed in the Pipe shop is:

- **Pipe Fabrication/Installation**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Collect and recycle scrap metal.
- Recycle metal containers and scrap metal.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

PIPE FABRICATION/INSTALLATION

PROCESS DESCRIPTION
This shop installs and maintains piping systems including PVC, chlorinated polyvinyl chloride, steel, copper, and cast iron. Operations include: gluing, soldering, and threading.

Base Process ID #: AFRESPS-01

HSMS Code: SR-04-00, SR-10-00

Substrate: PVC, Copper, Steel, Iron, Concrete

MRC/Technical Publication: NA

P2/Environmental Equipment Used in Process:
Aluminum cutting machine; Aluminum hand bending machine; Electrical bending machine; Pipe cutting machine.

PROCESS FLOW DIAGRAM:

Piping Maintenance/Installation Task to be Completed

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Solder; Flux	Copper Pipe Repair	Metal Containers
Cutting Oil; Welding Rod; Thread Sealant	Steel Pipe Repair	Metal Containers; Rags with Oil
PVC Primer, Adhesive; PVC Cement	PVC Pipe Repair	Metal Containers; Rags with PVC Primer & Cement
Cleaner Pipe	Drain Cleanings	Metal Containers

OUT

Completed Piping Installation/Maintaining Task

AFRES 301 LGMCP - PNEUDRAULICS

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MSX/LGMAH)
WORK CENTER:	AFRESPNE
SHOP NAME:	Pneudraulics
BUILDING #:	1655
SHOP POC AND PHONE #:	Senior Master Sergeant Frank Gum, (817) 782-7037

WORK CENTER DESCRIPTION

This shop is responsible for overhaul and repair of hydraulic and pneumatic aircraft components and some support equipment. Parts are stripped, repaired, cleaned, and inspected for use.

The primary process performed in the Pneudraulics shop is:

- **Pneumatic Equipment Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Recycle metal containers.
- Replaced ODS-containing products with ODS-free materials.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes for used oil; no antifreeze

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

MAINTAIN PNEUMATIC EQUIPMENT

PROCESS DESCRIPTION
Pneumatic equipment is cleaned, repaired, and lubricated as necessary. Safety Kleen solvent is changed out quarterly (30 gallon drum); hydraulic fluid in the test stand is about 20 – 25 gallons, and 2 – 3 gallons are added every 6 months.

Base Process ID #: AFRESPNE-01

HSMS Code: ID-23-01

Substrate: Steel

MRC/Technical Publication: Several (TO-9 H2-113-4, TO-4B1-2-1164)

P2/Environmental Equipment Used in Process:
Safety Kleen Parts Washer; Pneumatic Test Stand, Hydraulics International Inc., Serial Number 77004-33, Hydraulic Test Stand, Anitech Model AV843, Serial Number 51314; hose assembly machine; hose cutoff machine.

PROCESS FLOW DIAGRAM:

Pneumatic Equipment in Need of Repair

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Safety Kleen 105 Solvent; Antiseize Compound	Disassemble and Clean	Safety Kleen 105 Solvent; Rags with Solvent
Sealing Compound; Leak Test Compound	Inspect and Repair	None
A/C Grease; Hydraulic Fluid (for test stand); Lube Oil; Petrolatum for seals	Reassemble, Lube, and Test	Containers; Hydraulic Fluid

↓

OUT

Repaired Equipment

AFRES 301 SPTG/CEO – POWER PRODUCTION

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Support Group (301 SPTG/CEO)
WORK CENTER:	AFRESPP
SHOP NAME:	Power Production
BUILDING #:	1213
SHOP POC AND PHONE #:	Bobby Brown, (817) 782-7188 and (817) 782-3847

WORK CENTER DESCRIPTION

This shop performs maintenance of emergency generators. This includes change out of oil, oil filters, starters, fuel systems, and cooling systems. This shop also provides portable emergency generators on a temporary basis for buildings. Oil filters are crushed and turned into transportation for disposal. Cans are returned to the HazMinCen.

The primary process performed in the Power Production shop is:

- **Generator Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Use Gel Cel Optima sealed batteries in place of older unsealed lead acid batteries.
- Eliminated use of HCFC-114 in electric contact cleaner.
- Crush and recycle metal from used oil filters.
- Replaced materials with MEK and toluene with products that do not contain these VOCs.
- Eliminated use of solvent engine degreaser by using rag wiping in place.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, Paper, Plastic picked up by Recycling Center – No

Used Batteries (all types) picked-up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked-up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified

MAINTAIN GENERATORS

PROCESS DESCRIPTION
Maintain the following generators: Generators (2-5KW, 1-35 KW, 1-40 KW, 1-60k KW, 4-15 KW, 1-200KW, and 1-10KW). Maintenance includes testing, fluid change-out, filter changes, and repair as necessary.

Base Process ID #: AFRESPP-01

HSMS Code: ID-23-02

Substrate: Various

MRC/Technical Publication: See Attachment

P2/Environmental Equipment Used in Process:
None.

PROCESS FLOW DIAGRAM:

Generator Requiring Maintenance

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Rags	Clean	Oily rags to recycle
12 V Battery; Oil, 30 wt Lube; Starting Fluid; Antifreeze	Service	Oil Filters (Crushed); Batteries; Rags with Oil; Aerosol Cans
Corrosion Preventative Compound; Penetrating Oil; Cleaning/Lubricating Compound	Preserve	Containers; Rags with Oil

↓

OUT

Maintained Generator

AFRES 301 LGMFS – STRUCTURAL

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMFB)
WORK CENTER:	AFRESSTR
SHOP NAME:	Structural
BUILDING #:	1643
SHOP POC AND PHONE #:	Ray Schecter, (817) 782-7083

WORK CENTER DESCRIPTION

This shop is responsible for structural maintenance of the F-16 aircraft. Three work areas make up this shop: structural, welding, and machine shop. This shop performs maintenance on equipment such as welding, machining, and fabrication. This shop also maintains the wash rack soap supply. The wash rack is inside the hangar so all water drains to the oil-water separators but no rainwater can enter the system.

The primary processes performed in the Structural shop are:

- **Wash Rack Maintenance**
- **Welding**
- **Structural Repair**
- **Machine Shop**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

None.

CURRENT P2 PRACTICES & EQUIPMENT

- The Wash Rack has an oil-water separator prior to release to the publicly owned treatment works (POTW).
- Replaced products using MEK and toluene except for Dynalube solvent and Everlube 620C paste.
- Replaced primer sealants with ODS-free products.
- Recycle metal containers.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no. Use prohibited by possible metal shavings in the used rags.

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, picked up by Recycling Center – yes, except not plastic.

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified

WASH RACK

PROCESS DESCRIPTION
Aircraft are washed inside the aircraft hangar. All wash water and cleaner are collected in the hangar drains. The wash and rinse water are sent to an oil water separator prior to discharge to the POTW. No storm water can enter this system.

Base Process ID #: AFRESSTR-02

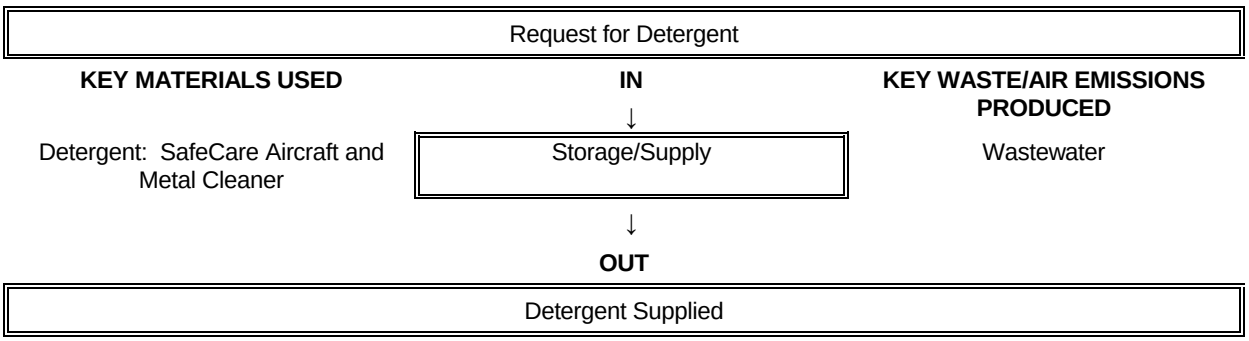
HSMS Code: ID-02-08

Substrate: Metal

MRC/Technical Publication: NA

P2/Environmental Equipment Used in Process:
(2) Oil-Water Separators.

PROCESS FLOW DIAGRAM:



WELDING SHOP

PROCESS DESCRIPTION
Structural components of the F-16 aircraft are welded as necessary. Welding fumes are captured by Aercology fume capturing machine, which captures gases and dusts electrostatically. Filters are cleaned out every 30 to 60 days. Other air emissions are vented. Scrap metal is placed in Dumpsters and recycled. Not much water is generated in this shop, but there are floor drains that go to an oil-water separator and then to the POTW.

Base Process ID #: AFRESSTR-03

HSMS Code: ID-11-00

Substrate: Metal

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Welding Machines: Wire Welder, Oxygen and Acetylene Welder; Tig Welders (3); Metal Worker-Model 4; Serial No. 800413305, Plasma Cutter.

PROCESS FLOW DIAGRAM:

Parts Needing Welding (Repaired)

KEY MATERIALS USED	IN ↓	KEY WASTE/AIR EMISSIONS PRODUCED
Denatured Alcohol; Welding Rods; Acetylene; carbon dioxide; argon, oxygen; electricity	Clean/Weld	Scrap Metal; Rags with Alcohol; Welding Rod Stubs; dust from fume capture; air emissions

↓
OUT

Welded Part (Repaired)

STRUCTURAL REPAIR

PROCESS DESCRIPTION

Various equipment is used to fabricate metal parts as necessary. Touch-up painting is occasionally performed. A heat-treating oven is used to temper metal. Air emissions are vented through roof vents. A hazardous waste drum is used to collect spent containers. Rags with solvent are put into paint-related universal waste drums.

Base Process ID #: AFRESSTR-04

HSMS Code: ID-06-99

Substrate: Aluminum

MRC/Technical Publication: Numerous

P2/Environmental Equipment Used in Process:
Slip Roller, Cornice Brake, Doall Saw, Foot Shear, Rivet Squeezer; Large Power Shear; Box and Pan Brake; Drill Press; Belt Sander; Shrinking Machine; Rolltec Punch; Bar Folder; Drill-bit Grinder; 90 degree Shear, Tube Flarer, Tube Bending Machine, Circle Cutter, Hand Roller.

PROCESS FLOW DIAGRAM:

Aircraft Requiring Repair

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Modified Acrylic Adhesive; Adhesion Promotor; PR 1750 B-1 ½; EA 9317-Modified Epoxy; Promotor 86; Dynamold Solvent; Curing Agent; Epoxylated Polysulfide; FMS-10444-C; other adhesives; absorbent pads	Patch	Metal Containers; Rags with Solvent; Waste Sealant; Some Air Emissions; Spent Absorbent Pads
Brushes; Paint	Touch-up Painting	Spent Brushes
None	Inspect	None

↓

OUT

Patched Part

MACHINE SHOP

PROCESS DESCRIPTION
Various machines are used to machine metal parts as necessary. Cutting oils are used for lubing tools and pieces to be cut.

Base Process ID #: AFRESSTR-06

HSMS Code: ID-10-01

Substrate: Metal

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Machine Equipment: 2-Standard Modern Lathes, 1-Sunnen Honning Machine; 1-Bridgeport Apollo Series II; and 1-Clausing/Colchester Model Storm CNC 200 Serial No. C20347; Surface Grinder.

PROCESS FLOW DIAGRAM:

Parts Which Require Machining

KEY MATERIALS USED	IN ↓	KEY WASTE/AIR EMISSIONS PRODUCED
Layout Fluid; A-9 Cutting fluids; Primer T; Kennametal Top Fluid; Anaerobic Sealant; Tri-Cool Coolant; Tellus-32 (Hyd); Honing Oil; Cool Tool II; Machinable Wax; Alcohol; Welding Rods; Argon; Spray cleaners such as 409	Repair and Fabrication/Machining	Rags with Detergent; Metal Shavings/Scrap to recycle; Metal and plastic containers; Cutting Fluid

↓
OUT

Machined Part

AFRES 301 LGMFE – SURVIVAL EQUIPMENT

COMMAND:	301 U.S. Air Force Reserve
DEPT:	301 Logistics Group (301 MXS/LGMFS)
WORK CENTER:	AFRESSS
SHOP NAME:	Survival Equipment Shop
BUILDING #:	1650
SHOP POC AND PHONE #:	Jose Rodriguez, (817) 782-7016

WORK CENTER DESCRIPTION

This shop maintains life support equipment including parachute, life raft, life preservers, flight suits, exposure suits, anti-G garments, harnesses, and survival kit repair. Explosive charges are removed and replaced in seat shop and survival shop.

The primary processes performed in the Survival shop are:

- **Survival Equipment Maintenance**
- **Parachute Maintenance**
- **Flotation Gear Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Replaced cleaners containing MEK and toluene with isopropyl alcohol.
- Recycle metal containers.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

MAINTAIN SURVIVAL EQUIPMENT

PROCESS DESCRIPTION
Survival equipment is cleaned, lubricated, repaired, repacked, and stenciled as necessary.

Base Process ID #: AFRESSS-01

HSMS Code: ID-23-99

Substrate: Cloth

MRC/Technical Publication: Several; Tech 14P-3 Series

P2/Environmental Equipment Used in Process:
None.

PROCESS FLOW DIAGRAM:

Survival Equipment Requiring Maintenance

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Test and Check	None
Lubricants, Grease, Talc Denatured Alcohol, Adhesives, Silicone Compound	Repair	Paper Towels w/ Sealing Compound Containers Brushes w/Adhesive
None	Test and Check	None
Ink , Stencil	Pack Stencil	Paper Towels
None	Cleanup	None

OUT

Maintained Survival Equipment

MAINTAIN PARACHUTES

PROCESS DESCRIPTION

Parachutes are repaired and repacked as necessary.

Base Process ID #: AFRESSS-02

HSMS Code: ID-23-99

Substrate: Cloth

MRC/Technical Publication: Several; Tech 14D-3-10-1

P2/Environmental Equipment Used in Process:
None.

PROCESS FLOW DIAGRAM:

Parachutes Requiring Maintenance

KEY MATERIALS USED	IN ↓	KEY WASTE/AIR EMISSIONS PRODUCED
Stencil Ink, Grease, Adhesive Nitrile, Denatured Alcohol	Inspect and Repair	Containers Paper Towels with Solvent

↓

OUT

Serviced Parachutes

REPAIR FLOTATION GEAR

PROCESS DESCRIPTION
Rubber flotation gear are repaired and repacked as necessary. CO_2 cylinders are replaced when needed.

Base Process ID #: AFRESSS-03

HSMS Code: ID-23-99

Substrate: Rubber

MRC/Technical Publication: Several; Tech 14S-1-102

P2/Environmental Equipment Used in Process:
CO_2 Charging Unit.

PROCESS FLOW DIAGRAM:

Flotation Gear Requiring Repair

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Technical Talc, Silicone Compound, Adhesive, Stencil Ink, CO_2 Cylinders	↓ Inspect ↓	Containers Acid Brushes Paper Towels with Adhesives Silicone Spent CO_2 Cylinders

OUT

Repaired Flotation Gear

AFRES 301 LGTM – VEHICLE MAINTENANCE

COMMAND:	301 U.S. Air Force Reserve/Navy/TANG
DEPT:	301 Logistics Group (301 LRS/LGTM)
WORK CENTER:	AFRESVM
SHOP NAME:	Vehicle Maintenance
BUILDING #:	1191/1194
SHOP POC AND PHONE #:	Mike Carocci (Supervisor), Tim Green (Hazmat Representative), Matt Sherman, (817) 782-7195

WORK CENTER DESCRIPTION

This shop provides service and preventive maintenance of vans, heavy duty trucks, fork lifts, stationary generators, fire pumps, and fire trucks. This shop performs vehicle repairs, oil filter changes, fluid changes, lubrication, and general maintenance of the above-mentioned vehicles. The shop is a combined shop for the base for the Air Force Reserve, Navy and Texas Air National Guard.

The primary process performed in the Vehicle Maintenance shop is:

- **Vehicle Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider use of Propylene Glycol in place of Ethylene Glycol Antifreeze where permitted.
- Consider use of Antifreeze Recycle Unit for onsite recycle.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Use Gel Cel batteries for replacements.
- Replaced ODS containing materials with non-ODS containing product.
- HFC-134a has replaced CFC-12 in all vehicles.
- Use re-refined engine oil where permitted.
- Use Clarus Tech PCS-25 parts cleaner with filter and Breakthrough solvent to minimize waste solvent disposal. This replaced Safety Kleen unit.

- Use bulk POL fluid dispensing to minimize container disposal.
- Use HVLP paint guns and enclosed paint gun cleaning unit.
- Use HFC-134a Recovery Unit.
- Use oil filter crusher to maximize metal recycling.
- Use compressed gas alternative fuel in 3 vehicles.
- Use low VOC paints and water-based primer to reduce VOC air release and disposal of waste paint VOC.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic picked up Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle– yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

MAINTAIN VEHICLES

PROCESS DESCRIPTION
Maintain Air Force vehicles in combined base facility under Air Force control. Maintain vehicle fluid changes, mechanical repairs, cleaning, wheel, engine, and transmission repair. Batteries are also replaced as necessary.

Base Process ID #: AFRESVM-01

HSMS Code: SR-02-00

Substrate: Metal

MRC/Technical Publication: Several

P2/Environmental Equipment Used in Process:
Freon Recovery Unit; Oil Filter Crusher; Bulk POL Fluid Dispensing Units; Steam Sweeper; Clarus Tech PCS-25 Parts Cleaner with Breakthrough solvent; Amoco 1450 Break cleaner with Breakthrough solvent.

PROCESS FLOW DIAGRAM:

Vehicle Requiring Maintenance

KEY MATERIALS USED	IN ↓	KEY WASTE/AIR EMISSIONS PRODUCED
Hydraulic Fluid; Engine Oil; Transmission Fluid; Antifreeze; Brake Fluid; Freon 134A; Batteries; Power Steering Fluid; Absorbent Pads; Rags	Service Fluids	Brake Fluid; Metal Containers; Rags with Service Fluids; Oil Filters; Fuel Filters; Transmission Fluid; Batteries; Oil; Hydraulic Fluid; Antifreeze; Absorbent Pads
Grease; Gear Case Oil; Rags	↓ Lubricate	Drums; Rags with Service Fluids; Gear Case Oil
IPA; Rags; Tires; Soap; SafetyKleen Parts Washer; Simple Green Solvent	↓ Repair/Maintenance	Dirty Solvent Filters; Tires

↓
OUT

Serviced Vehicle

AFRES 301 MAOW – WEAPONS FLIGHT

COMMAND:	301 U.S. Air Force Reserve
DEPT:	457 FS/DOMW
WORK CENTER:	AFRESWF
SHOP NAME:	Weapons Flight
BUILDING #:	1655
SHOP POC AND PHONE #:	Terry Ryan, (817) 782-7904

WORK CENTER DESCRIPTION

This shop provides general maintenance of the weapons systems on the F-16 aircraft. This shop in the past performed repairs on the weapons systems, however, the repair operations are no longer performed.

The primary process performed in the Weapons shop is:

- **Weapons Systems Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- None noted.

CURRENT P2 PRACTICES & EQUIPMENT

- Use Inland Technology deployable parts cleaner with filter using Breakthrough solvent which minimizes disposal of waste solvent.
- Replaced products using ODSs with non-ODS substitutes.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

MAINTAIN WEAPONS SYSTEMS

PROCESS DESCRIPTION
This shop cleans and lubricates weapons systems on the F-16 aircraft. In the past, repair operations were performed but this function has been discontinued.

Base Process ID #: AFRESWF-01

HSMS Code: ML-02-00

Substrate: Metal

MRC/Technical Publication: Owners Manual, T.O. IF-16C-456-30-4, and T.O. 1F-16C-2-94-JG-50-1

P2/Environmental Equipment Used in Process:
Inland Technology deployable parts cleaner using Breakthrough solvent.

PROCESS FLOW DIAGRAM:

Weapons Systems Requiring Maintenance

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Disassemble	None
Inland Technology Parts Cleaner, Breakthrough Solvent	Clean	Dirty Filters from Parts Washer
None	Reassemble	None

↓

OUT

Maintained Weapon Systems

AIMD

DYNCORP DRP-33

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: DRP-33
SHOP NAME: GSE-DynCorp
BUILDING #: 1401
SHOP POC AND PHONE #: Mark Wagner, (817) 782-7865

WORK CENTER DESCRIPTION

The Dyncorp DRP-33 shop performs depot-level maintenance on ground support equipment (GSE). Depot-level maintenance involves rework on equipment such as testing and disassembly of equipment, mechanical paint stripping, repainting and reassembly of equipment. A quick turnaround on repair of equipment is imperative since GSE is involved in critical aircraft functions. This work center uses the paint booth in the 500 division of AIMD.

The primary process performed in the Dyncorp DRP-33 shop is:

- **Equipment Rework**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Implement use of SEMS pens or blotter paint bottles for minor touch-up work. The HazMinCen currently stocks SEM pens for other work centers to use in place or in addition to aerosol spray paint. SEM pens contain small amounts of paint that are applied directly to the touch-up area. The use of aerosol spray paints involve overspray and air emissions which would be eliminated with SEM pens.
- Procure an absorbent pad wringer to remove excess oils and fluids from absorbents that are captured when GSE is torn down for rework. This will allow the reuse of the absorbent pads, collection of additional used oil, and reduce the amount of petroleum, oil, and lubricants waste generated.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- The shop utilizes Spill Tech WP 12 hydrophobic oil absorbent. This product absorbs only petroleum based liquids (oil and paint) and is preferable to absorbents that absorb water along with oil and paint.
- Acid brushes are used for minor touch up work. This reduces the use of aerosol spray paint.
- Naphtha has been substituted for Type II paint thinner for surface wipe down. This process has reduced the usage of Type II thinner which contains higher amounts of MEK, toluene, and xylene.
- The plastic bead media used in the blasting booth and glove box (used by Dyncorp) is leased and recycled through an offsite contractor. Approximately 40 55-gallon drums a year of the plastic bead media are leased. This practice eliminates a large hazardous waste stream and diverts this waste from disposal and costly disposal fees. The bead media can also be reused several times before it is considered spent and shoveled into recycling drums. This helps reduce the cost of new material.
- Have replaced solvent paint stripping with abrasive blast media, a mechanical method.
- Lead paint is no longer used on the GSE. The majority of the GSE has already been repainted with lead-free paint and the remaining pieces are on schedule to be repainted.
- This work center uses HVLP paint guns in the paint booth that helps reduce overspray and material usage.
- A paint gun washer equipped with a filtration unit has been purchased for this shop; however, it has not been properly installed and therefore cannot be used.
- Polyurethane paint is ordered and used in 1-quart containers and is measured according to the paint job.
- Vinyl stencils are used in lieu of spray painting the equipment. Vinyl stencils last longer than traditional paint and eliminate aerosol paint emissions and reduce paint waste.
- Used antifreeze drained from the GSE is recycled through AIMD 900's antifreeze recycler.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard returned to Recycling Center – yes

Used batteries (all types) returned to Recycling Center – yes (AIMD 900 battery locker)

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Consider recycling office paper, aluminum cans, plastic, and glass to supplement cardboard recycling. Recyclables are picked up periodically basewide by the Recycling Center.
- A closed-loop wash rack has been installed near building 1414 for use by AIMD 900. The wash rack recycles and reuses wash water to reduce the amount of water used in cleaning GSE and minimize the amount of water that is sent to the sanitary sewer. The wash rack is

currently not operating. AIMD 900 utilizes the wash rack at VFMA 112. Dyncorp could utilize this wash rack as well.

- Properly install and begin using the paint gun washer (T-236) equipped with a filtration system to clean the HVLP paint guns. Paint guns are cleaned manually with rags and paint thinner. Even though the manual cleaning is done in the paint booth, the use of the paint gun washer reduces air emissions. The solvent used in the paint gun cleaner is filtered through a filtration system that extends the life of the solvent. The only waste generated from the paint gun washer is the filter that is changed every few months as opposed to gallons of thinner waste. The use of the paint gun washer will also reduce the amount of thinner purchased and used.

EQUIPMENT REWORK

PROCESS DESCRIPTION

When GSE comes in for rework, it is inspected to determine what parts must be repainted or if the whole unit must be repainted. The gear is disassembled, fluids are drained, and parts are pressure washed with water. If the whole unit must be stripped of paint, it is taken to the plastic bead media blasting booth to remove the paint, or smaller parts will be stripped in one of the two glove boxes. Once the paint is removed, the part is wiped down or cleaned in the parts washer prior to being painted. Painting takes place in a dry filter paint booth using HVLP paint guns and polyurethane paint. The filters in the paint booth are changed when needed. The painted parts are hung on a painting rack during painting and then allowed to dry. Once the parts are dry, the GSE will be reassembled and fluids are refilled. If a part becomes scratched during reassembly, touch-up paint is done using aerosol paints. Once the GSE is painted and reassembled, vinyl stencils are applied which identify the GSE. Before the GSE can return to service, it is tested to verify it is working properly.

Paint guns are cleaned manually with thinner and rags. The bead media used in the blasting booth is swept to one area of the booth then reclaimed with a vacuum and placed into spent bead media drums. A contractor makes pick ups of the bead media and takes it offsite for recycle. All bead media used with the AIMD is brought to the 900 division for recycle.

Base Process ID #: AIMD92D01

HSMS Code: ID-23-00

Substrate: Steel or Aluminum

MRC/Technical Publication: None identified

P2/Environmental Equipment Used in Process:

Walk In Blast booth, 2 Glove box Blast Units, Paint Booth, Uni-Ram Paint Gun cleaner, HVLP paint guns, Gerber Vinyl Stencil machine

PROCESS FLOW DIAGRAM:

Ground Support Equipment in for Rework

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Water Break Free CLP	Clean and Inspect Disassemble Gear	Absorbent pads w/used oil & antifreeze Used oil - recycled offsite Used antifreeze - recycled offsite
Plastic Media Blast (PMB) Blast Booth Filters	Paint Removal	PMB w/ paint chips -recycled Spent blast booth filters
Water, Naphtha	Prep for Paint	Rags w/naphtha
Type II Thinner Polyurethane Primer, Polyurethane Paint Paint booth filters	Prime Paint	Paint waste liquids Paint waste solids Paint booth filters
Break Free CLP RTV sealant CPC, Lubricants Anti-freeze, Brake fluid Flux, Solder	Reassemble	Empty containers - HazMinCen
	Test	

OUT

Reworked Support Equipment

41U - F404 ENGINE SHOP DISASSEMBLY

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD41U
SHOP NAME: F404 Engine Shop
BUILDING #: 1420
SHOP POC AND PHONE #: P.O. Gandy, (817) 782-7624

WORK CENTER DESCRIPTION

This work center performs scheduled and unscheduled maintenance (engine disassembly) for the F404 (F-18) engines. These engines are also shipped (to other installations) and received by this work center.

The primary process performed in the F404 Engine Shop is:

- **Engine Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- This work center would benefit from the use of a drain rack or oil filter crusher. Currently, used filters are set to drain on an absorbent pad, creating excess absorbent pad waste. The oil can be drained and collected in a more efficient and feasible manner by using a drain rack or oil filter crusher. A centrally located drain rack or filter crusher could be shared between 41U and 41L to reduce the overall amount of absorbent pad waste generated and increase the amount of used oil collected.
- AIMD 400 work center would greatly benefit from the procurement of an absorbent pad wringer. The shops within the 400 division generate a considerable amount of absorbent pad waste from the engine repair processes. A centrally located wringer for the 400 division could be shared among the shops. This will allow the reuse of the absorbent pads, collection of additional used oil, and reduction of petroleum, oil, and lubricants (POL) waste.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Drip pans are used to catch excess fuels and oils when the engines are drained. The POLs are then poured into the used oil drum.
- Used oil filters are combined with other used oil filters (crushed or noncrushed) from around base and sent offsite for recycling.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ENGINE MAINTENANCE

PROCESS DESCRIPTION

The maintenance process always begins by cleaning the engine with Simple Green. All fluids (engine oils and JP-8) are drained from the engine, and filters are removed and set to drain on absorbent pads. In the event of unscheduled maintenance, the engine is sent to shop 414 to be torn down and repaired. Once the engine is repaired and built up again (at 414), it is sent to the test cell where all fluids are replaced. After testing is completed the engine is returned to 41U to preserve the engine with 1010 oil and prepare it for shipment to its original installation.

Support equipment is maintained on a 30-lubrication cycle. Equipment is cleaned, filters are changed, if needed, and parts are lubricated.

Base Process ID #: AIMD41U01

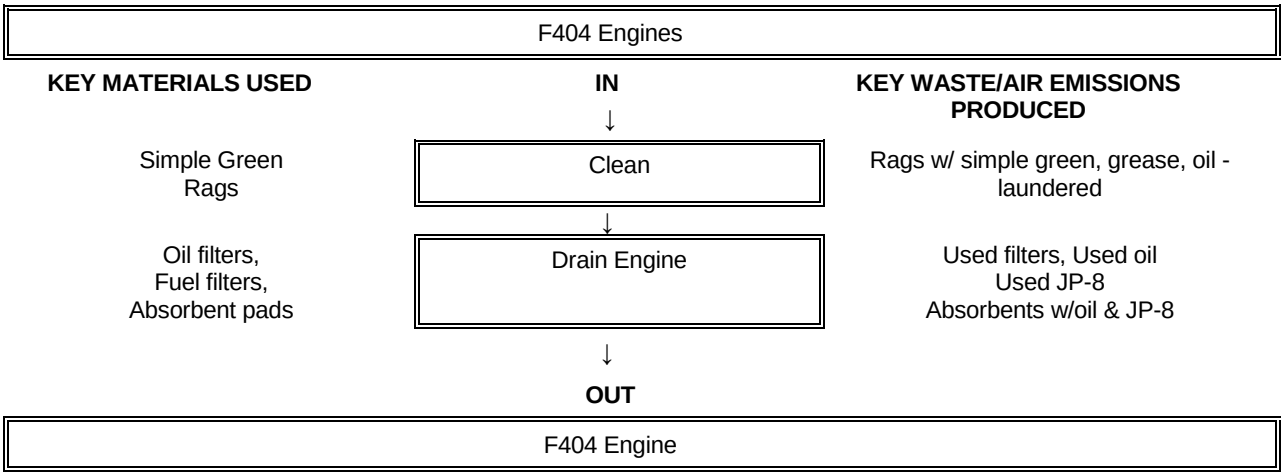
HSMS Code: ID-02-99

Substrate: Metal

MRC/Technical Publication: Platform PMA265

P2/Environmental Equipment Used in Process: Preservation Cart

PROCESS FLOW DIAGRAM:



41L - T56 COMPONENT REPAIR

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD41L
SHOP NAME: Component Repair
BUILDING #: 1418
SHOP POC AND PHONE #: GSgt. McElvain, (817) 782-6023

WORK CENTER DESCRIPTION

This work center repairs and assembles T56 engine components for the C-130 aircraft. Specific components include fuel, oil, and pneumatic systems.

The primary process performed in the T56 Component Repair Shop is:

- **Component Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- This work center would benefit from the use of a drain rack or oil filter crusher. Currently, used filters are set to drain on an absorbent pad, creating excess absorbent pad waste. The oil can be drained and collected in a more efficient and feasible manner by using a drain rack or oil filter crusher. A centrally located drain rack could be shared between 41U and 41L to reduce the overall amount of absorbent pad waste generated and increase the amount of used oil collected.
- AIMD 400 work center would greatly benefit from the procurement of an absorbent pad wringer. The shops within the 400 division generate a considerable amount of absorbent pad waste from the engine repair processes. A centrally located wringer for the 400 division could be shared among the shops. This will allow the reuse of the absorbent pads, collect additional used oil, and reduce the amount of petroleum, oil, and lubricants (POL) waste generated.
- Investigate possible alternatives for toluene and MEK (both Sara 313 TRI chemicals) such as isopropyl alcohol, CitraSafe, or DS104 in order to reduce toxic air emissions. If the use of toluene and MEK are governed by a technical order, this opportunity may not be feasible.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to

participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Drip pans are used to catch excess fuels and oils when the engines are drained. The POLs are then poured into the used oil drum.
- Used oil filters are combined with other used oil filters (crushed or noncrushed) from around base and sent offsite for recycling.
- Old engine parts are turned into Supply instead of being thrown in the trash.
- ODS containing lubricants/preservatives have been replaced with ODS-free alternatives.
- Isopropyl alcohol is used for some parts cleaning.
- Fuel and oil filters are separated in waste storage area to reduce volume of hazardous waste due to low flash fuel in oil.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types picked up by Hazardous Waste for recycle) – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

COMPONENT REPAIR

PROCESS DESCRIPTION

The T56 engines are removed from the aircraft in order to make the components more assessable for repair. The engine is inspected and disassembled, and components are washed in the Safety Kleen parts washer or the MiniMax Steam Cleaner (for internal cleaning of parts). If the component to be worked on contains fuel, oil, or other fluids, the components are drained prior to being cleaned. Components are set on absorbent materials for drying. Components are repaired if possible or replaced. Toluene and MEK are used to clean the surface of the component prior to applying adhesive material. Fluids are added back into the components and the engine reassembled. The T56 engine is then sent to the AIMD Test Cell to verify the integrity of the repair. After being tested, the engine is filled with 1010 oil until the engine is put into place on the aircraft. If the engine is to be shipped off base, the engine will be packed with desiccant packets to prevent moisture build up.

During major engine inspections, filters in the engine will be changed out. These filters are placed on absorbents in order to drain all excess fluids out.

Base Process ID #: AIMD41L01

HSMS Code: ID-02-99

Substrate: Various

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
MiniMax Steam Cleaner, Safety Kleen Premium Gold Parts Washer

PROCESS FLOW DIAGRAM:

T56 Engines Received

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Visual Inspection Disassembly	Used Oil, Used JP-8 Used Hydraulic Fluid Used Filters
High flash petroleum solvent, Isopropyl alcohol, Water Absorbent material	Clean Parts (Steam Clean or Solvent Clean)	Used Rags w/ Solvents, Alcohol Used Absorbents
BOSTIK Adhesives, Sealants	Repair	Empty Containers - HazMinCen
Engine Oil Hydraulic Fluid	Fluid Fill (prior to testing)	Empty Containers - HazMinCen Used rags w/engine oil, hyd. fluid
	Engine sent for test at Test Cell	None
1010 Oil Desiccant	Preservation (for shipping)	Absorbent pads
	OUT	

T56 Engine shipped

51A - AIRFRAMES/SHEET METAL SHOP

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD51A
SHOP NAME:	Sheet Metal Shop
BUILDING #:	1060
SHOP POC AND PHONE #:	Sgt Matijebic, Sgt Atwood, (817) 782-7621

WORK CENTER DESCRIPTION

This work center repairs and assembles F-18 and C-130 aircraft flight surfaces and any type of airframe (panels, ribs, etc.). Most of the structures are assembled using conventional metal fastening techniques such as riveting, screwing, and welding. Other flight surfaces are bonded using structural adhesives.

The primary process performed in the Sheet Metal Shop is:

- **Flight Surface Metal Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- The Sheet Metal Shop has a freezer for storing sealants to prevent spoiling of material. However, only a very small amount of sealants are needed or used, and the shop often does not stock the adhesive. The shop should discontinue use of the freezer and transfer it out of the work center.

CURRENT P2 PRACTICES & EQUIPMENT

- Scrap metal, aluminum, and steel are recycled in scrap metal bins.
- Use a grease pencil or regular pencil to lay out metal instead of layout dye.
- Store hazmat (primarily adhesives) in freezer to control temperature and extend life of materials.
- Use an ODS free version of MILSPEC-VV-L-800 spray lubricant.
- The booth used for sanding and cutting fiberglass has autocleaning filters and a HEPA vacuum to collect fiberglass particles.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no. This shop uses lint free rags or disposable scrap rags due to metal shavings

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes, except no glass is used in shop

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Transfer the storage freezer to another shop.

FLIGHT SURFACE METAL REPAIR

PROCESS DESCRIPTION

Damaged sheet metal flight surfaces are wiped down with isopropyl alcohol prior to inspection. The damaged part is measured, and these measurements are marked with a pencil on a new piece of sheet metal. The patch is cut and applied to the remaining metal surface using rivets or occasionally with adhesives. Sealant is then applied around the edge of the patch to ensure a tight seal. Excess or scrap pieces of metal are placed in metal recycle bins. An oven is used to treat metal to heat specifications.

Fiberglass repair is conducted in a composite booth, where the fiberglass is sanded and cut. The booth has filters to contain the fiberglass shavings, and the filters are autocleaned. Shavings are collected with a HEPA vacuum and disposed of in the Dumpster.

Some equipment used to cut the sheet metal patches is lubricated with general purpose oil as a corrosion control measure. The oil added to the machines is less than an ounce per month. Ball bearing grease and lightweight grease is added to the power shear several times per year.

Base Process ID #: AIMD51A01

HSMS Code: ID-07-00

Substrate: Metal

MRC/Technical Publication: Platform PMA234

P2/Environmental Equipment Used in Process: None identified

PROCESS FLOW DIAGRAM:

Damaged Flight Surface

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Isopropyl Alcohol	Clean	Rags w/isopropyl alcohol
	Visual Inspection	
Grease pencil or regular pencil	Patch Manufacture	Scrap metal-recycled
Rivets, Adhesives, Nitrile gloves Resin for fiberglass repair	Patch Application Fiberglass cutting and sanding	Fiberglass particles
Sealants Acid Brushes	Seal Patch	Acid brushes, tongue depressors, mixing cups w/sealants-trash

OUT

Repaired Flight Surface

51B - AIRFRAMES/PAINT SHOP

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD51B
SHOP NAME; Paint Shop
BUILDING #: 1060
SHOP POC AND PHONE #: Corporal Gahring, (817) 782-7582

WORK CENTER DESCRIPTION

The paint shop provides painting, paint stripping, and corrosion control of aircraft parts needing NDI, as well as painting of a small quantity of miscellaneous nonaircraft equipment. Personnel from the 900 Work Center perform sanding of support equipment in this shop. A small amount of composite repair is also performed.

The primary process performed in the Paint Shop is:

- **Aircraft Parts Painting/Removal**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Begin using the paint gun washer equipped with a filtration system to clean the HVLP paint guns. Currently paint guns are cleaned manually with thinner and rags, a process that consumes large amounts of thinner and generates a large amount of waste—140 gallons a year. Even though the manual cleaning is done in the paint booth, the use of the paint gun washer reduces air emissions and will minimize the use of thinner. For maximum effectiveness of the gun washer, paint guns should be cleaned soon after use. Some gun washers have different rack inserts available for different cleaning jobs. The solvent used in the paint gun cleaner is filtered through a filtration system that extends the life of the solvent. The only waste generated from the paint gun washer is the filter that is changed every few months as opposed to gallons of thinner waste. The use of the paint gun washer will also reduce the amount of thinner purchased and used.
- Consider changing paint booth filters based on pressure drop instead of on a quarterly basis. A magnetic gauge or some other means of measuring the pressure drop will be required.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to

participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Plastic bead media used in the blast booth and glove boxes is part of a lease/recycle program set up with AIMD and handled through the 900 division.
- This shop has a paint gun washer with filtration unit, however, it is not used to clean paint guns.
- Have replaced solvent paint stripping with abrasive blast media, a mechanical method.
- Use Eco-sure low VOC aerosol paint.
- HVLP paint guns are used for painting and smaller, touch-up HVLP paint guns are used for smaller jobs.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen– yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

AIRCRAFT PARTS PAINTING/REMOVAL

PROCESS DESCRIPTION

Abrasive blasting is the method used to remove paint from aircraft metal parts. Parts such as brake housings, tire rims, and launch bars need to be stripped of paint prior to NDI. Small parts are stripped in one of the two glove boxes with plastic bead media followed by a wipe down with isopropyl alcohol. Larger parts are stripped in the blast booth. Those parts that need NDI are then sent to the NDI shop. After removal of the blast media residue, parts are primed in the down draft paint booth. Polyurethane paint is applied to the primed parts and allowed to dry while still in the paint booth. Paint guns are manually cleaned with thinner and rags. The rags used are kept in the paint booth and then are placed in a bag and stored separate from other rags. Paint suits used while painting are also bagged up and kept separate from other wastes.

Paint booth filters are changed on a quarterly basis. The plastic bead media in the glove boxes is changed out every week, approximately 3 gallons each week. Approximately 6 cups of new plastic bead media is added to each unit every week. The filters on each unit are changed every 2 months.

Base Process ID #: AIMD51B01

HSMS Code: ID-05-01

Substrate: Aluminum

MRC/Technical Publication: Platform PMA234

P2/Environmental Equipment Used in Process: Down-draft paint booth, Two Plastic Bead Media Glove Boxes, Cascade Uni-RAM paint gun washer with filtration system, HVLP paint guns, HVLP touch up paint guns

PROCESS FLOW DIAGRAM:

Metal Parts

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Plastic Bead Media	Paint Removal	Spent bead media-recycled Blast box filters
Isopropyl Alcohol, Thinner, Rags	Residue Removal	Rags w/ isopropyl alcohol, thinner
	Send to NDI if required	
Thinner, Primer, Polyurethane Paint, Uni-coat Paint	Prime Paint	Air Emissions-paint Empty paint containers-HazMinCen Paint Booth Filters Paint Suits
Thinner, Rags	Paint gun/equipment clean up	Waste paint and thinner Rags w/paint and thinner

OUT

Painted Metal Parts

63E - APG63 RADAR SHOP

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD63E
SHOP NAME:	APG-63 Radar Shop
BUILDING #:	1055
SHOP POC AND PHONE #:	AT2 Frick, (817) 782-7150

WORK CENTER DESCRIPTION

This work center performs intermediate level maintenance on radar system components. Activities include testing, cleaning and repair of components. Liquid Cooling Stations (LCS) are used to pressure test the radar components. Two of the units are Consolidated Automated Support System (CASS) water-cooled units, and one is an air-cooled Radar Set Test System (RSTS). The three LCS units housed in this shop are shared between Marine and Navy personnel on an integrated basis. The test equipment is maintained by work center 650.

The primary process performed in the Radar Shop is:

- **Radar Equipment Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Coolant samples are taken every 30 days to verify coolant used in LCS units meets specifications. If the coolant does not meet specs, a second sample is collected to verify.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen– yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle– yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

RADAR EQUIPMENT REPAIR

PROCESS DESCRIPTION

Radar components are placed in one of the three LCS units and subjected to a pressure test with nitrogen gas. After the pressure test is completed, the components are cleaned with isopropyl alcohol in preparation for repair or realignment. Epoxy and RTV are used to repair the radar components. The work stations are required to be clean due to the sensitivity of the radar components repaired in these areas. Work stations are cleaned on a regular basis using Simple Green to remove particles that could potentially contaminate the components.

Coolant runs through the LCS units in order to cool the radar transmitter during testing. Samples (2-4 oz. samples) of the coolant are taken every 30 days for an oil analysis and water/particulate contamination. If the sample does not meet specifications, a second sample is collected to confirm. If the second sample analysis reveals contamination, the system must be flushed and recharged with fresh coolant. The coolant capacity is 17 gallons, and coolant is typically maintained between 11 and 14 gallons. The filters on the LCS units (two per unit) are changed every 90 days. Used antifreeze coolant is kept in a 30-gallon plastic drum until emptied, once every year or two. Absorbent rags with lubricant (polyalphaolefin, or PAO) are kept in a 30-gallon drum. The rags are collected once a week by hazmat. Absorbent pads used for oil collection under the stations are recycled.

Base Process ID #: AIMD63D01

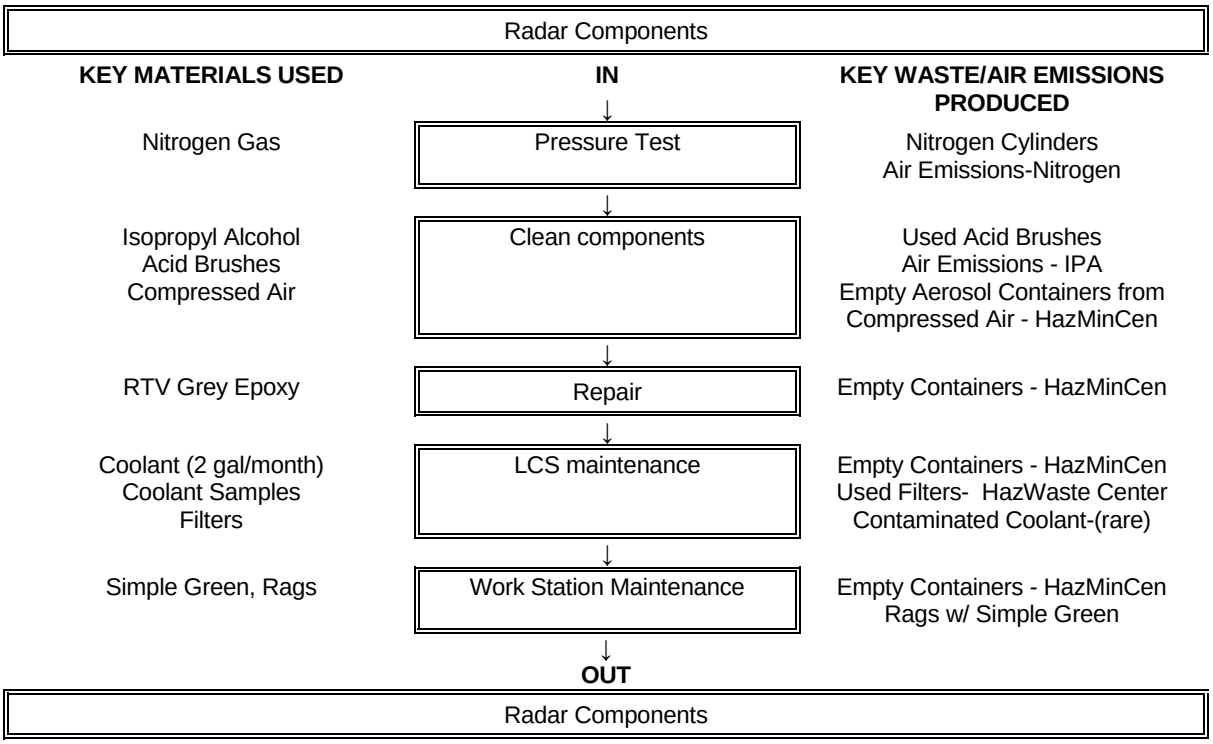
HSMS Code: ID-22-00

Substrate: Radar Equipment

MRC/Technical Publication: Not listed

P2/Environmental Equipment Used in Process: Liquid Cooling Systems

PROCESS FLOW DIAGRAM:



69B - 2M MICRO MINIATURE REPAIR

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD690
SHOP NAME: 2M Micro Miniature Repair
BUILDING #: 1055
SHOP POC AND PHONE #: AE2 Dudley, (817) 782-6281

WORK CENTER DESCRIPTION

This work center tests and repairs circuit cards and 2M modules for AIMD. Circuit cards are tested in work center 69A then sent to 69B for repair and cleaning.

The primary process performed in the 2M Repair Shop is:

- **Circuit Card Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Lead-free solder is used.
- Minda Dispensers, small pump bottles used for dispensing isopropyl alcohol for electric contact cleaning. Unused isopropyl alcohol drains back into the bottle, avoiding spills.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes for oil; no antifreeze used in shop

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

CIRCUIT CARD REPAIR

PROCESS DESCRIPTION
Repairing circuit cards involves removing and replacing bad components. Circuit cards are cleaned with cotton swabs dipped in isopropyl alcohol. New components are placed with solder and flux, sealants and adhesives. When the part is in place, the circuit card is cleaned again to remove any particles from the sealants and other materials. Mineral Oil and greases are used to lubricate the machines used in the repair of circuit cards. Continuity and polarity tests are also performed on cables and diodes with a digital multimeter, however, no materials are used in these tests.

This department has a solder extractor that is used to clean out old solder. The extractor has a glass tube with a filter that contains the waste solder. The tube with the spent solder is eventually disposed of as solid waste. Approximately two tubes per month per bench are disposed. Shop personnel maintain that all solder on the cards is now lead-free.

Base Process ID #: AIMD69001

HSMS Code: ID-22-01

Substrate: Electronic components

MRC/Technical Publication: Not listed

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

	Circuit Cards	
KEY MATERIALS USED	**IN** ↓	**KEY WASTE/AIR EMISSIONS PRODUCED**
Isopropyl Alcohol, Swabs	Clean	Cotton Swabs w/ IPA-trash
	↓	
Epoxy Adhesives, Solder, Flux, Sealants, Isopropyl Alcohol Mineral Oil, Greases	Repair of Cards Equipment Maintenance	Wipes and Swabs with IPA-trash Old components-trash Air emissions from solder flux
	↓ **OUT**	
	Circuit Cards	

413 - ENGINE/AFTERBURNER TEARDOWN

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD413
SHOP NAME: Afterburner Repair
BUILDING #: 1418
SHOP POC AND PHONE #: Calvin Bates, (817) 782-5697

WORK CENTER DESCRIPTION

This work center disassembles the engine afterburner system for the F-18 aircraft for shipment to depot level repair off base. Activities include tear downs of the engines afterburners

The primary process performed in the Afterburner Shop is:

- **Engine and afterburner Teardown**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Best Engineering hot water parts washer
- Tornado low VOC parts washer.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

AFTERBURNER REPAIR

PROCESS DESCRIPTION
Afterburner assemblies are inspected to determine which parts are working and to check for cracks in the metal. The afterburners are torn down and repaired or parts are replaced. Calibration fluid (23699 oil) is pumped into the assembly to verify parts are working. The assemblies are built back up, preserved, and sent to the test cell.

Base Process ID #: AIMD41301

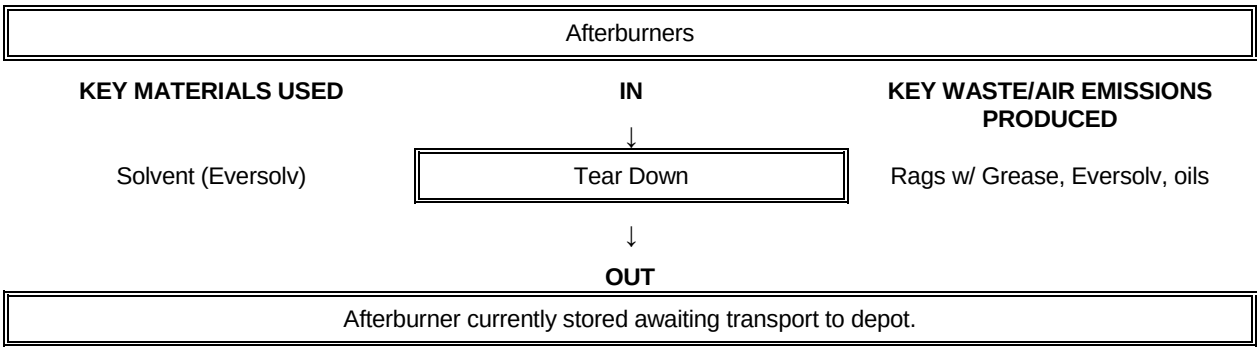
HSMS Code: ID-23-00

Substrate: Metal

MRC/Technical Publication: Platform PMA234

P2/Environmental Equipment Used in Process: None identified

PROCESS FLOW DIAGRAM:



530 - NON DESTRUCTIVE INSPECTION

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD530
SHOP NAME: Non-Destructive Inspection Lab
BUILDING #: 1414
SHOP POC AND PHONE #: AM2 Trubee, (817) 782-7774

WORK CENTER DESCRIPTION

This work center performs nondestructive inspection (NDI) on aircraft components such as slings, parachutes, and bolts. Most of the NDI work is performed in the field as opposed to the shop. Inspections are done on metallic and nonmetallic parts, components attached to the aircraft, ferrous metals, and parts with internal defects.

The primary processes performed in the NDI Shop are:

- **Penetrant Inspection (Currently unit is not operating, Personnel are using mobile kits.)**
- **Magnetic Particle Inspection (Currently unit is not operating. Personnel are using mobile kits.)**
- **X-ray Film Development**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Discontinue use of inspection penetrant NSN 6850-00-142-8840 that contains 1,1,1-trichloroethane and chlorodifluoromethane, both ODSs. Approximately 15 - 20 12-oz. cans were used in RY05. Efforts should be coordinated with the HazMinCen to reorder inspection kits that are non-ODS formulations

- Work to get digital X-ray accepted as lone method for X-ray inspection. Currently, work center is taking backup film X-ray along with digital X-ray due to digital X-ray not passing “crack inspection.”

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- A digital X-ray has been purchased to replace the wet chemistry development process.
- Perform inspections in the field to minimize down time for equipment.
- Drumming fixer and developer and taking to HazMin for recycling.
- Utilize rechargeable batteries for two-way radios, flashlights, eddy current machines, and ultrasonic unit.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable White Rags – no

HazMat obtained from HazMinCen– yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes (white paper only)

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- The penetrant unit is equipped with an RGF Environmental Systems unit to that removes spent penetrant from rinse water. The unit was installed because the shop drain is not tied to an oil-water separator. Work center personnel are not trained on the use and upkeep of the RGF unit, and are not certain how to operate it. As a result, personnel are taking parts to AFES for inspection. In addition, the unit has not been operated for approximately one year according to work center personnel. A cost benefit analysis should be conducted and, if practical and economic, the unit should be tested and certified and put into use. This would eliminate the need for the work center to use aerosol penetrant for inspections in the shop.

PENETRANT INSPECTION

PROCESS DESCRIPTION
Metallic and nonmetallic parts are inspected using a penetrant method of inspection. Liquid penetrant is applied to the surface of the part, allowing the penetrant to seep into any defects in the part. Penetrant remover is then applied and the surface wiped clean. Developer is sprayed onto the part and when dry the part is placed under a UV lamp to highlight any defects. Once the imperfections have been identified, the part is removed from the lamp and wiped clean with lint free rags.

Portable equipment allows for this inspection to be done in the field as well as in the NDI work center. The process for performing the inspection in the field is the same as in the shop.

Base Process ID #: AIMD53001

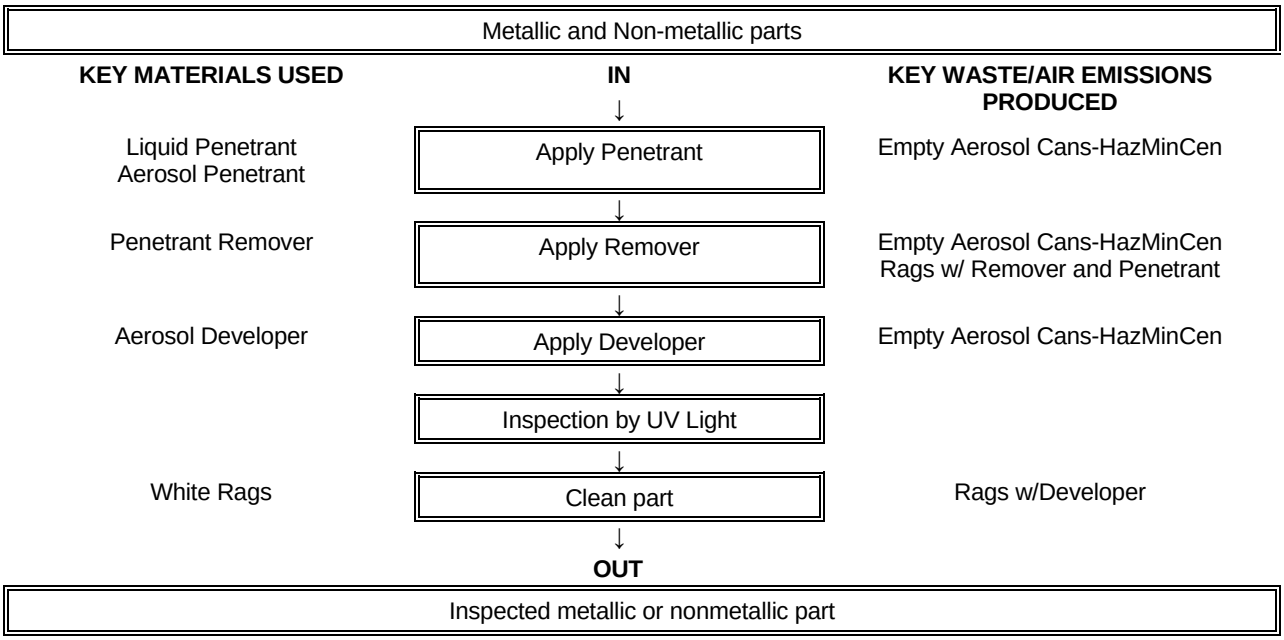
HSMS Code: ID-14-00

Substrate: Metallic and Nonmetallic parts

MRC/Technical Publication: NAVAIR 01-1A-16

P2/Environmental Equipment Used in Process: None identified

PROCESS FLOW DIAGRAM:



MAGNETIC PARTICLE INSPECTION

PROCESS DESCRIPTION

Ferrous metal parts are cleaned with an aerosol cleaner prior to inspection. The part is then placed into a solvent bath containing iron particles or fillings. The solution is magnetized and the iron fillings penetrate the cracks or imperfections in the part. The part is removed and cleaned once again with the aerosol cleaner.

When this inspection is performed in the field the part is magnetized with a handheld electromagnet. Aerosol magnetic particles are applied and the part is inspected under a black light for cracks. The particles are then removed with a rag.

Base Process ID #: AIMD53002

HSMS Code: ID-14-00

Substrate: Ferrous Metal parts

MRC/Technical Publication: NAVAIR 01-1A-16

P2/Environmental Equipment Used in Process: H-710G Stationary magnetic Particle Unit, DA200 Portable unit

PROCESS FLOW DIAGRAM:

	Ferrous Metal	
	IN ↓	
KEY MATERIALS USED	**Shop Procedure**	**KEY WASTE/AIR EMISSIONS PRODUCED**
Aerosol Cleaner	Clean	Empty Aerosol Cans - HazMinCen
	↓	
ISOPAR M solvent Magnetic Particles	Solvent Bath Magnetize Solution	None
	↓	
Aerosol Cleaner Rags	Clean	Empty Aerosol Cans - HazMinCen Rags w/ solvent and iron fillings
	Field Procedure	
None	Magnetize	None
	↓	
Aerosol magnetic particles	Apply Magnetic Particles	Empty Aerosol Cans - HazMinCen
	↓	
None	Inspect w/ UV lamp	None
	↓	
None	Clean part	Rags w/ magnet particles
	↓	
	OUT	
	Inspected Ferrous metal part	

X-RAY FILM DEVELOPMENT

PROCESS DESCRIPTION
Parts that have an internal defect can only be X-rayed to determine where the defect is. X-rays can be taken in the field if a part is too large to bring into the shop. Once an X-ray is taken, it requires development to show the internal defects. The film is first exposed to a developer solution followed by a rinse. It is then exposed to fixer solution followed by a second rinse. The film is then "developed" and will display the internal defects of the part. The used fixer and developer solutions are drained into drums that are turned into the HazWaste Center for proper disposal.

A digital X-ray unit was installed in 2003. The unit takes digital X-rays, eliminating the need to process film. However, the process is not approved as a sole replacement for the film X-ray technique, and so duplicate film is still taken for most inspections.

This process will be replaced in early 2003 with a digital X-ray imaging process that does not involve the use of chemicals to process film.

Base Process ID #: AIMD53003

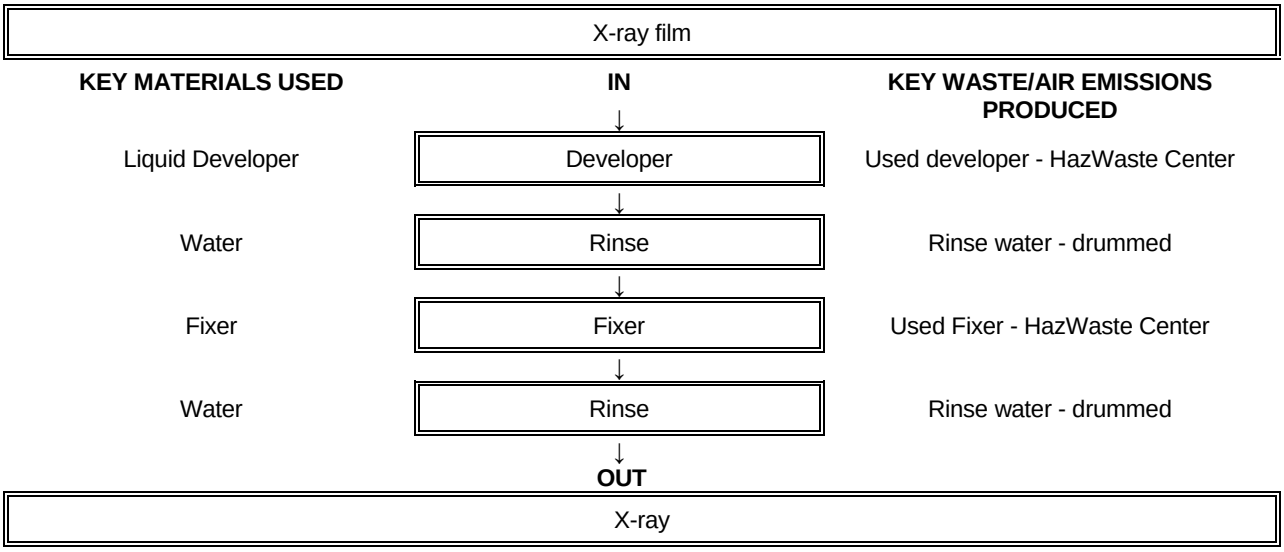
HSMS Code: ID-14-00

Substrate: Parts with internal defects

MRC/Technical Publication: NAVAIR 01-1A-16

P2/Environmental Equipment Used in Process:
Automatic film processor

PROCESS FLOW DIAGRAM:



610 - COMM/NAV SHOP

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD610
SHOP NAME: Comm/Nav
BUILDING #: 1055
SHOP POC AND PHONE #: AT3 Gladney, (817) 782-6280

WORK CENTER DESCRIPTION

This work center repairs communication and navigation equipment, such as PRC 90 radios, for the F-18 and C-130 aircraft.

The primary process performed in the Comm/Nav Shop is:

- **Equipment Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- None noted.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable (use lint free rags)

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

EQUIPMENT REPAIR

PROCESS DESCRIPTION
Equipment is first inspected for corrosion and missing parts (such as screws) then tested to determine the proper repair. Some materials for repair are used in such small quantities that this department does not keep them on hand, but checks them out from other AIMD departments. Simple Green is used for cleaning floors.

Base Process ID #: AIMD61001

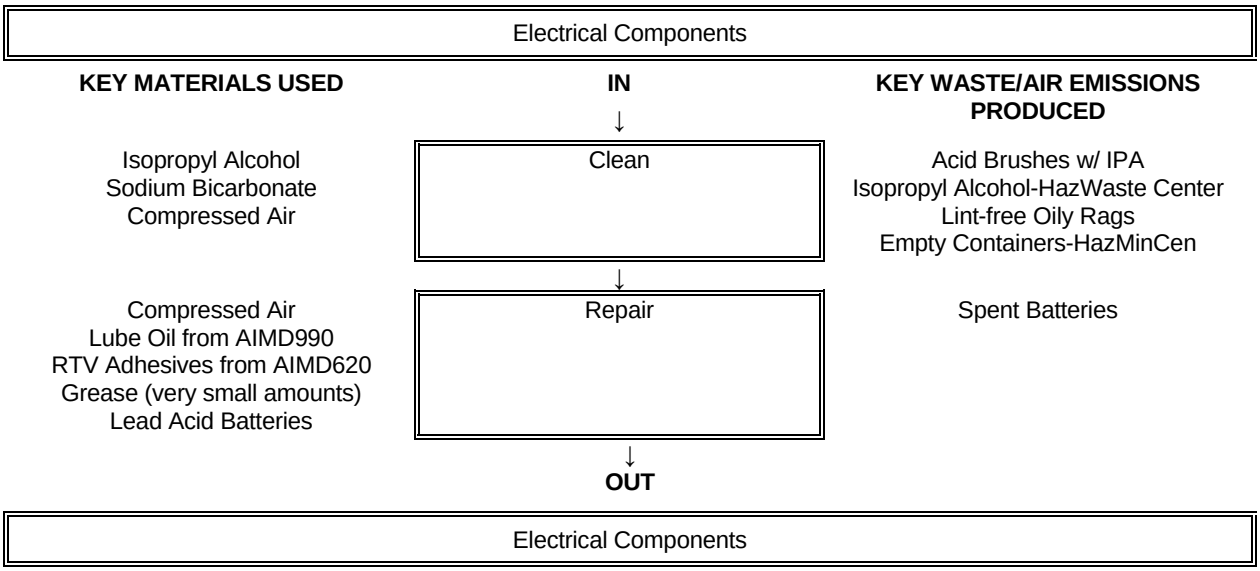
HSMS Code: ID-22-99

Substrate: Various

MRC/Technical Publication: Not listed

P2/Environmental Equipment Used in Process:

PROCESS FLOW DIAGRAM:



620 - ELECTRIC SHOP

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD620
SHOP NAME:	Electric Shop
BUILDING #:	1055
SHOP POC AND PHONE #:	AE2 Sing, (817) 782-6353

WORK CENTER DESCRIPTION

This work center performs tests and repairs of F/A-18 aircraft electrical systems. The Electric shop consists of 62A general electrician, 62B Instruments, 62C Batteries, 62E generators, and 62F Inertial Navigation Units. Shop 69C, Cable Repair, is not yet functional; cable repair is currently performed under 62A.

The primary process performed in the Electric Shop is:

- **Electrical Equipment Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider the use of Minda Dispensers, small pump bottles for dispensing isopropyl alcohol for electric contact cleaning. Unused isopropyl alcohol drains back into the bottle, avoiding spills.
- Investigate the feasibility of replacing the lead acid batteries used in equipment with longer lasting, maintenance-free OPTIMA batteries. The use of sulfuric acid and the danger of potential spills will be reduced with the use of OPTIMA batteries.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Simple Green, instead of solvent cleaners, is used to clean equipment and work area.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable (use lint free rags)

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes for used oil; no antifreeze used

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ELECTRICAL EQUIPMENT REPAIR

PROCESS DESCRIPTION

Components such as cables, connectors, generators, inertial navigation units (INUs), and instruments are cleaned and repaired in the electric shop. This shop also cleans and repairs electrical components on vans (mobile shops for overseas military use). Once the components are cleaned, they are repaired either by replacing batteries, calibrating, or soldering new parts on. The generators come in empty and go out empty, but are cooled with MIL-23699 oil while they are being bench tested. Approximately 12 quarts of oil are used per year for the generators. Absorbent pads are used to collect oil that spills from the generators during bench testing. Maintenance on the INUs involves connecting to a meter for testing. Nitrogen is used for purging indicators; approximately one cylinder of nitrogen is used in a year. Some components are cleaned in the ultrasonic cleaners with isopropyl alcohol while other components (casings, housings) are wiped down with Simple Green. Lube oil is used for preventive maintenance on vans and actuators. Sodium bicarbonate is kept on hand to neutralize battery acid if there is a spill.

Base Process ID #: AIMD62001

HSMS Code: ID-23-08

Substrate: Electronic components

MRC/Technical Publication: Not listed

P2/Environmental Equipment Used in Process:
Bench-top Ultrasonic Cleaner

PROCESS FLOW DIAGRAM:

Electrical Components

KEY MATERIALS USED	IN ↓	KEY WASTE/AIR EMISSIONS PRODUCED
Simple Green Isopropyl Alcohol Turbo Oil (generators only) Sodium Bicarbonate	Clean	Used Turbo Oil Acid Brushes w/ IPA or grease Isopropyl Alcohol - HazWaste Center Lint free oily rags Used Absorbent pads Empty Containers - HazMinCen
	↓	
Nitrogen (INUs and Instruments) Lube Oil Solder, Flux Lead Acid Batteries for vans	Repair	Empty Aerosol Lube Oil Cans-HazMinCen Spent Batteries – HazMinCen
	↓ OUT	

Electrical Components

620 - ELECTRIC SHOP

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD620
SHOP NAME:	Electric Shop
BUILDING #:	1055
SHOP POC AND PHONE #:	AE2 Sing, (817) 782-6353

WORK CENTER DESCRIPTION

This work center performs tests and repairs of F/A-18 aircraft electrical systems. The Electric shop consists of 62A general electrician, 62B Instruments, 62C Batteries, 62E generators, and 62F Inertial Navigation Units. Shop 69C, Cable Repair, is not yet functional; cable repair is currently performed under 62A.

The primary process performed in the Electric Shop is:

- **Electrical Equipment Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider the use of Minda Dispensers, small pump bottles for dispensing isopropyl alcohol for electric contact cleaning. Unused isopropyl alcohol drains back into the bottle, avoiding spills.
- Investigate the feasibility of replacing the lead acid batteries used in equipment with longer lasting, maintenance-free OPTIMA batteries. The use of sulfuric acid and the danger of potential spills will be reduced with the use of OPTIMA batteries.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Simple Green, instead of solvent cleaners, is used to clean equipment and work area.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable (use lint free rags)

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes for used oil; no antifreeze used

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ELECTRICAL EQUIPMENT REPAIR

PROCESS DESCRIPTION

Components such as cables, connectors, generators, inertial navigation units (INUs), and instruments are cleaned and repaired in the electric shop. This shop also cleans and repairs electrical components on vans (mobile shops for overseas military use). Once the components are cleaned, they are repaired either by replacing batteries, calibrating, or soldering new parts on. The generators come in empty and go out empty, but are cooled with MIL-23699 oil while they are being bench tested. Approximately 12 quarts of oil are used per year for the generators. Absorbent pads are used to collect oil that spills from the generators during bench testing. Maintenance on the INUs involves connecting to a meter for testing. Nitrogen is used for purging indicators; approximately one cylinder of nitrogen is used in a year. Some components are cleaned in the ultrasonic cleaners with isopropyl alcohol while other components (casings, housings) are wiped down with Simple Green. Lube oil is used for preventive maintenance on vans and actuators. Sodium bicarbonate is kept on hand to neutralize battery acid if there is a spill.

Base Process ID #: AIMD62001

HSMS Code: ID-23-08

Substrate: Electronic components

MRC/Technical Publication: Not listed

P2/Environmental Equipment Used in Process:
Bench-top Ultrasonic Cleaner

PROCESS FLOW DIAGRAM:

Electrical Components

KEY MATERIALS USED	IN ↓	KEY WASTE/AIR EMISSIONS PRODUCED
Simple Green Isopropyl Alcohol Turbo Oil (generators only) Sodium Bicarbonate	Clean	Used Turbo Oil Acid Brushes w/ IPA or grease Isopropyl Alcohol - HazWaste Center Lint free oily rags Used Absorbent pads Empty Containers - HazMinCen
	↓	
Nitrogen (INUs and Instruments) Lube Oil Solder, Flux Lead Acid Batteries for vans	Repair	Empty Aerosol Lube Oil Cans-HazMinCen Spent Batteries – HazMinCen
	↓ OUT	

Electrical Components

640 - ELECTRONIC COUNTERMEASURES/FLIR (Forward Looking Infrared)

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD640
SHOP NAME:	Electronic Countermeasures
BUILDING #:	1055
SHOP POC AND PHONE #:	AT2 Bendu, (817) 782-6234

WORK CENTER DESCRIPTION

This work center performs maintenance on electrical countermeasures. Activities include testing, cleaning, and repair of countermeasures. The automatic test equipment used to perform the work is calibrated by AIMD670 Calibration Lab.

The primary process performed in the Radar Shop is:

- **Electronic Countermeasure Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- None noted.

CURRENT P2 PRACTICES & EQUIPMENT

- None noted.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes, except glass, not used in this shop

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ELECTRONIC COUNTERMEASURE REPAIR

PROCESS DESCRIPTION
Electronic Countermeasures are connected to the automatic test equipment to pinpoint the problem area. The bad component is identified and the countermeasure is sent to the appropriate AIMD shop to remove or replace the component. Circuit cards are also changed out and replaced if needed. Used circuit cards are turned into Supply on a 1:1 basis. Once the countermeasure is returned to this work center, the electrical connections are cleaned with isopropyl alcohol and the equipment tested again before returned to service. For FLIR components, work center personnel go to the aircraft to conduct the required testing.

Base Process ID #: AIMD64001

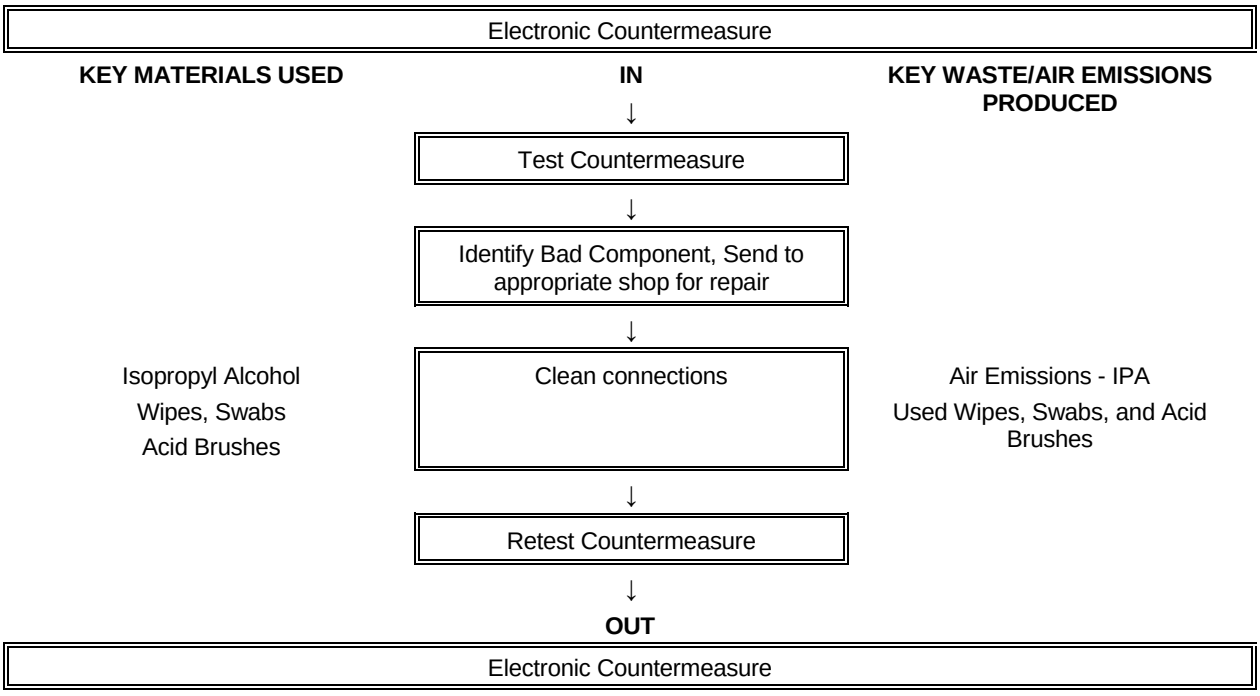
HSMS Code: ID-22-99

Substrate: Electronic Countermeasure

MRC/Technical Publication: Not listed

P2/Environmental Equipment Used in Process:
None identified

PROCESS FLOW DIAGRAM:



650 – CONSOLIDATED AUTOMATIC SUPPORT SYSTEM

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD650
SHOP NAME:	CASS
BUILDING #:	1055
SHOP POC AND PHONE #:	AT1 Gilbreath, (817) 782-7150

WORK CENTER DESCRIPTION

This work center tests replaceable electronic assemblies for the F-18 aircraft and maintains the Consolidated Automatic Support System (CASS) testing equipment, which is also used by the Radar Shop, 63E. Activities performed in this shop include testing, assembly, and repair of replaceable electronic assemblies, and maintenance and repair of the CASS equipment.

The primary process performed in the CASS Shop is:

- **Equipment Repair and Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- None noted.

CURRENT P2 PRACTICES & EQUIPMENT

- CASS-HP unit is kept in a bermed area of the shop to contain coolant in event of spill. The floor in the bermed area has been treated and coated with a nonporous material to prevent spills from seeping through and into the ground.
- The floor in the bermed area has been waterproofed and leak-proofed in the event of a spill.
- The old VAST equipment was replaced with new CASS equipment.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle –yes

Used oil, antifreeze picked up by Hazardous Waste for recycle– not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

EQUIPMENT REPAIR

PROCESS DESCRIPTION
Electronics from the F-18s are brought in, disassembled, and bench tested with the CASS-HP unit by the Radar Shop. Defective parts are either repaired or a replacement part is ordered. If a circuit card has gone bad, the part is sent to the Microminiature shop to have a new circuit card installed. The electronics are reassembled after repair or part replacement and tested once again before issued back into service.

Coolant runs through the CASS-HP unit in order to cool the radar transmitter during testing. A water chiller is connected to the CASS-HP unit and uses a mixture of glycol and water to dissipate the heat from the coolant. The area of the shop where the CASS-HP unit is housed is surrounded by a berm in case of a spill.

Base Process ID #: AIMD65001

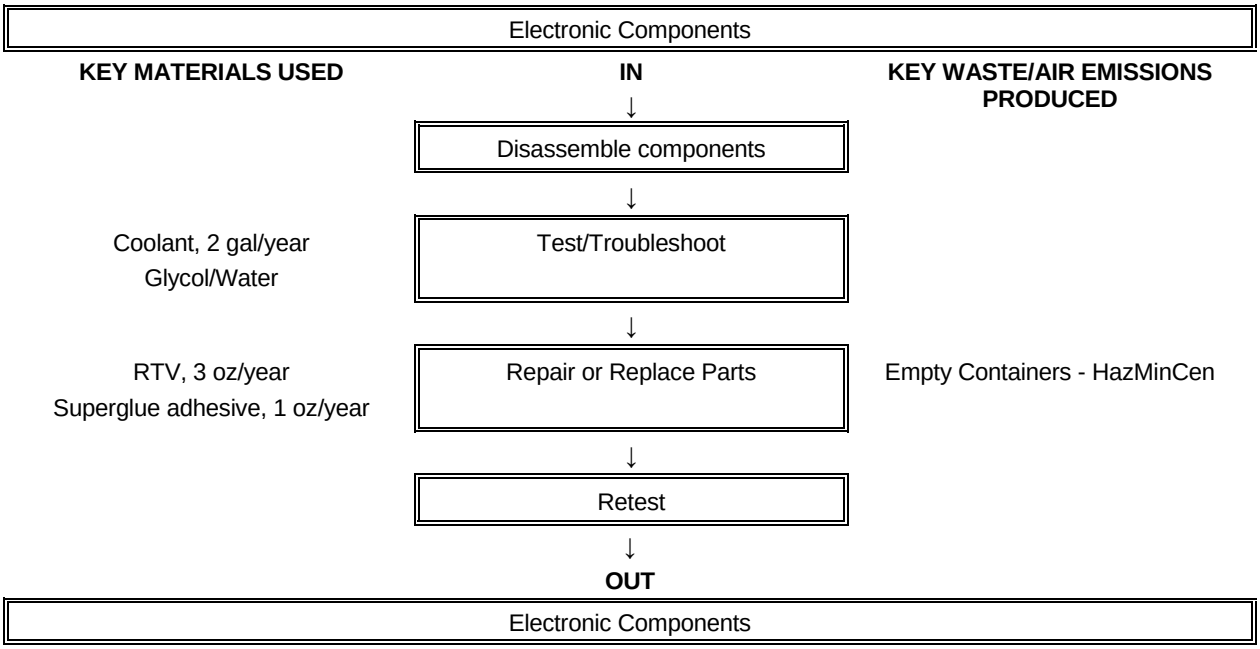
HSMS Code: ID-22-00

Substrate: Electronics

MRC/Technical Publication: PMA260 Platform

P2/Environmental Equipment Used in Process:
None identified

PROCESS FLOW DIAGRAM:



670 - CALIBRATION LAB

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD670
SHOP NAME: Calibration Lab
BUILDING #: 1445
SHOP POC AND PHONE #: AT1 Webb, (817) 782-6193

WORK CENTER DESCRIPTION

The Calibration Lab tests, calibrates, and repairs electronic test equipment used to support the AIMD and Lieutenant command on station.

The primary process performed in the Calibration Lab is:

- **Electronic Equipment Calibration**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Water is used in the ultrasonic cleaner to clean components.
- Replaced Genesolv D (containing Freon 113) with Forane R 141B. Forane is a liquid, eliminating all ODS.
- Laundering white rags with Aramark.
- Taking aluminum cans to recycle periodically.
- Torque wrenches are calibrated with bismuth instead of lead.
- Freon 113 has been replaced as a cleaning solvent with Forane R 141B liquid.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags - not applicable, use white lint free rags

Launderable White Rags - yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ELECTRONIC EQUIPMENT CALIBRATION

PROCESS DESCRIPTION
Electronic test equipment is brought in to be calibrated to keep systems working accurately. Equipment is inspected and connected to test stands. The testing of hydraulic pressure gauges is a large part of the work conducted by the work center. All pressure gauges are internally cleaned with Forane R 141B. All of this work is conducted inside a fume hood. Forane R 141B is pulled through the pressure gauge several times via vacuum to remove residual hydraulic fluid prior to hooking the gauge up to the standard (per calibration procedure 17-20MP-06). The used Forane R 141B is contaminated with hydraulic fluid and is disposed as nonhazardous waste. Some components are cleaned in the ultrasonic cleaner with water. Old components are replaced. The equipment is reassembled and then calibrated. The equipment used in this shop to perform the calibrations and tests are maintained on a regular basis. Hydraulic fluid is added to the test stands and equipment is wiped down to remove dirt and grease buildup.

Base Process ID #: AIMD67001

HSMS Code: ID-22-03

Substrate: Electronics

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Ultrasonic Cleaner, Hydraulic Test Stands

PROCESS FLOW DIAGRAM:

Electronic Equipment

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Leak Detector Isopropyl Alcohol, Hydraulic Fluid	Inspect Test	Rags w/oil, cleaner Empty containers - HazMinCen
Forane, Water Isopropyl Alcohol Flux, solder	Clean Repair/Replace Components	Forane and Hydraulic Fluid Empty containers - HazMinCen
Nitrogen Gas - filled by LOX farm Calibration Gases	Calibrate	Gas Cylinders

OUT

Calibrated Equipment

670 - CALIBRATION LAB

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD670
SHOP NAME: Calibration Lab
BUILDING #: 1445
SHOP POC AND PHONE #: AT1 Webb, (817) 782-6193

WORK CENTER DESCRIPTION

The Calibration Lab tests, calibrates, and repairs electronic test equipment used to support the AIMD and Lieutenant command on station.

The primary process performed in the Calibration Lab is:

- **Electronic Equipment Calibration**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Water is used in the ultrasonic cleaner to clean components.
- Replaced Genesolv D (containing Freon 113) with Forane R 141B. Forane is a liquid, eliminating all ODS.
- Laundering white rags with Aramark.
- Taking aluminum cans to recycle periodically.
- Torque wrenches are calibrated with bismuth instead of lead.
- Freon 113 has been replaced as a cleaning solvent with Forane R 141B liquid.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags - not applicable, use white lint free rags

Launderable White Rags - yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ELECTRONIC EQUIPMENT CALIBRATION

PROCESS DESCRIPTION
Electronic test equipment is brought in to be calibrated to keep systems working accurately. Equipment is inspected and connected to test stands. The testing of hydraulic pressure gauges is a large part of the work conducted by the work center. All pressure gauges are internally cleaned with Forane R 141B. All of this work is conducted inside a fume hood. Forane R 141B is pulled through the pressure gauge several times via vacuum to remove residual hydraulic fluid prior to hooking the gauge up to the standard (per calibration procedure 17-20MP-06). The used Forane R 141B is contaminated with hydraulic fluid and is disposed as nonhazardous waste. Some components are cleaned in the ultrasonic cleaner with water. Old components are replaced. The equipment is reassembled and then calibrated. The equipment used in this shop to perform the calibrations and tests are maintained on a regular basis. Hydraulic fluid is added to the test stands and equipment is wiped down to remove dirt and grease buildup.

Base Process ID #: AIMD67001

HSMS Code: ID-22-03

Substrate: Electronics

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Ultrasonic Cleaner, Hydraulic Test Stands

PROCESS FLOW DIAGRAM:

Electronic Equipment

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Leak Detector Isopropyl Alcohol, Hydraulic Fluid	Inspect Test	Rags w/oil, cleaner Empty containers - HazMinCen
Forane, Water Isopropyl Alcohol Flux, solder	Clean Repair/Replace Components	Forane and Hydraulic Fluid Empty containers - HazMinCen
Nitrogen Gas - filled by LOX farm Calibration Gases	Calibrate	Gas Cylinders

OUT

Calibrated Equipment

810A - PARACHUTE MAINTENANCE

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD810A
SHOP NAME:	Parachute Maintenance
BUILDING #:	1024
SHOP POC AND PHONE #:	PR1 Leake, (817) 782-7772

WORK CENTER DESCRIPTION

This work center performs preventive maintenance and repair to all parachutes used to support AIMD. Parachutes are inspected on either a 448-day or 672-day cycle.

The primary process performed in the Parachute Shop is:

- **Parachute Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Eliminated the use of toluene in this shop.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable

Launderable White Rags - no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes for cardboard and paper

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

PARACHUTE MAINTENANCE

PROCESS DESCRIPTION
Parachutes are inspected thoroughly for imperfections like rips or tears. If defects are found they are repaired. Sensor plugs are cleaned with isopropyl alcohol. Service dates are also installed on the metal parts of the parachutes using a Sharpie pen.

Base Process ID #: AIMD810A01

HSMS Code: MS-99-99

Substrate: Nylon, Cloth, or Plastic

MRC/Technical Publication: NAVAIR 01-1A-16

P2/Environmental Equipment Used in Process:
None identified

PROCESS FLOW DIAGRAM:

	Parachute	
KEY MATERIALS USED	**IN**	**KEY WASTE/AIR EMISSIONS PRODUCED**
	↓	
	Inspect	
	↓	
Soap and Water Isopropyl Alcohol	Clean	Lint-free rags - trash Air emissions - IPA
	↓	
Polypropylene Adhesive	Repair (some sewing involved)	Empty Containers - HazMinCen
	↓	
Lube Oils	Sewing Machine Maintenance	
	↓	
	OUT	
	Parachutes	

810B - FLOATATION GEAR

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD810B
SHOP NAME:	Floatation Gear Shop
BUILDING #:	1024
SHOP POC AND PHONE #:	PR1 Leake, (817) 782-7772

WORK CENTER DESCRIPTION

This work center performs preventive maintenance, inspections and repairs to floatation gear and survival equipment used. The rafts kept in the C-130s are serviced every 224 days and the life preservers are serviced every 90 days. Personnel also install PRC-90 and PRT-5 radios on the life rafts. This work center also tests diver suits for leaks.

The primary processes performed in the Floatation Gear Shop are:

- **Floatation Gear Maintenance**
- **Diver Suit Testing**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- None noted.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no, but could be implemented

Launderable White Rags - no, but could be implemented

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes for cardboard and paper

Used batteries (all types) returned to Recycling Center – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

FLOATATION GEAR MAINTENANCE

PROCESS DESCRIPTION

Floatation devices, such as rafts, are visually inspected when brought in for service. Gear is then subjected to a four-hour pressure test to determine if any leaks are present; the gear is inflated with compressed air or carbon dioxide and maintained for a set period of time. Talc is sprinkled on the rafts to absorb excess moisture from the air that may adhere to the rafts. Every fourth inspection, the gear undergoes a functional inspection where the gear is actually used as it would be in the field. After all the tests are completed, repair will be made if necessary. If a leak is found, toluene (technical order) is applied around the area and on the patch material to be applied to thoroughly clean the rubber. Toluene is used because it allows the patch better adhesion to the surface. Casings will be changed on personal life preservers if needed, using rivets to attach the casings. A press is used to attach the rivets.

Base Process ID #: AIMD810B01

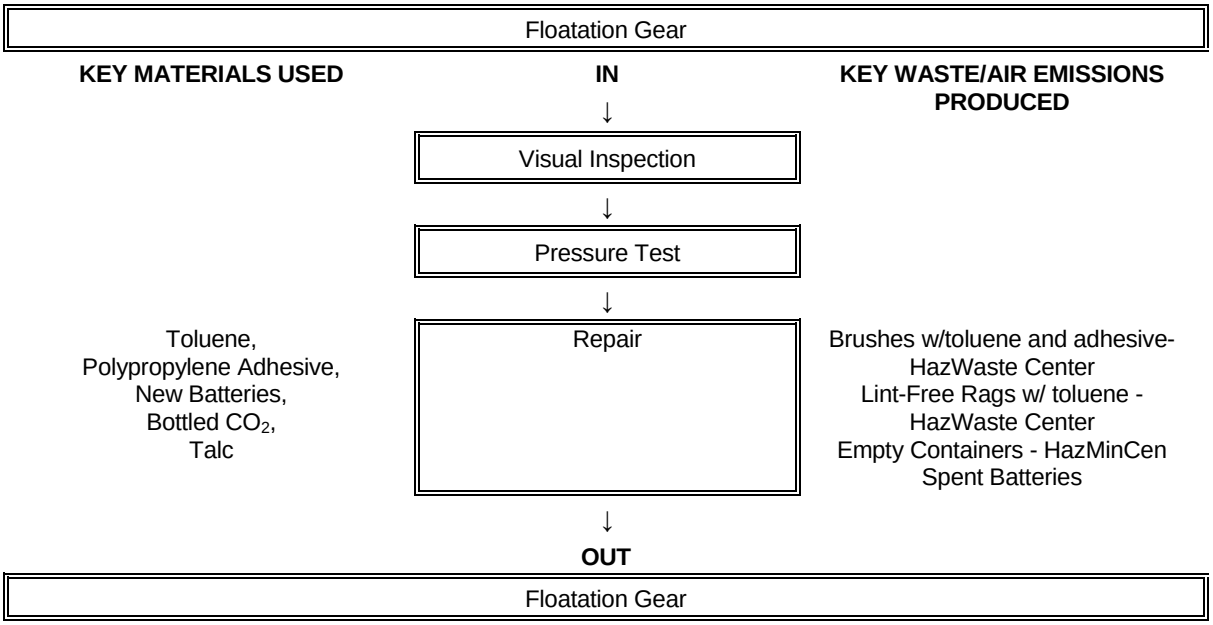
HSMS Code: MS-99-99

Substrate: Floatation Gear

MRC/Technical Publication: NAVAIR 01-1A-16

P2/Environmental Equipment Used in Process:
CO2 Charging Unit

PROCESS FLOW DIAGRAM:



DIVER SUIT TESTING

PROCESS DESCRIPTION

Diver suits are tested twice a year. The suits are submerged in a water bath and checked for leaks. If leaks are detected, the suits are repaired using adhesive and a heat reactive nylon material. The nylon is ironed onto the suit as a patch. The water in the water bath is used repeatedly. One cup of Clorox bleach is added every 6 months to maintain water quality.

Base Process ID #: AIMD810B02
HSMS Code: MS-99-99
Substrate: Diver Suit
MRC/Technical Publication: NAVAIR 01-1A-16
P2/Environmental Equipment Used in Process:
Water bath

PROCESS FLOW DIAGRAM:

Diver Suit

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
	↓	
None	Inflation	None
	↓	
Water 1 cup Clorox bleach	Submersion in Water Bath	Wastewater
	↓	
Heat-reactive nylon Polypropylene adhesive	Leak Repair	Empty Containers - HazMinCen
	↓	
	OUT	

Diver Suit

810C - OXYGEN SUPPORT SYSTEMS

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD810C
SHOP NAME:	Oxygen Support Systems
BUILDING #:	1024
SHOP POC AND PHONE #:	PR1 Leake, (817) 782-7772

WORK CENTER DESCRIPTION

This work center performs preventative maintenance, scheduled inspections, and repairs to oxygen equipment used on the F-18 and C-130 aircraft. This equipment also requires adjustment and cleaning.

The primary process performed in the Oxygen Support Shop is:

- **Oxygen Equipment Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- None noted.

CURRENT P2 PRACTICES & EQUIPMENT

- Freon 113 was previously used to clean the oxygen lines but has been replaced with soap and water.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes for cardboard and paper

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes for used oil

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

OXYGEN EQUIPMENT MAINTENANCE

PROCESS DESCRIPTION
Oxygen systems are visually inspected before pressure tested on the test stands. Once tested, the oxygen lines are cleaned with soap and water; the water discharge to the publicly owned treatment works (POTW) is about 1 gallon every seven days. The test stands are maintained on a preventive maintenance schedule. The monometer fluid is replaced once a year during calibration of the instrument, and the stands are lubricated to prevent wear and rust.

Base Process ID #: AIMD810C01

HSMS Code: ID-23-00

Substrate: Aviation Breathing Equipment

MRC/Technical Publication: NAVAIR N18 13-1-6.4 Oxygen Manual

P2/Environmental Equipment Used in Process:
None identified

PROCESS FLOW DIAGRAM:

Oxygen Support Equipment

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Visual Inspection	None
Liquid Oxygen	Pressure Test	None
Soap, Water	Clean Lines	Wash water - POTW
Lubricating Oil Monometer Fluid	Test Stand Maintenance	Empty Containers - HazMinCen

↓

OUT

Oxygen Support Equipment

820 - LOX FARM

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD820
SHOP NAME: LOX Farm
BUILDING #: 1024
SHOP POC AND PHONE #: WS7 Lane Herchberger, (817) 782-5292

WORK CENTER DESCRIPTION

The LOX Farm services oxygen equipment, such as tanks and carts, for all tenant commands on base. Liquid oxygen is stored in a 2,000-gallon tank and a 3,000-gallon tank that are filled every 30-40 days. Liquid Nitrogen is also stored here in two 2,000-gallon tanks and refilled every 30-40 days as well. Nitrogen and oxygen gases are stored in two bullet tanks. Carbon dioxide in cylinders is stored in the LOX as well.

The primary process performed at the LOX farm is:

- **Liquid Oxygen and Nitrogen Storage**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- None noted.

CURRENT P2 PRACTICES & EQUIPMENT

- None noted.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable

HazMat obtained from HazMinCen – not applicable

Empty HazMat Containers returned to HazMinCen – not applicable

Cardboard, paper, plastic, glass picked up by Recycling Center – yes for cardboard and paper

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

LIQUID OXYGEN AND NITROGEN STORAGE

PROCESS DESCRIPTION

The tenants on base bring cylinders and carts to be filled with either liquid oxygen or nitrogen. TANG and AFRES stores liquid nitrogen in 100-gallon carts and has them refilled as needed. The personnel at the LOX farm do inspections on the storage tanks every 28 days to verify there are no leaks or damages to the tanks. Cylinders are sent out every five years for hydrostatic tests. Leak detection compound is sprayed around the head of the cylinders once full to check for possible leaks. No waste is associated with the storage of these liquid gases. A pressure washer is used in the LOX farm for cleaning the area. The pressure washer contains only water, no soap.

Base Process ID #: AIMD82001

HSMS Code: Not known

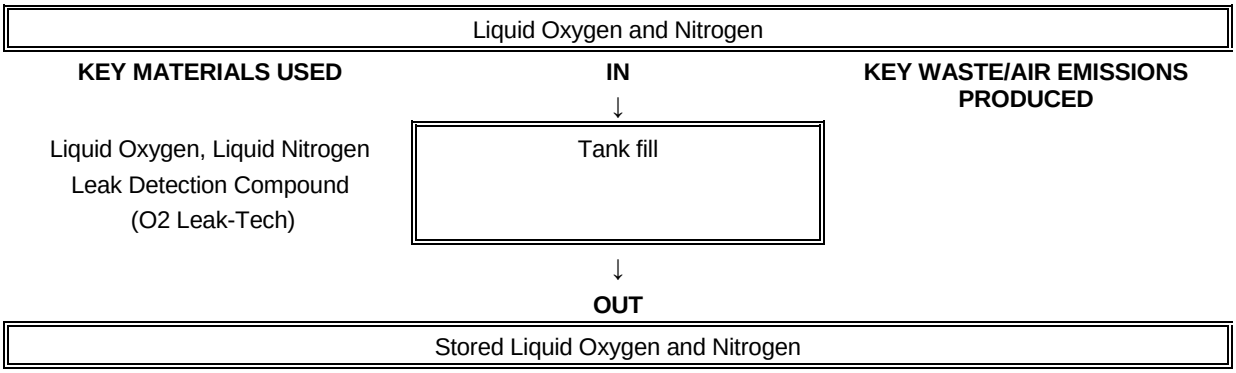
Substrate: Gases and metal

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:

None identified

PROCESS FLOW DIAGRAM:



910 - GROUND SUPPORT EQUIPMENT GAS ENGINE REPAIR

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD910
SHOP NAME:	Ground Support Equipment (GSE) Gas Engine Repair Branch
BUILDING #:	1414
SHOP POC AND PHONE #:	AS1 Williams, (817) 782-7728

WORK CENTER DESCRIPTION

The 900 division of AIMD takes care of all Ground Support Equipment (GSE) used to support the AIMD. Each shop in this division is responsible for a different type of GSE; hydraulic, gas engine, or electrical. The GSE Gas Engine repair shop is responsible for scheduled and unscheduled maintenance on GSE internal combustion and diesel engines. Major repair is not performed in this shop, only repair involving consumable items such as filters and fluids will be performed. If the engine requires detailed maintenance, the engine will be pulled out and sent to Cherry Point for repair, and an extra engine will be placed in the equipment. Equipment maintained includes turbines, diesel pre-heaters, and pneumatic air compressors.

The primary processes performed in the GSE Gas Engine Repair shop are:

- **Engine Maintenance**
- **Turbine Engine Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Better Engineering parts washer is used to clean equipment parts. The use of this aqueous parts washer comprises approximately 30% of the parts washing at the work center, reducing the use of PD-680 in the shop.

- System One parts washer. Although this washer comprises 70% of the work center parts cleaning and utilizes PD-680, it recycles solvent and generates less waste. The solvent and filter have not been changed in approximately three to four years, according to shop personnel.
- The shop utilizes ZEP ZGreen floor clean in the floor cleaning machine. ZGreen is soap based and reduces solvent waste. The machine is emptied into the oil-water separator.
- All fuel, engine oil and hydraulic oil drained from the vehicles is placed in a fuel bowser which is pumped out on a weekly basis. This oil is recycled offsite.
- Antifreeze is recycled with an antifreeze recycling unit as opposed to sending offsite for recycle.
- OPTIMA batteries have replaced traditional lead acid batteries in the equipment.
- Used oil filters are combined with other used oil filters (crushed or noncrushed) from around base and sent offsite for recycle.
- Bulk fluid dispensing system is in use to reduce the number of empty containers generated.
- A particle counter has replaced the patch test method in testing hydraulic fluid. The particle counter requires less hydraulic fluid and does not use a solvent to perform the test.
- AIMD 900 utilizes a wash rack at VMFA 112. The wash rack recycles and reuses wash water to reduce the amount of water used in cleaning GSE and minimize the amount of water that is sent to the sanitary sewer.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags - yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes (Take to AIMD 600)

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- A closed-loop wash rack has been installed near building 1414 for use by AIMD 900. The unit is not currently operable and needs repair. The shop is currently utilizing the wash rack at VFMA 112. The wash rack at AIMD 900 should be considered for repair and put back in service if economically feasible.

ENGINE MAINTENANCE

PROCESS DESCRIPTION
Scheduled maintenance on engines involves filter changes, fluid change-outs, battery charging, and part lubrications. All equipment is on a 52-week preventive maintenance schedule. Antifreeze is pumped from the engines and recycled through an antifreeze recycler. Batteries are recharged if needed, or replaced. Bearings, bolts, etc are cleaned in the parts washers to remove built up greases and oils.

If an engine is in for unscheduled maintenance, the engine is pulled from the equipment and shipped to Cherry Point on a 1:1 swap basis. This shop keeps a few extra maintained engines for this purpose and will place one of these engines into the equipment to keep down time as short as possible.

Base Process ID #: AIMD91001

HSMS Code: SR-02-00

Substrate: Steel and Aluminum

MRC/Technical Publication: Platform PMA260

P2/Environmental Equipment Used in Process:
System One parts washer, antifreeze recycler, Hydraulic fluid bulk dispensers, Particle Counter, Ultrasonic cleaner, Better Engineering aqueous parts washer

PROCESS FLOW DIAGRAM:

Engine

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Filter, Motor Oil, Rags	Oil and Oil Filter change	Used filter, Used motor oil Rags w/oil
Antifreeze (recycled), Brake Fluid, Transmission Fluid, Hydraulic fluid, Diesel Fuel, Mogas, Filters	Fluid Servicing (Particle counter test for hydraulic fluid)	Used Antifreeze - recycled Used oils, Reclaimed Diesel fuel, Mogas Antifreeze recycler filter
PD-680, Natural Orange Rags	Parts Cleaning	Used Rags w/grease
Bearing Grease Lube Oils	Lubricate	Used Rags w/grease
OPTIMA Batteries	Battery Charging	Spent Batteries – recharged Spent Batteries - exchanged

OUT

Engines

TURBINE ENGINE REPAIR

PROCESS DESCRIPTION
Maintenance on the turbine engines is done just like the previous engine repair process. However, turbine engines run on JP-8 as opposed to diesel fuel or Mogas. When the engines are maintained, the JP-8 is reclaimed from the engine and placed in a fuel bowser with other fuels.

If an engine is in for unscheduled maintenance, the engine is pulled from the equipment and shipped to Cherry Point on a 1:1 swap basis. This shop keeps a few extra maintained engines for this purpose and will place one of these engines into the equipment to keep down time as short as possible.

Base Process ID #: AIMD91002

HSMS Code: SR-02-00

Substrate: Steel and Aluminum

MRC/Technical Publication: Platform PMA260

P2/Environmental Equipment Used in Process:
System One parts washer, antifreeze recycler, Hydraulic fluid bulk dispensers, Particle Counter, Ultrasonic cleaner, Better Engineering aqueous parts washer

PROCESS FLOW DIAGRAM:

Turbines

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Filter, Motor Oil Rags	Oil Filter change	Used filter, Used motor oil Rags w/ oil
Hydraulic fluid, JP-8, Filters	Fluid Servicing (Particle counter test for hydraulic fluid)	Used oils Reclaimed JP-8
PD-680, Natural Orange Rags	Parts Cleaning	Used Rags w/grease
Bearing Grease Lube Oils	Lubricate	Used Rags w/grease
OPTIMA Batteries	Battery Charging	Spent Batteries - Recharged Spent Batteries - Exchanged

OUT

Turbines

920 - GROUND SUPPORT EQUIPMENT (GSE) STRUCTURE/HYDRAULIC SHOP

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD920
SHOP NAME: Ground Support Equipment (GSE) Structure/Hydraulic Shop
BUILDING #: 1414
SHOP POC AND PHONE #: AS1 Williams, (817) 782-7728

WORK CENTER DESCRIPTION

The 900 division of AIMD takes care of all Ground Support Equipment (GSE) used to support the AIMD. Each shop in this division is responsible for a different type of GSE; hydraulic, gas engine, or electrical. The GSE Structure/Hydraulic shop is responsible for the decontamination of hydraulic power units and structural repair for the GSE used to support AIMD activities. Equipment (platforms, stands and jacks) is tested and serviced as well.

The primary process performed in the GSE Structure/Hydraulic shop is:

- **Decontamination of GSE Hydraulic Units**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- When stenciling is not practical or available, use paint markers to stencil on equipment and eliminate the use of aerosol spray paint. Personnel said they had tried markers in the past but due to the slight film of hydraulic fluid built up on the equipment, the markers did not adhere well. If the area was prepped prior to being painted this problem could be bypassed. Isopropyl alcohol or any other degreaser should remove the film from the metal and allow the paint markers to be used.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Vinyl stencils are used to mark GSE most equipment. The stencil machine in the Dyncorp shop is utilized. Stencils last longer and do not involve the use of chemicals or generate waste.
- Particle counter is used to test hydraulic fluid versus the patch test method. Particle counters require less hydraulic fluid to be pulled per test and does not use a solvent as in the patch test method. A patch test kit is maintained in case the particle counter becomes inoperable.
- Contaminated hydraulic fluid is cycled through a hydraulic fluid purifier unit as opposed to purging the systems and disposing the hydraulic fluid as waste. Use of the purifier reduces the amount of fresh hydraulic fluid needed and reduces waste disposal costs since the fluid is recycled.
- A closed-loop wash rack has been installed near building 1414 for use by AIMD 900. The wash rack recycles and reuses wash water to reduce the amount of water used in cleaning GSE and minimize the amount of water that is sent to the sanitary sewer. Currently the wash rack needs repair and is not operating. AIMD 900 is using the wash rack at VMFA 112. Repairs to the wash rack should be considered and if economical, it should be repaired.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags - yes

HazMat obtained from HazMinCen– yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used Batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

DECONTAMINATION OF GSE HYDRAULIC UNIT

PROCESS DESCRIPTION
Hydraulic fluid contained in the Hydraulic Power Units is tested using a particle counter, or a patch test if the particle counter is not working. A failed test signifies contaminate hydraulic fluid that must be removed from the power unit. The hydraulic fluid is purged from the power unit and cycled through a hydraulic fluid purifier as opposed to disposing of the fluid as waste. If the fluid in a portable hydraulic service unit fails the particle counter test, the fluid is pumped from the unit and drummed as used oil. There is not enough fluid (approximately 1 gallon) in these units to run through the purifier. The filters on the purifier unit are changed only when the hydraulic fluid leaving the unit fails a particle counter test. Otherwise, the filters are not changed.

Information regarding the maintenance of the hydraulic power units is stenciled on with aerosol spray paint. Paint markers were tried but the result was not successful; the paint didn't adhere well to the metal due to the hydraulic fluid film that builds up on the equipment.

Base Process ID #: AIMD92001

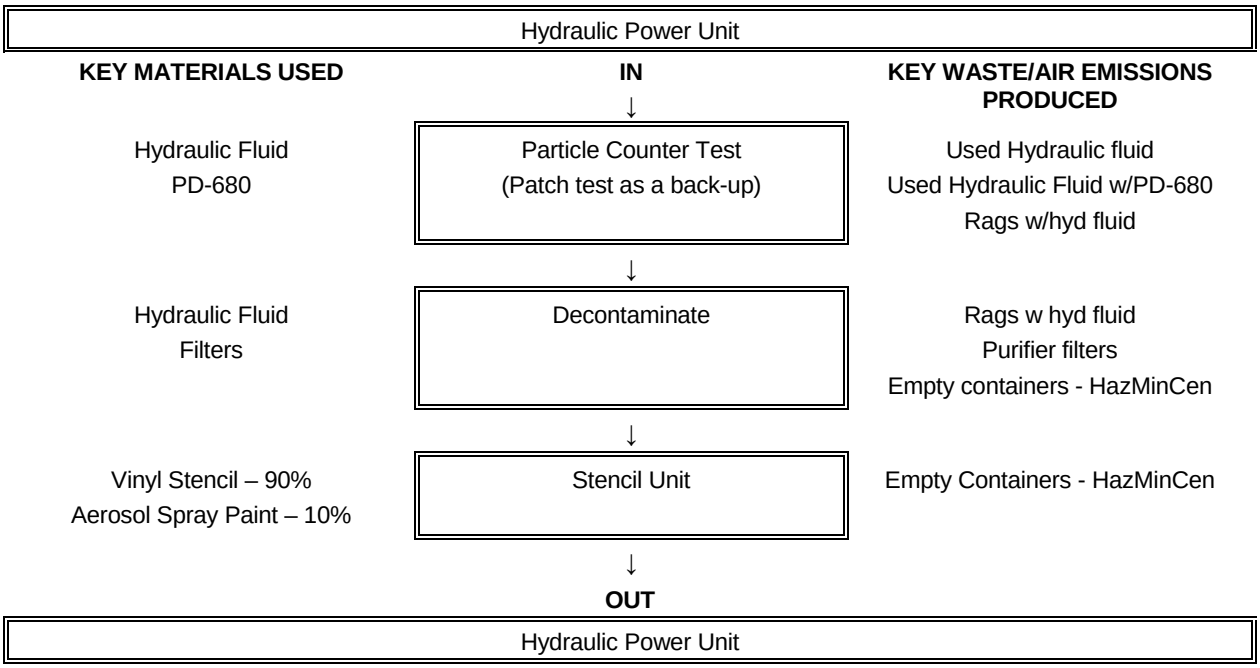
HSMS Code: SR-02-00

Substrate: Hydraulic Power Units

MRC/Technical Publication: Platform PMA260

P2/Environmental Equipment Used in Process:
Hydraulic Fluid Purifier, Particle Counter

PROCESS FLOW DIAGRAM:



930 - GROUND SUPPORT EQUIPMENT (GSE) ELECTRIC REPAIR/AC SHOP

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD930
SHOP NAME: GSE-Electric Repair/AC Shop
BUILDING #: 1414
SHOP POC AND PHONE #: AS1 Williams, (817) 782-7728

WORK CENTER DESCRIPTION

The 900 division of AIMD takes care of all Ground Support Equipment (GSE) used to support the AIMD. Each shop in this division is responsible for a different type of GSE; hydraulic, gas engine or electrical. This shop provides maintenance for the electrical GSE used to support AIMD. This shop also maintains air-conditioning units. Activities include cleaning, fluid servicing, lubrication, and refrigerant recharging.

The primary process performed in the GSE Electric Repair/AC shop is:

- **GSE Electrical Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider the use of SEM pens or paint markers for touch up work in lieu of aerosol spray paint. SEM pens do not have overspray when applied and contain a small amount of paint ideal for touch up work. The HazMinCen orders SEM pens for other shops so there should not difficulty in obtaining these pens.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Better Engineering parts washer is used to clean equipment parts. The use of this aqueous parts washer comprises approximately 30% of the parts washing at the work center, reducing the use of PD-680 in the shop.
- System One parts washer. Although this washer comprises 70% of the work center parts cleaning and utilizes PD-680, it recycles solvent and generates less waste. The solvent and filter have not been changed in approximately 3 to 4 years according to shop personnel.
- Refrigerant recovery units are used to service the R12 and R22 used in the AC units and refrigerator.
- Antifreeze removed from the units is recycled through an antifreeze recycler at AIMD 910 as opposed to being sent off-site for recycle.
- A closed-loop wash rack has been installed near building 1414 for use by AIMD 900. The wash rack recycles and reuses wash water to reduce the amount of water used in cleaning GSE and minimize the amount of water that is sent to the sanitary sewer. Currently the wash rack needs repair and is not operating. AIMD 910 is using the wash rack at VMFA 112. Repairs to the wash rack should be considered and if economical, it should be repaired.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags - yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass returned to Recycling Center – yes

Used batteries (all types) returned to Recycling Center – yes (Go to AIMD 600 Bin)

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Oil filter crusher.

GSE ELECTRICAL MAINTENANCE

PROCESS DESCRIPTION
Electrical equipment and components are cleaned with PD-680 or isopropyl alcohol to remove greases, dirt, or oils. Any filter or fluid servicing that is required will be performed in order to maintain the equipment. The antifreeze in the equipment is cycled through the antifreeze recycler and pumped back into the equipment as opposed to adding new fluid. Minor touch-up work to the surface of the electrical GSE is performed using aerosol spray paints

Mobile air-conditioning units and one refrigerator are maintained by this work center as well. R-12 and R-22 in these units will be recovered using a refrigerant recovery system in order to recharge the fluid and keep the units working properly.

Base Process ID #: AIMD93001

HSMS Code: SR-02-00

Substrate: Metal

MRC/Technical Publication: Platform PMA260

P2/Environmental Equipment Used in Process:
System One parts washer, antifreeze recycler, Hydraulic fluid bulk dispensers, Particle Counter, Ultrasonic cleaner, Better Engineering aqueous parts washer, Refrigerant recovery units

PROCESS FLOW DIAGRAM:

Electrical GSE Equipment, AC units

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
PD-680, Isopropyl alcohol	Clean	Rags w/PD-680, alcohol and oils
Antifreeze (recycled), Brake Fluid, 10 W Hydraulic fluid Optima Batteries	Fluid Servicing Battery Servicing	Used Antifreeze - recycled Used oils Antifreeze recycler filter Recharge/Replace Battery
Aerosol spray paint	Touch-Up Paint	Air Emissions - Paint Empty containers - HazMinCen
R-22	Refrigerant Recharge	Reclaimed R-22

OUT

Electrical Equipment/AC units

950 - GROUND SUPPORT EQUIPMENT (GSE) PERIODIC MAINTENANCE

COMMAND:	Navy Air Intermediate Maintenance Depot
DEPT:	AIMD
WORK CENTER:	AIMD950
SHOP NAME:	Ground Support Equipment (GSE) Periodic Maintenance
BUILDING #:	1414
SHOP POC AND PHONE #:	AS1 Williams, (817) 782-7728

WORK CENTER DESCRIPTION

The 900 division of AIMD takes care of all Ground Support Equipment (GSE) used to support the AIMD. Each shop in this division is responsible for a different type of GSE; hydraulic, gas engine, or electrical. The GSE Periodic Maintenance shop is responsible for scheduled periodic maintenance on GSE ground support equipment. Major repair is not performed in this shop, only periodic maintenance. Periodic maintenance includes fluids exchange, filter change, bearing maintenance and cleaning.

The primary processes performed in the GSE Gas Engine Repair shop are:

- **Periodic Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Better Engineering parts washer is used to clean equipment parts. The use of this aqueous parts washer comprises approximately 30% of the parts washing at the work center, reducing the use of PD-680 in the shop.
- System One parts washer. Although this washer comprises 70% of the work center parts cleaning and utilizes PD-680, it recycles solvent and generates less waste. The solvent and filter have not been changed in approximately three to four years according to shop personnel.

- The shop utilizes ZEP ZGreen floor clean in the floor cleaning machine. ZGreen is soap based and reduces solvent waste. The machine is emptied into the oil-water separator.
- All fuel, engine oil, and hydraulic oil drained from the vehicles is placed in a fuel bowser which is pumped out on a weekly basis. This oil is recycled offsite.
- Antifreeze is recycled with an antifreeze recycling unit as opposed to sending offsite for recycle.
- Used oil filters are combined with other used oil filters (crushed or noncrushed) from around base and sent offsite for recycle.
- Bulk fluid dispensing system is in use to reduce the number of empty containers generated.
- AIMD 900 utilizes a wash rack at VMFA 112. The wash rack recycles and reuses wash water to reduce the amount of water used in cleaning GSE and minimize the amount of water that is sent to the sanitary sewer.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags - yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes (Taken to AIMD 600)

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- A closed-loop wash rack has been installed near building 1414 for use by AIMD 900. The unit is not currently operable and needs repair. The shop is currently utilizing the wash rack at VFMA 112. The wash rack at AIMD 900 should be considered for repair and put back in service if economically feasible.

ENGINE MAINTENANCE

PROCESS DESCRIPTION

Scheduled maintenance involves filter changes, fluid change-outs, and part lubrications. All equipment is on a 52-week preventive maintenance schedule. Antifreeze is pumped from the engines and recycled through an antifreeze recycler. Bearings, bolts, etc. are cleaned in the parts washers to remove built up greases and oils.

Base Process ID #: AIMD95001

HSMS Code: SR-02-00

Substrate: Steel and Aluminum

MRC/Technical Publication: Platform PMA260

P2/Environmental Equipment Used in Process:
System One parts washer, antifreeze recycler, hydraulic fluid bulk dispensers, ultrasonic cleaner, Better Engineering aqueous parts washer

PROCESS FLOW DIAGRAM:

Equipment needing PM

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Oil Filter Motor Oil Rags	Oil and Oil Filter change	Used filter Used motor Oil Rags w/oil
Antifreeze (recycled) Brake Fluid, Transmission Fluid, Hydraulic fluid Diesel Fuel, Mogas Filters	Fluid Servicing (Particle counter test for hydraulic fluid)	Used Antifreeze - recycled Used oils Reclaimed Diesel fuel, Mogas Antifreeze recycler filter
PD-680 Natural Orange Soap, Water, Rags	Parts Cleaning	Used Rags w/grease, Wastewater w/ soap, grease and oil
Bearing Grease Lube Oils	Lubricate	Used Rags w/grease
Air Filter	Change Air Filter	Used Air Filter, Rags w/soil, grease

OUT

Equipment with PM

990 - MOBILE FACILITIES MAINTENANCE

COMMAND: Navy Air Intermediate Maintenance Depot
DEPT: AIMD
WORK CENTER: AIMD990
SHOP NAME: Mobile Facilities Maintenance
BUILDING #:
SHOP POC AND PHONE #: P.O. Abbott, (817) 782-5845

WORK CENTER DESCRIPTION

This work center maintains the mobile containers (vans) for AIMD and MALS 41 that would be deployed with these units overseas.

The primary process performed in the MFM Shop is:

- **Mobile container maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider use of Propylene Glycol in place of Ethylene Glycol Antifreeze where permitted.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- R-22 Freon in air conditioning units is being replaced by R-12.
- Reclaimed R-12 Freon is reused in air conditioning units.
- Antifreeze Recycle Unit is used for onsite recycle.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable Absorbent Pads – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard and paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes for oil; antifreeze recycled by 900 Division

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

MOBILE FACILITIES MAINTENANCE

PROCESS DESCRIPTION
Maintain mobile facilities (vans) according to log book and maintenance schedule. Van inventory is checked, general maintenance performed, corrosion control and cleaning conducted, and generators maintained in working order.

Base Process ID #: AIMD99001

HSMS Code:

Substrate: Various

MRC/Technical Publication: Not listed

P2/Environmental Equipment Used in Process:
Freon reclaimer

PROCESS FLOW DIAGRAM:

Van to be maintained

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Inspect & inventory van & contents	None
Polyurethane 2-coat epoxy; R-22 Freon; R-12 Freon; 8802 sealant; engine lube oil; antifreeze; automotive grease; spray paint; latex paint; vacuum pump lube oil; VVL Prolube aerosol; rust eliminator; thinner; light bulbs; absorbent pads; automotive batteries for generators	Check fire extinguisher; change light bulbs; pull, drain, and service air conditioning unit, reclaiming Freon for reuse; repair or replace weather seals; where corrosion is noted, strip, sand, and paint; maintain mobile generators with oil and antifreeze; wash vans	Used oil; used oil filters; used absorbent pads with oil; paint and thinner waste; halogenated waste (F002, D002) from compressors; R-22 Freon

↓
OUT

Maintained van

MAG41 473

MACS24-AIR TRAFFIC CONTROL MAINTENANCE

COMMAND: Marine Aircraft Group (MAG) 41
DEPT: Detachment A
WORK CENTER: MAGATCM Det A
SHOP NAME: Air Traffic Control Maintenance
BUILDING #: 4242, 4245, 4246
SHOP POC AND PHONE #: MSgt Brand, (817) 782-7249

WORK CENTER DESCRIPTION

The Air Traffic Control Maintenance shop (ATCM) consists of four divisions: Radar, Communications, Navigation, and Auxiliary. Work center personnel provide maintenance and service for the equipment classified by the above divisions. This work center also maintains 11 vans used for the mobilization of this detachment.

The primary processes performed in the ATCM Shop are:

- **Auxiliary Equipment maintenance**
- **Radar, Communication and Navigation Equipment maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- A Freon Recovery Unit is used in the servicing of air-conditioning units in order to recharge the R-22.
- An antifreeze recycler equipped with triple filtration has been procured and installed in this work center, but has not been implemented.
- Work center personnel change fluorescent bulbs out of the vans. The old bulbs are taken to the HazWaste Center for offsite recycling.

- Replaced traditional lead-acid batteries with Hawker sealed lead-acid batteries.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

AUXILIARY EQUIPMENT MAINTENANCE

PROCESS DESCRIPTION

Air conditioners are equipment classified in the Auxiliary Division. There are 20 air-conditioning (AC) units serviced by this work center for use in the vans used for mobilization. Using the Halogen Leak Detector, the AC units are inspected for any possible leaks. The R-22 used in the units will be cycled through the Freon Recycling and Recovery System (FRRS) as required. The FRRS unit requires vacuum pump oil and WD-40 on occasion to run properly. Rarely, the AC units will be touch-up painted using aerosol spray paint.

Generators are serviced based on a preventive maintenance (PM) schedule. Oil filter changes are performed during the PM and antifreeze is tested for proper levels of corrosion inhibitors. If the antifreeze does not meet specifications, it is drained out and replaced. When a part is to be repaired it is removed from the generator and cleaned in the parts washer. Diesel fuel from the engine will be drained during unscheduled repairs in order to work on the engine safely. Lead acid batteries from the generators are recharged or replaced during PMs as well.

Mobilizers are serviced according to a PM schedule as well. If the unit is leaking hydraulic fluid, the leak will be fixed and the fluid replaced. Parts are replaced when necessary and lubricated to ease friction.

Base Process ID #: MAGAAUX01

HSMS Code: SR-04-02, ID-23-02

Substrate: Various

MRC/Technical Publication: HD-1099/TSQ, TM-00038G-35

P2/Environmental Equipment Used in Process:

Freon Recycling and Recovery System, Halogen Leak Detector, Antifreeze Recycler DMI PN 5514, Kleer Flo Parts Washer, Battery Recharger

PROCESS FLOW DIAGRAM:

Auxiliary units

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Freon R-22 WD-40 Vacuum Pump Oil Aerosol Spray Paint	AC Unit Repair (Recharge R-22)	Oily Rags - HazWaste Center Air Emissions Empty Aerosol Cans - HazMin
Engine Oil, Antifreeze, Diesel Fuel Oil and Fuel Filters Sealants, Greases Batteries Rags, Absorbents	Generator Maintenance	Used Oils - HazWaste Center Used filters - HazWaste Center Antifreeze – HazWaste Center Oily Rags - HazWaste Center Used Batteries - HazWaste Center Absorbents - HazWaste Center Empty Containers - HazMin
Hydraulic Fluid, WD-40 Greases Rags, Absorbents	Mobilizer Maintenance	Oily Rags - HazWaste Center Absorbents - HazWaste Center Empty Containers - HazMin

OUT

Auxiliary Units

RADAR, COMMUNICATION & NAVIGATION EQUIPMENT MAINTENANCE

PROCESS DESCRIPTION

Radar, communication, and navigation equipment is kept inside the vans used for mobilization. Equipment such as PRC 90 radios, monitors, and radar are serviced on a monthly PM schedule. All equipment is inspected thoroughly to determine if repair is required. Batteries are changed out of the PRC 90 and BASS 90 radios when needed. Parts are soldered on, cracks and seams are sealed, desiccant is checked and changed, if needed, and the equipment is wiped down with isopropyl alcohol. The equipment is then tested prior to returning to service.

The vans are also maintained as needed. Every month, the van is checked for rust and corrosion. The vans are painted with CARC paint, but are touched up using aerosol spray paint. If rust is found, it is removed with a wire brush and the area is primed and painted.

Base Process ID #: MAGARAD01

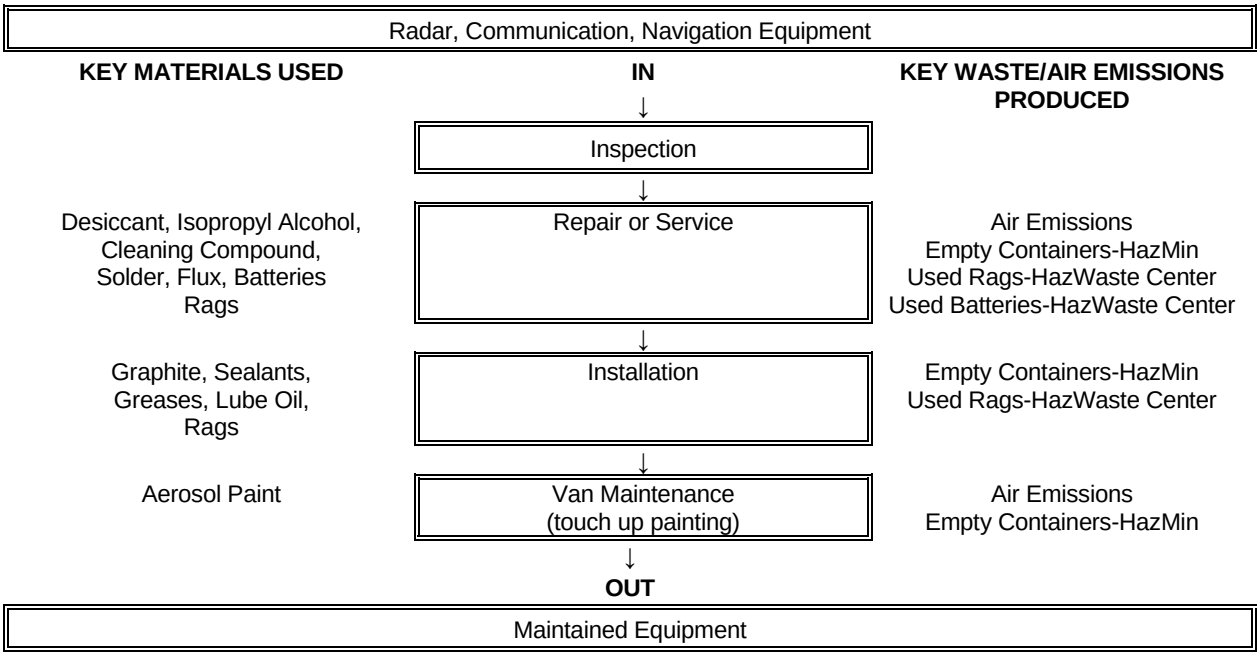
HSMS Code: ID-23-08

Substrate: Various

MRC/Technical Publication: OPNAV 4790

P2/Environmental Equipment Used in Process:

PROCESS FLOW DIAGRAM:



MWSS - HEAVY EQUIPMENT SHOP

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	MWSS 473 Det B
WORK CENTER:	MWSSHE
SHOP NAME:	Heavy Equipment Shop
BUILDING #:	1410
SHOP POC AND PHONE #:	Sgt. Toliver, (817) 782-2829

WORK CENTER DESCRIPTION

The Heavy Equipment shop serves as a staging area for heavy equipment used to support activities during deployment. First, second, and limited third echelon repairs and preventive maintenance is performed on forklifts, cranes, bulldozers, and a P-19 fire truck to maintain equipment and to train reservists.

The primary process performed in the Heavy Equipment Shop is:

- **Heavy equipment maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Excess oil contained in oil filters is drained prior to the filter disposal. This effort helps increase the amount of used oil captured that is sold for offsite energy recovery.
- Used oil filters are combined with other used oil filters (crushed or noncrushed) from around base and sent offsite for recycled.
- Replaced traditional lead-acid batteries with Hawker sealed lead-acid batteries.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked-up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

HEAVY EQUIPMENT MAINTENANCE

PROCESS DESCRIPTION

The equipment is serviced according to a preventive maintenance (PM) schedule or in case of an unscheduled repair. Fluids used in the heavy equipment (fuels, oils, antifreeze, hydraulic) are topped off when needed. Oil samples are taken every quarter from each piece of equipment and sent offsite for an oil analysis to determine if an oil change is required. Oil filters are only changed if the oil analysis shows the oil is bad and does not meet specifications for operation. Used filters are drained over the used oil drum for 24 hours before placed in the waste drum however they are not crushed. Repair or unscheduled maintenance of the equipment requires replacing faulty parts such as fittings and starters. Bearings, gaskets, and joints are also lubricated with grease to prevent friction. Batteries, 12V and 24V lead-acid batteries, are changed out when the charge is spent. Touch-up painting is performed as well as spray painting on embark boxes for shipment. Repainting of the equipment is contracted off base.

Base Process ID #: MWSSHE01

HSMS Code: ID-23-00

Substrate: Various

MRC/Technical Publication:

P2/Environmental Equipment Used in Process:

Safety Kleen Parts Washer; SmartWasher Aqueous Parts Washer; Oil Filter Crusher. Parts washers are not in use.

PROCESS FLOW DIAGRAM:

Heavy Equipment

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Rags	Inspect and Clean Equipment	Oily Rags - HazWaste Center
Brake Fluids, Antifreeze, Engine Oil, Hydraulic fluid, Rags, Oil Samples, Oil, Fuel and Air Filters, Absorbents	Service Fluids Filter Changes (Oil analysis performed every quarter)	Used Oil - HazWaste Center Oil, Fuel, Air filters - HazWaste Center Oily Rags - HazWaste Center Used Absorbents - HazWaste Center Empty Containers - HazMin
Lube Oils Greases Lead Acid Batteries	Parts maintenance and Repair	Oily Rags - HazWaste Center Used Batteries - HazWaste Center Old Parts - Supply
Aerosol primer	Limited Corrosion control	Air Emissions - Painting Empty Containers - HazMin

OUT

Heavy Equipment

MWSS - NUCLEAR, BIOLOGICAL, & CHEMICAL WARFARE SHOP

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	MWSS 473 Det B
WORK CENTER:	MWSSNBC
SHOP NAME:	Nuclear, Biological, Chemical Warfare Shop
BUILDING #:	1410
SHOP POC AND PHONE #:	Sgt. Law, (817) 782-2804

WORK CENTER DESCRIPTION

The Nuclear, Biological & Chemical Warfare (NBC) shop serves as a staging area for nuclear, biological, and chemical warfare protective equipment used for training reservists. Personnel in this work center will also maintain (second echelon) the gas masks.

The primary process performed in the NBC Shop is:

- **Gas Mask maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- None.

CURRENT P2 PRACTICES & EQUIPMENT

- None noted.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable

Launderable White Rags – not applicable

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

GAS MASK MAINTENANCE

PROCESS DESCRIPTION

The NBC shop stores all protective equipment in building 1410 for several units (14th Marines, MALS-41, etc.). Personnel instruct reservists on the proper use and cleaning procedures for the gas masks. After a training session, each trainee is responsible for cleaning the mask with alcohol wipes and warm, soapy water. NBC personnel will use bleach water to sanitize the masks if the mask is to be issued out to someone else. When required, filters, and rubber disks from the masks will be changed. Embark boxes for shipping or storing and designated areas are stenciled with aerosol spray paint, however, this is a rare occasion.

Base Process ID #: MWSSNBC1

HSMS Code: MS-99-99

Substrate: Rubber

MRC/Technical Publication:

P2/Environmental Equipment Used in Process:

PROCESS FLOW DIAGRAM:

Gas Masks

KEY MATERIALS USED	IN ↓	KEY WASTE/AIR EMISSIONS PRODUCED
Alcohol Wipes Soapy Water	Inspect and Clean Equipment	Used Wipes - Solid Waste Soapy Water - Sanitary Sewer
Rubber Disks Filters	Maintenance	Used Disks, Filters - Solid Waste
Aerosol spray paint	Stencil	Aerosol Cans - HazMin Air Emissions - Painting

↓

OUT

Gas Masks

MWSS - UTILITIES SHOP

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	MWSS 473 Det B
WORK CENTER:	MWSSUT
SHOP NAME:	Utilities
BUILDING #:	1410
SHOP POC AND PHONE #:	SSgt. Nicholas (817) 782-2831

WORK CENTER DESCRIPTION

The Utilities shop serves as a staging area for equipment used to support activities during deployment. First and second echelon repairs and maintenance are performed on utility equipment in this shop to maintain equipment and to train reservists. Semiannual preventive maintenance (PM) is performed on equipment such as generators, hygiene equipment (water purification units), and refrigeration units. This shop receives hazardous materials and disposes of waste along with the other MWSS shops in building 1410.

The primary process performed in the Utilities Shop is:

- **Utility equipment maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- A Freon Recovery Unit to reclaim and recharge the refrigerant used to run the AC units and the Enhanced Refrigeration Unit is maintained in the area. According to personnel, the unit has not been used in the past three years.
- Excess oil contained in oil filters is drained prior to the filter disposal. This effort helps increase the amount of used oil captured that is sold for offsite energy recovery.
- Used oil filters are combined with other used oil filters (crushed or noncrushed) from around base and sent offsite for recycled.

- Replaced traditional lead-acid batteries with Hawker sealed lead-acid batteries.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

UTILITY EQUIPMENT MAINTENANCE

PROCESS DESCRIPTION

The equipment is serviced according to a PM schedule or in case of an unscheduled repair. Generators require oil changes every 3,000 hours of run-time, however, the generators are only run enough to change the oil and filter once a year. Used filters are drained over the used oil drum for 24 hours before placed in the waste drum however they are not crushed. This shop operates a Freon recovery unit to recharge the R-12 in the AC units and the ERU (enhanced refrigeration unit). Floodlights contain electrical components that are cleaned according to schedule and any rust is removed with a wire brush unless the equipment is painted with CARC paint. Repair or unscheduled maintenance of the equipment (generators, water purification units, etc.) requires replacing faulty parts such as fittings, pipes, and starters. Bearings, gaskets, and joints are lubricated with grease to prevent friction. Batteries are also changed out. Equipment is sent offsite to be painted once a year (or as required).

Base Process ID #: MWSSUT01

HSMS Code: ID-23-00

Substrate: Various

MRC/Technical Publication:

P2/Environmental Equipment Used in Process:

Freon Recovery Unit; Safety Kleen Parts Washer; SmartWasher Aqueous Parts Washer. Parts washers are shared with the Heavy Equipment Shop; however, these washer are not currently in use.

PROCESS FLOW DIAGRAM:

Generators, Water Purification Units, Refrigeration Units, Floodlights

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Diesel Fuel, Antifreeze, Engine Oil, R-12, Rags, Oil, Fuel and Air Filters, Absorbents	Service Fluids Filter Changes	Used Oil - HazWaste Center Oil, Fuel, Air Filters - HazWaste Center Oily Rags - HazWaste Center Used Absorbents - HazWaste Center Empty Containers - HazMin
Contact Cleaner, Greases, Rags, Lead Acid Batteries	Parts maintenance and Repair	Oily Rags - HazWaste Center Used Batteries - HazWaste center Old Parts - Supply
Wire Brush	Corrosion control (rust removal from non-CARC surfaces)	

OUT

Utilities Equipment

Operations

OPERATIONS NAVYBF – BASE FUELS

COMMAND:	Navy Operations Department
DEPT:	Operations
WORK CENTER:	NAVYBF
SHOP NAME:	Base Fuels
BUILDING #:	1101
SHOP POC AND PHONE #:	P. O. Johnson, (817) 782-7661

WORK CENTER DESCRIPTION

Using trucks or from a base service station, this shop is responsible for fueling and defueling aircraft, personally owned vehicles (POVs), and GSE..

The primary process performed in the Base Fuels shop is:

- **Fuel/Defuel Aircraft**

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider identification of JP-8 generators whose streams can be cleaned/dewatered reasonably and the fuel used in ground equipment such as AGE equipment. This would save the purchase of new JP-8 for these purposes.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Collect contaminated JP-8 and used oils in two tanks at the fuel farm. This used oil/fuel is collected by HazMin.
- JP-8 from defueling of aircraft is filtered and tested. If not contaminated, it is reused.
- Spill kits with absorbent pads are available for controlling spills.
- Storm water from the base fuels area passes through an oil-water separator before discharge.
- New fuel trucks will come equipped with a vacuum to pick up spilled fuel.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no. Very few rags used; absorbent pads are used instead.

Launderable Absorbent Pads – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – not applicable

Cardboard and paper, picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes for used oil; no antifreeze

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- The use of imbiber beads to minimize the spread and prevent release of oil and fuel spills. imbiber beads allow water to pass through while the beads take up or "imbibe" organic materials such as fuel and oil contained in the water. Imbiber beads are available in several products and configurations, including
  - Imbiber bead blankets, pillows, socks, booms, and spill kits. Due to the fact that these materials do not absorb or imbibe water, these products are especially valuable in rainy or wet environments to prevent the spread of organics, and to clean up spills in wet environments.
  - Drop-in drain shut-off or filtration systems that remove organic materials as storm water passes through the drain/filter system. The imbiber bead systems are installed directly in storm drains to provide either a filtration of organics, or filtration combined with shut-off capability. The shut-off system contains an additional imbiber bead matrix that will expand and shut off flow in the event of a catastrophic release or spill of organic materials.
- Investigate the use of bio-diesel blends to replace the use of diesel fuel in vehicles around base. Executive Order 13149 mandates the use of alternative fuel vehicles for agencies operating 20 or more motor vehicles within the United States. Section 201 of E.O. 13149 also states these facilities had to reduce their petroleum fuel consumption by at least 20 percent by fiscal year 2005. A DoD approved approach towards meeting this goal is using alternative fuels in vehicles to reduce petroleum consumption. Successful alternative fuels fulfill environmental and energy security needs without sacrificing operating performance. Such approved alternatives include bio-diesel as an alternative to diesel fuel. However, bio diesel fuels can degrade and so cannot remain in tanks longer than 6 months. Some GSEs/generators on base have fuel that remains longer than 6 months, so use of bio diesel would be prohibited in these tanks.

FUEL/DEFUEL AIRCRAFT, POVs, GSE

PROCESS DESCRIPTION
Fuel delivery trucks are used to fuel and defuel aircraft. Fuel delivery trucks fill stationary generators with diesel fuel. Other vehicles using diesel and gasoline are refueled by the user at the fuel farm operation.

Base Process ID #: NAVYBF-01

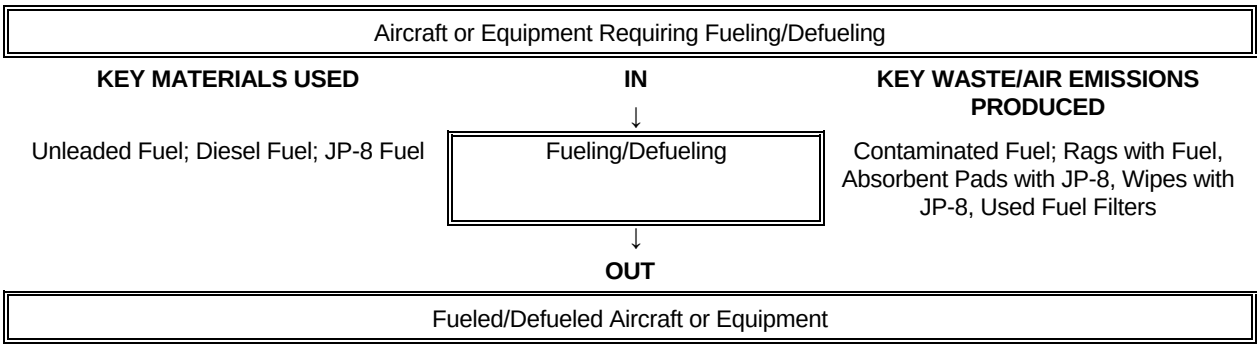
HSMS Code: ML-02-04

Substrate: NA

MRC/Technical Publication: NA

P2/Environmental Equipment Used in Process:
Fuel Delivery Trucks.

PROCESS FLOW DIAGRAM:



OPERATOINS OPSFIRE – FIRE DEPARTMENT

COMMAND:	Navy Operations Department
DEPT:	Operations
WORK CENTER:	OPSFIRE
SHOP NAME:	Fire Department
BUILDING #:	1425
SHOP POC AND PHONE #:	Fire Chief Murray, (817) 782-6331 Stephen Thrall, (817) 782-6335

WORK CENTER DESCRIPTION

This shop performs firefighting functions for the base. Maintenance of firefighting trucks is performed by transportation. Currently, recharging of fire extinguishers is not performed by the fire department but the equipment is sent offsite for refilling. The processes include inspecting, maintaining, testing, and servicing firefighting equipment, except for the firefighting trucks and fire extinguishers.

The primary process performed in the Fire Department is:

- **Firefighting Equipment Maintenance**

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider washing firefighting vehicles on wash rack, not on flight line. Department has access to several wash racks on base that recycle wash water.
- Consider replacing Aqueous Film Forming Foam (AFFF) with Micro-Blaze Out, an alternative to existing firefighting foams for Class A and Class B fires.
- Participate in a base wide rag and adsorbent pad laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Ft. Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Ft. Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Recycle of metal containers.
- Wash vehicles with Simple Green and water.
- Fire extinguishers have been changed from Halon 1311 to Halon 1211.
- Utilizing Micro-Blaze Out in one of the two tank trucks. The tank truck with Micro-Blaze Out is utilized for fuel spills and petroleum fires. Its primary benefit (touted in the manufacturer's literature) is that it does not contain any fluorosurfactants, butyl carbitol, and other toxic

ingredients that can cause foaming and other problems at wastewater treatment plants. It also contains microbes to treat hydrocarbon contaminants (i.e., fuel from a fire) after a fire has been extinguished. It is touted as superior to typical AFFFs in that it prevents "flash-back" or reignition of spill fires. It is compatible in all current foam proportioning and delivery systems.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Linen Service – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, aluminum cans picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Consider obtaining Halon 1211 recovery unit so tanks can be serviced on flight line rather than sending offsite for service. Extinguishers are currently going to NAS Corpus Christi for filling and recertification.

MAINTAIN AND TEST FIREFIGHTING EQUIPMENT

PROCESS DESCRIPTION
This shop inspects, maintains, tests, and services firefighting equipment including fire trucks and extinguishing systems. This shop also responds to emergency situations on the base.

Base Process ID #: OPSFIRE-01

HSMS Code: SR-06-99

Substrate: Metal and Rubber

MRC/Technical Publication: NA

P2/Environmental Equipment Used in Process:
Three propane trainers are currently being utilized.

PROCESS FLOW DIAGRAM:

Fire-Fighting Equipment Requiring Service

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
	↓	
	Inspection	
	↓	
Simple Green; ABC Dry Powder, Penetrating Fluid, Metal Polish, Battery Water, Motor Oil	Maintenance/Service, Test	Metal Containers, Rags with Simple Green for Laundering, Polish, and Oil
	↓	
	OUT	

Serviced Equipment

OPERATIONS GEMD – GROUND ELECTRONIC MAINTENANCE DEPARTMENT

COMMAND:	Navy Operations Department
DEPT:	Operations
WORK CENTER:	GEMD
SHOP NAME:	Ground Electronic Maintenance Department
BUILDING #:	1422
SHOP POC AND PHONE #:	ET2 Bangston, (817) 782-7842

WORK CENTER DESCRIPTION

This shop maintains ground electronics equipment (i.e., control tower). This equipment includes airport surveillance radar, precision approach radar, communication equipment. This includes both preventive maintenance and repairs.

The primary process performed in the GEMD shop is:

- **Service GEMD Equipment**

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider use of SEM pens, blotters, and markers to replace aerosol paint.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Recycle metal containers.
- Utilize rechargeable batteries in radios, power supplies, remotes for AV.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard and paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

SERVICE GEMD EQUIPMENT

PROCESS DESCRIPTION
Process includes servicing of radios and radar equipment. This includes cleaning, repair, touch-up painting, and lubrication.

Base Process ID #: GEMD-01

HSMS Code: ID-22-00

Substrate: Electronics

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None.

PROCESS FLOW DIAGRAM:

Radio and Radar Equipment Requiring Service

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Antiseize Compound; General Purpose Cleaner; Dry-Cleaning Solvent; Isopropyl Alcohol	Clean	Rags with Dry-Cleaning Solvent and Isopropyl Alcohol; Metal Containers
Electrical Coating Compound; Adhesive; Silicon Compound; Sealant; Moisture Resistant Varnish; Paint	Repair Touch-up Painting	Rags, Paper towels, Brushes, Liquid paint, Plastic Containers
Lube Oil; A/C Grease; Corrosion Preventive Compound	Lubricate	Rags with Grease and Oil; Metal Containers

OUT

Serviced Equipment

OPERATIONS – SMALL ARMS RANGE

COMMAND: Navy Operations
DEPT: Operations
WORK CENTER:
SHOP NAME: Small Arms Range
BUILDING #: 1345
SHOP POC AND PHONE #: A01 Masseau, (817) 782-3918

WORK CENTER DESCRIPTION

This shop provides a small arms training facility in a 20-lane building. Ventilation is controlled by a series of HEPA filters prior to air release. Lead from ammunition is captured in shredded rubber tires. The mixture is raked out to remove lead for disposal. Both lead and brass casings are sent to DRMO for recycle. Weapons cleaning is performed in a separate building (1348) operated by station weapons. All material for weapons cleaning and related P2 recommendations are contained in Operations Station Weapons Shop Report.

The primary process performed in the Small Arms Range is:

- **Range Maintenance**

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Recovered lead is sent to DRMO for recycle.
- Brass casings are collected and sent to DRMO for recycle.
- Ventilation is treated by a series of HEPA filters prior to release to air.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no. Lint-free rags must be used for weapons.

Launderable White Rags (lint free) – no

HazMat obtained from HazMinCen – not applicable

Empty HazMat Containers returned to HazMinCen – not applicable

Cardboard and paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified

MAINTENANCE OF SMALL ARMS RANGE

PROCESS DESCRIPTION
Processes include collection of brass casings and lead for recycle. Replacement of HEPA filters is being done under contract. The collection of lead from bullet traps will be contracted to an off-base contractor in the near future, and the contractor will take the lead offsite for recycle or disposal.

Wastes generated at this shop are minimal and include 20 pieces of cardboard a month, plastic drink bottles, brass casings, and lead (which will be eliminated). The ventilation system maintenance is under contract; prefilters are changed twice a year, and the HEPA filters are changed once per year.

Weapons cleaning is no longer performed at this work center.

Base Process ID #: Not assigned yet

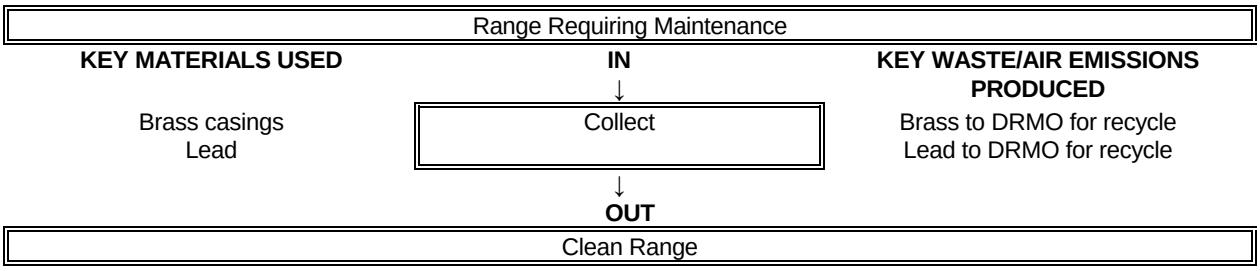
HSMS Code: Not assigned yet

Substrate: Lead, Brass

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
HEPA FILTRATION on air ventilation.

PROCESS FLOW DIAGRAM:



OPERATIONS OPSWFA - STATION WEAPONS

COMMAND:	Navy Operations Department
DEPT:	Operations
WORK CENTER:	STAWEAP
SHOP NAME:	Station Weapons
BUILDING #:	3355
SHOP POC AND PHONE #:	A02 Chance (817) 782-7779; Chief Forsythe, (817) 782-7185

WORK CENTER DESCRIPTION

This shop performs periodic maintenance on weapons adapters, weapons skids, and transporters. Tasks include cleaning, corrosion control, and lubrication of the various weapons adapters and skids.

The primary process performed in the Station Weapons shop is:

- **Ordnance Adapters and Trailer Service**

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Consider the use of a stencil machine to reduce aerosol spray can stencil painting.
- Consider the use of Minimax steam cleaning unit for weapons cleaning in new weapons area at new firing range.
- Recycle metal containers.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Using SEM pens to replace aerosol touch-up paints.
- Utilize low-VOC (Eco Sure) aerosol paints.
- Flashlights and barcode scanner guns utilize rechargeable batteries.
- Replaced PD680 type II solvent with Simple Green solvent cleaning.
- Eliminated use of ODS-containing corrosion preventative compound as a corrosion inhibiting compound by substitution of non-ODS products.
- Consider preval system for spray-type delivery of small quantity of two-part poly paints.

- Consider use of reformulated non-ODS Break-Free.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Paper picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – N/A

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Implemented a closed-loop wash rack to conserve water during cleaning of weapons skids, and transporters. This unit is currently not operable and repair should be considered if economically feasible.

SERVICE ORDNANCE ADAPTERS AND TRAILERS

PROCESS DESCRIPTION
Processes include cleaning, corrosion control, and lubrication of weapons adapters and trailers.

Base Process ID #: STAWEAP-01

HSMS Code: ML-01-05

Substrate: Steel

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Parts Washer using Simple Green Solvent.

PROCESS FLOW DIAGRAM:

Unscheduled Maintenance of Ground Support Equipment

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Break-Free	Disassembly	Rags with Break-Free
Simple Green Aircraft Cleaner	Clean/Wash	Rags with Aircraft cleaner and Simple Green
Brake Fluid; Solid Film Lubricant; Lube Oil; Nonskid Paint; Moly-B Disufide; Aerosol and Other Paints; Auto and Artillery Grease	Service/Reassemble	Aerosol Cans; Metal Containers; Rags with Grease and Oil; Empty aerosol cans

↓

OUT

Serviced Units

PWC

PUBLIC WORKS – AIR CONDITIONING SHOP

COMMAND:	Navy
DEPT:	Public Works
WORK CENTER:	PWAC
SHOP NAME:	Air Conditioning Shop
BUILDING #:	1217
SHOP POC AND PHONE #:	Charles Kelly, (817) 782-5723

WORK CENTER DESCRIPTION

This shop services numerous water chillers and direct expansion air-conditioning units throughout the base. No Class I ODS refrigerants are in use except for some old household refrigeration units. R-22 is the primary refrigerant utilized, but some R-404, R-409, and R-134 are also used. Five certified technicians work in this shop.

The primary process performed in the Air Conditioning Shop is:

Air Conditioning (AC)/Refrigeration Maintenance/Repair

Pollution prevention (P2) practices currently utilized by the Air Conditioning Shop are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Replacing the three remaining water-cooled condensers with air-cooled air-conditioning units. This is part of the PW energy efficiency initiative wherein Siemens provides the upfront capital to fund the new equipment. Siemens is paid a portion of the savings generated by the new equipment over the next 15 years in compensation for the investment. Replacing the water-cooled condensers eliminates the need for cooling tower operation and associated hazardous material usage.
- Two Freon-recovery units are in place to capture and reuse refrigerant to the maximum extent possible.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

None noted.

AC/Refrigeration Maintenance/Repair

PROCESS DESCRIPTION
This shop services the mechanical refrigeration equipment along with the cooling water distribution systems associated with many of the building heating, ventilation, and air-conditioning units. Chemical treatment/conditioning of the water in the cooling water distribution systems is performed in tandem with building heating system water treatment. Half of the buildings on base use two-pipe heating/cooling systems wherein the heating and cooling is done with the same water loop. The other half use four-pipe heating/cooling systems wherein the heating and cooling is done in separate water loops.

This shop also maintains three cooling towers that transfer heat for three building air-conditioning units. This involves treatment/conditioning of the cooling tower water. These units will be replaced over the next couple of years.

Base Process ID #: PWAC-01

HSMS Code: SR-04-02

Substrate: Copper and steel

MRC/Technical Publication: NA

P2/Environmental Equipment Used in Process:
2 Freon recovery units

PROCESS FLOW DIAGRAM:

A/C Equipment

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
None	Inspection and water test (preventive maintenance schedule)	None
Refrigerant recharge Paper towels and “Pig” wipes Compressor oil	Mechanical maintenance	Refrigerant air emissions Oily towels and wipes - disposal as solid waste Used compressor oil w/CFCs
De-scaling agents (55 gallons/yr) Chemsearch 777 (corrosion inhibitor and stabilizer) (55 gallons/yr) algaecides (for cooling towers)	Water chemistry adjustment	Empty containers - to HazMinCen water blow down – to sanitary sewer

↓

OUT

Maintained A/C Equipment

PUBLIC WORKS - BOILER SHOP

COMMAND:	Navy
DEPT:	Public Works
WORK CENTER:	PWBOILER
SHOP NAME:	Boiler Shop
BUILDING #:	1217
SHOP POC AND PHONE #:	Dave Walker and Jeff Robertson, (817) 782-7174

WORK CENTER DESCRIPTION

This shop services 39 boilers located in various buildings throughout NAS JRB Fort Worth. Two of the boilers produce steam, while the remainder produce hot water to heat buildings and other purposes. All are fueled with natural gas. Two technicians work in this shop and boiler inspections are performed by the state periodically. The newest of the boilers are at least six years old.

The primary process performed in the Boiler Shop is:

- **Boiler Maintenance and Repair**

Pollution prevention (P2) practices currently utilized by the Boiler Shop are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Use of low-pressure water heater to heat buildings is much cheaper and energy efficient versus steam heat. Also, maintaining the proper water chemistry takes involves much less hazardous material use in the low-pressure units.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified.

BOILER WATER TREATMENT

PROCESS DESCRIPTION
This shop services the more than 40 hot-water "boilers" on base. Each produces hot water (versus steam), except the steam boiler at the galley. Because each is a closed-loop system, the water chemistry must be checked and maintained to prevent scalding. All are fueled with natural gas and are certified annually by the state for safety and fuel-use efficiency.

Treatment of the water in the closed-loop heating systems is performed in tandem with building cooling system water treatment. Half of the buildings on base use two-pipe heating/cooling systems wherein the heating and cooling is done with the same water loop. The other half use four-pipe heating/cooling systems wherein the heating and cooling is done in separate water loops. HSMS indicates no hazardous material usage in the Boiler shop—it is all accounted for in the Air Conditioning Shop.

Base Process ID #: PWBOILER-01

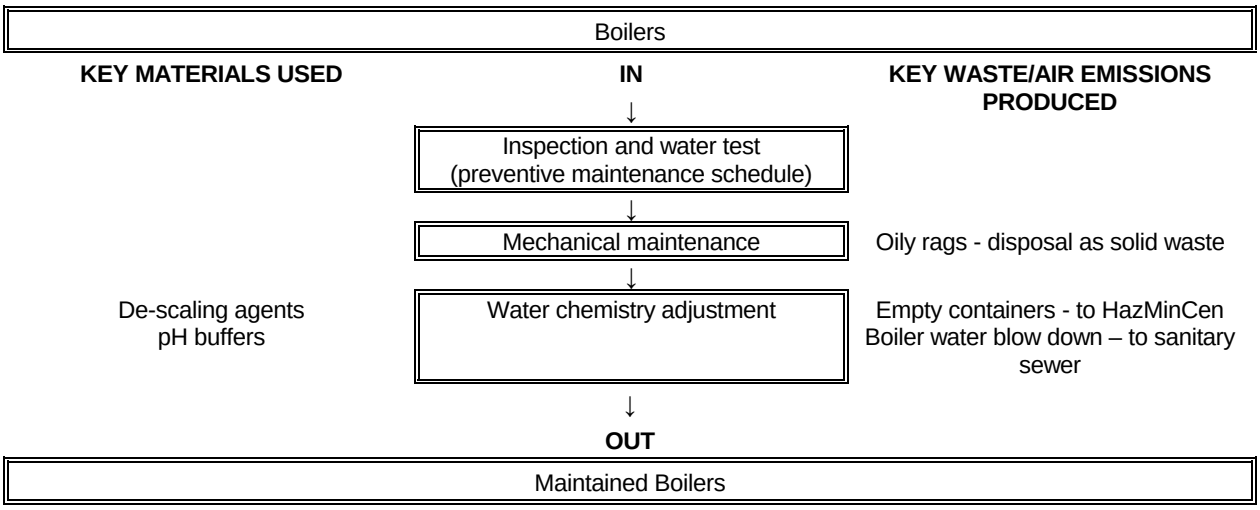
HSMS Code: SR-10-02, SR-10-03

Substrate: Copper and steel

MRC/Technical Publication: NAFACMO 209-Operation

P2/Environmental Equipment Used in Process:
None noted

PROCESS FLOW DIAGRAM:



PUBLIC WORKS - CARPENTRY SHOP

COMMAND:	Navy
DEPT:	Public Works (PWC)
WORK CENTER:	PWCARPTY
SHOP NAME:	Carpentry Shop
BUILDING #:	1217
SHOP POC AND PHONE #:	Bill Johnson, (817) 782-5267

WORK CENTER DESCRIPTION

This work center provides woodworking services to the entire base—both indoor and outdoor. The focus is primarily on repair jobs versus new construction, although jobs will include small office construction. No hazardous materials are maintained in the shop according to the POC; however, HSMS indicates that a small amount of adhesive, lock lubricant, and roofing asphalt were used in 2002.

The primary process performed in the Carpentry Shop is:

- **Carpentry**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. A detailed process description and process flow diagram is provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Work out a more amicable relationship with the HazMinCen so that carpentry services are not abandoned.
- Mix the sawdust with mulch and use around the building.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Lumber is reused as much as possible—down to the smallest scraps. Scrap wood is stored in a lumber shed for reuse at a later time.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no, few rags used.

HazMat obtained from HazMinCen – yes (have curtailed services provided, such as gluing, because they feel the HazMinCen is too restrictive).

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

CARPENTRY

PROCESS DESCRIPTION
Repair work is performed on door, locks, roof vents, floors, and building signs, etc. Small framing jobs will be performed when needed. The shop is equipped with saws, sanders, planers, drill press, and other tools. A new ventilation system was installed in the shop to capture and contain sawdust (indoors). This replaced an outdoor cyclone used to collect sawdust captured in the shop ventilation system. Approximately 100 gallons of sawdust are captured per year.

Base Process ID #: PWCARPTY01

HSMS Code: ID-20-00

Substrate: Wood

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Indoor sawdust collector

PROCESS FLOW DIAGRAM:

Items in need of repair

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Wood	Cut/Join/Shape/Sand	Scrap – wood (reused until too small, then to Dumpster) Sawdust – to Dumpster
Lubricants – spray graphite (consumed)	Lock Repair	Empty containers (to HazMinCen)
Roofing asphalt	Roof repairs	Empty containers (to HazMinCen)

OUT

Repaired items

PUBLIC WORKS – PIPE SHOP/PLUMBING

COMMAND: Navy
DEPT: Public Works (PWC)
WORK CENTER: PWPIPE
SHOP NAME: Pipe Shop/Plumbing
BUILDING #: 1217
SHOP POC AND PHONE #: Rich Bryan and Ron Allen, (817) 782-5687

WORK CENTER DESCRIPTION

This work center performs indoor and outdoor plumbing (water and sewer) repair as well as natural gas line repair. All hazardous materials are obtained as need from the HazMinCen and returned directly after use (none are stored at the shop). Also, this shop does not have a Satellite Accumulation Area for waste.

The primary process performed in the Pipe/Plumbing shop is:

- **Pipe repair and Installation**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. A detailed process description and process flow diagram is provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Scrap pipe reused to the extent possible. Unusable pieces are taken to the base recycling center.
- Lead-free solder in use.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

PIPE REPAIR AND INSTALLATION

PROCESS DESCRIPTION
Variety of operations related to maintaining water supply, sewage collection, and natural gas lines. Indoor, and outdoor work is performed. Pipe replacement and repair are the primary activities along with de-clogging of pipes.

Base Process ID #: PWPIPE01

HSMS Code: SR-04-00, SR-10-00

Substrate: PVC, copper, steel, iron

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

Piping systems in need of repair

KEY MATERIALS USED	IN ↓	KEY WASTE/AIR EMISSIONS PRODUCED
PVC pipe primer & adhesive, Lead-free solder, Solder flux, Rags	Pipe repair	Empty hazmat containers – HazMinCen Used Rags – to Dumpster Excess pipe – reused or taken to base recycling center
De-clogging agents :"Endure Enzyme," "Grease-be-gone," others	Drain Cleaning Pipe De-clogging	Used de-clogging agents – to sewer

↓
OUT

Repaired piping system

PUBLIC WORKS – ROADS and GROUNDS

COMMAND: Navy
DEPT: Public Works (PWC)
WORK CENTER: PWROAD
SHOP NAME: Roads and Grounds
BUILDING #: 1213
SHOP POC AND PHONE #: Eddie Edwards and Herb Brooks, (817) 782-7188

WORK CENTER DESCRIPTION

This work center maintains roads on base. They do not perform grounds or lawn maintenance. Work is performed primarily with asphalt, but concrete work is sometimes required. The shop maintains its own small engine equipment, such as trash pumps and air compressors, while large equipment is maintained by the PW Heavy Equipment shop (Building 1191).

The primary process performed in the Roads and Grounds Shop is:

- **Road and Road Equipment Repair**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. A detailed process description and process flow diagram is provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

- Identify a method to recycle the scrap asphalt piled behind Building 1320. Several local vendors should be available to take this material away and reprocess it for road projects. Also consider recycling waste asphalt onsite for repair use around the base (in lieu of buying new).

- Substitute synthetic oil for regular motor oil to improve lubrication and extend the time between oil changes by three.

- Replace traditional lead/acid batteries with OPTIMA batteries (absorbed glass mat design). They are maintenance-free (eliminating the need for adding battery acid), sealed with no possibility of electrolyte leakage (safer), and will provide double the life span versus conventional wet-cell lead acid batteries (less generation of spent batteries). OPTIMA batteries come in a variety of sizes and have been successfully implemented in numerous

transportation shops within the Navy. See the following Web site for more information http://www.optimabatteries.com/.

CURRENT P2 PRACTICES & EQUIPMENT

- None identified

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no, but shop would benefit from such a program

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ROAD AND ROAD EQUIPMENT REPAIR

PROCESS DESCRIPTION

Road maintenance includes fixing potholes, repairing portions of parking lots and roads after they have been torn-up for various reasons (e.g. sewer maintenance), and repairing road washouts. Asphalt removed has been piled in back of Building 1320.

The shop does minor maintenance on various road repair equipment that use 5-10 hp motors. This includes two air compressors, two ground pounders, one ditch witch, three trash pumps, two concrete saws, small portable generators, one steel wheel roller, and two portable cement mixers.

Base Process ID #: PWROAD01

HSMS Code: SR-02-99

Substrate: Asphalt and concrete

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

Items in need of repair

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Asphalt and asphalt products, Concrete	Road repair	Scrap asphalt – (piled behind Build. 1320)
Lubricants Fuel (15-20 gal/yr)	Small Equipment Maintenance	Empty containers - HazMinCen Used oil (5 gal/yr) Used rags – (55 gal/month) Spent lead/acid batteries Spent oil filters (200 gallons/year)

↓

OUT

Repaired items

SEABEES PWDSEA - SELF-HELP

COMMAND:	Navy
DEPT:	Public Works (PWC)
WORK CENTER:	PWSLFHLP
SHOP NAME:	Seabees Self Help
BUILDING #:	1217
SHOP POC AND PHONE #:	UT1 Ferguson, (817) 782-7160

WORK CENTER DESCRIPTION

This shop provides basewide maintenance support on an as-needed basis to work center buildings and any squadron including self-help painting and light construction activities for Navy facilities.

The primary process performed in the Self-Help shop is:

- **Self-Help Projects**

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Eliminated use of ODS-containing material by substitution with non-ODS products.
- Eliminated use of aerosol paints for most work. Traffic paint is now roll-on type.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, shredder paper, picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

SELF-HELP

PROCESS DESCRIPTION

Self-help provides support on an as-needed basis for self-help painting and light construction. Projects are conducted in one of two possible ways: (1) Self-help provides all the materials and labor to do a project; (2) Self-help provides materials and technical knowledge, but not the labor.

This shop works closely with other public works shops and uses their equipment for construction projects. Self-help does not maintain many tools or pieces of equipment because it works closely with other departments that have these tools.

Base Process ID #: PWSLFHLP-01

HSMS Code: CN-09-99

Substrate: Varies

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:

Two trucks and a golf cart. Several lockers for storing hazmat, and one drum for waste paints. Materials stored in lockers include: latex paint, traffic paint, drywall joint compound, wood stain. Other key materials listed are project-specific and either used up or returned to HazMinCen.

PROCESS FLOW DIAGRAM:

Self-Help Project Request

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Metal Polish, Interior Silicone Sealer; General Purpose Lube Oil, Joint Compound, Deck Adhesive, Plastic Roof Cement, Sealant; General Purpose Detergent, Liquid Nails, Oil Stain, Walkway Compound, Wood Finish, Enamel and Latex Paints	↓ Provide Material/Maintenance Assistance ↓	Metal Containers - HazMinCen; Brushes w/ Dried Stain - solid waste; Stain, Wood Finish, and Walkway Compound - solid waste; Plastic Containers; Rags w/ Wood Finish and Walkway Compound - solid waste

OUT

Project Complete

TANG

COMBINED WITH AFRES 301 LGTM VEHICLE MAINTENANCE – NO LONGER AN INDIVIDUAL WORK CENTER

TANG VM – VEHICLE MAINTENANCE

COMMAND:	Texas Air National Guard (TANG)
DEPT:	TANGVM
WORK CENTER:	TANGVM
SHOP NAME:	Vehicle Maintenance
BUILDING #:	1191
SHOP POC AND PHONE #:	SMSGT David Harris, (817) 852-3569

WORK CENTER DESCRIPTION

This shop services and maintains 92 registered vehicles and 25 other pieces of equipment for TANG. Vehicles such as pickup trucks, flight-line tow vehicles, forklifts and cranes are maintained on a maintenance schedule. Unscheduled maintenance and repair is also performed as needed. The shop contracts out all vehicle painting and bodywork. AFRES is the building host and coordinates the all waste handling through the Environmental Department.

The primary process performed in this shop is:

- **Vehicle Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential Pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Replace use of traditional lead-acid batteries with Optima batteries (**http://www.optimabatteries.com/**). These batteries cost twice as much as traditional batteries, but are:

  - Maintenance free (eliminate the need for adding battery acid),
  - Sealed with no possibility of electrolyte leakage (safer),
  - Can go unused for up to a year without recharging, and
  - Will provide double the life span versus conventional wet-cell lead-acid batteries (less generation of spent batteries).

  Educating OPTIMA users on proper charging techniques must also be part of this program to ensure its success. During P2 shop surveys at NAVSTA Norfolk, AIMD shop personnel indicated that the OPTIMA batteries had a short-life span, whereas they are touted for two to three times the typical life span of a traditional lead-acid battery. Based on discussions with OPTIMA, it is likely that the AIMD personnel were trying to charge the battery too fast (a "quick boost charge") versus following the instructions in the OPTIMA user guide. Unfortunately, these batteries cannot be charged in exactly the same manner as traditional lead-

acid batteries. Enlisting OPTIMA representatives to assist in this educational process would be helpful.

- The addition of a fast-fill system for the compressed natural gas would increase the use of the alternative fuel in the bi-fuel vehicles. The current method takes is a slow-fill method which is done overnight.
- The Motor Pool should purchase a portable brake washer for the maintenance of motor pool vehicles. The shop had a Clayton brake cleaner but turned it into Air National Guard (ANG) DRMO mid-2002. Shop personnel indicated the system did not effectively clean the brakes. The shop currently borrows an AMMCO Model 1450 brake washer from AFRES.
- Replace the Sakety Kleen solvent parts washer with an aqueous based parts washer with a corrosion inhibitor. The shop is interested in getting a Better Engineering aqueous parts washer.

CURRENT P2 PRACTICES & EQUIPMENT

- AGE and vehicles (from the Motor Pool) are washed in an enclosed closed-loop wash rack. The wash rack is equipped with overflow protection. The wash rack is connected to an OWS which is cleaned periodically. The filters of the closed-loop system are cleaned by an outside contractor.
- The shop participates in a reusable rag program through Star. The shop has recently expanded the program to include coveralls used in the shop. These were previously disposed of when dirty.
- The shop/TANG has three bi-fuel (unleaded gasoline and compressed natural gas [CNG]) pickup trucks. One of the three vehicles is a maintenance truck.
- The shop is converting all vehicles from R-12 to R-134a refrigerant. The conversion is done whenever a major repair of a vehicle air conditioning system is required. The shop operates two freon recyclers to support this effort.
- Vehicle tires are changed out and exchanged through the ANG Supply System one for one.
- The shop operates an antifreeze recycler. All vehicle antifreeze is filtered through the system and put back into the vehicle. The shop tops off the fluid level as needed.
- Oil filters are crushed and recycled offsite.
- The shop is equipped with several overhead fluid dispensing hose systems (oil, automatic transmission fluid and antifreeze). The drums are stored in a separate room and connected to the piping transfer system. The room is diked.
- The shop has three Lincoln 3613S oil drain systems for oil changes. The systems have a drain pan for oil filters.
- The shop has a Snap-On Freon Recovery Unit (ECO-134). The unit recovers and recycles freon and recharges vehicle AC systems.
- Metal containers are recycled offsite.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Laundrable Red Rags – yes

Laundrable Absorbent Pads – no

HazMat obtained from HazMin Center – yes

Empty HazMat Containers returned to HazMin Center – yes

Cardboard, Paper, Plastic, Glass returned to Recycling Center – yes

Used Batteries (all types) returned to Recycling Center or HazMin Center – yes

Used oil, antifreeze picked-up by Hazardous Waste for recycle – yes

Wood waste and/or yard waste to composting – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

VEHICLE MAINTENANCE

PROCESS DESCRIPTION

This shop services and maintains 92 registered vehicles and 25 other pieces of equipment for TANG. Vehicles such as pickup trucks, flight-line tow vehicles, forklifts and cranes are maintained on a maintenance schedule. Unscheduled maintenance and repair is also performed as needed. The shop contracts out all vehicle painting and bodywork. AFRES is the building host and coordinates the all waste handling through the Environmental Department. Fluids such as oil, hydraulic fluid and antifreeze are changed out based on miles driven. Oil filters are crushed and placed in a used filter drum.

Tires are changed out when needed with the used tires turned into ANG Supply System one for one. Bearings, gaskets and joints are lubricated with grease to prevent friction. Vehicles are washed in the enclosed closed-loop wash rack near the Vehicle Maintenance Shop. Two freon recovery units are used during work on vehicle air conditioning systems.

Parts are cleaned using a Safety Kleen solvent parts washer.

Base Process ID #: TANGVM-01

HSMS Code: SR-02-00

Substrate: Motor Vehicles

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:

Antifreeze Recycling Unit, Two Snap-On Freon Recovery Unit, Two Battery Chargers, Oil Filter Crusher, Three Bi-Fuel Vehicles, Close-Loop Wash Rack (enclosed), Vinyl Stenciling Machine (Sheet Metal Shop)

PROCESS FLOW DIAGRAM:

Vehicle/Equipment Requiring Maintenance

MATERIALS USED	IN ↓	WASTE/AIR EMISSIONS PRODUCED
Rags, Soap, General purpose cleaner, Wax, Water	Wash/Wax	Washwater w/soap (OWS) Rags w/soap (Recycle)
Engine Oil, Antifreeze, Oil filters Corrosion preventative compound Grease, Brake fluid Hydraulic fluid Power steering fluid, Rags	Service/Minor Repair	Used engine oil (Recycle) Used Antifreeze (Recycle) Used Oil filters (Recycle) Used lube oil (Recycle) Empty aerosol cans (Recycle) Rags w/oil, grease, brake fluid and Hydraulic fluid (Recycle) Air Emissions - fueling
Safety Kleen Premium Gold Solvent Rags	Parts Clean	SK Premium Gold (RCRA) Empty containers (Recycle) Rags w/solvent (RCRA) Air Emissions - solvent
Lead-acid Batteries	Battery replacement	Used batteries (Recycle)

↓ **OUT**

Maintained Vehicle

TANG 224 – WEAPONS

COMMAND:	Texas Air National Guard (TANG)
DEPT:	Security Police (224SF)
WORK CENTER:	TANG224
SHOP NAME:	Weapons
BUILDING #:	4175
SHOP POC AND PHONE #:	MSGT David Rogers, (817) 852-3491 TSGT Aubrey Beaver, (817) 852-3482

WORK CENTER DESCRIPTION

This shop provides security services for TANG. Weapons used by security police are cleaned periodically based on use and maintenance schedule.

The primary process performed in this shop is:

- **Small Arms Weapons Cleaning**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- The work center should switch to rechargeable alkaline batteries for flashlights. The volume of used batteries generated per year would be greatly reduced.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- The shop has eliminated the use of ODS-containing formulations of lubricants/preservatives and Break-Free (NSNs 9150-01-054-6453, 9150-00-823-7860, 9150-01-053-6688, 6850-00-105-3084, and 9150-01-079-6124).

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Work center should procure and use a Mini Max Arms steam-cleaning system with Arma-Sol Wash and Arma-Sol Dry solutions or an Inland Technology IT-48WC part washer (with filter) to replace the Safety Kleen Premium Gold Solvent parts washer. The Inland Technology parts washer is approved to use Breakthrough (6850-01-378-0666) or Skysol (6850-01-381-4404). The system uses Edge Tek filters (4250-01-381-8024).

SMALL ARMS WEAPONS CLEANING

PROCESS DESCRIPTION
This shop provides security services for TANG. Weapons used by security police are cleaned periodically using one of two cleaning systems currently available. The shop has a Safety Kleen parts washer with Premium Gold Solvent and patches and CLP. Approximately 500 weapons are cleaned per year. Weapons are generally cleaned after firing or after use in foul weather.

Weapons used by the security police primarily consist of M-16s and 9-mm side arms. Other weapons used include M-249, M-60, M-203, and 12-gauge shotguns.

Flashlights and radios are used in support of security activities at the station. The radios use rechargeable nickel-cadmium batteries. Radios and batteries are sent to depot level for repair or discharge/recharge. Flashlights use alkaline batteries. All used batteries are turned into the HazMinCen.

Base Process ID #: TANG224-01

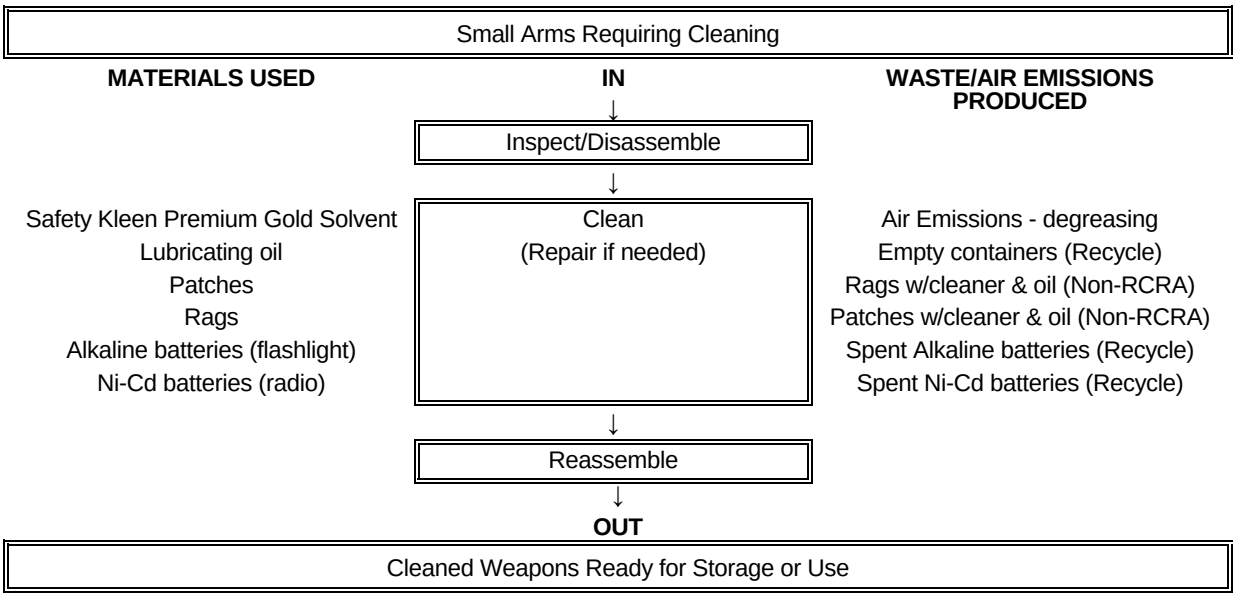
HSMS Code: ML-01-05

Substrate: Steel

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



TANG 241 – FUEL CELL

COMMAND:	Texas Air National Guard (TANG)
DEPT:	Fuel Services (241FS)
WORK CENTER:	TANG241
SHOP NAME:	Fuel Cell
BUILDING #:	1675
SHOP POC AND PHONE #:	Trey McKinney, (817) 852-3639

WORK CENTER DESCRIPTION

This shop maintains and repairs integral fuel cells and replaces ballistic foam. Aircraft bladder cells are removed and sent to a contractor for repair.

The primary process performed in this shop is:

- **Service Fuel Cells**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Segregate partially used rags and absorbents and use them to wipe out drip pans and other noncritical tasks.
- Use launderable absorbent pads for all leaks, spills, and cleanups. This will eliminate the labor and disposal costs associated with the use of nonreusable absorbents.
- Investigate using a pneumatic vacuum to clean up fuel spills and drips instead of using absorbent materials. Fuel leaks into drip pans should be vacuumed and disposed in used fuel bowser or the used POL container. Spills could be cleaned up in the same manner. From there, the used fuel could be filtered and reused by the Fuel Farm or the POL waste could be hauled and recycled with other POL wastes.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Aircraft fuel bladder contents are pumped to a defueling truck prior to servicing. Fuel is then filtered and reused. A fuel bowser is used to de-puddle (drain residual fuel) fuel bladders. The fuel bowser is eventually pumped to a defueling truck for filtration and reuse.
- Empty metal containers are recycled offsite.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, Paper, Plastic, Glass returned to Recycling Center – yes

Used Batteries (all types) returned to Recycling Center or HazMinCen – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

SERVICE FUEL CELLS

PROCESS DESCRIPTION

This shop maintains fuel cells for C-130 aircraft. The shop performs cleaning, sealing, leak testing, and top-coating operations. Repairs are performed in the shop. Aircraft bladder cells are removed and sent to an outside contractor for repair. Prior to any inspection or servicing, all bladders are defueled using a defueling truck, then de-puddled using a fuel bowser. Airplanes are periodically cleaned in a covered hanger where wash and rinse water is collected in an oil-water separator.

Base Process ID #: TANG241-01

HSMS Code: ID-23-07

Substrate: Fuel cells

MRC/Technical Publication: 1-1-3

P2/Environmental Equipment Used in Process:
Fuel bowser, Defueling truck

PROCESS FLOW DIAGRAM:

Dirty Airplane		
MATERIALS USED	**IN**	**WASTE/AIR EMISSIONS PRODUCED**
Biodegradable Detergent	Cleaning	Water mixed with biodegradable detergent, JP-8, dirt, grease collected in oil-water separator (Oil-water separator periodically emptied)
	OUT	
Clean Airplane		

PROCESS FLOW DIAGRAM:

Unserviced Fuel Cell		
MATERIALS USED	**IN**	**WASTE/AIR EMISSIONS PRODUCED**
None	Defuel/Purge/Ventilate	JP-8 (from aircraft) (Recycle) Used JP-8 (Recycle) Air Emissions - JP-8
Sealants, Isopropyl Alcohol, Phenolphthalene, Epoxy/Adhesive	Test and Clean	Absorbents w/ JP-8 (non-RCRA) Empty containers (Recycle)
None	Repair	None
	OUT	
Repaired/Serviced Fuel Cell		

TANG 243 – NDI SHOP

COMMAND: Texas Air National Guard (TANG)
DEPT: Non-Destructive Inspection (243ND)
WORK CENTER :
BUILDING #: 1675
SHOP POC AND PHONE #: MSGT Bill Freeman, (817) 852-3545

WORK CENTER DESCRIPTION

The Non-Destructive Inspection (NDI) shop performs nondestructive inspections for aircraft and weapons in support of the C-130 aircraft. Metal parts, when fabricated, repaired, or welded, must be inspected for defects prior to installation on the aircraft. Due to the sensitivity and extreme conditions placed upon the metal while in flight, each metal piece must meet specific criteria in order to guarantee the security of the aircraft. If the part is without defects, it can be installed on the aircraft. If defects are found, the part is sent back to the shop with the defects noted, and it must be repaired.

A technical order specifies what type of inspection is to be performed on each type of metal or part from the aircraft. The types of inspections performed in this shop are: fluorescent penetrant, magnetic particle, X-ray analysis, and eddy current. Eddy current analysis does not involve the use of any chemicals. Most of these tests are performed in the shop. However, the shop does have portable equipment that may be used to perform analysis in the field of parts or components that are too large or difficult to remove.

All waste generated by this shop is combined with the waste from the NDI Shop of the 301st Air Force. The Air Force handles the disposition of all of the waste streams.

The primary processes performed in the NDI Shop are:

- **Fluorescent Penetrant Inspection**
- **Magnetic Particle Inspection**
- **X-ray Analysis**

Pollution prevention practices currently utilized by this work center are presented below along with potential Pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Track and implement other nonsolvent technologies for nondestructive inspection.

CURRENT P2 PRACTICES & EQUIPMENT

- Discontinued use of MIL-I-25135 inspection penetrants, inspection penetrant removers, and developers purchased prior to 1994 that contained ODS. Reordered inspection kits that contain non-ODS formulations.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable (Must use tech wipes)

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None identified.

ULTRASOUND INSPECTION

PROCESS DESCRIPTION
Ultrasound evaluation of metal parts is conducted by using the ultrasound equipment. View of ultrasound monitor reveals possible flaws in the metal or the welded area. Waste ultrasound gel is produced when parts are wiped clean after the inspection process.

Base Process ID #: TANG243-05

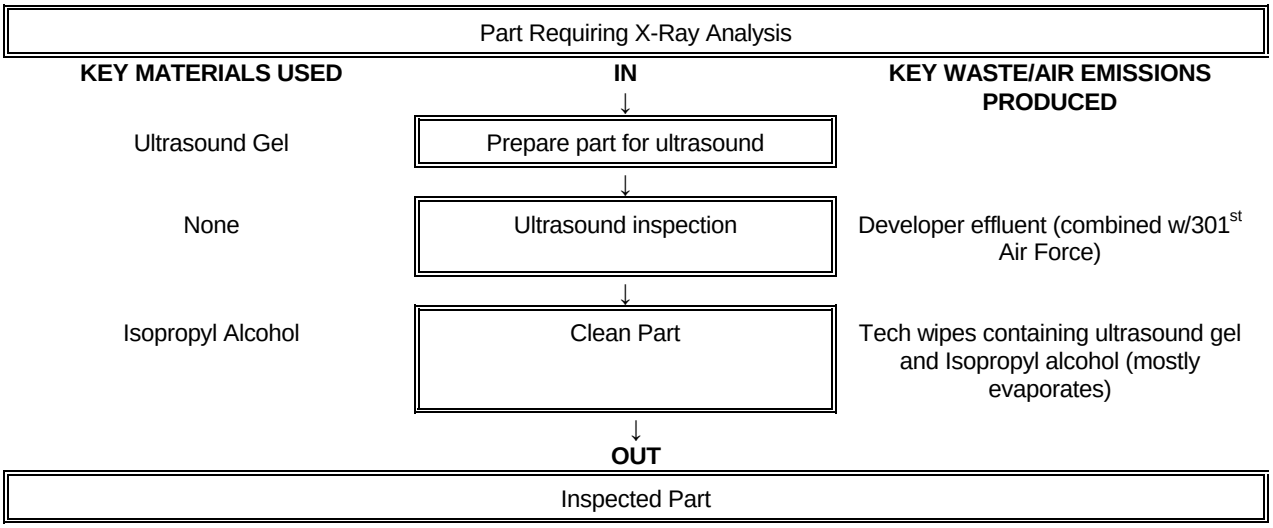
HSMS Code: ID-14-01

Substrate: Aluminum, steel, titanium

MRC/Technical Publication: T.O. 33B-1-1

P2/Environmental Equipment Used in Process:
Ultrasound Resonance Equipment

PROCESS FLOW DIAGRAM:



FLUORESCENT PENETRANT INSPECTION

PROCESS DESCRIPTION
Fluorescent penetrant inspection allows the flaw or defect in the metal to be visible when the part is placed under a black light. Metal parts are to be cleaned with isopropyl alcohol by the shops prior to being delivered to the NDI shop. The part is dipped into the penetrant (fixed unit) or the penetrant is sprayed on to the metal and allowed to sit for an hour in order to "penetrate" the cracks or defects (portable). Excess penetrant is removed with spray remover and developer is applied after. The developer helps to expose the penetrant absorbed into the defects when placed under the black light for evaluation. Once all defects have been identified, the part is cleaned thoroughly with penetrant remover. Each type of inspection requires the use of lint-free rags; therefore, tech wipes are used to clean or apply materials.

Fluorescent penetrant is generally used on nonferrous parts. All waste generated from this process is combined with the waste from the 301st Air Force.

Base Process ID #: TANG243-01

HSMS Code: ID-14-00

Substrate: Aluminum, steel

MRC/Technical Publication: T.O. 33B-1-1

P2/Environmental Equipment Used in Process:
Fluorescent penetrant inspection equipment

PROCESS FLOW DIAGRAM:

	Aircraft Part	
KEY MATERIALS USED	**IN**	**KEY WASTE/AIR EMISSIONS PRODUCED**
Isopropyl alcohol	Clean Surface	Tech wipes w/isopropyl alcohol (combined w/301st Air Force)
Penetrant	Dip in Penetrant or Apply Penetrant	Empty aerosol cans (Recycle) Swabs w/penetrant (combined w/301st Air Force)
Remover	Remove Excess Penetrant	Empty aerosol cans (Recycle) Tech wipes w/remover (combined w/301st Air Force)
Penetrant/developer	Dip in Developer or Apply Developer	Empty aerosol cans (Recycle) Tech wipes w/ penetrant, developer (combined w/301st Air Force)
	Evaluate Part/Clean	Tech wipes w/developer (combined w/301st Air Force)
	OUT	
	Inspected Part	

MAGNETIC PARTICLE INSPECTION

PROCESS DESCRIPTION
In magnetic particle inspection, a magnetic particle spray is applied to the metal part and then magnetized with a handheld electromagnet. The part is evaluated and then demagnetized by moving it slowly away from the probe. The part is cleaned with either isopropyl alcohol or the penetrant remover used in the fluorescent penetrant test. All waste generated from this process is combined with the waste from the 301st Air Force. The shop also has a portable magnetic particle inspection system. Magnetic particle inspection is generally used for ferrous parts.

Base Process ID #: TANG243-02

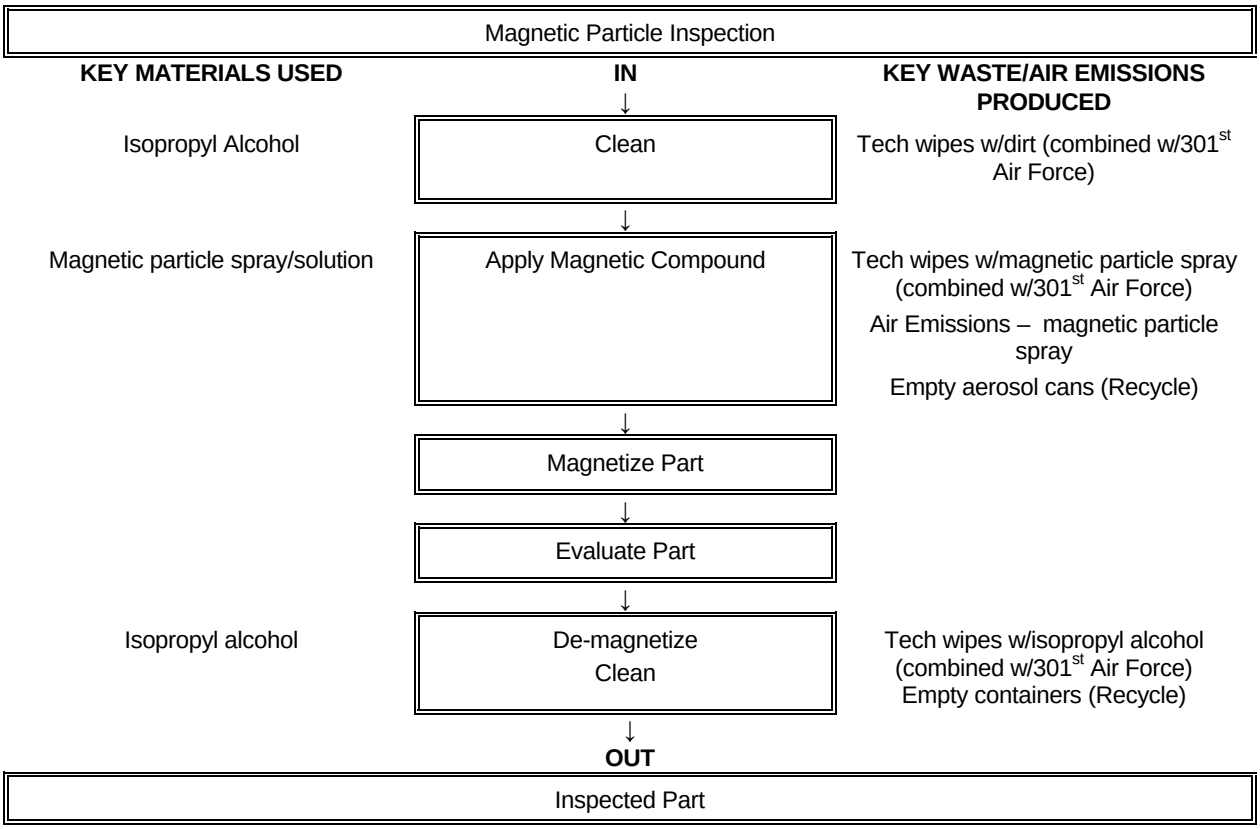
HSMS Code: ID-14-02

Substrate: Aluminum, steel, titanium

MRC/Technical Publication: T.O. 33B-1-1

P2/Environmental Equipment Used in Process:
MAG particle equipment

PROCESS FLOW DIAGRAM:



X-RAY ANALYSIS

PROCESS DESCRIPTION
X-ray film of metal parts is developed and fixed in the X-ray unit. Visual inspection of the developed X-ray film reveals possible flaws in the metal or the welded area. Waste film and all solutions are combined with the waste generated by the 301st Air Force.

Base Process ID #: TANG243-03

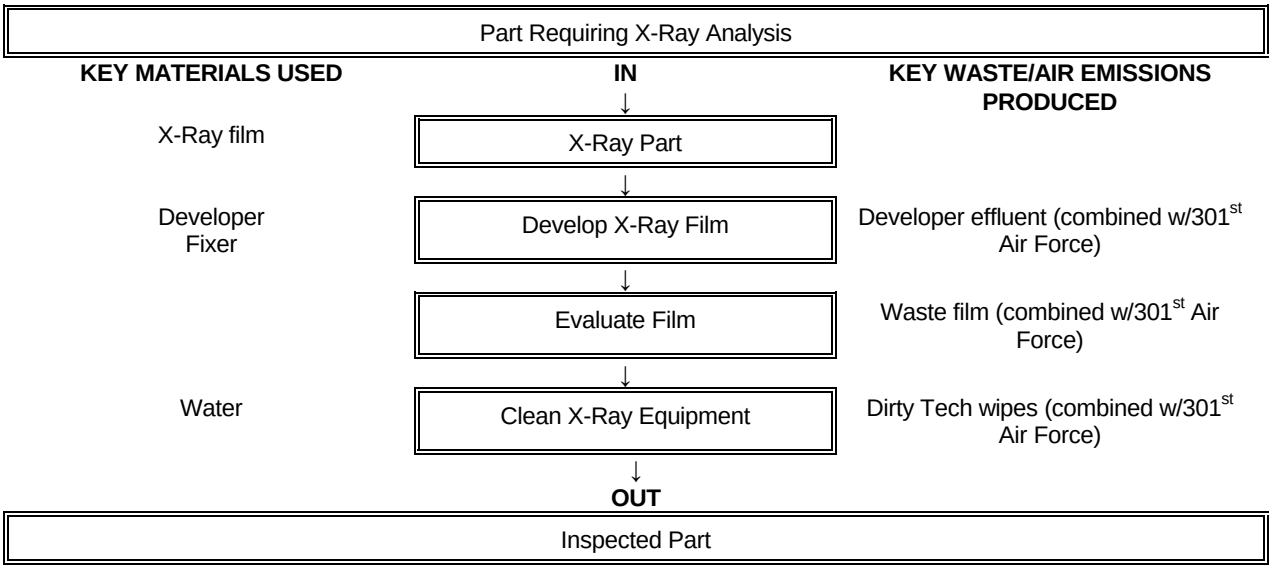
HSMS Code: ID-14-99

Substrate: Aluminum, steel, titanium

MRC/Technical Publication: T.O. 33B-1-1

P2/Environmental Equipment Used in Process:
X-ray equipment

PROCESS FLOW DIAGRAM:



TANG - STRUCTURAL REPAIR/ CORROSION CONTROL

COMMAND: Texas Air National Guard (TANG)
DEPT: Structural Repair
WORK CENTER: TANG242
SHOP NAME: Structural Repair / Corrosion Control
BUILDING #: 1675
SHOP POC AND PHONE #: Tracy Craft, (817) 852-3544

WORK CENTER DESCRIPTION

The Structural Repair/Corrosion Control shop maintains and repairs aircraft structures and performs corrosion control for the C-130s. The manufacture, repair or modification of metal used for aircraft structures is performed in the shop. All touch-up painting is done in Hangar 1675. All painting of AGE equipment is contracted out until a planned new fuel cell/corrosion control facility is constructed. The shop does not have a parts washer.

The primary processes performed in the Structural Repair/Corrosion Control Shop are:

- **Corrosion Control**
- **Metal Manufacturing**

Pollution prevention practices currently utilized by this work center are presented below along with potential Pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Replace use of paint thinner for paint removal/stripping with Safety Prep (6850-01-381-5139) by Inland Technology.
- Continue to push for the implementation of a plastic bead media lease and recycle program similar to the program at AIMD. The shop uses about 25 gallons of blast media per year. This opportunity has been considered, but the shop has been told it does not generate enough used blast media to have its own recycle program. The shop's plastic blast media could possibly be combined with another shop's media or the shop might participate in a future basewide program.
- Procure at least one smaller HVLP gravity-fed paint gun to use for small paint projects.
- Replace the alodine dip process with the use of alodine pens for smaller jobs. An estimated two pints of waste alodine is generated per year. The use of SEM pens would eliminate this waste, as well as the rags used to wipe excess alodine from the dip process. Both the waste alodine and the wipe rags are disposed as RCRA hazardous waste.
- Replace technical grade toluene (6810-00-290-0048) and PENS-LLP 003190 with isopropyl alcohol, DS-104, DS-108, or other suitable solvent for wipe and equipment cleaning.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop

towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- The shop has and operates 4 HVLP paint guns. All of the paint guns are 2-quart capacity.
- Paint used in the paint guns is mixed according to the size of the job, which reduces the amount of excess paint waste. Painting projects are grouped together to also reduce the amount of paint waste generated and gun cleaning required.
- All TANG C-130 aircraft have been completely repainted at the depot level within the last year and a half. This has greatly reduced the amount of short-term touch-up painting and paint cleanup performed by the shop.
- MEK use for wipe and equipment cleaning has been eliminated.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable Absorbent Pads – not applicable

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass returned to Recycling Center – yes

Used batteries (all types) returned to Recycling Center or HazMinCen – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

Wood waste and/or yard waste to composting – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Paint waste (PPE, paint filters, excess paint and sludge, mixing cups and brushes, barrier tape) generated can be tested for hazardous waste determination. If the tests (TCLP test) show a negative result for any of these paint waste streams, the corresponding waste stream can be disposed of as nonhazardous solid waste. Results from these tests are good for up to three years. This will greatly reduce the amount of waste being sent off as RCRA waste, thus resulting in a cost savings. This opportunity has been implemented by the LAANG Structural Repair/Corrosion Control Shop at NAS JRB New Orleans.

CORROSION CONTROL

PROCESS DESCRIPTION

In order to prepare structures, such as panels, for painting, the old paint is removed chemically by using paint thinner. Other small parts and pieces are placed in the plastic media glove box, or sanded down to remove paint then wiped down with paint stripper to remove particles. Priming and painting of the metal are done in the hangar. The shop does not have a paint booth. A corrosion control facility has been planned but has not yet been constructed. Using HVLP spray guns, the epoxy primer and poly paint are applied. Occasionally a part is primed using aerosol spray paint. Once the primer has dried, the paint is applied using the HVLP guns. About two quarts of paint are used in aircraft touch-up painting per month. After each painting job, and when switching types or color of paint, the HVLP guns are manually cleaned using paint thinner. A gallon of paint thinner is used per paint gun cleaning.

Base Process ID #: TANG242-01

HSMS Code: ID-05-00

Substrate: Metals, fiberglass

MRC/Technical Publication: Various

P2/Environmental Equipment Used in Process: HVLP paint guns, Pneumatic sanders, Plastic bead blast glove box cabinet

PROCESS FLOW DIAGRAM:

Aircraft Components to be Painted

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Paint thinner Plastic media General purpose detergent Toluene PENS-LLP	Clean/Remove Paint	Spent media (non-RCRA) Rags w/solvents (RCRA) Rags w/ general purpose detergent (non-RCRA) Air Emission - solvent use
Aerosol primer Spray gun epoxy primer Alodine	Prime	Empty aerosol cans (Recycle) Air Emissions – painting Rags w/ alodine (RCRA)
Polyurethane paint Enamel and Lacquer paint Thinner	Paint	Waste paint/solvent (RCRA) Rags w/paint and solvent (RCRA) Empty aerosol cans (Recycle) Air Emissions - painting
Paint thinner	Clean Paint Guns	Used paint thinner (RCRA)

OUT

Painted Aircraft Equipment

METAL MANUFACTURING

PROCESS DESCRIPTION
Metal, structural parts are either manufactured, repaired, or modified in this process. Metal sheets, tubing, or metal parts removed from the aircraft will be formed into the proper shape using various machines. Rivets and fasteners are applied to the metal using adhesives or sealants and then installed onto the aircraft.

Base Process ID #: TANG242-02

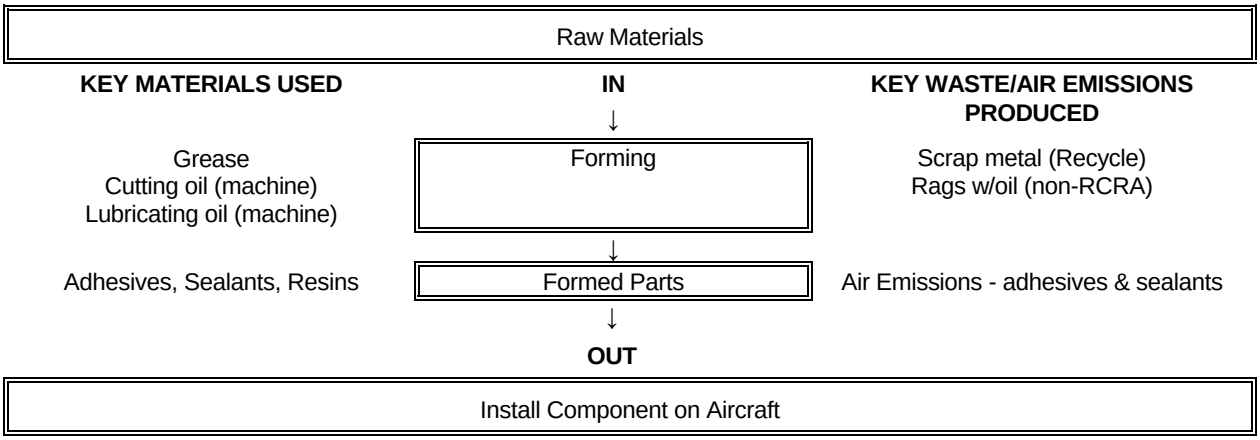
HSMS Code: ID-07-00

Substrate: Steel, titanium

MRC/Technical Publication: NA

P2/Environmental Equipment Used in Process: None

PROCESS FLOW DIAGRAM:



TANG 244 – PHASE DOCK

COMMAND:	Texas Air National Guard (TANG)
DEPT:	PH Docks (244OM)
WORK CENTER:	TANG244
SHOP NAME:	Phase Dock
BUILDING #:	1676
SHOP POC AND PHONE #:	Mike Brewster, (817) 852-3523 Sean Almy

WORK CENTER DESCRIPTION

The work center performs minor and major phase inspections and maintenance of eight C-130 aircraft. This involves cleaning, lubricating, sealing, adhesive bonding, and minor painting of the aircraft and its components.

The primary process performed in this shop is:

- **Aircraft Maintenance and Repair**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Purchase and use an oil filter press to reduce volume of solid waste associated with the disposal of used oil and fuel filters.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- See below.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

AIRCRAFT MAINTENANCE AND REPAIR

PROCESS DESCRIPTION
The work center performs minor and major phase inspections and maintenance of eight C-130 aircraft. This involves cleaning, lubricating, sealing, adhesive bonding, and minor painting of the aircraft and its components.

There are four phases of the inspection process and the process is conducted over a four-year cycle. There are three minor phases and one major phase. During various phases the hydraulic fluid is topped off and the engine oil is changed out per technical orders.

Base Process ID #: TANG244-01

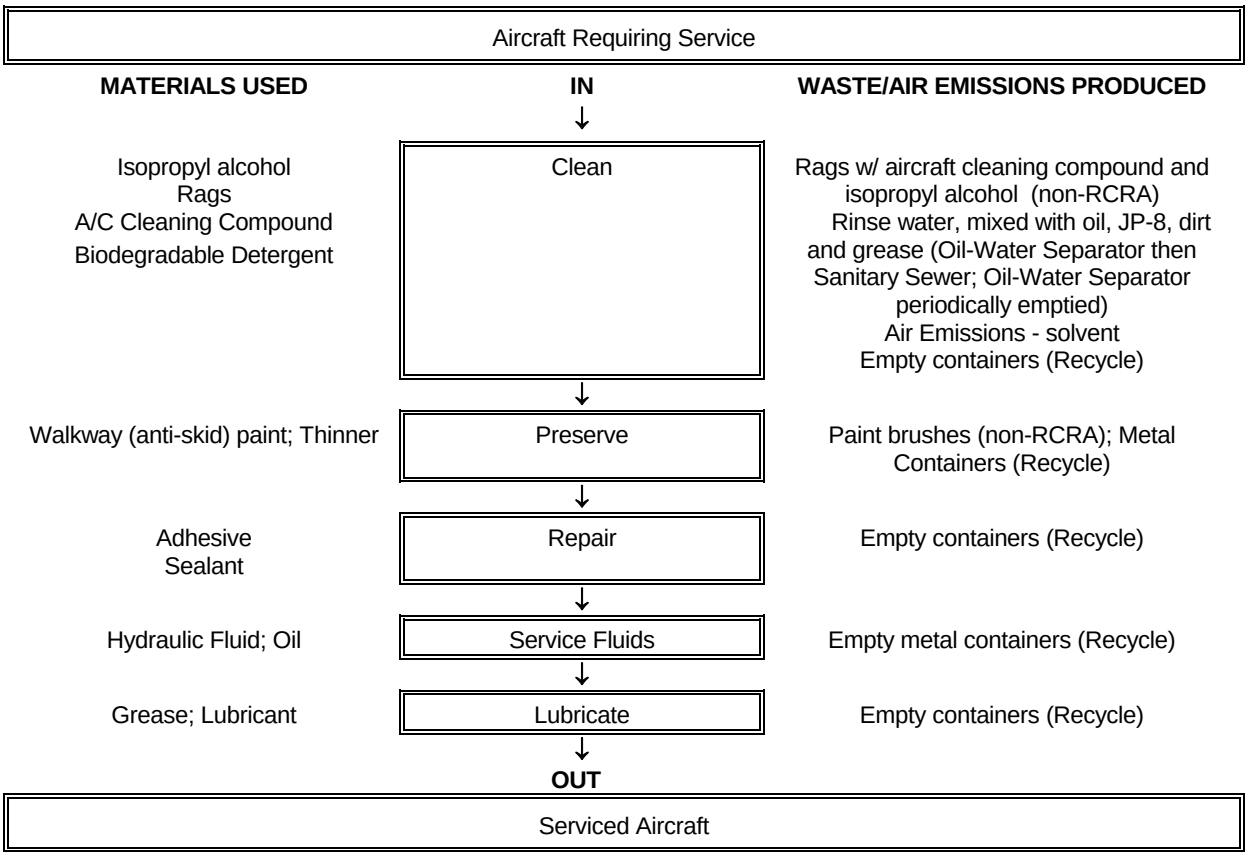
HSMS Code: ID-02-00

Substrate: Aluminum, Composite

MRC/Technical Publication: USAF Technical Manual

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



TANG 248 – AVIONICS SHOP

COMMAND:	Texas Air National Guard (TANG)
DEPT:	Avionics (248AN)
WORK CENTER:	TANG248
SHOP NAME:	Avionics
BUILDING #:	1675
SHOP POC AND PHONE #:	MS Charles Chavers, (817) 782-3518

WORK CENTER DESCRIPTION

The work center performs maintenance and minor repair of the avionics systems of the C-130 aircraft. If work center personnel cannot repair the component, it is replaced and the defective component is shipped to the naval air station AIMD for repair.

The primary process performed in this shop is:

- **Avionics Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Use of isopropyl alcohol for electric contact and other cleaning can be reduced using small pump bottles called Minda Dispensers. Unused isopropyl alcohol drains back into the bottle. Spills are also avoided. These dispensers are in use at 69A Hybrid Test Shop in the Van Pad area at Marine Corps Air Station (MCAS) Beaufort. Alternatively, presoaked and sealed packages of isopropyl alcohol tech wipes could be used in place to reduce the amount of isopropyl alcohol being used.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- The shop has eliminated the use of Freezing Compound, NSN 6850-00-405-9385, which contained CFC-12, an ODS.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

REPAIR OF AVIONICS EQUIPMENT

PROCESS DESCRIPTION
The work center performs maintenance and minor repair of the avionics systems of the C-130 aircraft. Virtually all avionic components are electronic-based. If work center personnel cannot repair the component, it is replaced and the defective component is shipped to the naval air station AIMD for repair. Sealant is used to protect the installed avionic components from moisture.

Base Process ID #: TANG248-01

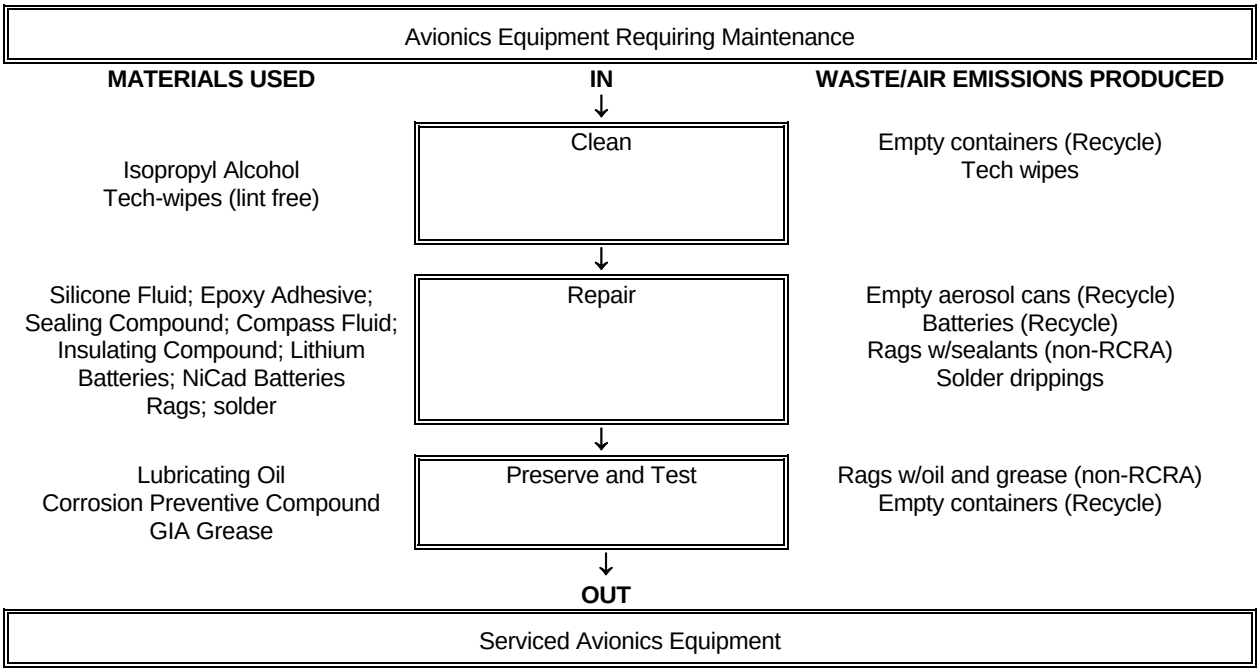
HSMS Code: ID-22-01

Substrate: Aircraft Electronic Equipment

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



TANG 707 – FUEL SUPPLY

COMMAND:	Texas Air National Guard (TANG)
DEPT:	Fuels (707FO)
WORK CENTER:	TANG707
SHOP NAME:	Fuel Supply
BUILDING #:	1101
SHOP POC AND PHONE #:	Tech Sgt. Allen Douglas, (817) 852-3574

WORK CENTER DESCRIPTION

This shop maintains fuel stores and supplies fuel to operational aircraft and the service station for TANG and the 301st Air Force. It also services Navy and Marine military vehicles.

The primary process performed in this shop is:

- **Fuel Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a base wide rag and adsorbent pad laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Ft. Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Ft. Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Empty metal containers are recycled offsite.
- Spill kits contain absorbents, which selectively take up petroleum constituents and not water.
- Parking lot where fuel vehicles are stored drains to a storm water collection basin that has an oil-water separator. The storm water collection system has a shutoff to prevent release of oil in case of a spill.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

FUEL MAINTENANCE

PROCESS DESCRIPTION
This shop receives fuel, stores the fuel in tanks, and fuels aircraft using tank trucks. The service station for TANG and the 301st Air Force is serviced directly by an outside contractor. The contractor delivers motor gasoline and diesel on an as-needed basis.

The shop is responsible for testing the flashpoint of JP-8 and diesel every delivery, as well as performing other quality control checks in the laboratory. The fuel in the trucks is sampled weekly for water and contamination. All equipment used to fill the aircraft is inspected, cleaned, and maintained by the Fuels Department. Checks of the equipment are performed monthly. The strainers on the ends of the fill hoses are then cleaned with fuel or air.

Trucks are drained each day to rid the JP-8 fuel of excess water. The fuel-containing water is placed in 301st fuel bowser. The fuel and water in the bowser goes to the Navy for offsite disposal. The fuel could be filtered to separate water and solids, and the fuel reused, but the Navy refuses to consider this option after having had a big fuel spill in the past.

The shop fuels and defuels aircraft. The fuel can then be used in another aircraft. Contaminated fuel is taken off base by a contractor and disposed or reused for energy recovery.

Base Process ID #: TANG707-01

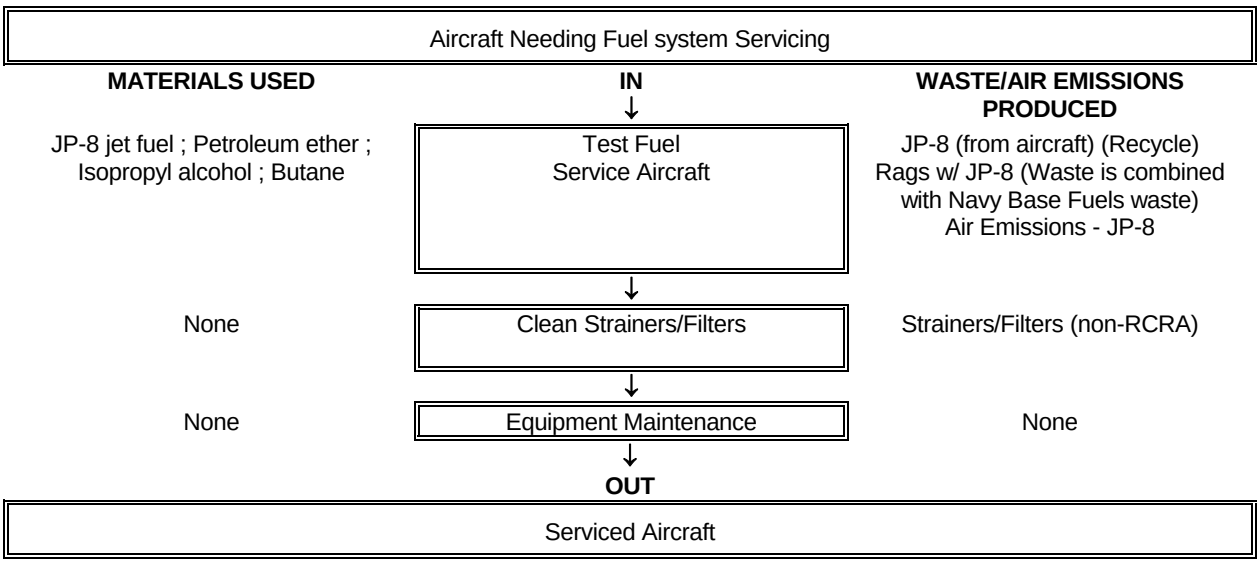
HSMS Code: ML-02-04

Substrate: Aircraft

MRC/Technical Publication: USAF Technical Guidelines

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



TANG 722 – ROADS AND GROUNDS

COMMAND:	Texas Air National Guard (TANG)
DEPT:	Roads and Grounds (722RG)
WORK CENTER:	TANG722
SHOP NAME:	Roads and Grounds
BUILDING #:	1671
SHOP POC AND PHONE #:	Mr. Danny Hance, (817) 852-3629

WORK CENTER DESCRIPTION

The work center provides services for maintaining the grounds, pavement, and buildings for the Texas Air National Guard. Pavement marking and large nonroutine projects are contracted out.

The primary process performed in this shop is:

- **Grounds Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participation in a lubricant analysis program for larger equipment.
- Use bypass filters in vehicles and equipment to reduce the frequency of oil changes.
- Replace the use of conventional oils with synthetic oils.
- Use reformulated non-ODS-containing formulations of lubricants/preservatives and Break-Free (NSNs 9150- 01-054-6453, 9150-00-823-7860, 9150-01-053-6688, 6850-00-105-3084, and 9150-01-079-6124). This has been accomplished by many of the shops throughout the base, including the Ordnance Shop of VMFA-112.
- Compost yard waste and cuttings.

Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- See below.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

GROUNDS MAINTENANCE

PROCESS DESCRIPTION
The work center provides services for maintaining the grounds, pavement, and buildings for the Texas Air National Guard. This includes cutting the grass, maintaining the lawnmowers, and fertilizing the grass. Pavement marking, insecticide and herbicide application, and large nonroutine projects are contracted out.

Base Process ID #: TANG722-01

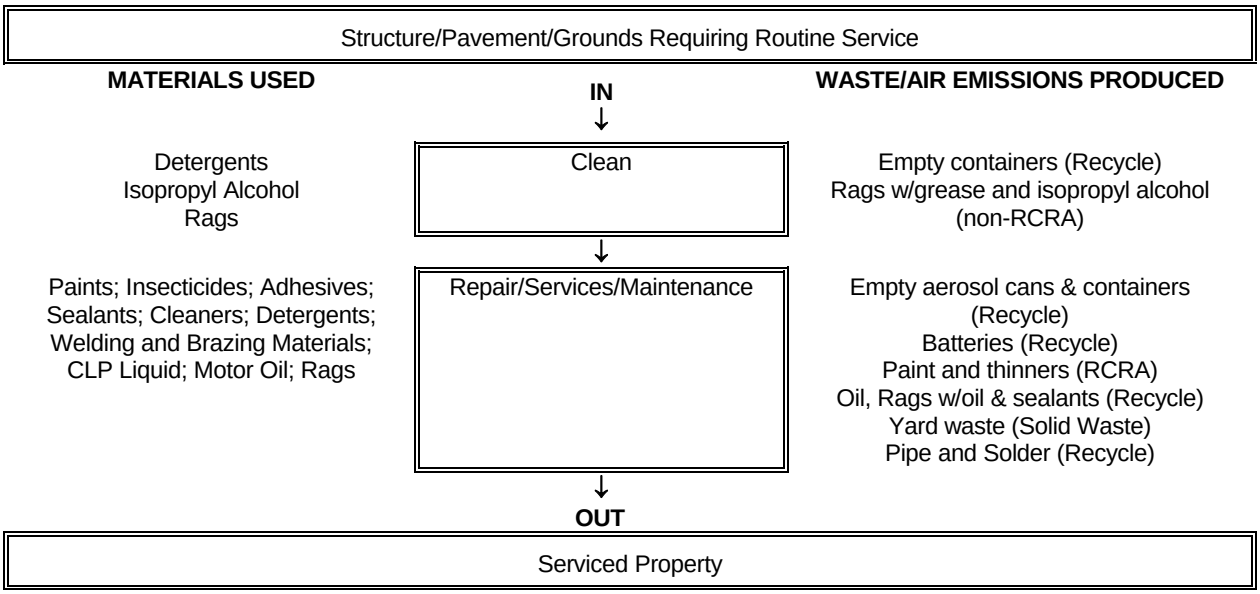
HSMS Code: SR-04-00, SR-05-00

Substrate: Grounds and Equipment

MRC/Technical Publication: USAF Technical Guidelines

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



TANG - AEROSPACE GROUND EQUIPMENT (AGE)

COMMAND:	Texas Air National Guard (TANG)
DEPT:	AGE (246AG)
WORK CENTER:	TANGAGE
SHOP NAME:	Aerospace Ground Equipment (AGE)
BUILDING #:	4160
SHOP POC AND PHONE #:	Jeff Ray, (817) 852-3528

WORK CENTER DESCRIPTION

The Aerospace Ground Equipment (AGE) shop maintains and services all AGE for the 159th (FG) division of LAANG. AGE is essential in flight-line activities, and a quick turnaround on AGE maintenance is imperative. The overall maintenance of AGE includes preventive maintenance, minor repair and touch up painting. An enclosed wash pad is operated by this work center adjacent to the maintenance buildings.

The primary process performed in the AGE Shop is:

- **AGE Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential Pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Segregate used hydraulic fluid from waste diesel fuel and coordinate the recycling of hydraulic fluid with AIMD 920.
- Investigate a substitute for thinner used in wiping down parts prior to painting. There are less toxic alternatives, such as Citra Safe by Inland Technologies, which will lower air emission and be as affective as thinner in the prep of parts.
- An absorbent pad wringer can be used to capture excess oil collected on absorbents. The used oil can then be collected for recycling. This allows the absorbent pads to be reused and reduces the volume of absorbent waste.
- Vinyl stencils can be used in place of aerosol spray paint to stencil dates and ID numbers onto the AGE. This reduces paint waste and air emissions and the vinyl stencils last longer than painted-on stencils, reducing labor as well. AIMD Dyncorp has a Gerber System that can be used.
- Use bypass filters in vehicles and equipment to reduce the frequency of oil changes.
- Substitute the use of synthetic oil for conventional oil. Conventional oil is currently used due to specification in tech orders. The tech orders would need amending to allow use of synthetic oil.
- Purchase and use of filter press to reduce volume of solid waste associated with disposal of use oil and fuel filters.
- Explore the use of imbiber beads to minimize the spread and prevent release of oil and fuel spills. According to the 1999 and 2000 P2ADS reports, nonrecurring waste (typically associated with spill and spill cleanup material) accounted for more than 300,000 pounds (in 1999) and 100,000 pounds (in 2000) of waste disposal.

  Imbiber beads allow water to pass through while the beads take up or "imbibe" organic materials such as fuel and oil contained in the water. Imbiber beads are available in several products and configurations, including:

1. Imbiber bead blankets, pillows, socks, booms, and spill kits. Due to the fact that these materials do not absorb or imbibe water, these products are especially valuable in rainy or wet environments to prevent the spread of organics and to clean up spills in wet environments.

2. Drop-in drain shut-off or filtration systems that remove organic materials as storm water passes through the drain/filter system. The imbiber bead systems are installed directly in storm drains to provide either a filtration of organics, or filtration combined with shut-off capability. The shut-off system contains an additional imbiber bead matrix that will expand and shut off flow in the event of a catastrophic release or spill of organic materials.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Work shop has and operates an antifreeze recycling unit. Antifreeze additives of glycol and corrosion inhibitor are added to the recycled antifreeze to regenerate it.
- AGE is washed at the wash rack every 6 months. Equipment is primarily steam cleaned to remove greases and oil, with aircraft soap and water rarely used. The wash rack is connected to the oil-water separator that is cleaned by the Environmental Department.
- OPTIMA batteries have replaced the traditional lead-acid batteries in the AGE serviced.
- R-12 use has been eliminated. All equipment now uses R-134.
- JP-8 is reclaimed and reused in one piece of AGE. As a result, the work center does not generate any waste JP-8.
-

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center– yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Procure a hydraulic fluid purifier to extend the life of the fluid used in the equipment. An estimated 50 gallons of hydraulic fluid is used per year. The hydraulic fluid drained from the systems is collected and combined with other used oils from around base for offsite energy recovery. A hydraulic fluid purifier would help decrease the amount of fresh fluid purchased by allowing the fluid to be cleaned and recycled back into the equipment.
- Replace the Safety Kleen Parts Washer with an Inland Technologies Filtered Parts Washer using Breakthrough solvent. This system is in successful use in AFRES shops at NAS-JRB Ft. Worth. Other cleaners include Brulin 63-G (6850-01-394-0169) by Brulin Corp. and ShopMaster HP (6850-01-420-2884) by Buckeye Intl. Both contain corrosion inhibitors.

AGE MAINTENANCE

PROCESS DESCRIPTION

Preventive maintenance on AGE includes fluid top-off and change-outs, filter changes, brake replacements, and battery service. Oil filters are changed out and placed in used filter drum for recycle offsite. Occasionally, AGE will require small parts cleaning, done in a parts washer, and minor repair. In cases when the pieces of AGE require painting, they are prepped first with sand paper to remove any visible corrosion and to smooth the surface, wiped down with thinner, and touch-up painted with aerosol spray paints. AGE are washed at the wash rack every 6 months. Equipment is primarily steam cleaned to remove greases and oil, with aircraft soap and water rarely used. The wash rack is connected to the oil-water separator, which is cleaned by the Environmental Department.

Refrigerant used in the AGE AC unit is rarely serviced. In this case, R-134 is reclaimed and recycled back into the unit. All AGE use OPTIMA maintenance free batteries. All used batteries are turned into the HazMinCen.

Base Process ID #: TANGAGE-01

HSMS Code: ID-23-00, ID-01-11, ID-05-07

Substrate: Steel, some aluminum

MRC/Technical Publication: Tech Orders

P2/Environmental Equipment Used in Process: Refrigerant Reclaim System (Freon R134), Galileo Vacuum Tec Vac Sound for Freon 134; BG Cool'r Clean'r Coolant Purification (antifreeze recycler)

PROCESS FLOW DIAGRAM:

AGE Requiring Maintenance

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Hydraulic fluid, Antifreeze, Engine oil, Turbine oil, Engine primer, Transmission fluid JP-8, Diesel and Motor gasoline Freon R-134 Diesel starting fluid	Fluids Service (top-off)	Used Hydraulic fluid, Anti-freeze, Oil, JP-8 & Motor gasoline(Recycle) Rags w/oil (Recycle) Air Emissions – fuel Empty containers (Recycle)
Antifreeze Additives: Corrosion Inhibitor,: Glycol Lube oils, Hydraulic fluid Grease, Oil Filters Absorbent pads	Lubricate Filter/Fluid Change	Lube oils (Recycle) Used Hydraulic fluid (Recycle) Used Absorbent pads (non-RCRA) Used Oil Filters (Recycle)
Brake shoe Brake fluid	Brake Change	Brake fluid (Recycle) Brake shoes (Solid Waste)
OPTIMA Batteries	Change Batteries	Used batteries (Recycle)
Safety Kleen Premium Gold Solvent Sealants, Lubricants, Adhesive, Antiseize, Solder, flux Solder, Acid and Rosin Core	Clean Small Parts Repair	SK Premium Gold Solvent (RCRA) Rags w/solvent & lubricants (Recycle) Empty containers (Recycle)
Sandpaper on sander Thinner	Corrosion Removal Clean	Waste sandpaper (Solid Waste) Rags w/ thinner (Recycle)
Aerosol paint, Aerosol primer, Alphatic thinner Lacquer thinner	Prime and Topcoat	Empty aerosol cans (Recycle) Waste paint/thinner (RCRA) Air Emissions - painting
Aircraft Soap Water	Wash	Water and Soap-OWS

OUT

Serviced AGE

TANG ELEC – ELECTRO/ENVIRONMENTAL SHOP

COMMAND:	Texas Air National Guard (TANG)
DEPT:	Electro/Environmental (241EE)
WORK CENTER:	TANGELEC
SHOP NAME:	Electro/Environmental
BUILDING #:	1675
SHOP POC AND PHONE #:	Thomas Crieger, (817) 782-3532

WORK CENTER DESCRIPTION

The work center performs maintenance and minor repair of the aircraft electrical systems of the C-130 aircraft. The work center also maintains the aircraft air-conditioning and oxygen systems and the liquid oxygen carts. If work center personnel cannot repair the component, it is replaced and the defective component is shipped to the naval air station AIMD for repair.

The primary processes performed in this shop are:

- **Electrical Systems Maintenance**
- **Oxygen Systems Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Use of isopropyl alcohol for electric contact and other cleaning can be reduced using small pump bottles called Minda Dispensers. Unused isopropyl alcohol drains back into the bottle. Spills are also avoided. These dispensers are in use at 69A Hybrid Test Shop in the Van Pad area at Marine Corps Air Station (MCAS) Beaufort. Alternatively, use prepackaged isopropyl soaked tech wipes to reduce amount of isopropyl alcohol used.

- Use reformulated non-ODS version of Cleaning Compound, Solvent (6850-01-434-4410) (5-gallon can). It contains 1,1-Dichloro-1-Fluoroethane, an ODS and a TRI chemical. Possible alternatives include Safety Prep (6850-01-381-5139) and Samurai (6850-01-381-4419), both by Inland Technology and Hurrisafe (8015) HK-188 AE(6850-01-426-6682) by PCI of America.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Scrap metal from the replacement of components is placed in the recycle bins in the Structural/Sheet Metal Shop.
- The shop has discontinued the use of electrical/lube compound (NSN 6850-01-375-5690), which contained HCFC-114.
- The shop uses maintenance-free 24-volt sealed lead-acid batteries (SLAB) on the aircraft whenever possible.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ELECTRICAL SYSTEMS MAINTENANCE

PROCESS DESCRIPTION
The work center performs maintenance and minor repair of the aircraft electrical systems of the C-130 aircraft. If work center personnel cannot repair the component, it is replaced and the defective component is shipped to the naval air station AIMD for repair. Sealant is used to protect the installed electrical system components from moisture.

Base Process ID #: TANGELEC-01

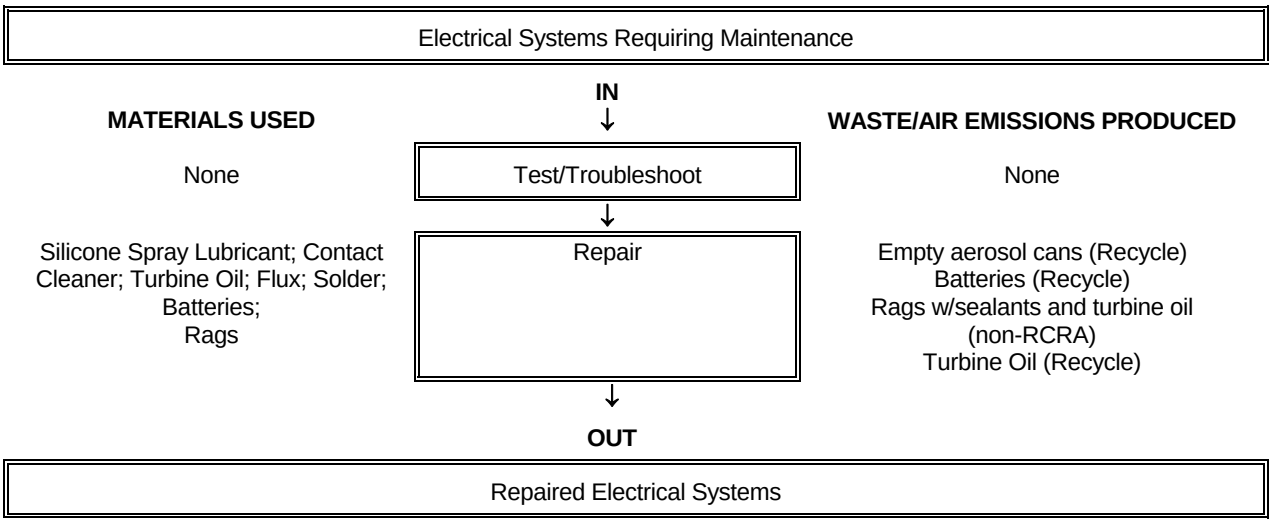
HSMS Code: ID-22-99

Substrate: Aircraft Electronic Systems

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



OXYGEN SYSTEMS MAINTENANCE

PROCESS DESCRIPTION
The work center maintains the aircraft air-conditioning and oxygen systems and the liquid oxygen carts. If work center personnel cannot repair the component, it is replaced and the defective component is shipped to the naval air station AIMD for repair. Regulators are sent to the depot level for repair and replaced with a spare.

Base Process ID #: TANGELEC-02

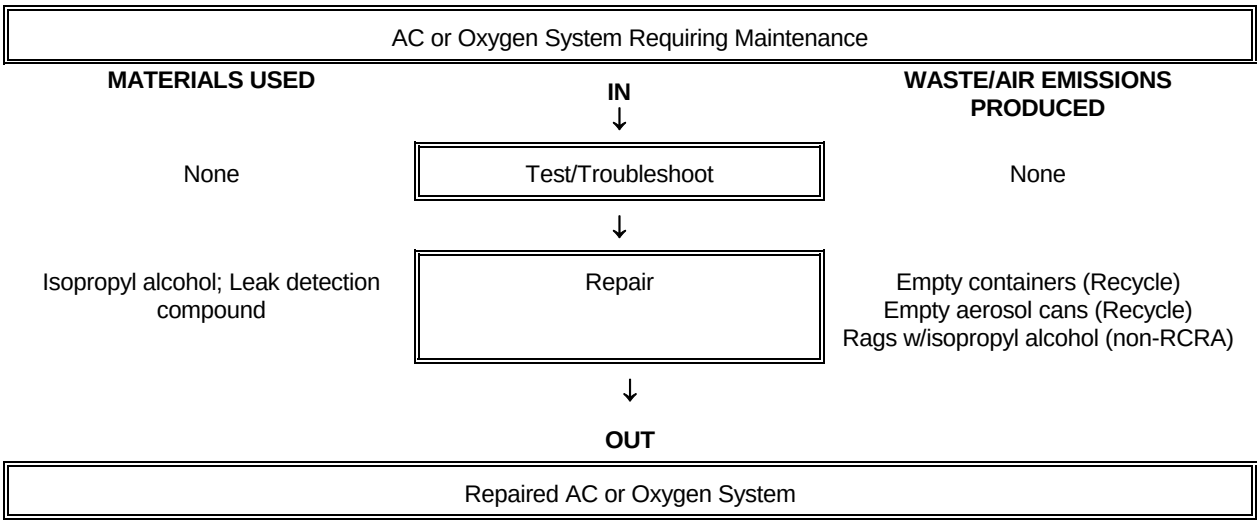
HSMS Code: ID-22-99

Substrate: Aluminum and stainless steel

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



TANG HYD – HYDRAULIC SHOP

COMMAND:	Texas Air National Guard (TANG)
DEPT:	Hydraulic Shop (241HS)
WORK CENTER:	TANGHYD
SHOP NAME:	Hydraulic Shop
BUILDING #:	1675
SHOP POC AND PHONE #:	MSGT Charles Barnett & SSGT Jeremy Bingham, (817) 852-3537

WORK CENTER DESCRIPTION

The shop provides scheduled and unscheduled maintenance of aircraft hydraulic system components. The shop does not perform testing of hydraulic fluids for particulate contamination since it is not required.

The primary process performed in this shop is:

- **Maintenance on Hydraulic System/Components**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Collect asbestos disks for proper disposal; they are currently disposed as solid waste.
- Procure and use parts washer and aqueous degreaser solution to replace Safety Kleen solvent. Alternative solutions include Brulin 63-G (6850-01-394-0169) by Brulin Corp., KRC-7X (6850-01-412-7809) by Chemique, Inc. These include rust inhibitors.
- If a centralized hydraulic fluid purifier is made available and is close enough, the shop should use it to reduce the cost of hydraulic fluid material purchases.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Recycle scrap steel.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

MAINTENANCE ON HYDRAULIC SYSTEM/COMPONENTS

PROCESS DESCRIPTION
The work center performs brake system disassembly and repair, installation of new brake pads, hydraulic components cleaning, and testing of hoses. Minor repair is performed in the shop. Valves, actuators, and pumps are sent to the depot level for repair. In the event of a major system repair, all hydraulic fluid is drained and placed in a used POL bowser. The system is then refilled with new hydraulic fluid, per tech orders. Otherwise, hydraulic fluid is added to the aircraft hydraulic systems as needed.

The shop utilizes Safety Kleen parts washers located in the Engine Shop or the Tire Shop.

Base Process ID #: TANGHYD-01
HSMS Code: ID-23-01
Substrate: Aluminum, Composite
MRC/Technical Publication: Tech Orders
P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

Hydraulic or Brake System/Component Requiring Maintenance

MATERIALS USED	IN	WASTE/AIR EMISSIONS PRODUCED
Hydraulic fluid Red rags; Asbestos Insulating Disks	Component Disassembly, Clean	Rags w/hydraulic fluid (Recycle) Hydraulic fluid (Recycle) Asbestos Insulating Disks (Solid Waste) Empty containers (Recycle)
Hydraulic fluid; Adhesive; Steel parts	Visual Inspection and Repair	Scrap steel (Recycle)
Rags Technical petrolatum Sealing compound Lube oil, Grease Anti-seize compound	Repair/Service (Phase Activities)	Empty containers (Recycle) Rags w/grease, sealant, adhesive (Recycle)

OUT

Maintained Hydraulic System/Component

TANG MACH – MACHINE SHOP

COMMAND:	Texas Air National Guard (TANG)
DEPT:	Machine Shop (243MS)
WORK CENTER:	TANGMACH
SHOP NAME:	Machine Shop
BUILDING #:	1675
SHOP POC AND PHONE #:	TSGT James Meadows, (817) 852-3536 MSGT Jayson Deleon

WORK CENTER DESCRIPTION

The Metal shop performs basic machining operations for the C-130 aircraft, AGE, and Civil Engineering equipment. Aircraft structures or parts are manufactured, modified, or repaired using drilling, cutting, and welding techniques. Larger and more complicated aircraft parts are fabricated/repaired at the depot level.

The primary processes performed in the Metal shop are:

- **Metal Machining**
- **Welding**

Pollution prevention practices currently utilized by this work center are presented below along with potential Pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Implement use of Tri-cool water soluble cutting oil to reduce oil left on parts in order to reduce use of denatured alcohol required to clean oil from machined parts.

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Scrap aluminum and steel are collected in separate drums in the shop, transferred to nearby scrap Dumpsters, and transported to the NAS side for recycle.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen– yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center–yes

Used batteries (all types) picked up by Hazardous Waste for recycle –not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle–not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

METAL MACHINING

PROCESS DESCRIPTION
Metal parts or structures from the aircraft and other equipment can be modified or manufactured using drilling, grinding, and cutting machines. The shop also supports AGE and Civil Engineering equipment. Larger and more complicated aircraft parts are fabricated/repaired at the depot level.

Scrap aluminum and steel are collected in separate drums in the shop, transferred to nearby scrap Dumpsters, and transported to the NAS side for recycle.

Base Process ID #: TANGMACH-01

HSMS Code: ID-01-00

Substrate: Various metals

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process: Basic machine shop equipment

PROCESS FLOW DIAGRAM:

Metalwork Needed

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
General purpose cleaner Cutting fluid Magic Marker/Layout dye Lubricating oils Grease	Machining	Empty containers (Recycle) Scrap metal and shavings (Recycle) Lubricating oils (Recycle) Rags w/oil and grease (non-RCRA) Rags w/general purpose cleaner (Solid waste)
General purpose cleaner Adhesives Lubricants Grease Denatured alcohol	Assemble, Cleanup, Equipment Maintenance	Empty containers (Recycle) Scrap metal and shavings (Recycle) Lubricating oils (Recycle) Rags w/oil and grease (non-RCRA)

OUT

Metalwork Completed

WELDING

PROCESS DESCRIPTION

The majority of welding done in the Machine shop is TIG welding, which uses gases in the process. The metal to be welded is first sanded down to smooth any rough edges, wiped down with alcohol, and then welded. Soldering is done on a rare basis, but this shop has the ability to perform this type of welding. The gas cylinders are owned by this work center and taken off base to be filled.

Base Process ID #: TANGMACH-02

HSMS Code: ID-11-00

Substrate: Various metals

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process: Welding equipment

PROCESS FLOW DIAGRAM:

Metal Requiring Welding

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Sand paper	Sand	Used Sand Paper (Solid waste)
Alcohol Consumable welding rods Electrodes Argon Oxyacetylene	Clean Weld	Unusable welding rods (Recycle) Air Emission - welding Empty containers (Recycle) Empty cylinders (Reused)

↓

OUT

Welded Parts

TANG LGMP – PROPULSION

COMMAND:	Texas Air National Guard (TANG)
DEPT:	Propulsion (242P)
WORK CENTER:	LGMP
SHOP NAME:	Propulsion
BUILDING #:	1675
SHOP POC AND PHONE #:	SMS Arnold Flores, (817) 852-3540

WORK CENTER DESCRIPTION

This shop maintains and repairs engines, auxiliary power units (APUs), propellers, and prop assemblies in support of the TANG C-130 aircraft. The engines and components are torn down, tested, repaired, and rebuilt. All repairs are done in the shop. The shop is scheduled to have a test cell constructed by 2008.

The primary processes performed in this shop is:

- **Engine and Prop Assembly**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Use recyclable conweb to catch drips and potential spills instead of using roll or clay absorbents and pigs for cleanup. The following Web site provides information regarding the grey/black conweb used at MCAS Beaufort as recyclable oil absorbent: http://www.cyclesorb.com/service.htm
- Coordinate the recycling of hydraulic fluid with AIMD 920. An estimated 165 gallons of used hydraulic fluid is generated each year.
- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Large metal drip pans are used to catch leaks and spills when work is conducted .
- The shop operates a “buffalo” to capture all Gas Path cleaner solution that is exhausted from the C-130. The buffalo is equipped with large flexible hoses that are connected to the engine exhaust and the drain mast to catch all runoff and avoid spills.
- The shop operates a “doghouse” to collect used hydraulic fluid from engine propellers. The doghouse contains a metal grate with a reservoir below to collect the fluid. The used fluid is then transferred to a used oil bowser.
- The shop has converted from the use of conventional oil to synthetic oil.
- Used filters are recycled offsite.
- The shop has eliminated the use of MEK for wipe cleaning.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Replace the Safety Kleen solvent parts washer with an aqueous-based parts washer with a corrosion inhibitor. The VC-6 Maintenance Squadron at Dam Neck uses a Cantol, Inc. heated aqueous parts washer to clean all metal parts. The cleaning solution AquaPower contains a metal corrosion inhibitor and is safe on all metals. The shop indicated that the heated solution cleans off saltwater, grease, and corrosion and does not harm the parts. Two other alternatives are a “Smart Washer” using “Ozzie Juice” or an Inland Technology IT-48WC part washer (with filter). “Smart Washers” (marketed by ChemFree Corporation) use a nontoxic, nonflammable degreasing solution (“Ozzie Juice”) that is cleaned by enzymes feeding on soils removed from the parts. It produces no harmful fumes, has only a slight odor, and is gentle on mechanics’ hands (protective gloves are not required). The Inland Technology parts washer is approved to use Breakthrough (6850-01-378-0666) or Skysol (6850-01-381-4404). The system uses Edge Tek filters (4250-01-381-8024).
- Obtain an Engine Gas Path Effluent Pretreatment System to process the effluent rather than collecting it and disposing offsite. The Pretreatment System is available on the PPEP Web site and has been tested at NAS Jacksonville.

ENGINE AND PROP ASSEMBLY

PROCESS DESCRIPTION

This shop maintains and repairs engines, auxiliary power units (APUs), propellers, and prop assemblies in support of the TANG C-130 aircraft. The engines and components are torn down, tested, repaired, and rebuilt. All repairs are done in the shop. The shop is scheduled to have a test cell constructed by 2008.

The C-130 engines are cleaned at a rate of one compressor wash per engine per month. The Gas Path cleaner removes the carbon buildup within the engine. The cleaning solution is run through the compressor, followed by two fresh water rinses. All cleaning solution and rinse water is collected by the shop's "buffalo," a bowser fitted with two flexible hoses that are attached to the engine exhaust and the drain mast to catch the runoff. All Gas Path cleaning is conducted on the flight line.

Hydraulic fluid is drained from propellers whenever propeller maintenance is required. Draining is performed in the "dog house," an open-faced containment system consisting of a metal grate with a collection reservoir below. The fluid is drained from the propellers over the grate. The used hydraulic fluid is then transferred to the used oil bowser. The shop performs an average of six propeller changes per year.

Base Process ID #: 159ENGN1Z

HSMS Code: ID-23-00

Substrate: Aircraft Engines

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
"Buffalo," "Doghouse"

PROCESS FLOW DIAGRAM:

Un-serviced Engine and Propeller

MATERIALS USED	IN	WASTE/AIR EMISSIONS PRODUCED
Safety Kleen Premium Gold Solvent, Toluene, Isopropyl Alcohol, Gas Path Cleaner MEK (Mil-Spec)	Disassembly and Clean	Used Oil & Oil Filters (Recycle) Rags w/ oil (non-RCRA) JP-8, Hydraulic Fluid (Recycle) Empty metal containers (Recycle) De-icer boots (Solid Waste) Gas Path Cleaner (RCRA)
Adhesive, Gaskets, Solder, Flux	Repair	Gaskets & Fuel filters (non-RCRA) Absorbent mats w/ JP-8 (non-RCRA)
RTV, Petroleum Lubricants, Sealants, Spray paints (stencil)	Assembly	Air emissions-RTV tubes (HazMin Center Aerosol cans, Drums, Solder droppings (Recycle) Rags w/oil (non-RCRA
Hydraulic Fluid Engine oil Preservative oil	Service	Rags w/oil and hydraulic fluid (non-RCRA) Oil, Hydraulic Fluid, Metal Containers (Recycle)
Absorbent mats (PIGS)	Clean up	Absorbent mats w/ oil and hydraulic fluid (non-RCRA)

OUT

Serviced Engine and Prop

TANG TIRE – WHEEL/TIRE REPAIR AND RECLAMATION SHOP

COMMAND:	Texas Air National Guard (TANG)
DEPT:	Wheel/Tire (241TS)
WORK CENTER:	TANGTIRE
SHOP NAME:	Wheel/Tire Repair and Reclamation Shop
BUILDING #:	1430
SHOP POC AND PHONE #:	SMSGT Dan Sheppard, (817) 852-3534

WORK CENTER DESCRIPTION

The Repair and Reclamation shop maintains C-130 aircraft tires and wheels. Routine maintenance, such as cleanings and lubricating, are performed on a periodic basis.

The primary process performed in the Wheel/Tire Repair and Reclamation Shop is:

- **Wheel and Tire Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential Pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- The shop operates a MART Tornado heated aqueous washer with 296 cleaning solution to clean tire rims.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – not applicable

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- Replace the Safety Kleen solvent parts washer. Two alternatives are a “Smart Washer” using “Ozzie Juice” or an Inland Technology IT-48WC part washer (with filter). “Smart Washers” (marketed by ChemFree Corporation) use a nontoxic, nonflammable degreasing solution (“Ozzie Juice”) that is cleaned by enzymes feeding on soils removed from the parts. It produces no harmful fumes, has only a slight odor, and is gentle on mechanics’ hands (protective gloves are not required). The Inland Technology parts washer is approved to use Breakthrough (6850-01-378-0666) or Skysol (6850-01-381-4404). The system uses Edge Tek filters (4250-01-381-8024). Agitated parts washers are also available.

WHEEL AND TIRE MAINTENANCE

PROCESS DESCRIPTION

Wheels and tires are cleaned and inspected for damage on a periodic basis. When the tires are removed and wheels disassembled, the wheel rim is cleaned in the MART Tornado Parts Washer with 296 Cleaning Solution. The wash water is discharged and the wheel removed for inspection and reassembly. Once the unit has been cleaned, the wheel and tire is installed on the aircraft. Bearings and smaller parts are cleaned in a 25-gallon Safety Kleen parts washer using Premium Gold Solvent. A self-contained bead blast machine using plastic media is sometime used to remove corrosion or paint prior to repainting and reassembly. The bead blast booth is the responsibility of the Structural Repair (TANG242) Shop.

Base Process ID #: TANGTIRE-01

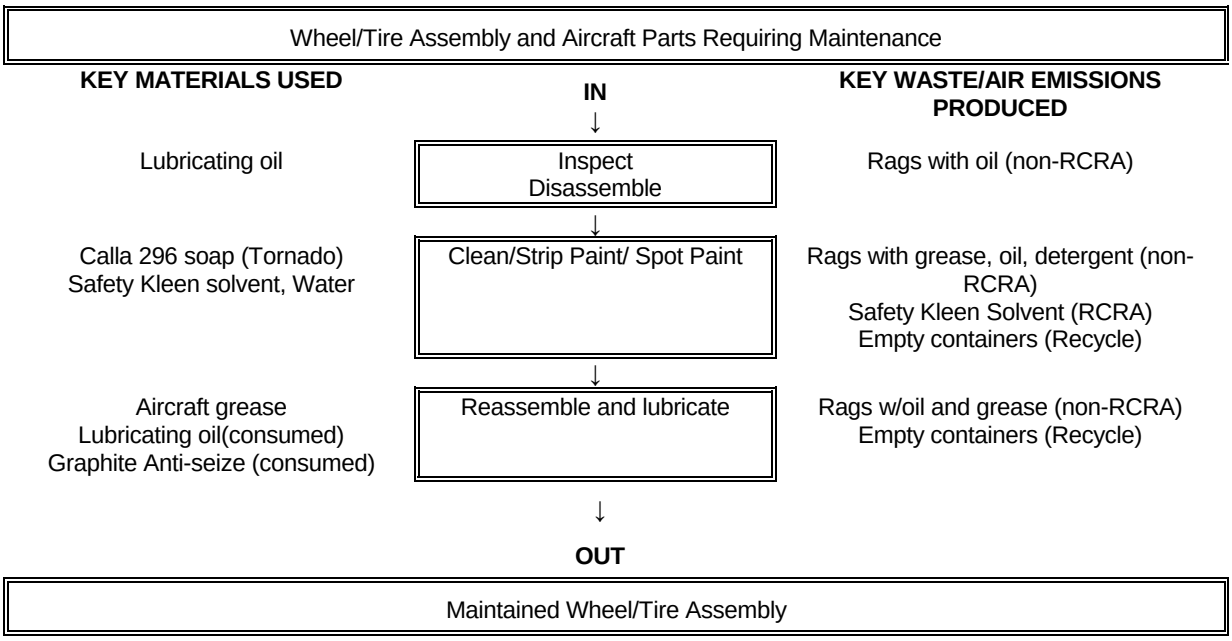
HSMS Code: ID-01-02, ID-02-07

Substrate: Steel (Wheel Assemblies)

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
MART Tornado heated aqueous washer

PROCESS FLOW DIAGRAM:



VMFA 112

VMFA-112 13B – SEAT SHOP

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	VMFA-112
WORK CENTER:	VMFASEAT
SHOP NAME:	Seat Shop
BUILDING #:	1048
SHOP POC AND PHONE #:	Sgt. Thornberg, (817) 782-2885

WORK CENTER DESCRIPTION

This shop performs maintenance and repair of ejection seats for 11 F/A-18 aircraft.

Primary processes performed in this shop are:

- **Ejection Seat Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- The shop has eliminated the use of ODS-containing formulations of lubricants/preservatives and Break-Free (NSNs 9150-01-054-6453, 9150-00-823-7860, 9150-01-053-6688, 6850-00-105-3084, and 9150-01-079-6124).

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

EJECTION SEAT MAINTENANCE

PROCESS DESCRIPTION
Ejection seats are inspected periodically based on the PM schedule. Seats are cleaned using CLP. Grease and lubricants are used to lube seat actuator and other components.

Base Process ID #: VMFASEAT-02

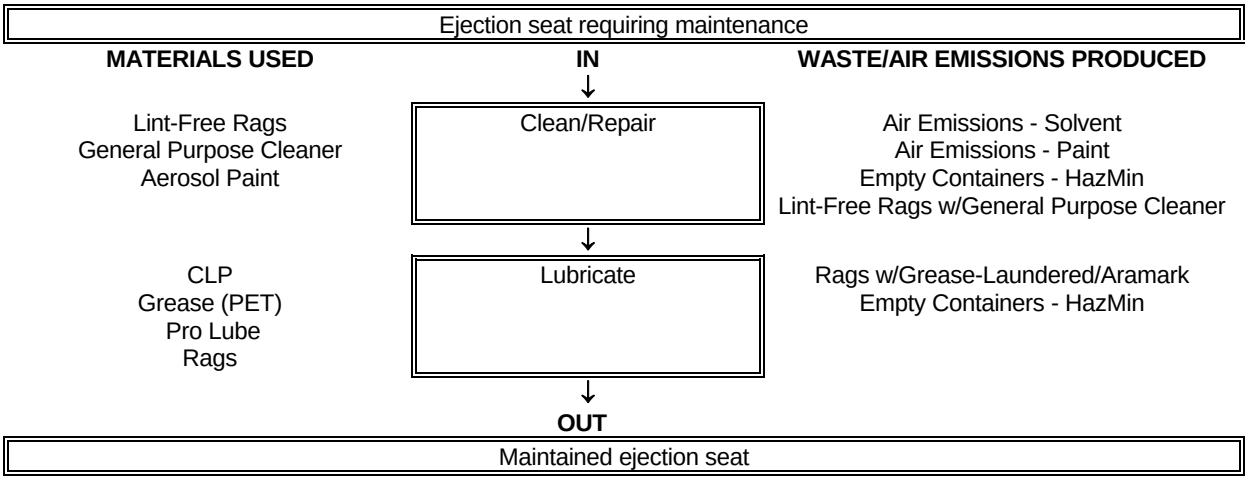
HSMS Code: MS-01-00

Substrate: Aluminum

MRC/Technical Publication: NA

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



VMFA-112 12C – CORROSION CONTROL

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	VMFA-112
WORK CENTER:	VMFA12C
SHOP NAME:	Corrosion Control
BUILDING #:	1048
SHOP POC AND PHONE #:	Sgt Gause (817) 782-2881

WORK CENTER DESCRIPTION

The work center performs small-scale painting and corrosion prevention of the F/A-18 aircraft. This is accomplished by performing periodic inspection and maintenance operations. Occasional unscheduled maintenance activities are also performed.

The work center is also responsible for floor painting, stripping, and cleaning within the building.

The primary process performed in this shop is:

- **Corrosion Control**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Use four HVLP paint guns; two are regular size and two are smaller touch-up paint guns.
- The work center uses Unicoat Paint Technology for aircraft painting.
- The shop has replaced MIL-C-16173D coating compound (NSN 8030-00-903-0931), which contained CFC-12 and Toluene.
- The shop uses reformulated non-ODS versions of MIL-C-81309 and MIL-C-85054 (CPC).
- Use Sem pens and alodine pens for small touch-up projects.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

CORROSION CONTROL

PROCESS DESCRIPTION
The work center performs small-scale painting and corrosion prevention of F/A-18 aircraft. Complete aircraft repainting is done at the Depot level.

The work center performs painting and corrosion control using two regular-size HVLP paint guns, two smaller touch-up HVLP paint guns, and Sem pens. The HVLP paint guns are primarily used for painting activities. Polyurethane paint is the primary paint used on the F/A-18. The shop uses self-priming topcoats (unicoat). The paint guns are manually cleaned with approximately four ounces of paint thinner after each use. Used paint and thinner is then placed in the waste paint and thinner container. Sem pens are used to prime and paint screws and other small pieces. Aerosol enamel paints are used to paint the squadron insignias on the aircraft. Sanding is performed manually and with power sanders as needed.

The work center is also responsible for floor painting, stripping, and cleaning within the building.

Base Process ID #: VMFA12C-01

HSMS Code: ID-05-00

Substrate: Aluminum, steel

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Four HVLP paint guns, Sem Pens, Kwik Kits

PROCESS FLOW DIAGRAM:

Aircraft Requiring Corrosion Control

MATERIALS USED	IN	WASTE/AIR EMISSIONS PRODUCED
Aliphatic Naphtha Lint-Free Rags A/C Cleaning Compound	Initial Surface Cleaning	Lint-Free Rags w/Naphtha - HazWaste Center Air Emissions - Solvent Empty Containers - HazMin
Aluminum Oxide Grit Paper	Minor Paint Removal (Hand and Power Sanding)	Aluminum Oxide Grit Paper w/Paint Residue - Solid Waste
Aliphatic Naphtha Lint-Free Rags	Surface Cleaning	Lint-Free Rags w/Naphtha - HazWaste Center Air Emissions - Solvent Empty Containers - HazMin
Primer Paint Thinner Lint-Free Rags Sem Pens and Alodine Pens Aerosol Paints	Prime and Paint	Lint-Free Rags w/Paint and Thinner - HazWaste Center Empty Containers - HazMin Waste Paint/Thinner - HazWaste Center Air Emissions - Painting
Thinner Lint-Free Rags	Paint Gun Clean-up	Lint-Free rags w/Thinner - HazWaste Center Thinner - HazWaste Center Air Emissions - Solvent Empty Containers - HazMin
CPC CPC Type I (AML-Guard) ProLube	Service	Rags w/ ProLube and CPC - Laundered/Aramark Empty Aerosol Cans - HazMin Empty Containers - HazMin

OUT

Corrosion Treated Aircraft

VMFA-112 120 – AIRFRAMES

COMMAND: Marine Aircraft Group (MAG) 41
DEPT: VMFA-112
WORK CENTER: VMFAAF
SHOP NAME: Airframes Shop
BUILDING #: 1048
SHOP POC AND PHONE #: Gunnery Sgt. Miale (817) 782-2886

WORK CENTER DESCRIPTION
The shop performs repair of the airframe of the F/A-18 aircraft, including the "skins," landing gear, doors, hatches, brakes, and tires. The shop is also responsible for the testing of hydraulic fluids for particulate contamination and maintenance of the hydraulic systems of the aircraft. The squadron does not have any parts washers.

The primary processes performed in this shop are:
- **Maintenance of Hydraulic Systems**
- **Maintenance of Sealing Panels**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Purchased a Portable Oil Diagnostics Systems particle counter, which has eliminated the need for traditional patch tests using PD680.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

MAINTENANCE OF HYDRAULIC SYSTEMS

PROCESS DESCRIPTION
The work center is responsible for the maintenance of the hydraulic systems of the aircraft. This includes cleaning of the components of the hydraulic systems with a rag and PD-680. PD-680 is applied using a pump spray bottle. Hydraulic fluid is added to the aircraft hydraulic systems as needed.

The work center is also responsible for the testing of hydraulic fluids in the aircraft. The shop only performs patch testing of hydraulic fluid. None of the hydraulic fluids samples are taken to AIMD for testing using a particle counter. Hydraulic fluid samples are pulled from the aircraft only in the event of a line break, when lines are replaced, or when personnel perform maintenance on the hydraulic system. This is done two to three times per month. A PON-6 (pre-oiler) used by the squadron is tested daily. A hydraulic jenny is tested upon each use, an average of about three times per week.

Base Process ID #: VMFAAF-01

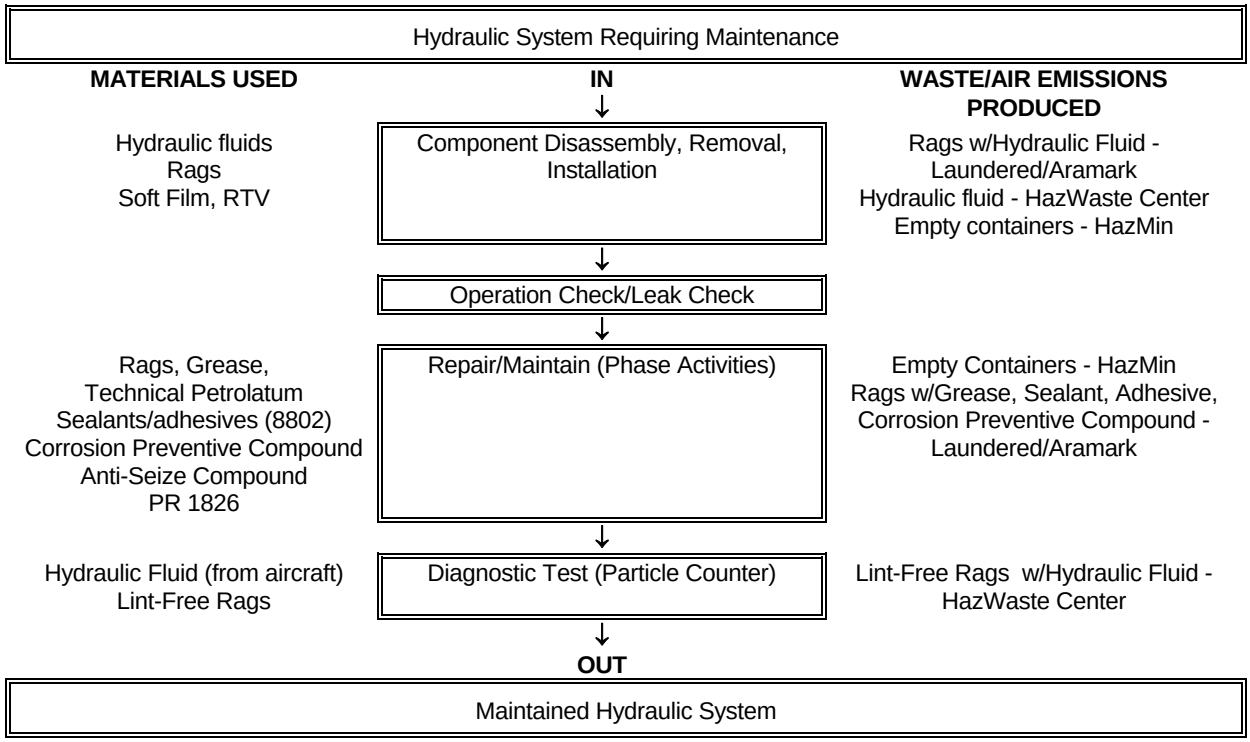
HSMS Code: ID-23-04

Substrate: Hydraulic systems on F/A-18 Aircraft

MRC/Technical Publication: Squadron Maintenance Instruction

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



MAINTENANCE OF SEALING PANELS

PROCESS DESCRIPTION
The work center performs repair of the airframe of the F/A-18 aircraft, including the “skins,” landing gear, panels, and brakes. Sealant is applied to the panels prior to reinstallation after repair.

Base Process ID #: VMFAAF-02

HSMS Code: ID-23-04

Substrate: FA-18 Aircraft

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

Aircraft in need of Replaced Panel

MATERIALS USED	IN ↓	WASTE/AIR EMISSIONS PRODUCED
None	Remove Old Panel	None
Isopropyl Alcohol	Inspect and Clean	Metal Containers - HazMin
Grease Sealants Adhesives Rags	Apply Sealant	Aerosol Cans - HazMin Rags with Adhesives, Sealants, & Grease - Laundered/Aramark Empty Tubes
RTV	Replace Panel	Metal Containers - HazMin

↓
OUT

Aircraft with Replaced Panel

VMFA-112 220 – ELECTRIC SHOP

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	VMFA-112
WORK CENTER:	VMFAELEC
SHOP NAME:	Electric Shop
BUILDING #:	1048
SHOP POC AND PHONE #:	Sgt. Wise (817) 782-2883

WORK CENTER DESCRIPTION

The work center performs maintenance and minor repair of the electrical systems of the F/A-18 aircraft. This consists of electrical wiring and cockpit instrumentation. If work center personnel cannot repair the component, it is replaced and the defective component is shipped to the naval air station AIMD for repair.

The primary process performed in this shop is:

- **Maintenance of Electrical Systems**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- The shop has eliminated the use of the ODS formulation of CPC MIL-C-85054 (8030-01-347-0979).

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

MAINTENANCE OF ELECTRICAL SYSTEMS

PROCESS DESCRIPTION
The work center performs maintenance and minor repair of the electrical systems of the F/A-18 aircraft. The electrical systems consist of many components. Work center personnel inspect these components based on a maintenance schedule. Cleaning and minor repair is performed. If work center personnel cannot repair the component, it is replaced and the defective component is shipped to the naval air station AIMD for repair.

Base Process ID #: VMFAELEC-01

HSMS Code: ID-23-08

Substrate: F-18 Electrical System Components

MRC/Technical Publication: Squadron Maintenance Instruction

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

Electrical System Requiring Maintenance

MATERIALS USED	IN	WASTE/AIR EMISSIONS PRODUCED
None	Remove & replace instruments	None
Lead-Acid Batteries	Remove & replace batteries	Used Batteries - HazWaste Center
Isopropyl Alcohol Sealant/Adhesive Flux/Solder RTV Gray, CPC Lint-Free Rags/Cheesecloth	Repair electrical system	Empty Containers - HazMin Rags with Sealant, Isopropyl Alcohol & CPC - HazWaste Center Air Emissions - Sealant/Adhesive Air Emissions – Soldering & CPC

OUT

Maintained Electrical System

VMFA-112 13A – FLIGHT EQUIPMENT SHOP

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	VMFA-112
WORK CENTER:	VMFAFE
SHOP NAME:	Flight Equipment Shop
BUILDING #:	1048
SHOP POC AND PHONE #:	SSgt. McDonald, (817) 782-2880

WORK CENTER DESCRIPTION

The work center is responsible for the maintenance and minor repair of flight gear for 12 F/A-18 aircraft. This primarily consists of flight suits, jackets, boots, helmets, torso harness, life preservers, and life rafts.

The primary process performed in this shop is:

- **Flight Gear Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- None identified.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

FLIGHT GEAR MAINTENANCE FOR AIR CREWS

PROCESS DESCRIPTION
The work center is responsible for the maintenance and minor repair of F/A-18 flight gear. This primarily consists of flight suits, jackets, boots, helmets, life preservers, and life rafts. These items are periodically inspected based on PM maintenance schedule and repaired or replaced as needed.

Base Process ID #: VMFAFE-01

HSMS Code: ID-23-99

Substrate: Flight Gear

MRC/Technical Publication: NA

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

Flight Gear Requiring Maintenance and Repair

MATERIALS USED	IN ↓	WASTE/AIR EMISSIONS PRODUCED
General Purpose Cleaner Isopropyl Alcohol Gauze Pads	Clean	Empty Containers - HazMin Gauze Pads w/Isopropyl Alcohol - Solid Waste Air Emissions - Solvent
Batteries (alkaline and lithium) Lube Oil (machine oil) Adhesive, Polychloropropene Lint-Free Rags	Maintenance & Repair	Used Batteries - HazWaste Center Empty Containers - HazMin Lint-Free Rags w/Adhesives

↓
OUT

Maintained Flight Gear

VMFA-112 230 - ORDNANCE

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	VMFA-112
WORK CENTER:	VMFAORD
SHOP NAME:	Ordnance Shop
BUILDING #:	1048
SHOP POC AND PHONE #:	Sgt. Rojas, (817) 782-2865

WORK CENTER DESCRIPTION

This shop maintains and loads F/A-18 aircraft weapons systems.

The primary process performed in this shop is:

- **Maintain Aircraft Armament**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Metal containers and empty aerosol cans are recycled offsite through the HazMinCen.
- The shop has eliminated the use of ODS-containing formulations of lubricants/preservatives and Break-Free (NSNs 9150-01-054-6453, 9150-00-823-7860, 9150-01-053-6688, 6850-00-105-3084, and 9150-01-079-6124).
- The shop has eliminated the use of ODS-containing formulations of VV-L-800 (NSN 9150-00-458-0075).
- Bomb racks are cleaned using Simple Green.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – no (available, but not being utilized)

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

MAINTAIN AIRCRAFT ARMAMENT

PROCESS DESCRIPTION
The work center is responsible for maintenance of the weapons systems of the F/A-18 aircraft. This consists of the installation and removal of weapons and the testing and checking of weapons systems. Any electronic components of the weapons systems that cannot be repaired by the shop are replaced and the defective components are shipped to AIMD for repair. If AIMD cannot repair components, they are sent to Depot level for repair or replacement.

Base Process ID #: VMFAORD-01

HSMS Code: ML-01-05

Substrate: Steel

MRC/Technical Publication: MRC-250

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

Weapons Systems Requiring Maintenance

MATERIALS USED	IN ↓	WASTE/AIR EMISSIONS PRODUCED
Pro Lube, Rags	Clean	Rags w/Pro Lube - HazWaste Center Empty Containers - HazMin
Rags Lubricant (TW-25B) Solid film, Grease	Lubricate	Empty Containers - HazMin Rags w/Grease & Lubricant - HazWaste Center
Rags, CPC	Preserve	Empty Containers - HazMin Rags w/CPC - HazWaste Center
MA-102 Cleaning Compound	Wipe Down (weekly local requirement)	Empty Containers - HazMin

↓
OUT

Maintained Weapons Systems

VMFA-112 310 – POWER LINE

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	VMFA-112
WORK CENTER:	VMFAPL
SHOP NAME:	Power Line
BUILDING #:	1048
SHOP POC AND PHONE #:	Sgt. Erpelding, (817) 782-2873

WORK CENTER DESCRIPTION
This shop is responsible for cleaning and servicing F/A-18 aircraft prior to takeoff and immediately after arrival.

This work center washes each aircraft every two weeks at the wash rack. In addition, smaller aircraft surfaces and the canopy receive more frequent cleanings. The work center tops off turbine oil reservoir and conducts daily fueling, defueling, and fuel sampling activities. The work center does not service the hydraulic fluid. This is done by the 120 Airframes Shop.

The primary processes performed in this shop are:
- **Aircraft Servicing/Washing**
- **Aircraft Servicing/Fueling**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Defueling is done from one cell within the aircraft to another whenever possible.
- Fuel samples and used oil are collected for recycle.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

AIRCRAFT SERVICING/WASHING

PROCESS DESCRIPTION
This work center washes each aircraft every two weeks at the wash rack. In addition, smaller aircraft surfaces and the canopy receive more frequent cleanings.

Base Process ID #: VMFAPL-01

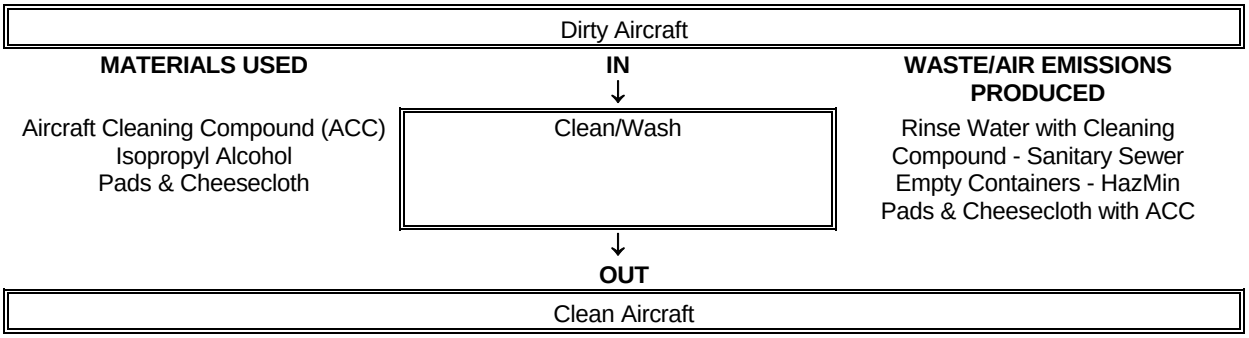
HSMS Code: ML-02-99

Substrate: Composite

MRC/Technical Publication: Squadron Maintenance Instruction

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



AIRCRAFT SERVICING/FUELING

PROCESS DESCRIPTION

The work center performs daily fueling and fuel sampling. A fueling truck from the Fuel Farm delivers the fuel to the aircraft. Shop personnel perform all hookups, monitor fuel flow, and staff the fire extinguishers. Samples are pulled from every fuel cell of each aircraft scheduled for flight operations that day. A visual inspection of the samples is conducted for the presence of water or other contamination. After visual inspection, the fuel samples are commingled with used oil generated in Building 1048. This fuel/oil mixture is picked up by the Hazardous Waste Center for recycle.

Base Process ID #: VMFAPL-02

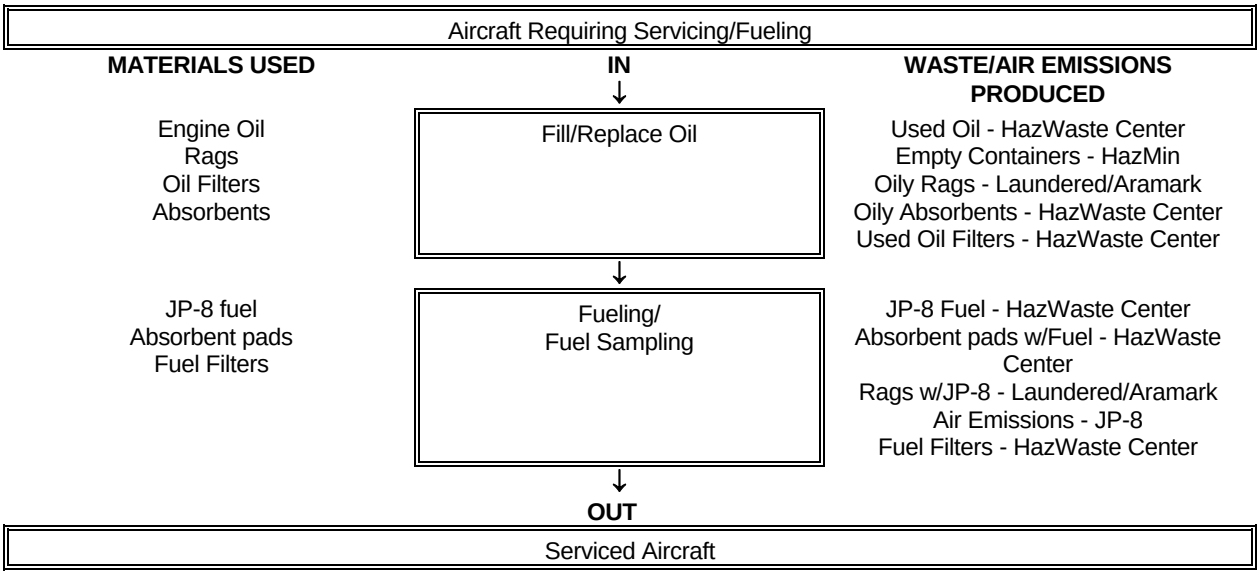
HSMS Code: ID-19-99

Substrate: F/A-18 Aircraft

MRC/Technical Publication: Squadron Maintenance Instruction

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



VMFA-112 RADAR SHOP

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	VMFA-112
WORK CENTER:	VMFARAD
SHOP NAME:	Radar Shop
BUILDING #:	1048
SHOP POC AND PHONE #:	Sgt. Garcia, (817) 782-2883

WORK CENTER DESCRIPTION

This shop performs repair and/or replacement of communication/radar/navigation equipment and weapons systems on the F/A-18 aircraft. This shop also maintains the radar coolant that cools aircraft electronics.

Primary process performed in this shop is:

- **Equipment Servicing**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Filter radar coolant with a purge cart and reuse coolant in the aircraft.
- The shop has eliminated the use of ODS-containing formulations of CPC MIL-C-85054 (8030-01-347-0979).

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

EQUIPMENT SERVICING

PROCESS DESCRIPTION
All work is performed on a PM schedule unless a repair is required. Work center personnel periodically inspect the aircraft radar coolant system. The radar coolant is removed from the aircraft and filtered through a purge cart if coolant samples do not meet the required specification properties. The filtered coolant is then retested. The coolant is pumped back into the aircraft once the coolant passes inspection.

The shop uses lint-free rags and optic lens cleaner to clean aircraft displays and a small amount of isopropyl alcohol to clean equipment electrical connectors.

Base Process ID #: VFA13B-02

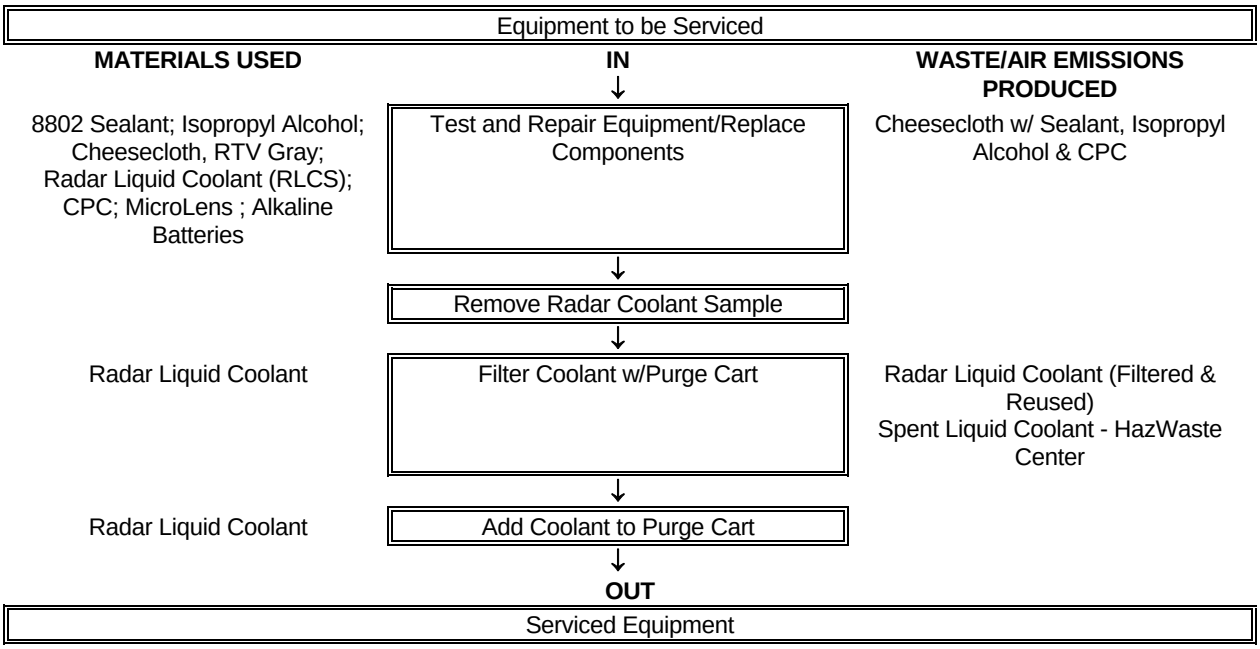
HSMS Code: ID-22-99

Substrate: Radar Systems

MRC/Technical Publication: 410-200

P2/Environmental Equipment Used in Process:
Purge cart, Coolant pumping system

PROCESS FLOW DIAGRAM:



MAG41 234

VMGR 234-12A AIRFRAMES

COMMAND:	Marine Aircraft Group (MAG) 41
DEPT:	VMGR 234
WORK CENTER:	MAG4112A
SHOP NAME:	Airframes
BUILDING #:	1050
SHOP POC AND PHONE #:	Cpl Collins (817) 782-2924

WORK CENTER DESCRIPTION

The Airframes shop provides routine and phase maintenance on C-130 aircraft airframes including the "skins," landing gear, doors, hatches, brakes, and tires. The shop combined duties with 12B, the Hydraulic shop, and is also responsible for the testing of hydraulic fluids and maintenance of the hydraulic systems of the aircraft.

The primary processes performed in the Airframes Shop are:

- **Airframe Maintenance**
- **Hydraulic Fluid Testing**
- **Hydraulic System Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- VMGR 234 operates an absorbent pad wringer to remove excess fluids from the pad facilitating an increase in the amount of used oil accumulated for offsite recycling. Pads are collected for disposal.
- Particle Counter Testing of hydraulic fluid has recently replaced the use of patch testing as the primary method. This reduces the usage of the dry-cleaning solvent, PD-680, and the waste generated from the hydraulic fluid sampling process.

- Tires removed from the aircraft are taken to the base Service Center to be retread as opposed to being disposed.
- Scrap metal is segregated and recycled in the scrap metal bins outside of the hangar.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

AIRFRAME MAINTENANCE

PROCESS DESCRIPTION

The C-130 aircraft consists of approximately 80% airframes that must be inspected for damage as part of a routine preventive maintenance measure. The “skins”—or outer shell—landing gear, doors, hatches, brakes, and tires are thoroughly inspected and all damage is identified. Routine maintenance consists of lubricating flaps, doors, and hatches; inspecting tires on a daily basis; changing tires; and changing the nonasbestos brakes. The tires removed from the plane are taken to the base Service Station to be retread off base and then returned to this work center. Repair can vary from sealing cracks to fabricating a new or modified piece (or patch) in order to correct the problem. Fabricated pieces are formed by AIMD and attached by this work center first applying Aldine on the patch and securing with rivets and sealants. The patch will then be painted by 12C, the Corrosion Control Shop.

Base Process ID #: MAG4112A01

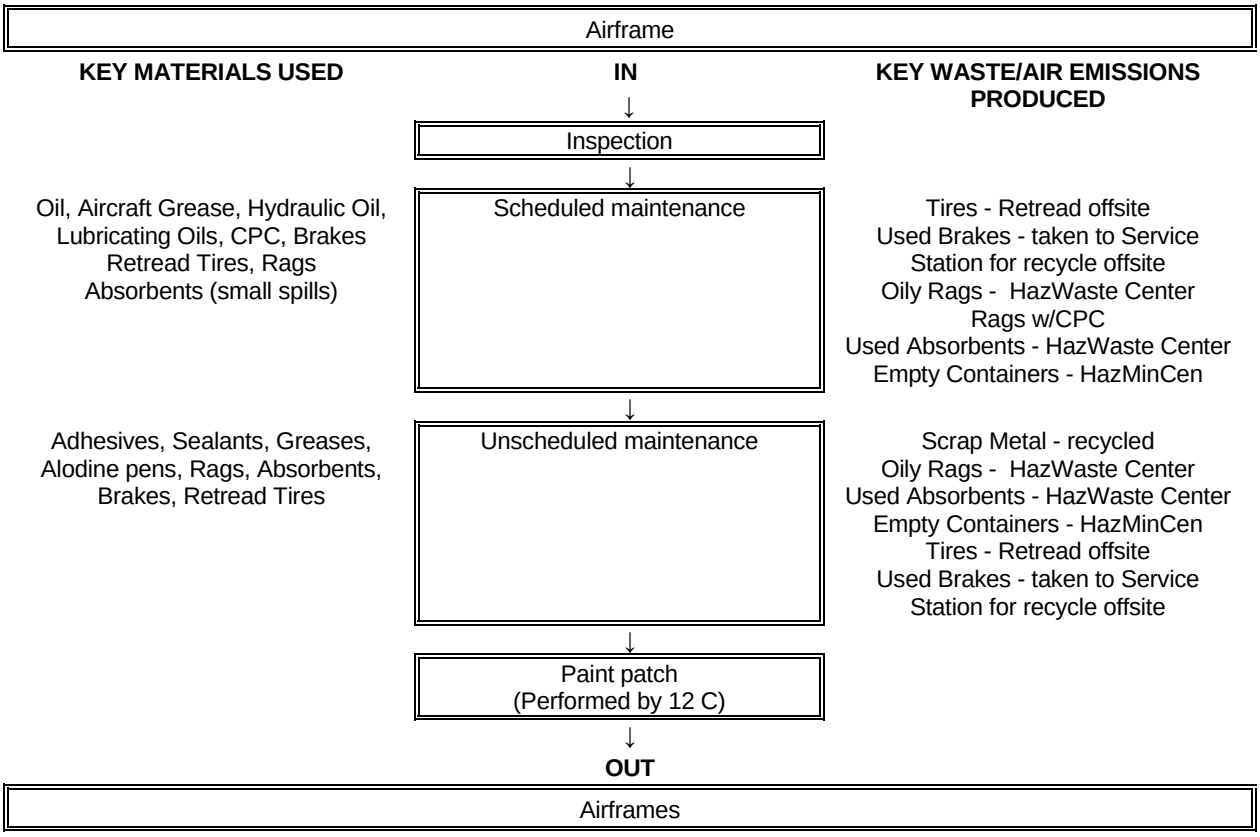
HSMS Code: ID-23-04

Substrate: Aluminum

MRC/Technical Publication: NAVAIR 0175GAA/GAH

P2/Environmental Equipment Used in Process:
None identified

PROCESS FLOW DIAGRAM:



HYDRAULIC FLUID TESTING

PROCESS DESCRIPTION
When hydraulic systems are sampled, approximately 8 oz. of hydraulic fluid is pulled for a particle counter test. Patch testing of hydraulic fluid occasionally occurs in the event the particle counter is inoperable or if a reservist requires training on patch testing. The hydraulic service unit is tested for contamination prior to pumping fluid into the aircraft.

Base Process ID #: MAG4112A02

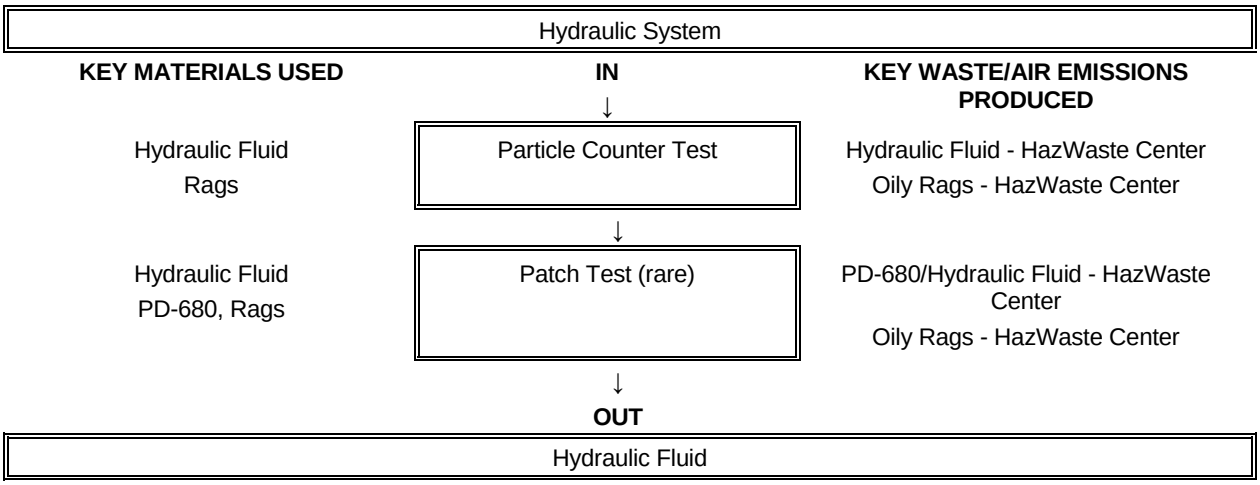
HSMS Code: ID-23-04

Substrate: Hydraulic fluid

MRC/Technical Publication: NAVAIR 0175 GAA/GAH

P2/Environmental Equipment Used in Process:
Particle Counter

PROCESS FLOW DIAGRAM:



HYDRAULIC SYSTEM MAINTENANCE

PROCESS DESCRIPTION
Hydraulic systems are cleaned with PD-680, either applied to a rag or as a fluid to flush out the lines in the event of a bad particle counter test result. With every phase change issued for the aircraft, the hydraulic fluid is drained out and replaced. Repair on hydraulic systems are primarily mechanical or electronic. If the hydraulic line is to be repaired, the hydraulic fluid would be drained prior to replacing parts or repairing the line. Once the repair is finished, the system is filled with hydraulic fluid.

Base Process ID #: MAG4112A03

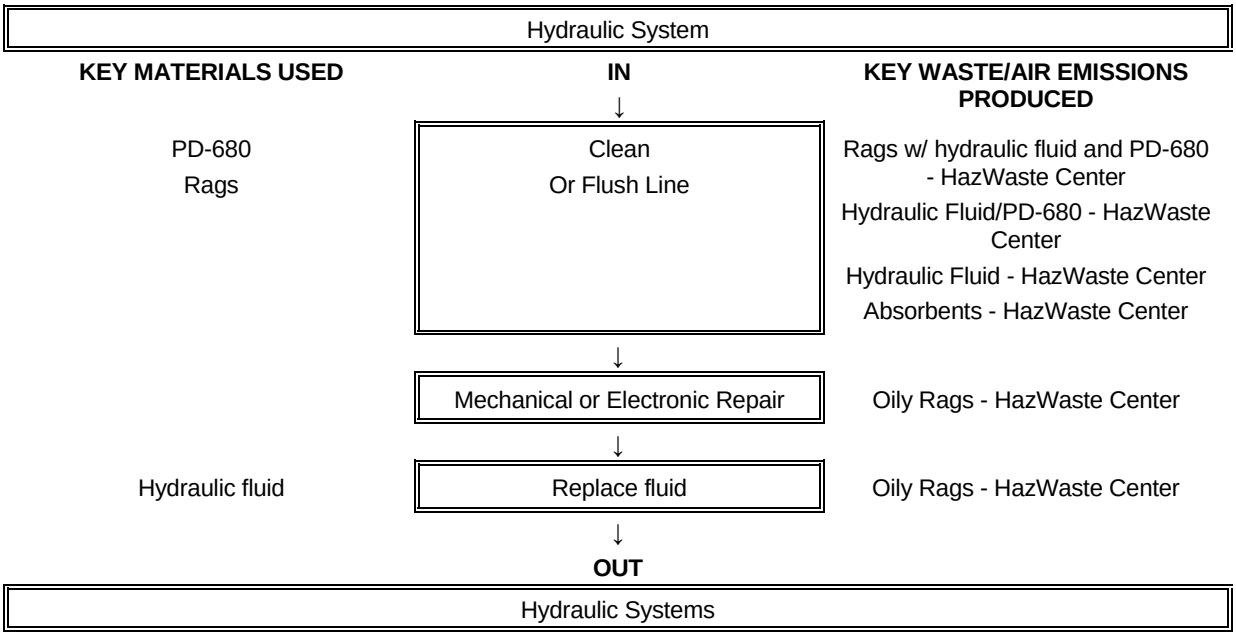
HSMS Code: ID-23-01

Substrate: Hydraulic lines

MRC/Technical Publication: Several

P2/Environmental Equipment Used in Process:
None identified.

PROCESS FLOW DIAGRAM:



VMGR 234 - 210 AVIONICS

COMMAND: Marine Aircraft Group (MAG) 41
DEPT: VMGR 234
WORK CENTER: MAG41AV
SHOP NAME: Avionics Shop
BUILDING #: 1050
SHOP POC AND PHONE #: Sgt. Long (817) 782-2929

WORK CENTER DESCRIPTION

The Avionics shop handles communication and navigation electrical systems on the C-130s used for transport by the Marine squadron. Personnel are responsible for the maintenance on the electrical systems including testing, cleaning, repairing, and installation, and the training of reservists during drill weekends.

The primary process performed in the Avionics Shop is:

- **Electrical System Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Have begun using reformulated lubricants/preservatives that are ODS-free.
- Use squirt bottles to apply isopropyl alcohol in order to reduce evaporation.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ELECTRICAL SYSTEM MAINTENANCE

PROCESS DESCRIPTION
In order to keep the plane in working condition, scheduled maintenance of electrical systems is based on flight hours. Systems are tested in order to verify faulty components or wiring. Components are checked for any damage or wear and cleaned using isopropyl alcohol. Antennas are sealed to prevent cracks and to maintain function. Repair or unscheduled maintenance of avionics equipment involves troubleshooting those systems that are found to have a faulty component. If the faulty system is due to wiring, new wire is connected to the component. In the case of a bad component, the faulty component is removed and replaced with a new one. Batteries (lead acid, lithium, alkaline) are removed and replaced. Areas are cleaned with isopropyl alcohol to remove any particles and then tested before returned to service.

Base Process ID #: MAG41AV01

HSMS Code: ID-22-01

Substrate: Electrical Systems

MRC/Technical Publication:

P2/Environmental Equipment Used in Process:
None identified

PROCESS FLOW DIAGRAM:

Electrical Systems

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Isopropyl Alcohol Acid brushes 8802 Sealant Compound	Scheduled Maintenance (Testing, Cleaning, Sealing)	Air Emissions - Alcohol Acid Brushes - Solid Waste Rags with Sealant - laundered off site Empty Containers - HazMinCen
Lithium Batteries Lead Acid Batteries Alkaline Batteries (flashlights)	Unscheduled Maintenance (Testing, Battery Change-out)	Used Batteries - HazWaste Center
Wire, Components Isopropyl Alcohol Soldering/Flux	Part Replacement	Air Emissions - Alcohol Air Emissions - Soldering Old Wire - Solid Waste Empty Aerosol Cans - HazMinCen
	Test	

↓

OUT

Communication and Navigation Equipment

VMGR 234 - 12C CORROSION CONTROL

COMMAND: Marine Aircraft Group (MAG) 41
DEPT: VMGR 234
WORK CENTER: MAG4112C
SHOP NAME: Corrosion Control
BUILDING #: 1050
SHOP POC AND PHONE #: Cpl Collins (817) 782-2924

WORK CENTER DESCRIPTION

The Corrosion Control work center is responsible for removing and preventing all corrosion from the C-130 aircraft. This involves small-scale painting using SEM pens and aerosol spray paints for small projects and HVLP paint guns for larger projects. A periodic inspection is performed every 35 days to examine the aircraft for corrosion. Any major corrosion prevention and painting is performed at the Depot level.

The primary process performed in the Corrosion Control Shop is:

- **Corrosion Control**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- VMGR 234 operates an absorbent pad wringer to remove excess fluids from the pad, facilitating an increase in the amount of used oil accumulated for offsite recycling. Pads are collected for disposal.
- A UNIRAM Cascade paint gun cleaner equipped with a filtration system has been installed in the work center; however, the use of the cleaner has yet to be implemented.
- SEM pens are used for small paint jobs that eliminate the need to mix paint and generate excess paint waste.
- HVLP paint guns are used in the larger paint jobs performed by work center personnel.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

CORROSION CONTROL

PROCESS DESCRIPTION
A basic step in corrosion control is keeping the aircraft surface clean. The C-130s are washed in the wash rack every 28 days. If corrosion is found during the periodic inspection, the surface paint is removed using sandpaper and paint stripper. The corrosion or rust is removed and the area prepped for painting. Once the area is clean, the primer is applied followed by the topcoat using HVLP spray guns or aerosol paint. SEM pens are used to repaint small areas of the aircraft. Although the shop has a paint gun cleaner, the HVLP guns are cleaned manually with thinner.

Base Process ID #: MAG4112C01

HSMS Code: ID-05-00

Substrate: Metal

MRC/Technical Publication: NAVAIR 01509 Series

P2/Environmental Equipment Used in Process:
UNI-RAM Cascade Paint gun cleaner (not currently in use), HVLP spray guns, SEM pens

PROCESS FLOW DIAGRAM:

Aircraft Surface

KEY MATERIALS USED	IN	KEY WASTE/AIR EMISSIONS PRODUCED
Aircraft Cleaning Compound, Abrasive Pads, Water	Wash	Wash water – Oil-Water Separator Abrasive Pads w/Cleaner - Solid Waste
Sandpaper, Rags, Epoxy Paint Remover Corrosion Preventative Compounds	Paint Removal Corrosion Removal	Rags w/Paint Remover Sandpaper - Solid Waste Empty containers - HazMinCen
Thinner, Naphtha, Acid Brushes, Alodine pens, Epoxy paint, Spray Paints, Paint markers, Thinner, Lint-Free Rags, Tape, Barrier Paper, Rubber Gloves	Prep & Paint	Rags with Solvent - HazWaste Center Waste Paint - HazWaste Center Lint-Free Rags - HazWaste Center Empty Containers - HazMin Tape, Barrier Paper, Rubber Gloves
Type I Thinner, Gun Cleaning Solvent, Filters	Spray Gun Cleaning	Rags with Solvent - HazWaste Center Waste Paint & Thinner - HazWaste Center Lint-Free Rags - HazWaste Center Paint Gun Cleaner Filters Empty Containers - HazMinCen

OUT

Repainted Aircraft Surface

VMGR 234 - EMBARKATION

COMMAND: Marine Aircraft Group (MAG) 41
DEPT: VMGR 234
WORK CENTER: MAGEMB
SHOP NAME: Embarkation
BUILDING #: 1050
SHOP POC AND PHONE #: Sgt. Cacerres (817) 782-2947/2908

WORK CENTER DESCRIPTION

Embarkation is the process of labeling boxes and equipment for shipping. In the event of field work, deployment, or transfers, equipment used to support the squadron is placed in boxes (wood or metal) for shipment to the final destination. The outside of the box is stenciled with tact marks, numbers, and unit IDs before shipment.

The primary process performed in the Embarkation Shop is:

- **Embark Box Stenciling**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- None noted.

CURRENT P2 PRACTICES & EQUIPMENT

- Paint markers are now being used as the primary method of labeling the embark boxes, reducing the amount of aerosol paint used in the process. Paint markers generate less waste, prevent overspray, and eliminate the need for thinner in the paint process.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – not applicable

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

EMBARK BOX STENCILING

PROCESS DESCRIPTION
Embark Boxes are labeled using stencils as a guide for painting. Aerosol spray paint was the primary method, however, paint markers have recently become the preferred method. Once a box is marked, the label is allowed to dry and the stencil is hung up for future use. Stencils are no longer cleaned using thinner since the paint markers eliminate overspray as with aerosol cans.

Base Process ID #: MAGEMB01

HSMS Code: ID-05-07

Substrate: Embark Boxes

MRC/Technical Publication: DOD-4145.1-R

P2/Environmental Equipment Used in Process:
None identified

PROCESS FLOW DIAGRAM:

Embark Boxes		
KEY MATERIALS USED	**IN** ↓	**KEY WASTE/AIR EMISSIONS PRODUCED**
Aerosol Spray Paint (rare) Paint Markers	Label	Air Emissions - Aerosol Paint Empty Containers - HazMinCen
	↓ **OUT**	
Embark Boxes Ready for Shipment		

VMGR 234 - 310 LINE DIVISION

COMMAND: Marine Aircraft Group (MAG) 41
DEPT: VMGR 234
WORK CENTER: MAG41LD
SHOP NAME: Line Division
BUILDING #: 1050
SHOP POC AND PHONE #: SSgt. Tauch, (817) 782-2925

WORK CENTER DESCRIPTION

Line Division is responsible for the flight line servicing of the C-130 aircraft. Personnel in this work center tow the planes for parking and launching, and maintain the engines, propellers, and fuel systems. Ground Support Equipment (GSE) used for towing is not maintained by this work center.

The primary process performed in the Line Division Shop is:

- **Engine, Propeller and Fuel System Maintenance**

P2 practices currently utilized by this work center are presented below along with potential P2 initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- VMGR 234 operates an absorbent pad wringer to remove excess fluids from the pad and allows for the reuse of the absorbent pad. This reduces the amount of absorbent pad waste and increases the amount of used oils collected for offsite recycling.
- Used filters are drained for 24 hours to remove excess fluids from the filter and increase the amount of used oils recycled offsite. Used oil filters are combined with other used oil filters (crushed or noncrushed) from around base and sent offsite for recycled.
- Used fluids (oils, hydraulic fluid, JP-8) drained from the systems are collected and stored in bowsers for future recycling offsite.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – not applicable

HazMat obtained from HazMinCen - yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

ENGINE, PROPELLER, AND FUEL SYSTEM MAINTENANCE

PROCESS DESCRIPTION

The maintenance of the C-130 engines, propellers, and fuel systems is based on the number of flight hours logged or in the event of a malfunction. Oil, fuel, and hydraulic filters from the engines are changed every 250 flight hours. The filters are removed, drained for 24 hours on the drain rack and then drummed up for disposal. The used oil, hydraulic fluid, and JP-8 (when drained from the plane) are collected and placed in the appropriate bowser in the storage area. In the event of a malfunction, the system (engine, propeller, or fuel) is examined first to locate the faulty area. Fluids are drained from the system before parts are removed and replaced. Parts such as valves, gaskets, motors, and props are replaced. Fluids are replaced in the systems and the systems are tested before placed back into service.

Base Process ID #: MAG41LD01

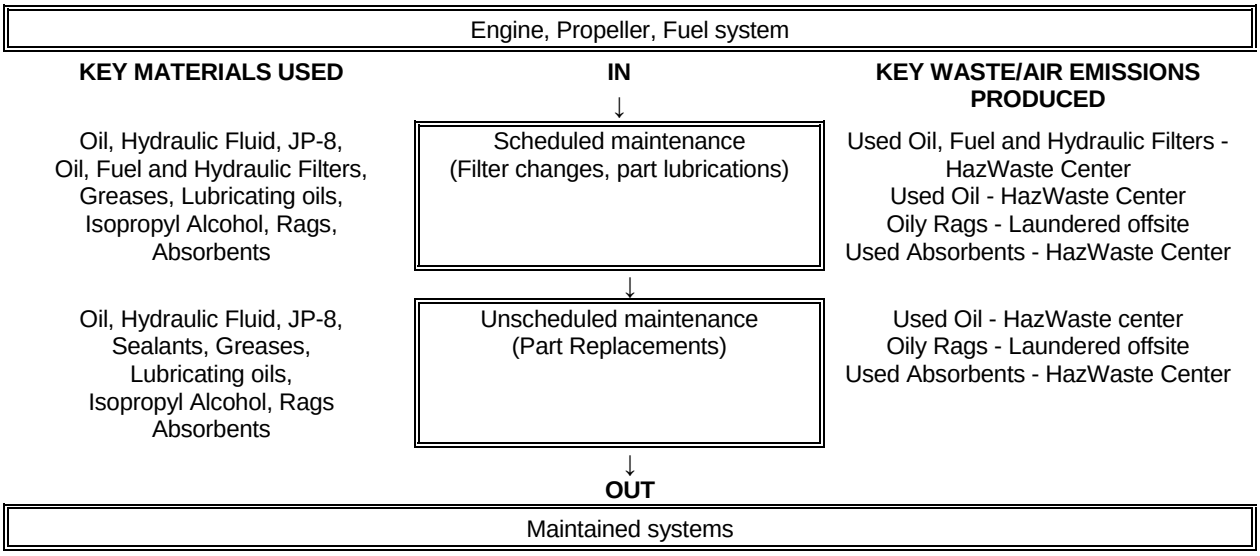
HSMS Code: ID-05-07

Substrate: Various metal

MRC/Technical Publication: Several

P2/Environmental Equipment Used in Process:
None identified

PROCESS FLOW DIAGRAM:



VR59

VR-59 110/310 – POWER LINE

COMMAND:	Fleet Logistics Support Squadron 59
DEPT:	VR-59
WORK CENTER:	VR59 110/310
SHOP NAME:	Power Line
BUILDING #:	1050
SHOP POC AND PHONE #:	AE1 Warren, (817) 782-5412, x644

WORK CENTER DESCRIPTION

This shop cleans and performs engine/APU maintenance for three C-40 aircraft. The shop also performs aircraft fuel system maintenance. The shop also performs "quick engine changes." All major maintenance or repair is done at a Boeing facility since the aircraft and all components are still under warranty. Once the warranty has expired, internal repair of the engines is expected to be performed at Aircraft Intermediate Maintenance Department (AIMD).

This shop was combined with VR59 310 Line Shop and is also responsible for cleaning and servicing these aircraft prior to takeoff and immediately after arrival. The work center washes each aircraft every 60 days at the wash rack. In addition, smaller aircraft surfaces and the canopy receive more frequent cleanings. The work center tops off turbine oil and hydraulic fluid reservoirs and conducts daily fueling, defueling, and fuel sampling activities.

The primary processes performed in this shop are:

- **C-40 Engine Maintenance**
- **Fuel Cell Maintenance**
- **Aircraft Cleaning**
- **Aircraft Servicing**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- Use ODS-free version of MILSPEC-VV-L-800 (NSN 9150-00-458-0075).
- The oil filter of the C-40 is an all metal microfilter. These filters are accumulated in the work center and picked up by the Hazardous Waste Center for recycling.
- Fuel samples and used oil are collected for recycle.
- Metal containers are recycled offsite.
- C-40 aircraft are washed every 60 days compared to the every 14- to 28-day washing of the C-9 aircraft.
- Use of engine gas path cleaner has been eliminated as a result of new C-40 (737) aircraft.
- An ODS-free version of MILSPEC-VV-L-800 (9150-00-458-0075) is now used. The propellant is carbon dioxide.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

C-40 ENGINE MAINTENANCE

PROCESS DESCRIPTION
This shop cleans and performs engine/APU maintenance for 3 C-40 aircraft. Engine maintenance is typically performed in "Quick Engine Change" mode. An engine is pulled from an aircraft for maintenance and replaced by another engine. All major maintenance or repair is done at a Boeing facility since the aircraft and all components are still under warranty. Once the warranty has expired, internal repair of the engines is expected to be performed at base AIMD.

Base Process ID #: VR59110-01

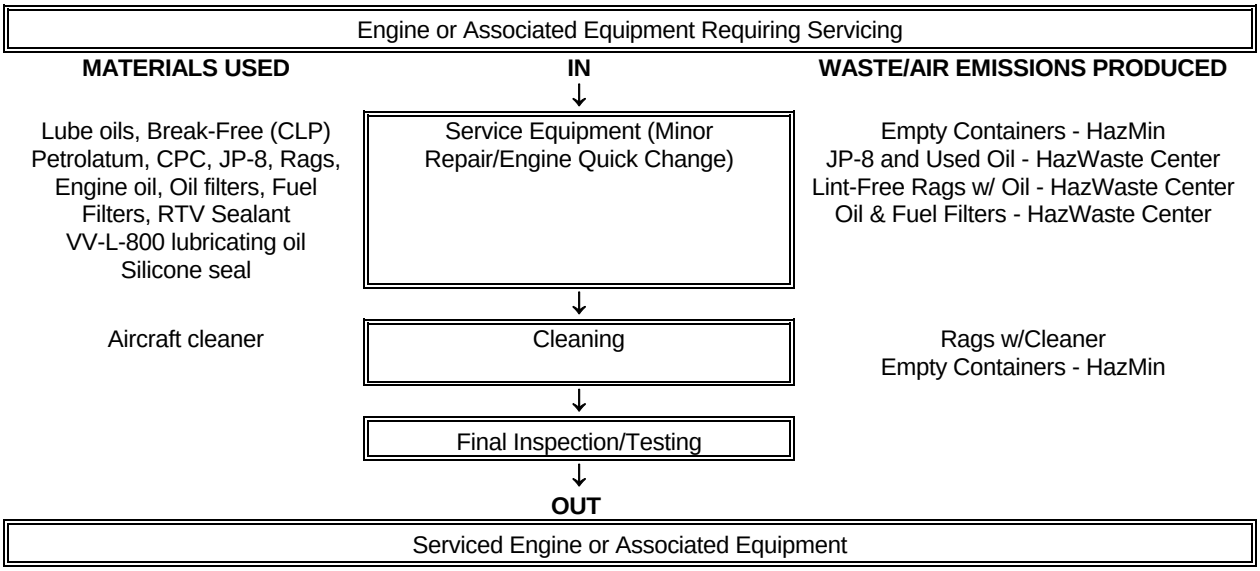
HSMS Code: ID-23-00

Substrate: Aircraft engines and associated components

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



FUEL CELL MAINTENANCE

PROCESS DESCRIPTION
The work center performs aircraft fuel system maintenance on C-40 aircraft. Work consists of repair of fuel tanks. The C-40 differs from the C-9 the squadron had serviced previously. The C-40 does not have any fuel bladders. The wings are the fuel tanks. This makes it easier to identify and repair leaks.

Base Process ID #: VR59110-02

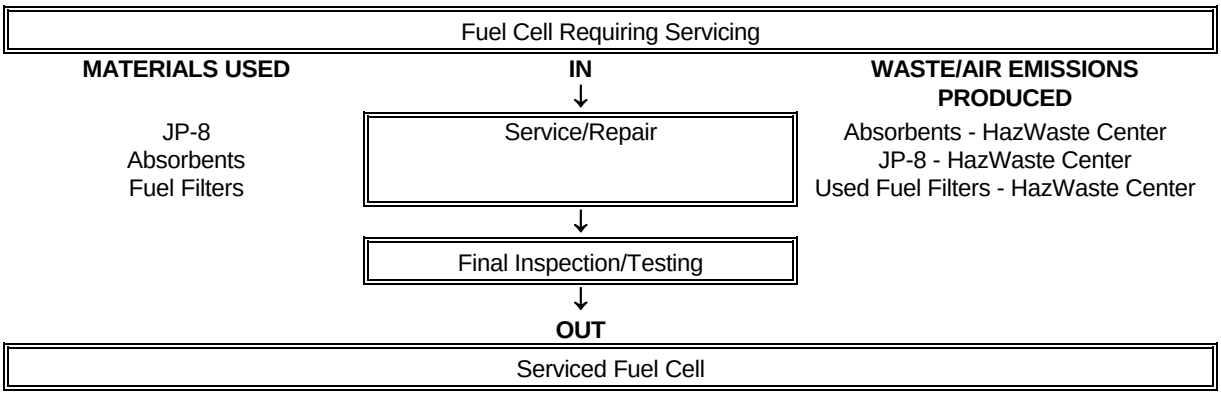
HSMS Code: ID-23-00

Substrate: Fuel cells

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



CLEAN AIRCRAFT

PROCESS DESCRIPTION
This work center washes each aircraft every 60 days at the wash rack. In addition, smaller aircraft surfaces and the canopy receive more frequent cleanings. The work center also cleans the interior of the cabins and the lavatories with a general purpose cleaner.

Base Process ID #: VR59310-01

HSMS Code: ML-02-99

Substrate: Painted Aluminum and Composite

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

Aircraft Requiring Cleaning		
MATERIALS USED	**IN** ↓	**WASTE/AIR EMISSIONS PRODUCED**
Aircraft Surface Cleaning Compound, Plastic Polish General Purpose detergent, Water Lint-Free Rags (Canopy Wipes)	Clean	Empty Containers - HazMin Lint-Free Rags w/Plastic Polish Wash Water - Sanitary Sewer Lint-Free Rags w/Cleaning Compound
	↓	
Aircraft Cleaning Compound Lint-Free Rags	Full Wash	Empty Containers - HazMin Lint-Free Rags
	↓ **OUT**	
Clean Aircraft		

SERVICE AIRCRAFT

PROCESS DESCRIPTION
The work center tops off turbine oil and hydraulic fluid reservoirs and conducts daily fueling and defueling. Skydrol is a hydraulic fluid that is used daily to wipe down the struts of the aircraft. The work center performs daily fuel sampling. One-pint samples are pulled from every fuel cell of each aircraft scheduled for flight operations that day. A visual inspection of the samples is conducted for the presence of water or other contamination. After visual inspection, the fuel samples are poured into a used fuel container. The Fuel Farm is contacted when the fuel container is full. The container contents are then pumped into a defueling truck and taken back to the Fuel Farm.

Base Process ID #: VFA201310-02

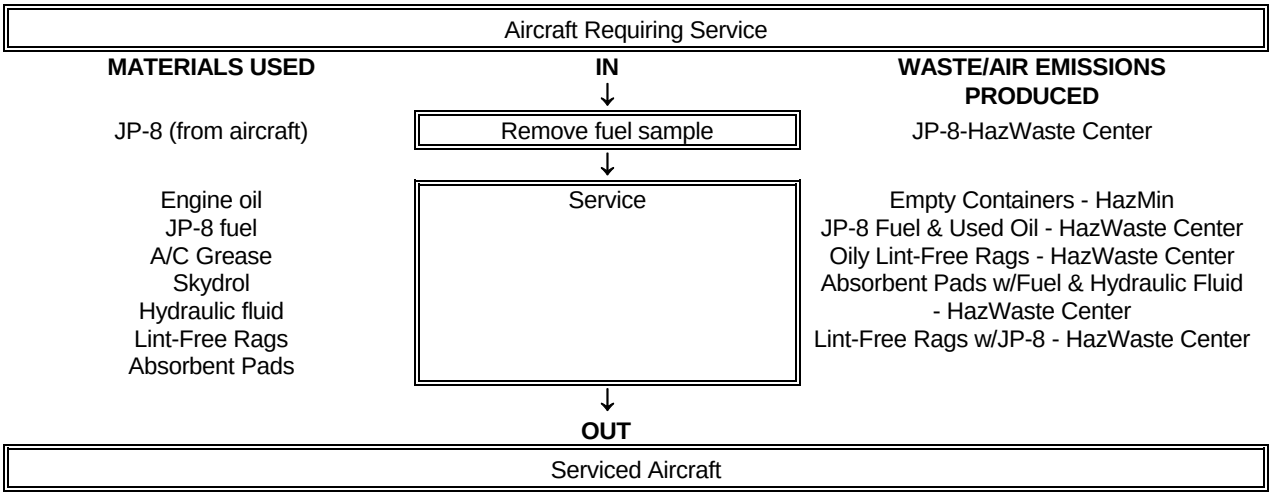
HSMS Code: ML-02-99

Substrate: Aluminum

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:



VR-59 120 – AIRFRAMES/CORROSION CONTROL

COMMAND:	Fleet Logistics Support Squadron 59
DEPT:	VR-59
WORK CENTER:	VR59120
SHOP NAME:	Airframes/Corrosion Control
BUILDING #:	1050
SHOP POC AND PHONE #:	AM1 Alanis, (817) 782-3501

WORK CENTER DESCRIPTION

The shop performs repair of the airframe of three C-40 aircraft (737s), including the "skins," landing gear, doors, hatches, brakes, and tires. The shop is also responsible for the testing of hydraulic fluids for particulate contamination and maintenance of the hydraulic systems of the aircraft.

The work center also performs level II (small-scale and touch-up) painting and corrosion prevention of the C-40 aircraft. This is accomplished by performing periodic inspection and maintenance operations. Occasional unscheduled maintenance activities are also performed.

The primary processes performed in this shop are:

- **Corrosion Control**
- **Airframe Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- A particle counter is used to perform hydraulic fluid testing.
- Two pint-size HVLP paint guns are used for all painting activities.
- ODS-free version of MILSPEC-VV-L-800 (NSN 9150-00-458-0075) is now used.

- The shop has eliminated the use of ODS-containing formulations of lubricants/preservatives and Break-Free (NSNs 9150-01-054-6453, 9150-00-823-7860, 9150-01-053-6688, 6850-00-105-3084, and 9150-01-079-6124).
- See below.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

CORROSION CONTROL

PROCESS DESCRIPTION

The work center performs small-scale painting and corrosion prevention of new C-40 aircraft. The aircraft are washed every 60 days. All painting of the aircraft is performed in the paint hangar after it has been washed. Complete aircraft repainting is done by an outside contractor as part of aircraft purchase maintenance warranty.

The work center performs painting and corrosion control using two pint-size HVLP touch-up paint guns and Sem pens. Polyurethane paint is the primary paint used on the C-40. The paint guns are manually cleaned with between a pint and a quart of paint thinner after each use. Used paint and thinner is then placed in the waste paint and thinner container. Sem pens are used to prime and paint screws and other small pieces. Aerosol paints are used to paint small internal components of the aircraft. Sanding is performed manually and with air-driven power sanders as needed.

Base Process ID #: VR59120-01

HSMS Code: ID-05-00

Substrate: Aluminum, Composite

MRC/Technical Publication: NAVAIR-01-1A-509

P2/Environmental Equipment Used in Process:
Two HVLP paint guns, Sem Pens

PROCESS FLOW DIAGRAM:

Aircraft Requiring Corrosion Control/Evaluation/Rework

MATERIALS USED	IN ↓	WASTE/AIR EMISSIONS PRODUCED
A/C Cleaning Compound	Inspect and Initial Surface Cleaning (Wash Rack)	Empty containers - HazMin
Sand Paper Isopropyl Alcohol	Minor Paint and Corrosion Removal (Hand and Power Sanding)	Sand Paper w/Paint Residue - Solid Waste
Green Zinc Chrome Primer Corrosion Preventive Compound Lint-Free Rags Naphtha, Alodine	Surface Treating	Empty Containers - HazMin Lint-Free Rags with Naphtha - Hazwaste Center Air Emissions - Solvent
Aircraft Cleaning Compound (“Scrubby Bubbles”)	Clean	Wastewater with A/C Cleaning Compound - Sanitary Sewer
Poly paint Lacquer paint (aerosol)	Paint/Preserve	Empty containers - HazMin Air Emissions - Painting
Thinner	Cleanup	Rags w/ Thinner Used Thinner - HazWaste Center Empty Containers - HazMin

↓ **OUT**

Corrosion Treated Aircraft

AIRCRAFT MAINTENANCE

PROCESS DESCRIPTION

The work center performs repair of the airframe of the C-40 aircraft, including the "skins," landing gear, doors, hatches, brakes, and tires. Minor repair and touch-up painting of the airframes is performed as needed. Work center personnel perform changing of aircraft tires, landing gear, brakes, and other associated components. Used tires are turned into AIMD, then Supply in a one-for-one exchange. Buildup of new tires onto rims is performed by AIMD.

The work is also responsible for the maintenance of the hydraulic systems of the aircraft. This includes cleaning of the components of the hydraulic systems with a rag and PD-680. PD-680 is applied using a pump spray bottle. Hydraulic fluid is added to the aircraft hydraulic systems as needed. Aircraft hydraulic fluid is tested using a particle counter attached to the aircraft via a hose. About a pint of used hydraulic fluid is generated per test and placed in used POL container for recycle. A Skydrol Service Unit (SSU) is used to fill the C-40 with hydraulic fluid. The SSU is tested every 13 weeks when the filter is changed out, or if contamination is suspected. A patch test is performed on the SSU; one patch is also performed per month for training purposes in the event of a deployment.

Base Process ID #: VR59120-01

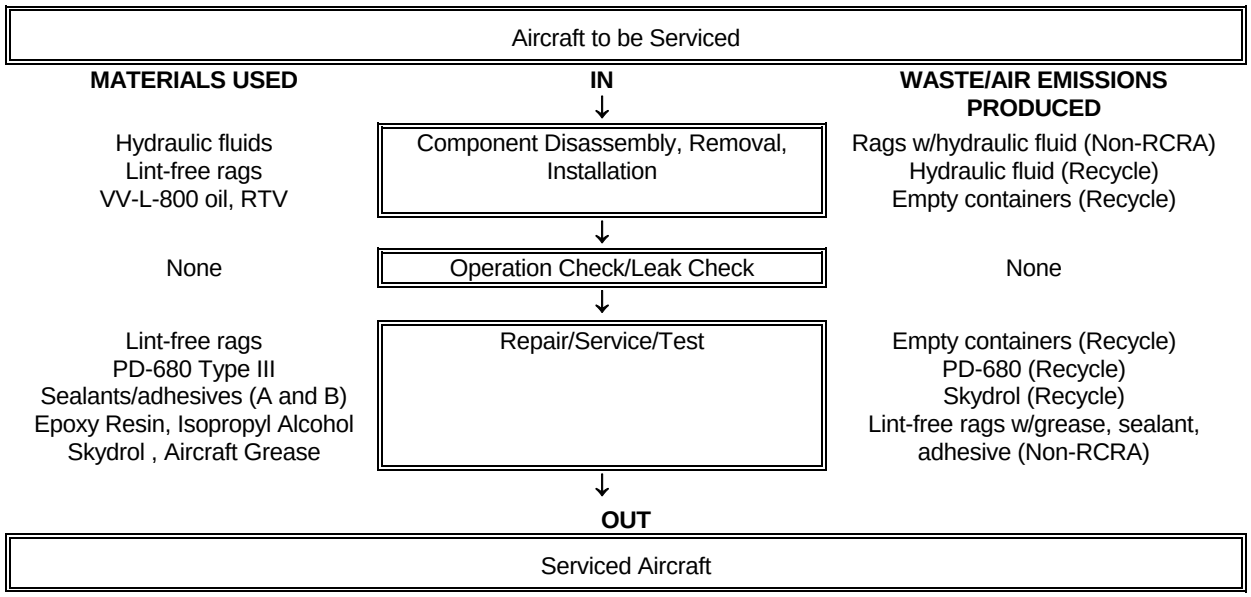
HSMS Code: ID-23-04

Substrate: Aluminum, Composite

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
Particle Counter

PROCESS FLOW DIAGRAM:



VR-59 200 - ELECTRONICS/AVIATION

COMMAND: Fleet Logistics Support Squadron 59
DEPT: VR-59
WORK CENTER: VR59200
SHOP NAME: Electronics/Aviation
BUILDING #: 1050
SHOP POC AND PHONE #: AT1 Sopiak, (817) 782-5411, x642

WORK CENTER DESCRIPTION

The work center performs maintenance and minor repair of the electronics and avionics systems of the C-40 aircraft. If work center personnel cannot repair the component, it is replaced, and the defective component is shipped to the Boeing facility on station for repair. All major maintenance or repair is done at the Boeing facility since the aircraft and all components are still under warranty. Once the warranty has expired, major maintenance and repair are expected to be performed at AIMD.

The primary process performed in this shop is:

- **Avionics Systems Maintenance**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- None identified.

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – yes

Used oil, antifreeze picked up by Hazardous Waste for recycle – yes

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

AVIONICS SYSTEMS MAINTENANCE

PROCESS DESCRIPTION

The work center performs maintenance and minor repair of the electronics and avionics systems of the C40 aircraft. If work center personnel cannot repair the component, it is replaced, and the defective component is shipped to the Boeing facility on station for repair. All major maintenance or repair is done at the Boeing facility since the aircraft and all components are still under warranty. Once the warranty has expired, major maintenance and repair are expected to be performed at AIMD. Sealant is used to protect the installed avionic components from moisture.

Base Process ID #: VR59200-01

HSMS Code: ID-22-99

Substrate: C-40 Electrical/Electronic Components

MRC/Technical Publication: None

P2/Environmental Equipment Used in Process:
None

PROCESS FLOW DIAGRAM:

Avionics Systems Requiring Maintenance

MATERIALS USED	IN ↓	WASTE/AIR EMISSIONS PRODUCED
None	Inspect	None
None	Test	None
RTV Sealant, Rags Soldering/Flux	Repair/Replace	Rags w/Sealant & Grease - Laundered Emissions - Soldering
CPC, Amyl Guard, Sealant, Rags	Corrosion Prevention	Empty Containers - HazMin Rags w/Oil and Sealant - Laundered
Isopropyl Alcohol, Rags, Q-tips	Clean	Empty Containers - HazMin Rags w/Cleaning Compound and Alcohol - Laundered Used Q-tips - Solid Waste Air Emission - Alcohol
None	Test	None

↓ **OUT**

Repaired Avionics System

VR-59 130 – SURVIVAL SHOP

COMMAND:	Fleet Logistics Support Squadron 59
DEPT:	VR-59
WORK CENTER:	VR59130
SHOP NAME:	Survival
BUILDING #:	1050
SHOP POC AND PHONE #:	PR2 Hicks, (817) 782-5411, x623

WORK CENTER DESCRIPTION

The work center is responsible for the maintenance and minor repair of C-40 (737) flight gear, oxygen systems, heating and air-conditioning systems, personal relief systems, and accessories. Flight gear primarily consists of flight suits, jackets, boots, helmets, life preservers, and life rafts.

The primary process performed in this shop is:

- **Maintenance of Environmental Systems**

Pollution prevention practices currently utilized by this work center are presented below along with potential pollution prevention initiatives that should be pursued further. Detailed process descriptions and process flow diagrams are provided in the remainder of the report.

PLANNED POLLUTION PREVENTION (P2) INITIATIVES

- Participate in a basewide rag laundering program. A shop towel laundering program reduces solid and hazardous waste generation. It provides an exemption from hazardous waste regulations for rag waste that would normally be handled as hazardous waste if it were disposed (i.e., a compliance benefit). Currently, one-time-use rags and absorbents from NAS JRB Fort Worth are used as a low-grade fuel in cement kilns. Under the shop towel program, contaminants are transferred to a wastewater medium (for subsequent treatment) and the towels reused.

  Shop towel laundering is in place for some organizations at NAS JRB Fort Worth. Expanding this program to other organizations on base is feasible, but will require promotion and incentives. Offering shop towels and reusable absorbents through the HAZMINCEN would provide convenience for those organizations that do not want to directly contract with a vendor. It would also provide a forum for consistently promoting the use of launderable shop towels and recyclable absorbents. Work center personnel could be encouraged to participate in these programs each time they visit the HAZMINCEN to procure hazardous materials (i.e., through posters and/or pamphlets).

CURRENT P2 PRACTICES & EQUIPMENT

- None identified

PARTICIPATION IN BASEWIDE P2 PROGRAMS

Launderable Red Rags – yes

Launderable White Rags – no

HazMat obtained from HazMinCen – yes

Empty HazMat Containers returned to HazMinCen – yes

Cardboard, paper, plastic, glass picked up by to Recycling Center – yes

Used batteries (all types) picked up by Hazardous Waste for recycle – not applicable

Used oil, antifreeze picked up by Hazardous Waste for recycle – not applicable

P2 EFFORTS TO BE CONSIDERED IN THE FUTURE

- None noted.

FLIGHT GEAR AND SYSTEMS MAINTENANCE

PROCESS DESCRIPTION

The work center is responsible for the maintenance and minor repair of C-40 (737) flight gear, oxygen systems, heating and air-conditioning systems, personal relief systems, and accessories. Flight gear primarily consists of flight suits, jackets, boots, helmets, life preservers, and life rafts. These items are periodically inspected based on PM maintenance schedule and repaired or replaced as needed.

The work center is responsible for cleaning and emptying the personal relief system (PRS) on each aircraft. Personnel wear disposable personal protective equipment while emptying out the PRS using vacuum carts. Used PPE is disposed as solid waste.

Base Process ID #: VR59310-01

HSMS Code: ID-23-99

Substrate: Aircraft

MRC/Technical Publication: None

P2/Environmental Equipment used in process:
None

PROCESS FLOW DIAGRAM:

Flight Gear and Systems Requiring Maintenance or Repair

MATERIALS USED	IN ↓	WASTE/AIR EMISSIONS PRODUCED
Leak Detection Fluid Isopropyl Alcohol Sodium Hypochlorite (water treatment)	Service, including remove and replace	Rags w/ Isopropyl Alcohol - Laundered Empty containers - HazMin Air Emissions - Alcohol
Isopropyl alcohol Disposable PPE, Rags	↓ Clean and Clean Up	Disposable PPE Rags w/Isopropyl alcohol - Laundered

↓
OUT

Maintained Flight Gear and Systems

Appendix H
Work Centers with Previous P2 Initiatives and Projects

Previous Pollution Prevention Program
NAS JRB Fort Worth

The pollution prevention program at NAS JRB Fort Worth has been highly successful since its inception in 1995. Implementation of basewide and work-center-specific P2 initiatives has resulted in dramatic reductions in pollution at the base. Some of the more notable successes include:

1. A solid waste recycle rate of nearly 40%.
2. A reduction in Resource Conservation and Recovery hazardous waste generation from approximately 90,000 pounds in 1999 to 15,593 pounds in 2005; a reduction of 82%.
3. Elimination of nonmission-critical Class I ODSs. Approximately 4 pounds is used each year.
4. Toxic Release Inventory chemicals are used in quantities that do not trigger Emergency Planning and Community Right-to-Know Act Section 313 reporting requirements
5. For fiscal years 2002 to 2004, 71% (46,980 tons) of construction and demolition debris were recycled.
6. Oil and oily waste are recycled offsite at a rate of 100% (308 tons in 2003 & 2004 combined).

These successes are due in part to the use of a variety of pollution prevention equipment and training, and promotion of initiatives on base. Pollution prevention has been largely integrated into station operations and is standard operating procedure.

Reductions in pollution have resulted in tremendous reductions in quantities of hazardous and solid wastes, which translate to cost avoidance for offsite disposal.

Recycling programs exist for fuels, oils, ethylene glycol, scrap metals (sheet metal, aluminum cans, crushed oil filters, steel cans and drums, vehicle parts), paper, plastic, cardboard, pallets and other wood scraps, and has in some cases generated income for the facility.

The attached summary provides the status of previous P2 initiatives gleaned from work center reports and the 2003 P2MP update.

Shop: AFRESAC

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	UNK
Replace CFC-12 units.	Implemented	UNK

Shop: AFRESAGE

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Recycle hydraulic fluid.	Equipment ordered. Awaiting delivery	NA
Construct awning to protect equipment.	Awning being constructed during site survey	NA
Collect, drain, and crush used filters.	Implemented	UNK
Procure Inland aqueous parts washer.	Implemented	UNK
Replace CFC-12 with HFC-134a in AGE equipment.	Implemented	UNK
Use propylene glycol in place of ethylene glycol.	Implemented	UNK
Reclaim JP-8 by using in AGE equipment.	Implemented	UNK

Shop: AFRESAIS

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Recycle batteries, paper, and cardboard.	Implemented	UNK

Shop: AFRESAS

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Use Simple Green to replace PD 680 solvent.	Not implemented	NA
Participate in basewide rag laundering program.	Not implemented	NA
Recycle metal containers.	Implemented	UNK
Use Inland parts washer in place of Safety Kleen washer.	Implemented	UNK
Replace Elantra parts washer with Better Engineering aqueous washer.	Implemented	UNK

Shop: AFRESCC

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use decal machine to label equipment.	Implemented	UNK
Use existing Safety Kleen parts washer to clean paint guns to reduce solvent usage.	Implemented	UNK
Replace MEK containing solvents.	Implemented	UNK

Shop: AFRESECM

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program. Switch from sandblasting with black beauty to blasting with garnet that is reusable.	Not implemented	UNK
Use non-ODS aerosol cleaner.	Implemented	Eliminated isopropyl alcohol
Recycle parts that contain precious metals.	Implemented	UNK
Use substitutes for ODS containing materials.	Implemented	UNK

Shop: AFRESEE (Egress)

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	UNK

Shop: AFRESEE (Battery)

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Substitute CFC-containing contact cleaner with isopropyl alcohol.	Implemented	UNK
Substitute sealed lead-acid batteries for Ni-Cad batteries.	Implemented	UNK
Use Halon/1301 recovery unit.	Implemented	UNK

Shop: AFRESEE (Electrical)

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Substitute CFC-containing contact cleaner with isopropyl alcohol.	Implemented	UNK
Use Halon/1301 recovery unit.	Implemented	UNK

Shop: AFRESELE NONE

AFRESFLM

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Recycle used antifreeze.	Basewide initiative. See CEDB section.	30 gal
Crush oil filters.	Basewide initiative. See CEDB section.	36 ea
Puncture aerosol cans.	Basewide initiative. See CEDB section.	12 ea
Replace solvent cleaning with aqueous solution cleaning.	Solvent use has been eliminated and aqueous solutions are be used. A Better Engineering aqueous parts washer has been installed and is being used.	200 gal
Recycle used oil.	Basewide initiative. See CEDB section.	200 gal
Replace Lithium batteries with rechargeable batteries.	A 100% change-out has been completed.	30 ea
Replace disposable rags with laundered rags.	A program of this type was initiated but the rag return rate was less than 50% and was discontinued due to cost factors.	NA

Shop: AFRESFS

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Basewide rag laundering program.	Not Implemented	NA
Collect and manage contaminated JP-8 as used oil for recycle.	Implemented	UNK
Use Venturi vacuum to pick up oil spills to allow recycle of liquid, not disposal with absorbents.	Implemented	UNK
Replace MEK containing materials with substitutes.	Implemented. Only 4-part compound cleaning solvent used.	UNK

Shop: AFRESJEM

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Recycle oil filters.	Implemented	UNK
Recycle JP-8 and used oil.	Implemented	UNK
Replace silicon lubricant containing CFC-11 with non-ODS solvent/propellant.	Implemented	UNK

Shop: AFRESMUN

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	UNK
Utilize stencil machine to eliminate aerosol painting.	Implemented. Shop is using machine in Building 3368	UNK
Construct wash rack with water recycling capability.	Implemented. Wash rack is currently not operable.	UNK

Shop: AFRESNDI

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Replace ODS-containing materials with substitute.	Implemented	UNK

Shop: AFRESPNE

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Replace ODS-containing materials with recognized substitute.	Implemented	UNK

Shop: MXA

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use synthetic oil where permitted by TO.	Implemented	UNK
Replace ODS-containing materials with recognized substitute.	Implemented	UNK

Shop: AFRESPP

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use gel cell Optima sealed batteries in place of lead acid batteries.	Implemented	UNK
Eliminate HCFC-114 in electric contact cleaner.	Implemented	UNK
Crush and recycle used oil filters.	Implemented	UNK
Replace MEK-containing materials with recognized substitutes.	Implemented	UNK
Eliminate use of solvent engine degreaser by using rag wiping.	Implemented	UNK

Shop: AFRESPS

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Collect and recycle scrap metal.	Implemented	UNK

Shop: AFRESSS

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Replace cleaners containing MEK and toluene with isopropyl alcohol.	Implemented	UNK

Shop: AFRESSTR

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Replace materials containing MEK and toluene with recognized substitutes.	Implemented	UNK
Replace primer sealants with non-ODS-containing substitutes	Implemented	UNK

Shop: NAFRESVM

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use propylene glycol instead of ethylene glycol antifreeze where permitted.	Not Implemented	NA
Use antifreeze recycler.	Not Implemented	NA
Use gel cell batteries (Optima) instead of lead acid batteries.	Implemented	UNK
Replace ODS-containing materials with non-ODS-containing substitutes.	Implemented	UNK
Replace CFC-12 with HFC-134a in all vehicles.	Implemented	UNK
Use re-refined engine oil where permitted.	Implemented	UNK
Use breakthrough solvent.	Implemented	UNK
Use bulk POL fluid dispensing to minimize container disposal.	Implemented	UNK
Use HVLP paint guns and enclosed paint gun cleaning unit.	Implemented	UNK
Use HFC-134a recovery unit.	Implemented	UNK
Use compressed gas alternative fueled vehicles.	Implemented	Three vehicles are AF powered.
Use low VOC paints and water-based primer to reduce VOC air emissions and disposal of waste paint.	Implemented	UNK

Shop: AFRESWF

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Use breakthrough solvent.	Implemented	UNK
Replace ODS-containing materials with recognized non-ODS-containing substitutes.	Implemented	UNK

Shop: AIMD 413

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use hot water parts washer.	Implemented	UNK
Use Tornado low VOC parts washer.	Implemented	UNK

Shop: AIMD 41L

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use oil filter drain rack and filter crusher.	Not implemented	NA
Procure an absorbent pad wringer.	Not Implemented	NA
Use drip pans to catch excess fuel and oil when engines are drained.	Implemented	UNK
Recycle used oil filters by combining with other shops.	Implemented	UNK
Recycle metal parts through Supply.	Implemented	UNK
Replace ODS-containing lubricants and preservatives with non-ODS-containing substitutes.	Implemented	UNK
Replace MEK and toluene containing cleaners with isopropyl alcohol.	Implemented	UNK
Segregate oil and low flash fuel to minimize hazardous waste generation	Implemented	UNK

Shop: AIMD 41U

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program	Not implemented.	NA
Segregate oil and low-flash fuel to minimize hazardous waste generation.	Implemented	UNK
Use drip pans to catch excess fuel and oil when engines are drained.	Implemented	UNK

Shop: AIMD 51A

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Use a grease pencil or regular pencil to lay out metal instead of layout dye.	Implemented	UNK
Use ODS-free substitute for VVL 800.	Implemented	UNK
Collect fiberglass in sanding booth with HEPA vacuum and auto cleaning filters.	Implemented	UNK

Shop: AIMD 51B

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use a paint gun washer.	Not implemented	NA
Use plastic bead media in blast booth and glove box.	Implemented	UNK
Use Eco-sure low VOC aerosol paint.	Implemented	UNK
Use HVLP paint guns.	Implemented	UNK

Shop: AIMD 530

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Discontinue use of penetrant NSN 6850-00-142-8840 that contains ODS.	Not implemented	NA
Perform field inspections when possible to minimize down time.	Implemented	UNK
Use rechargeable batteries for equipment in shop.	Implemented	UNK

Shop: AIMD 610

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA

Shop: AIMD 620

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use Simple Green instead of solvent cleaners.	Implemented	UNK

Shop: AIMD 63E

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Test coolant in radar units every 30 days to verify it meets specifications. This will reduce fluid change outs.	Implemented	UNK

Shop: AIMD 690

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use lead free solder.	Implemented	UNK
Use Minda Dispensers, pump bottles for dispensing isopropyl alcohol.	Implemented	UNK

Shop: AIMD 640 - None

Shop: AIMD 650 - None

Shop: AIMD 670

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Replace Gelsolv D, which contains Freon 113 with Forage R 141B.	Implemented	UNK
Calibrate torque wrenches with bismuth instead of lead.	Implemented	UNK

Shop: AIMD 810A

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use substitute for toluene.	Implemented	UNK

Shop: AIMD 810B

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA

Shop: AIMD 810C

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Use soap and water to clean oxygen lines instead of Freon 113.	Implemented	UNK

Shop: AIMD 820 - None

Shop: AIMD 910

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use aqueous parts washer.	Implemented	UNK
Replace lead acid batteries with OPTIMA batteries.	Implemented	UNK
Recycle filters.	Implemented	UNK
Use bulk fluid dispensing system.	Implemented	UNK
Use fluid particle counter to replace patch method for testing hydraulic fluid.	Implemented	UNK
Use water recycling wash rack.	Implemented	UNK

Shop: AIMD 920

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use vinyl stencils when practical	Implemented	UNK
Use hydraulic fluid recycler.	Implemented	UNK
Use closed-loop wash rack.	Implemented	UNK

Shop: AIMD 930

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use aqueous parts washer.	Implemented	UNK
Use recycling and filtering parts washer when using PD-680.	Implemented	UNK
Recover refrigerant.	Implemented	UNK
Recycle antifreeze in the shop.	Implemented	UNK
Use closed-loop wash rack.	Implemented	UNK

Shop: AIMD 950

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use aqueous parts washer.	Implemented	UNK
Use recycling and filtering parts washer when using PD-680.	Implemented	UNK
Recycle antifreeze.	Implemented	UNK
Recycle used oil filters.	Implemented	UNK
Use bulk fluid dispensing system for POLs.	Implemented	UNK
Use closed-loop wash rack.	Implemented	UNK

Shop: AIMD 990

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Use propylene glycol instead of ethylene glycol when permitted.	Not implemented	NA
Replace Freon R-22 units with Freon R-12 units.	Implemented	UNK
Reclaim R-12 for use in other units.	Implemented	UNK
Recycle antifreeze.	Implemented	UNK

Shop: DRP-33

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Procure an absorbent pad wringer.	Not implemented	NA
Use hydrophobic absorbents.	Implemented	UNK
Used acid brushed for minor touchup.	Implemented	UNK
Substitute Naphtha for Type II paint thinner to reduce MEK usage.	Implemented	UNK
Recycle plastic bead media.	Implemented	Reduced paint waste by 20,000 pounds
Use blast techniques instead of chemical paint stripping.	Implemented	UNK
Replace lead containing paint with nonlead substitutes.	Implemented	UNK
Use HVLP paint guns.	Implemented	UNK
Procure polyurethane paints in smaller containers to reduce waste.	Implemented	UNK
Use vinyl stencils when possible to reduce aerosol painting.	Implemented	UNK
Recycle antifreeze.	Implemented	

Shop: GEMD

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program 113.	Not Implemented	NA
Use rechargeable batteries in equipment.	Implemented	UNK

Shop: MWSSHE

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Recycle used oil and oil filters.	Implemented	UNK
Replace lead acid batteries with sealed batteries.	Implemented	UNK

Shop: MWSSNBC - None

Shop: MWSSUT

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use a Freon recovery unit.	Implemented	UNK
Recycle oil and oil filters.	Implemented	UNK
Replace lead acid batteries with gel cell batteries.	Implemented	UNK

Shop: NAVYBF

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Collect contaminated JP-8 for recycle.	Implemented	UNK
Test JP-8 for contamination. If not contaminated, then reuse.	Implemented	UNK
Process storm water from fuel farm through oil-water separator.	Implemented	UNK

Shop: OPSFIRE

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Wash vehicles with simple green and water.	Implemented	UNK
Exchange Halon 1311 fire extinguishers with Halon 1211.	Implemented	UNK
Utilize Micro-Blaze Out instead of AFFF.	Implemented	UNK

Shop: Small Arms

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Recover copper jacketed lead bullets for recycle.	Implemented	UNK
Recycle brass casings.	Implemented	UNK
Filter air in firing range with HEPA filter system.	Implemented	UNK

Shop: STAWEAP

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use Sem pens to reduce aerosol painting.	Implemented	UNK
Use low VOC Eco-sure aerosol paints.	Implemented	UNK
Use rechargeable batteries in equipment.	Implemented	UNK
Replace PD-680 in parts washer with Simple Green.	Implemented	UNK
Substitute ODS-containing materials with non-ODS-containing materials.	Implemented	UNK

Shop: PWAC

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Replace water-cooled condensers with air-cooled condensers which are more energy efficient.	Implemented	UNK
Recover and reuse Freon.	Implemented	UNK

Shop: PWBOILER

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use low-pressure water heaters to heat buildings which are much cheaper than steam heat.	Partially implemented	UNK

Shop: PWCARPTY

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Mix sawdust with mulch and use around buildings.	Not Implemented	NA
Reuse scraps of lumber on small projects.	Implemented	UNK

Shop: PWPIPE

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Recycle scrap pipe.	Implemented	UNK
Use lead-free solder.	Implemented	UNK

Shop: PWROAD

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program 13.	Not Implemented	NA
Recycle asphalt behind Building 1320.	Not implemented	NA
Substitute synthetic oil for regular motor oil to extend time between change outs.	Not implemented	NA
Replace lead acid batteries with gel cell batteries.	Not implemented	NA

Shop: PWSLFHLP

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Substitute ODS-containing materials with non-ODS-containing materials.	Implemented	UNK

Shop: TANG224

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Substitute ODS-containing lubricants with non-ODS-containing spray lubricants.	Implemented	UNK

Shop: TANG241

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program	Not Implemented	NA
Filter aircraft fuel when servicing to reduce disposal of fuel.	Implemented	UNK

Shop: TANG242

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Procure one HVLP paint gun for small projects.	Not implemented	NA
Replace toluene with isopropyl alcohol.	Not Implemented	NA
Use HVLP paint guns for large projects.	Implemented	UNK
Eliminate MEK for part preparation and wipe down.	Implemented	UNK

Shop: TANG243

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Use penetrants, penetrant removers and developers that are ODS-free.	Implemented	UNK

Shop: TANG244

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA

Shop: TANG 248

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Eliminate Freezing Compound NSN 6850-00-405-9358.	Implemented	UNK

Shop: TANG707

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Use oil-water separator at parking lot where fuel trucks are staged.	Implemented	UNK

Shop: TANG722

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Participate in a lubricant analysis program.	Not implemented	NA
Use bypass filters when possible in vehicles to reduce frequency of oil changes.	Not implemented	NA
Compost yard waste and cuttings.	Not implemented	NA

Shop: TANGAGE

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Recycle antifreeze.	Implemented	UNK
Wash equipment at wash rack equipped with oil-water separator.	Implemented	UNK
Replace R-12 Freon with R-134.	Implemented	UNK
Replace lead acid batteries with gel cell batteries.	Implemented	UNK
Recycle JP-8 through AGE.	Implemented	UNK

Shop: TANGELEC

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Recycle scrap metal generated from component replacement.	Implemented	UNK
Discontinue use of electrical lube compound (NSN 6850-01-375-5690), which contains HCFC-114.	Implemented	UNK
Use sealed lead-acid batteries when possible.	Implemented	UNK

Shop: TANGHYD

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Recycle scrap steel.	Implemented	UNK

Shop: LGMP

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use drip pans to contain drips and spills.	Implemented	UNK
Use synthetic oil instead of regular oil to reduce the frequency of change outs.	Implemented	UNK
Recycle used oil and oil filters.	Implemented	UNK
Reduce MEK usage.	Implemented	UNK

Shop: TANGMACH

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Recycle steel and aluminum.	Implemented	UNK

Shop: TANGTIRE

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use an aqueous parts washer for rims.	Implemented	UNK

Shop: VFA-201 110

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Recycle used JP-8.	Implemented	UNK
Use non-ODS-containing version of VVL-880 and lubricants.	Implemented	UNK

Shop: VFA-201 120

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Reduce MEK usage with substitute materials.	Implemented	UNK
Use rechargeable batteries in equipment.	Implemented	UNK
Use fluid particle counter to perform hydraulic fluid testing.	Implemented	UNK
Replace ODS-containing materials with non-ODS substitutes.	Implemented	UNK

Shop: VFA-201 12C

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use UNICOAT paint system to reduce paint usage.	Implemented	UNK
Use paint gun cleaning machine.	Implemented	UNK
Use HVLP paint guns.	Implemented	UNK

Shop: VFA-201 13A

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Use dry gauze and Sani Wipes to clean parts.	Implemented	UNK
Use alkaline and lithium batteries in shop, eliminating mercury batteries.	Implemented	UNK

Shop: VFA-201 13B

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Use purge cart to filter dielectric coolant in aircraft.	Implemented	UNK
Replace ODS-containing versions of VVL-880, break-free, lubricants and preservatives with non-ODS version.	Implemented	UNK

Shop: VFA-201 210

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not implemented	NA
Replace ODS containing versions of VVL-880 and coating compounds with non-ODS versions.	Implemented	UNK
Substitute Non-Rust X-110 for CPCs.	Implemented	UNK

Shop: VFA-201 220

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Non Implemented	NA
Replace VVL-880 and CPC with non-ODS version.	Implemented	UNK

Shop: VFA-201 230

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Replace VVL-880 and CPC with non-ODS version.	Implemented	UNK

Shop: VFA-210 310

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use particle counter to test hydraulic fluid.	Implemented	UNK
Recycle JP-8 fuel samples.	Implemented	UNK
Replace VVL-880 and CPC with non-ODS version.	Implemented	UNK

Shop: VMFA-112 12C

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use HVLP paint guns.	Implemented	UNK
Use UNICOAT technology to reduce paint usage and waste.	Implemented	UNK
Replace ODS-containing versions of coating compound, which contain toluene, with non-ODs version.	Implemented	UNK

Shop: VMFA-112 120

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use particle counter to test hydraulic fluid.	Implemented	UNK

Shop: VMFA-112 220

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA

Shop: VMFA-112 13A

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA

Shop: VMFA-112 230

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Replace ODS-containing versions of lubricants, preservatives, break-free and VVL-880 with non-ODS-containing versions.	Implemented	UNK
Clean bomb racks with soap and water, not solvents.	Implemented	UNK

Shop: VMFA-112 310

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Transfer fuel from one cell to another whenever possible.	Implemented	UNK
Recycle fuel samples.	Implemented	UNK

Shop: VMFARAD

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use purge cart to filter radar coolant.	Implemented	UNK

Shop: VMFASEAT

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Replace ODS-containing versions of lubricants, preservatives. and break-free with non-ODS versions.	Implemented	UNK

Shop: VR-59 110/310

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use ODS-free version of VVL-880.	Implemented	UNK
Recycle oil, oil filters and fuel samples.	Implemented	UNK
Decrease frequency of aircraft washing from 14 days to 60.	Implemented	UNK

Shop: VR-59 120

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Use particle counters to test hydraulic fluid.	Implemented	UNK
Use HVLP paint guns.	Implemented	UNK
Use non-ODS-containing versions of VVL-880, lubricants, preservatives, and break-free.	Implemented	UNK

Shop: VR-59 130

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA

Shop: VR-59 200

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA

Shop: MWR-Auto Hobby

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Recycle oil and oil filters.	Implemented	UNK
Utilize recycling and filtering parts washer.	Implemented	UNK
Use floor sweep multiple times to fully saturate with oils before disposing.	Implemented	UNK

Shop: HAZMINCEN

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Recycle empty hazmat containers.	Implemented	UNK
Develop a written SOP for extending shelf life of hazmat.	Implemented	UNK
Perform locker checks to identify hazmat that needs to be extended or is not on work center AUL.	Implemented	UNK
Procure aircraft soap that does not contain solvent.	Implemented	UNK
Procure low VOC Eco-sure aerosol paints.	Implemented	UNK
Make nonextendable shelf life materials available to other DoD installations and Habitat for Humanity.	Implemented	UNK
Procure non-ODS-containing substitutes for Break-free, CLP compound, and coating compounds. Procure lead-free traffic paint. Procure avionics cleaner that does not contain TCA.	Implemented	UNK

Shop: MAGATCM Det A

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Use Freon recovery unit for servicing air conditioners.	Implemented	UNK
Procure an antifreeze recycling unit.	Implemented	UNK
Replace lead acid batteries with sealed gel cell batteries.	Implemented	UNK

Shop: VMGR-234 310

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Procure an absorbent pad wringer.	Implemented	UNK
Recycle used oil, filters, and JP-8.	Implemented	UNK

Shop: VMGR-234 12A

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Procure an absorbent pad wringer.	Implemented	UNK
Procure particle counter to test hydraulic fluid.	Implemented	UNK
Recycle scrap metal.	Implemented	UNK

Shop: VMGR-234 210

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Substitute ODS-containing versions of lubricants and preservatives with non-ODS-containing versions.	Implemented	UNK

Shop: VMGR-234 12C

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Participate in basewide rag laundering program.	Not Implemented	NA
Procure an absorbent pad wringer.	Implemented	UNK
Procure a UNIRAM Cascade paint gun cleaner.	Implemented	UNK
Use HVLP paint guns.	Implemented	UNK

Shop: MAGEMB

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Use paint markers for labeling in lieu of stenciling with aerosol paint.	Implemented	UNK

Shop: Dental/Medical

P2 Recommendation	Implementation Status	Estimated HW/HM Reduction
Recycle silver from X-ray developer.	Implemented	UNK

CARSWELL AFB
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 744

AFTER ACTION REPORT

Offsite Weapons Storage Area Explosive Ordnance Disposal Range Ordnance Removal/Clearance at the Former Carswell AFB, Texas

FINAL

Contract No. FA8903-04-D-8671
Task Order 28, Modification 01
DECEMBER 2006

Project Title: Carswell After Action Report Draft Final and Response to Comments
Reviewer: USAF
2006

Item No.	Page/Section Paragraph	Comment/Code
General Comments		
1	General	Include the analytical results from the soil sampling to support regulatory, Department of Defense Explosive Safety Board (DDESB), and property transfer requirements.
Response: Analytical results from the soil sampling conducted at the project site have been included in the Draft Final AAR document. Page 4-1, Section 4.2, Paragraph 2.		
2	General	Throughout the document the text reverts back and forth from past tense to present tense which leaves the reader confused if actions have actually occurred. Additionally, recommend rearranging the format of the report to help support quick review, i.e., move Section 3.0, Data Quality Objectives as an appendix and separate investigation and removal into two separate Sections.
Response: The AAR Draft Final document has been through a technical edit review to correct grammatical and pagination errors. The document has been reformatted in an effort to support the clearance tasks in a more concise and logical manner which should make the document easier to review.		
3	General	Check page numbering throughout the document for consistency in format.
Response: See response to general comment no. 2		
4	General	Recommend reducing the technical information as related to the geophysical equipment since this has been previously submitted in other documents.
Response: The geophysical technical information has been reorganized to clarify its intent, and is necessary as it is the bases in science that supports the way anomalies were selected for investigation at the site. If it is still felt that this information should be removed after reviewing the Draft Final document we will remove it in the final document.		
5	General	Include maps of locations of identified material potentially presenting an explosive hazard (MPPEH), potential open burn (OB)/open detonation (OD) burn pits, and detonation areas. Additionally, include the anomaly location maps for the creek bed area.
Response: Figures have been included in the AAR Draft Final document that indicate where all potential MPPEH items were located, where all MPPEH items were located, planned project OD site, and soil sample locations.		
Specific Comments		
1	Page i	Last sentence. Reword the sentence for clarification. As it reads, it leads the reader to question if clearance has been done beyond 8 inches below ground surface. Code: C
Response: Sentence has been re-structured to clarify.		
2	Pages iii-iv, Table of Contents	Replace "Error! Bookmark not defined" with correct page number. Also, in the next submittal of the document, include all tables and figures that are discussed throughout the document. Code: A
Response: See general comments no. 2 and 5.		

Project Title: Carswell After Action Report Draft Final and Response to Comments
Reviewer: USAF
2006

Item No.	Page/Section Paragraph	Comment/Code
3	Page 1-2, Section 1.3, Paragraph 1	Last sentence. Replace "of the property" with "of a portion of property." Code: M
Response: Sentence has been changed as directed, due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner which should make the document easier to review, this change is located on Page 1-2, Section 1.3, Paragraph 2.		
4	Page 2-1, Section 2.1.1, Paragraph 2	First sentence. Add "pyrotechnics" in the sentence discussing disposal of munitions and explosives of concern (MEC). Code: M
Response: Sentence has been changed as directed, due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner which should make the document easier to review, this change is located on Page 2-1, Section 2.1.1, Paragraphs 1 and 2.		
5	Page 2-1, Section 2.1.1, Paragraph 2	Fourth sentence. Define "ball" as related to loaded small arms cartridges or expended projectiles. Code: M
Response: Sentence has been changed. The term ball is not correct and has been replaced with the correct term, which is bullet. Ball is one of many bullet types.		
6	Page 4-1, Part 1, Paragraph 2	2nd Sentence. Include "; however, MD was identified" between "MEC" and "during." Code: M
Response: Sentence has been changed as directed, due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner which should make the document easier to review, this change is located on Page 3-1, Part 1, Paragraph 1.		
7	Page 4-1, Part 2, Paragraph 1	1st Sentence. Insert "In accordance with the approved ESS dated December 2005" before "The second phase…." Code: M
Response: Sentence has been changed as directed, due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner which should make the document easier to review, this change is located on Page 3-10, Part 2, Paragraph 1.		
8	Page 4-1, Part 2, Paragraph 1	2nd Sentence. Rewrite the sentence as follows: "All detected anomalies were investigated and the anomaly source identified and removed. Items identified as MPPEH were explosively destroyed." Code: M
Response: Sentence has been changed as directed, due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner which should make the document easier to review, this change is located on Page 3-10, Part 2, Paragraph 1.		
9	Page 4-1, Part 2, Paragraph 2	1st Sentence. Include removal method for the EOD area. Code: C

Project Title: Carswell After Action Report Draft Final and Response to Comments
Reviewer: USAF
2006

Item No.	Page/Section Paragraph	Comment/Code
Response: The document has been reformatted in an effort to include discussions on both clearance areas and support the clearance tasks discussions in a more concise and logical manner which should make the document easier to review, this information is located on Page 3-10, Part 2, Section 3.2 Paragraph 2 and Section 3.2.2.		
10	Page 6-2	Correct number to start with page number "6-1." Code: A
Response: See general comment no. 3		
11	Page 6-2, Section 6.0	Include information related to the dry creek bed area. Code: C
Response: The reformatted document has included information on clearance activities conducted in the Dry Creek Bed. This information is located on Page 3-1, Section 3.1; Page 3-10, Section 3.2, Paragraph 2; Page 3-12, Section 3.2.2.5; and Page 3-14, Section 3.2.2.7, Paragraph 6.		
12	Page 6-2, Section 6.1	Explain if partial 100- by 100-foot grids along the edge of the 900-foot radius were partially or completely surveyed for anomalies during the geophysical investigation. Code: M
Response: Only area inside the 900' project boundary was geophysicaly mapped and cleared. Areas in the document that discuss these partial grids have been clarified to indicate actual clearance footprint and are located on Page 3-2, Section 3.1.1, Paragraph 3; Page 3-3, Section 3.1.2; and Page 3-6, Section 3.1.2.3, Paragraph 6.		
13	Page 6-2, Section 6.1.1, Paragraph 2	Insert "Site Preparation and Geophysical" after "Part 1" and insert "Intrusive" after "Part 2." Code: A
Response: Changes have been made as directed, due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner which should make the document easier to review, this change is located on Page 3-1, and Page 3-10.		
14	Page 6-3, Section 6.1.1, Paragraph 2	Insert "; however, MD was present" after "activities." Code: M
Response: Sentence has been changed to better explain the type of debris that was removed from the site during the surface preparation operation. Due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner, this change is located on Page 3-2, Section 3.1.1, Paragraph 2.		
15	Page 6-3, Section 6.1.1, Paragraph 4	Insert "and" after "NAD83". Code: M
Response: Sentence has been changed as directed, due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner, this change is located on Page 3-3, Section 3.1.1, Paragraph 4.		

Project Title: Carswell After Action Report Draft Final and Response to Comments
Reviewer: USAF
2006

Item No.	Page/Section Paragraph	Comment/Code
16	Page 6-6, Section 6.1.2.3, Paragraph 4	Include a discussion if the geophysical prove-out (GPO) test plot was used on a recurring basis during the geophysical investigation to determine variations in instrumentation response from the initial baseline. Code: M
Response: Section has been re-written to further clarify the function of the GOP Test Plot. Due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner, this change is located on Page 3-5, Section 3.1.2.3, Paragraph 4.		
17	Page 6-13, Section 6.2.5	Include the major constituents of the anomalies that were identified. Code: C
Response: This section contains a discussion on how we reacquire anomalies and was not intended to discuss major constituents located at the site. There were over 8000 anomalies investigated at the site with only 15 qualifying as MPPEH or MEC. A soil sample was taken and an analysis for Explosives under EPA Method 8330 at each site by STL with negative results. This information is captured in Chapter 4 and Appendix C.		
18	Page 6-14, Section 6.2.6, Paragraph 2	This sentence contradicts section 7.2. Recommend clarification of the number of actual 20 mm HE projectiles that were recovered during the real-time MEC/MPPEH clearance activities. Code: C
Response: Paragraph has been clarified to indicate 15 total MPPEH items were disposed of, with one 20mm HE projectile recovered from the Live Creek Bed and disposed of. Due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner, this change is located on Page 3-14, Section 3.2.2.7, Paragraph 6.		
19	Page 6-10, Section 6.1.2.4, Paragraph 4-5	Include timeframe when raw and final processed data were delivered. Additionally, insert "to include the following" after "optical computer disc (CD-ROM)." Code: M
Response: Sections have been changed to indicate when project data will be provided to AFCEE and sentence has been changed as directed. Due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner, this change is located on Page 3-9, Sections 3.1.2.6 and 3.1.2.7.		
20	Page 6-10, Section 6.1.2.5	Include discussion on the dry creek bed within this section. Code: M
Response: The Live Oak Dry Creek Bed was cleared as discussed on Page 3-12, Section 3.2.2.5. The creek bed was not geophysically mapped, but cleared using Real Time Point clearance methodology due to terrain and heavy vegetation issues.		
21	Page 8-4, Section 7.2, Paragraph 6	Include a discussion if the partial grids at the edge of the 900-foot radius were 100% coverage by the geophysical instrumentation. Code: M
Response: See specific comment no. 12.		

Project Title: Carswell After Action Report Draft Final and Response to Comments
Reviewer: USAF
2006

Item No.	Page/Section Paragraph	Comment/Code
22	Page 8-8, Section 8.2.1.3, Paragraph 1	Clarify the discussion of the burial of the 20mm projectiles at random locations across the survey area. The text indicates 23 inert projectiles were randomly buried in the project area but then further states that 10 of these projectiles were buried at known locations in the GPO. Code: M
Response: Text has been changed to clarify the placement of the 23 inert 20mm projectiles that were used at the site to establish and monitor geophysical instrument capabilities. Due to the document being reformatted in an effort to support the clearance tasks in a more concise and logical manner, this change is located in appendix E Page 6, Section E.2.1.2.		
23	Page 11-1, Section 11, Paragraph 1	Last Sentence. Expand this sentence to explain what a "green area" is. Include a map identifying this area. Code: C
Response: The Green Area has been defined on Page 6-1, and the area has been added to Figure 4-1		
24	Page 13-2, Section 13.4	Include maps with submittal of the AAR. Code: C
Response: All Maps identified in the After Action Report Draft Final, dtd September 2006, have been included as Figures.		

Comment Type Definitions:

A – Administrative	These comments address what appear to be typographical or grammatical errors.
M – Minor	These comments address potentially incorrect, incomplete, misleading, or confusing information in the document.
C – Critical	These comments address concerns that could lead to nonconcurrence of the document if not satisfactorily resolved.

Project Title: Final After Action Report for the Off-Site Weapons Storage Area, Explosives Ordnance Disposal Range, Ordnance Removal/Clearance at the Former Carswell AFB, Texas
Reviewer: Noel Bennett, EPA

Item No.	Page/Section Paragraph	Comment/Code
General Comments		
1	General	The depths of the recovered MPPEH (material potentially presenting an explosive hazard) items should be included in Table 4-1.

Response: Concur, the depths of the recovered MPPEH have been added as suggested to Table 4-1.

2	General	How deep were the 20 mm rounds detected? The Explosives Safety Submission indicated that 20 mm rounds could be detected to a depth of 5-8 feet. Property notification/restriction for intrusive activities below the detection depth will likely be needed. Will there be education provided to users/residents warning them of potential hazards, particularly from digging? There still may be potential for ordnance items to be found even though all anomalies were investigated.

Response: At this site 20 mm projectiles were recovered from as deep as 24 inches below ground surface (bgs). These deeper discoveries were found in trenches with other munitions debris, so are not truly representative of depths at which 20mm's would be detectable. Most 20mm's were recovered from 0 to 6 inches. The ESS states that 20 mm rounds could be detected to a depth of 5-8 inches, not 5-8 feet. The 5-8 inch depth of detection for 20 mm projectiles was established by Earth Tech on a geophysical test plot constructed at the site for the purpose of ground truthing geophysical equipment to be employed at the site. Also, the deed will contain covenants to ensure that any response or corrective actions that are the responsibility of the Air Force for Military Munitions substances released or disposed of on the Property prior to the date of the deed which are found to be necessary after the date of delivery of the Deed will be conducted by the United States. Provisions will also be included in the deed to allow the United States access to the property in any case where any such response or corrective action is found to be necessary, or where such access is necessary to carry out any response or corrective action on adjoining property.

3	General	Section 4.1, 1995 Clearance: Six munitions pits as deep as 20 feet bgs are mentioned. Please explain what was found in these pits. Were these pits dug up and the munitions removed? Please expand the discussion and provide more clarity of exactly what was done with the munitions pits.

Response: During the 1995 clearance 12 potential Open Burn/Open Detonation (OB/OD) pits, were located, excavated, and sifted for Materials Potentially Presenting an Explosive Hazard (MPPEH). Six of the 12 potential OB/OD pits were found to contain munitions debris (MD). The 1995 clearance report states that the 6 pits were cleared of all MD. Contents removed from the pits during the 1995 removal were described in the supporting documents provided by the Air Force and attached to the Statement of Objectives. During the 2006 clearance effort two pits were discovered. The suspect pits were investigated, and cleared of any detected MEC and MD. The first pit area was 30' wide by 80' long and 18" deep. All MD was removed from this area. The second pit area was 15' wide by 20' long and 10' deep, and as before all MD was removed from this area. Whether these were additional pit, or pits incompletely cleared in 1995 is not known. No other evidence of buried debris pits was seen in the geophysical data.

4	General	Shallow ground water contamination in the explosive ordnance disposal (EOD) area is yet to be addressed. There needs to either be some ground water sampling or some calculations/modeling based on soil concentrations to demonstrate that ground water quality is not threatened.

Response: If detections of explosive compounds were identified within the soil, groundwater sampling would be recommended dependent on location of results; however, no explosive compounds were identified. Additionally, previous soil and groundwater samples results collected during the Off-site Weapons Storage Area RCRA Facility Investigation (RFI) in 1998 were non-detect for explosive compounds. Based on historical and current soil sample results showing no explosive compounds, no groundwater sampling is recommended or necessary.

5	General	Perchlorate was not included on the analyte list for munitions constituents. Did any of these munitions contain perchlorate?

Project Title: Final After Action Report for the Off-Site Weapons Storage Area, Explosives Ordnance Disposal Range, Ordnance Removal/Clearance at the Former Carswell AFB, Texas
Reviewer: Noel Bennett, EPA

Item No.	Page/Section Paragraph	Comment/Code
Response: The MEC located/identified at the site did not contain perchlorate, therefore perchlorate was not included in the analyte list for munitions constituents for analysis.		
6	General	Please provide the specifics of what will be certified in a residential land use certificate. Will there be discussion of the limitation of the detection methods used?
Response: The Certificate of Clearance language located within the front of the After Action Report, provides a certification based on the most effective technologies and current information available, and in accordance with the approved Safe Work Procedure and Work Plan dated October 2005. Furthermore, in the Explosive Safety Submission dated January 2006, Earth Tech certified that all detectable explosive hazards have been removed from the project site, and that the site is suitable for residential use. The discussion of detection methods limitations were initially discussed in the ESS and summarized within Appendix D, Data Quality Objectives in the AAR.		

Comment Type Definitions:

A – Administrative	These comments address what appear to be typographical or grammatical errors.
M – Minor	These comments address potentially incorrect, incomplete, misleading, or confusing information in the document.
C – Critical	These comments address concerns that could lead to nonconcurrence of the document if not satisfactorily resolved.

Project Title: Final After Action Report for the Off-Site Weapons Storage Area, Explosives Ordnance Disposal Range, Ordnance Removal/Clearance at the Former Carswell AFB, Texas
Reviewer: Capt. Matthew Anderson, AFSC

Item No.	Page/Section Paragraph	Comment/Code
Comment		
1	Signature Page	"To the best of our belief and abilities, using the most effective technologies and current information available, and in accordance with the approved Safe Work Procedure and Work Plan dated October 2005, and Explosive Safety Submission dated January 2006, we certify that explosive hazards, have been removed from the project site, including <u>most</u> 20mm-sized HE projectiles at 8 inches or less below ground surface, and that the site is suitable for residential re-use." Comment: From this it sounds like there might be 20mm HE projectiles left. The AAR needs to state that all 20mm HE projectiles have be removed. If this change can be made, let me know and send me a final document and I will send it up to the DDESB for review.

Response: Concur, the above paragraph was changed to state: "To the best of our belief and abilities, using the most effective technologies, current information available, and in accordance with the established criteria for this project contained in the approved Safe Work Procedure and Work Plan dated October 2005, and Explosive Safety Submission dated January 2006, Earth Tech certifies that all detectable explosive hazards, have been removed from the project site, and that the site is suitable for residential re-use." A final version of the document has been provided as requested.

Comment Type Definitions:

A – Administrative	These comments address what appear to be typographical or grammatical errors.
M – Minor	These comments address potentially incorrect, incomplete, misleading, or confusing information in the document.
C – Critical	These comments address concerns that could lead to nonconcurrence of the document if not satisfactorily resolved.

FINAL

AFTER ACTION REPORT

Off-Site Weapons Storage Area
Explosive Ordnance Disposal Range
Ordnance Removal/Clearance
Former Carswell AFB, Texas
Contract No. FA 8903-04-D-8671,
Task Order No. 028

December 2006

Prepared for

Air Force Center for Environmental Excellence

Prepared by

Earth Tech, Inc.

After Action Report
Off-Site Weapons Storage Area Explosive Ordnance Disposal Range
Ordnance Removal/Clearance
Former Carswell AFB, Texas
Contract No. FA 8903-04-D-8671,
Task Order No. 028

This After Action Report pertains to the area within a 900-foot radius of the center point of the former Carswell AFB OWSA EOD Range located at 97.52483 degrees East and 32.77322 degrees North and the area 25 feet either side of the fall line of Live Oak Creek extending 1,800 feet down gradient from the edge of the 900-foot circle, excluding only the containment berm and floor of the pond, designated in this document as the Green Area, situated on the northern extremity of the project site. To the best our belief and abilities, using the most effective technologies, current information available, and in accordance with the established criteria for this project contained in the approved Safe Work Procedure/Work Plan dated October 2005, and Explosive Safety Submission dated January 2006, approved by DDESB March 31, 2006, Earth Tech certifies that all detectable explosive hazards, have been removed from the project site, and that the site is suitable for residential re-use. There is small arms ammunition debris that can be located across the entire project site to include; cartridge cases, links from caliber .30 and caliber .50 ammunition, projectiles from caliber .30 and caliber .50 ammunition, and other small non-recognizable metallic debris that do not constitute a safety hazard and would not preclude this property from being suitable for residential re-use.

Gregory J Peterson, Project Manager
Earth Tech MMRP Technical Director

27 DEC 06
Date

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1-1

1.1 Site Location 1-1
1.2 Site Description 1-1
1.3 Site History 1-2
1.4 Previous MEC Removal Operations 1-2
1.5 Purpose OF Current mec clearance 1-3
1.6 Anticipated MEC/MPPEH, Composition, and Quantity. 1-3

2.0 REASON FOR MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) 2-1

2.1 General 2-1
2.1.1 OWSA EOD Range 2-1

3.0 FIELD ACTIVITIES 3-1

3.1 Part 1 - Site Preparation and Geophysical Survey. 3-1
3.1.1 Site Preparation 3-1
3.1.2 Geophysical Detection and Mapping Survey 3-3
3.1.2.1 Personnel 3-3
3.1.2.2 Detection Equipment 3-3
3.1.2.3 Data Collection Method 3-5
3.1.2.4 Geophysical Survey Data, Processing, and Analysis 3-6
3.1.2.5 Anomaly Selection and Decision Criteria 3-8
3.1.2.6 Geophysical Data Analysis, Field Reacquisition and Reporting 3-9
3.1.2.7 Complete Geophysical Deliverables 3-9
3.1.2.8 Discussion of Geophysical Detection and Mapping Survey Results 3-9
3.2 Part 2 - Intrusive Activities and Investigation of Live Oak Creek Bed 3-9
3.2.1 Anomaly Reacquisition 3-10
3.2.2 MEC/MPPEH Recovery and Clearance 3-10
3.2.2.1 Safety Precautions 3-11
3.2.2.2 Personnel Qualifications 3-11
3.2.2.3 Field Teams 3-11
3.2.2.4 Site Control Plan 3-12
3.2.2.5 Realtime Investigation of Live Oak Creek Bed 3-12
3.2.2.6 MEC Removal/Clearance Operations Within the OWSA EOD Range 3-12
3.2.2.7 MEC Identification and Removal 3-14

4.0 INTRUSIVE INVESTIGATION RESULTS 4-1

4.1 1995 Clearance 4-1
4.2 2006 Ordnance Removal/clearance 4-1

5.0 MEC DISPOSAL OPERATIONS 5-1
5.1.1 Demolition Team 5-1
5.1.2 Administrative Controls 5-2
5.1.3 Engineering Controls 5-2
5.1.4 Operations in Populated Areas 5-2
5.1.5 Off-Site Destruction 5-2
5.2 Disposition of Scrap 5-3
5.2.1 Scrap Certification Process 5-3
5.2.2 Scrap Certification Documentation 5-3
5.2.3 Disposition 5-4
5.2.4 Chain Of Custody and Final Disposition 5-4
6.0 LAND USE RESTRICTIONS 6-1
7.0 PUBLIC INVOLVEMENT 7-1
8.0 QUANTITY-DISTANCE 8-1
8.1 Magazines 8-1
8.2 Planned or Established Demolition Areas 8-1
8.3 Collection Points 8-2
8.4 Q-D MAPS 8-2
9.0 REFERENCES 9-1

LIST OF APPENDICES

A INTRUSIVE INVESTIGATION RESULTS

B SCRAP DISPOSITION DOCUMENTATION

C SOIL SAMPLE LABORATORY REPORT

D DATA QUALITY OBJECTIVES

D.1 Geophysical Data Quality Objectives D-1
D.1.1 Positioning System Performance for Land Survey Operations D-1
D.1.2 Positioning System Performance for Geophysical Operations D-2
D.1.3 Geophysical Data Processing and Target Selection D-3
D.1.4 Geophysical Anomaly Targeting Criteria D-4
D.1.5 Geophysical Data Fidelity D-5
D.1.6 Geophysical Data Utility D-5
D.1.7 Geophysical Data Objectivity D-6
D.1.8 Data Integrity D-7

D.2 Geophysical Investigation Performance Goals D-8
D.2.1 MEC Detection D-8
D.2.2 False Positives. D-8
D.3 Intrusive Investigation Data Quality Objectives D-8

E QUALITY CONTROL/QUALITY ASSURANCE

E.1 Geophysical Mapping and Equipment E-1

E.2 Munitions and explosives of concern Clearance E-6
E.2.1 Quality Control Field Observation E-6
E.2.1.1 Unexploded Ordnance Quality Control Specialist Inspection E-6
E.2.1.2 Quality Control Pass/Fail Criteria E-6
E.2.2 Quality Assurance Investigation E-7
E.2.2.1 Quality Control Pass/Fail Criteria E-6

LIST OF FIGURES

Figure 1-1. Regional Location Map 1-4

Figure 1-2. Carswell AFB, OWSA, and EOD Range 1-5

Figure 1-3. OWSA EOD Range Project Area 1-6

Figure 3-1. Geophysical Detection and Mapping Survey Results 3-15

Figure 3-2. Munitions and Explosives of Concern Process Flowchart 3-17

Figure 4-1. Intrusive Investigation and Realtime MEC/MPPEH Clearance and Soil Sampling Locations 4-4

Figure 8-1. Exclusion Zones for MGFD within the Project Site 8-3

Figure 8-2. Exclusion Zone for Demolition Area 8-3

LIST OF TABLES

Table 4-1. Recovered MPPEH Items 7-12

Table 4-2. Soil Sample Analytical Results 4-3

Table 7-1. Adjacent Private Property Information 7-1

LIST OF PHOTOGRAPHS

Photograph 3-1. Vegetation Removal with Bush Hog 3-2

Photograph 3-2. EM 6I Detection Cart and Survey Team 3-4

Photograph 3-3. RTK GPS Base Station on Safety Bunker 3-5

LIST OF ACRONYMS AND ABBREVIATIONS

AAR	After Action Report
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AFSC	Air Force Safety Center
bgs	below ground surface
BIP	Blown in Place
cm	centimeter
CWM	chemical warfare materials
CEHNC	Corps of Engineers Huntsville Center
°	degrees
DDESB	Department of Defense Explosives Safety Board
DOD	Department of Defense
DQO	Data Quality Objective
EM	electromagnetic
EOD	Explosive Ordnance Disposal
EOR	Explosive Ordnance Reconnaissance
ESS	Explosive Safety Submission
EZ	Exclusion Zone
F	Fahrenheit
GIS	Geographic Information System
GPO	Geophysical Prove-Out
GPS	Global Positioning System
HAZWOPER	Hazardous Waste Operations
HE	High Explosive
'	minute
MD	munitions debris
MEC	munitions and explosives of concern
mm	millimeter
MPM	most probable munitions
MSD	minimum separation distance
MGFD	munition with the greatest fragmentation distance
MPPEH	material potentially presenting an explosive hazard
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NEW	net explosive weight
NSR	Noise to signal ration of geophysical instrument response
NTCRA	Non-Time Critical Removal Action

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

OB/OD	open burn/open detonation
OSHA	Occupational Safety and Health Administration
OWSA	Off-site Weapons Storage Area
QA	Quality Assurance
QC	Quality Control
Q-D	Quantity Distance
RTK	real time kinematic
SOP	Standard Operating Procedure
SSHP	Site Safety and Health Plan
SUXOS	Senior UXO Supervisor
TP	target practice
TSP	Texas State Plane
USACE	U.S. Army Corps of Engineers
UXO	Unexploded Ordnance
UXOQC	UXO QC Specialist
UXOSO	UXO Safety Officer
Zonge	Zonge Engineering Corporation

1.0 INTRODUCTION

This After Action Report (AAR) describes the methods and procedures used to locate, identify, and remove Munitions and Explosives of Concern (MEC) at the former Carswell Air Force Base (AFB) Off-Site Weapons Storage Area (OWSA) Explosive Ordnance Disposal (EOD) Range henceforth referred to as the OWSA EOD Range. This was a Non-Time Critical Removal Action (NTCRA) to address potential MEC associated with historic operations at the OWSA EOD Range.

The OWSA EOD Range is located ¼ mile north of the residence at 11300 White Settlement Road, Fort Worth, Texas 76108. Figure 1-1 is a regional location map that shows the general location of the former Carswell AFB and the OWSA EOD Range. Figure 1-2 shows the location of the OWSA EOD Range in relation to the former Carswell AFB.

Field teams mobilized to the site on 3 November 2005. The field work was completed and the teams demobilized on 23 August 2006. Field activities were performed in two parts and in accordance with the former Carswell AFB OWSA EOD Range Ordnance Removal/Clearance Explosive Safety Submission (ESS) and the project Work Plan. The goal of the ordnance removal/clearance was to provide the basis for a residential land use certification for approval by the Air Force Safety Center (AFSC) and the Department of Defense Explosive Safety Board (DDESB).

1.1 SITE LOCATION

The OWSA EOD Range is located approximately 5 miles west of the former Carswell AFB, and adjacent to the OWSA, which supported Carswell AFB prior to closure. The specific area investigated encompasses a 900-foot (274-meter) radius centered on the EOD range safety observation bunker on the disposal range at 97.52483 degrees (°) East and 32.77322° North (latitude and longitude). Additionally, an area of approximately 25 feet (8 meters) to either side of Live Oak Creek, and extending 1,800 feet (550 meters) south and east from the edge of the EOD range was cleared using realtime ("mag and flag") techniques. Figure 1-3 shows the boundaries of the project area.

1.2 SITE DESCRIPTION

The project site is situated in an area of gently rolling hills with scrub brush, grass, and small stands of hardwood trees. Live Oak Creek is an intermittent creek bed located approximately 1,400 feet to the northeast of the main ordnance disposal area. The Live Oak Creek bed has thick riparian vegetation, including scrub brush and hardwood trees lining the sides.

The former Carswell AFB lies at approximately 32° 46 minutes (') North latitude along an arid and semi-arid zone, characterized by hot summers and mild winters. The maximum mean monthly temperature for the year is 84° Fahrenheit (F), occurring in July. Maximum and minimum temperatures in July average 96°F and 72°F, respectively. The minimum mean monthly temperatures during the year occur in January at 43°F. Maximum and minimum temperatures during this month average 55°F and 31°F, respectively. The yearly average temperature is approximately 64°F. The frost penetration depth at the project site would be less than 1 foot bgs.

1.3 SITE HISTORY

Carswell AFB, originally known as Tarrant Field Airdrome, was established in 1942 as a flight training and heavy bomber operations facility. In 1946, the Strategic Air Command assumed control of the installation and the base became the headquarters for the 8th Air Force. In 1948, the base was renamed Carswell AFB in honor of Major Horace Carswell. Carswell AFB was the headquarters for the 19th Air Division from 1951 until 1988. The OWSA was constructed during the late 1950s.

Carswell AFB was slated for closure under the Defense Base Closure and Realignment Act of 1990. The closure activities began in 1992. By 1993, all aircraft were relocated to Barksdale AFB and by 30 September 1993, all base-related operations ceased and the base was transferred to the Air Force Base Conversion Agency. On 1 October 1994, the U.S. Navy assumed control of a portion of the property and it was realigned and renamed the Naval Air Station Fort Worth Joint Reserve Base, Carswell Field.

1.4 PREVIOUS MEC REMOVAL OPERATIONS

During August and September 1995, Hill AFB EOD Team personnel swept and cleared approximately 58.5 acres of the OWSA EOD Range and 6 acres of Live Oak Creek using Mk 26 ordnance locators to locate and excavate MEC.

Items located during the 1995 clearance consisted of the following:

- One105 millimeter (mm) high explosive (HE) Projectile
- One 3-inch HE Projectile
- One M229 2.75-inch HE Warhead
- One M57 Hand Grenade
- 50 Cubic Yards of Soil Containing Expended Aircraft Starter Cartridges
- 10 - M55A2 20mm target practice (TP) Projectiles
- 2 tons - Ordnance Scrap Metal.

The Hill AFB EOD Team also cleared approximately 1,800 feet of Live Oak Creek during the 1995 clearance using a sweep line method.

All anomalies found were intrusively investigated, including 12 potential Open Burn/Open Detonation (OB/OD) pits, which were excavated and sifted for Materials Potentially Presenting an Explosive Hazard (MPPEH). Only 6 of the 12 potential OB/OD pits contained munitions debris (MD). These six areas were munitions debris disposal pits as deep as 20 feet below ground surface (bgs).

There is no historical or visible evidence that Live Oak Creek has ever been used as a demolition or burn area. The banks of the creek bed are 10 to 15 feet high and the rugged terrain would make it an unlikely demolition site. It appears that the MEC and MD 20mm HE or TP projectiles located in the creek bed were due to sheet flood water running through the disposal range following the natural drainage into the creek bed. The majority of the items are located at the bottom of a drop-off that denotes the starting point of the creek bed. The MEC and MD diminished in quantity proportionally in distance from the range.

The final clearance certificate stated that the land was approved for livestock grazing or agricultural use. However, if the land was to be used for other than livestock grazing where there could be an excavation below 0.5 to 1 foot in depth, EOD personnel should be consulted.

1.5 PURPOSE OF CURRENT MEC CLEARANCE

The purpose of the current MEC clearance activity was to locate, identify, remove, and dispose of remaining MPPEH, including MEC and unexploded ordnance (UXO) within the OWSA EOD Range. The stated end use was to certify the area for residential land use.

Past Land Use. Carswell AFB operated a small EOD proficiency and disposal range since the late 1950s. The range was used by base personnel to conduct regular EOD proficiency training exercises using small explosive charges. These areas were also used for OB/OD of unserviceable munitions or explosives.

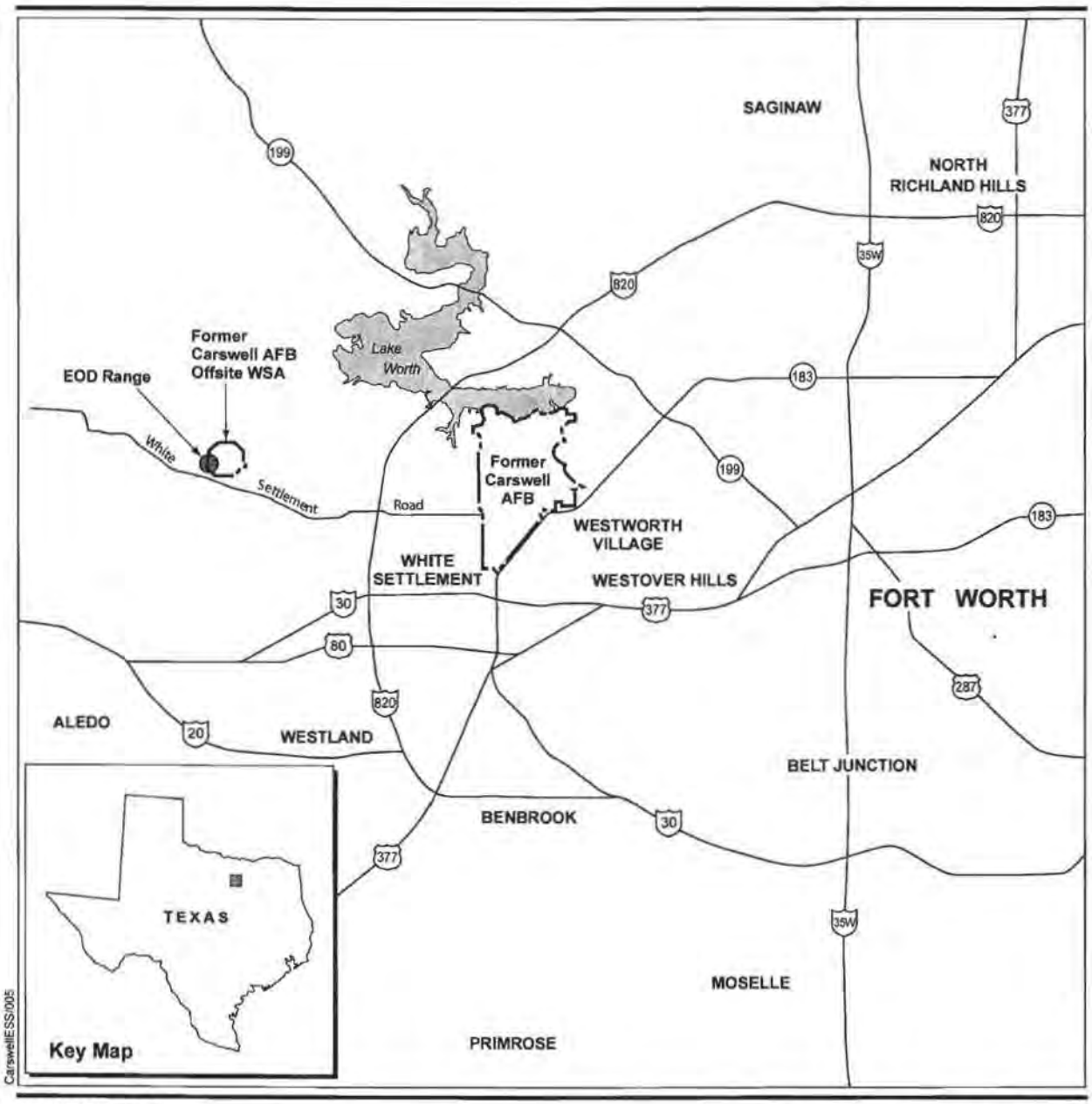
Current Land Use. Government owned land is exclusively open space with livestock grazing. The land surrounding the project site is in private ownership with low-density residential, and agricultural use, as well as livestock grazing.

Future Land Use. Future use will include General Agriculture, Agriculture Exclusive, Residential Agricultural, Residential, Light Industrial, and Open Spaces.

1.6 ANTICIPATED MEC/MPPEH, COMPOSITION, AND QUANTITY.

Based on previous clearance activities conducted by Air Force EOD in 1995, and a site visit conducted in August 2005, anticipated MEC/UXO types were as follows:

- 20mm projectiles
- 2.75-inch rocket HE Warhead
- 3-inch HE Projectile
- 105mm HE Projectile
- M57 Hand Grenade.

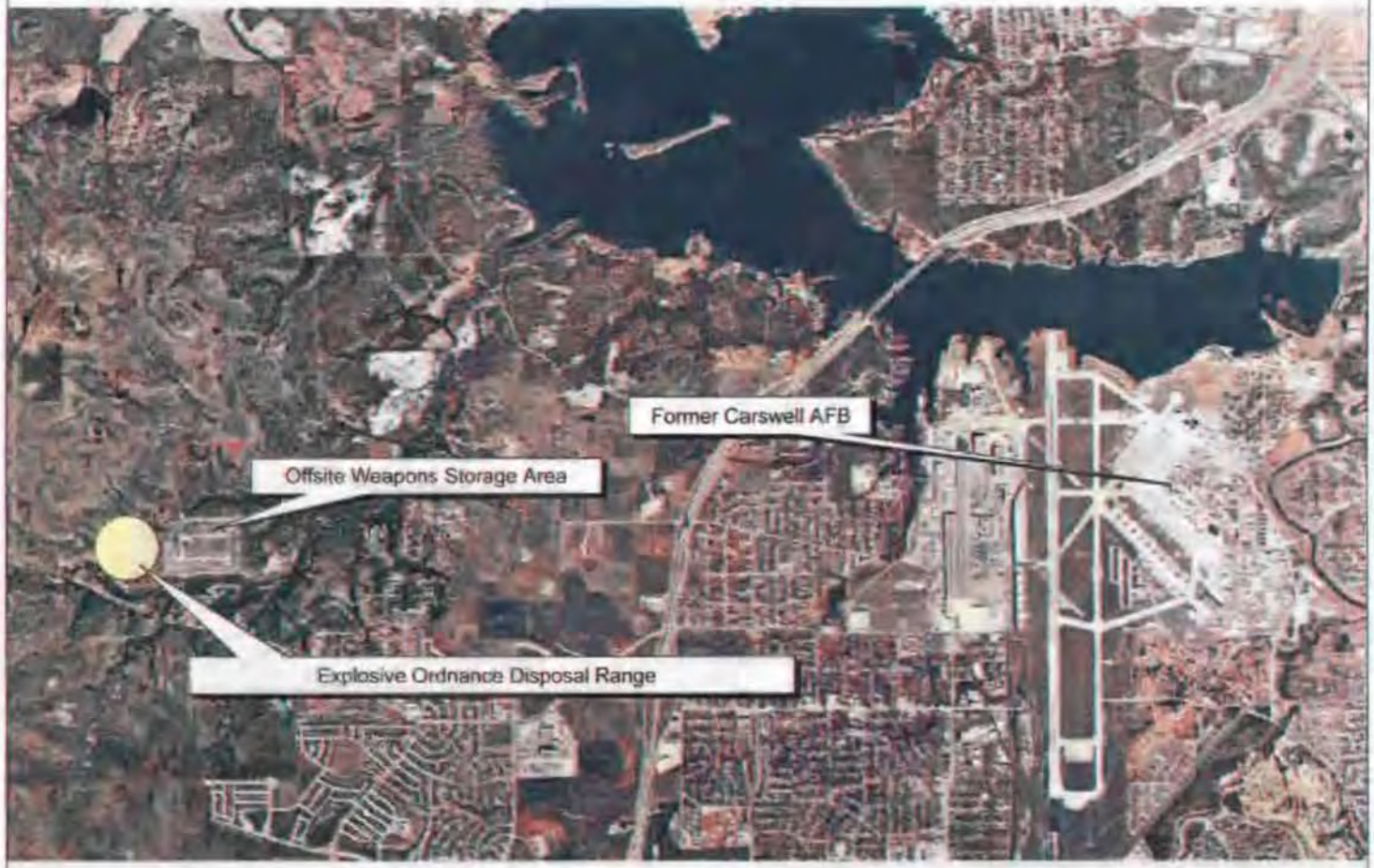


EXPLANATION

Regional Location Map Former Carswell AFB, Texas

0 1.5 3 Miles

Figure 1-1



Offsite Weapons Storage Area and Explosive Ordnance Disposal Range Former Carswell AFB, Texas

EXPLANATION

0 1750 3500 7000 Feet

Figure 1-2

Offsite WSA EOD Range Project Site Former Carswell AFB, Texas

EXPLANATION

MPPE/MMEC Survey Area

AFRPA Property Boundary

MEC Munitions and Explosives of Concern

MPPEH Munitions Potentially Presenting an Explosive Hazard

0 100 200 400 Feet

Figure 1-3

CRSWL AR # 744 Page 24 of 284

2.0 REASON FOR MUNITIONS AND EXPLOSIVES OF CONCERN (MEC)

2.1 GENERAL

Munitions debris were present over the entire project site addressed by this AAR due to past Department of Defense (DOD) activities at the OWSA EOD Range. Known and suspected MEC have been found, evaluated, and disposed. These are detailed in Section 4.0 of this AAR.

2.1.1 OWSA EOD Range

Carswell AFB began operation of the OWSA EOD Range in the late 1950s. The area was used for the disposal of unserviceable ammunition, pyrotechnics and explosives. The range was also used by EOD personnel to conduct demolition training exercises using small explosive devices and other ordnance items. Disposal operations ceased in 1980.

Typical operations at the OWSA EOD Range included demolition training and disposal of unserviceable ammunition, pyrotechnics and explosives by OB/OD. During disposal by detonation, the possibility exists that items were "kicked out" from the point of detonation, depositing them on or near the surface. Cartridges and cartridge-activated devices containing propellants were disposed of by burning in an open pit using fuel-soaked wood dunnage. During a site visit on 2 August 2005, MD (e.g., small arms casings and bullets) was found on the surface of the former OB/OD area; 20mm projectiles and other MD were present in the Live Oak Creek bed.

THIS PAGE INTENTIONALLY LEFT BLANK

3.0 FIELD ACTIVITIES

The project was conducted in two parts:

1. Site Preparation and Geophysical Survey
2. Intrusive Activities and Investigation of Live Oak Creek Bed

3.1 PART 1 - SITE PREPARATION AND GEOPHYSICAL SURVEY.

Start date: November 2005.

The initial phase of fieldwork consisted of project site preparation and geophysical mapping of the site. All work conducted during the Part 1 of the field operations were non-intrusive activities. The range was previously swept and cleared by EOD personnel in 1995 and MD was identified; however, there was no indication of MEC, however MD was identified, during the August 2005 site visit. Where necessary, vegetation was cut to less than 6 inches high to accommodate geophysical mapping equipment, using standard anomaly avoidance procedures. Standard anomaly avoidance procedures include surface sweeping by UXO personnel and marking any suspect MEC items with pin flags to prevent the equipment operator from cutting vegetation in these areas. Geophysical mapping began following completion of the site preparation. Geophysical mapping data were processed, validated, and reported in an anomaly map for further investigation during Part 2 Intrusive Activities and Investigation of Live Oak Creek Bed.

Earth Tech and subcontractor Zonge Engineering Corporation (Zonge) conducted site preparations and geophysical mapping and data collection at the OWSA EOD Range to document subsurface locations of potential MEC related items for clearance activities to be conducted during Part 2 of the project. The survey area comprised a 58.4-acre area centered on the Safety Bunker extending out to a 900-foot radius "kick-out" area that encompasses the main ordnance disposal area of the OWSA EOD Range (Figure 1-3).

Site set-up and survey area preparations commenced on November 7, 2005. Zonge arrived onsite on November 21, 2005 and began set-up of detection equipment and GPO testing. All work was conducted in accordance with the Statement of Work and the project Site Specific Health and Safety Plan (SSHP). Site preparation activities consisted of vegetation removal, fence removal, and surveying and marking 100- by 100-foot grids on the entire 900–foot radius from the center point of the safety bunker located on the OWSA EOD Range. The geophysical investigation comprised; (1) establishing positional survey control, (2) validating instrument response parameters, and (3) geophysical investigation of approximately 58.4 acres. The results of this investigation present a geophysical survey of the EM response characteristics of the site. These data identify locations of buried anomalies, as well as provide a reference datum for any future geophysical investigations at the site.

3.1.1 Site Preparation

To prepare the range ground surface for a geophysical survey, the OWSA EOD Range site was cleared of vegetation (grass, brush and small trees) as necessary to allow survey data to be collected. Interior fencing was removed to facilitate unobstructed access within the project site and allow geophysical mapping crews to map the site without interference from the metal fencing. A semi-permanent fence was installed on the Northwest quadrant to keep grazing

livestock out of the project site (Figure 1-3). All fencing was retained at the site for reinstallation at the conclusion of the project.

Vegetation Removal with Bush Hog

Metallic debris that could impact subsurface detection and mapping of potential MEC sources was removed from the project site ground surface. Numerous debris piles on the project site inspected by UXO technicians to ensure they were free of MPPEH/MEC/MD and were removed from the area. Also, during surface clearance activities, an estimated 6,000 to 7,000 non-hazardous metallic items made up of a mixture of MD and non-MD debris were moved to a consolidation area for recycling and subsequently delivered to a local scrap dealer at the conclusion of the project.

The 900-foot radius was surveyed by a registered public land surveyor and semi-permanent markers (36-inch survey stakes) were installed such that the OWSA EOD Range search area was covered with a 100-foot by 100-foot reference grid to facilitate a systematic surface sweep of the project site in advance of digital geophysical detection and mapping. The entire area of each the 100-foot by 100-foot grids situated within the 900-foot radius were cleared during the surface sweep. Of the grids situated at the edge of the 900-foot radius, only the areas within the 900-foot radius were cleared during the surface sweep.

Survey points were established coincident with coordinates recorded relative to the TSP Grid coordinate system. This allowed navigation and instrument position, during Part 1 (Site

Preparation and Geophysical Surveys and Mapping) and Part 2 (Intrusive Investigation and Real-Time Investigation of Live Oak Creek bed), within the investigation area to be tracked and recorded using precision surveying systems (i.e., state-of-the-art real-time kinematic [RTK] GPS or other locational system with 20 cm resolution) and will be referenced to the NAD83 and TSP coordinates, in U.S. survey feet.

No MEC/MPPEH items were discovered during the surface preparation activities; however MD items were present (see Section 4.0).

3.1.2 Geophysical Detection and Mapping Survey

The EM surveying consisted of contiguous parallel transects covering the entire 900-foot (274-meter) radius of the project site. The entire area of each the 100- by 100-foot grids situated within the 900-foot radius were surveyed during the geophysical mapping activities. Of the grids situated at the edge of the 900-foot radius, only the areas within the 900-foot radius were surveyed during the geophysical mapping activities.

3.1.2.1 Personnel

A Project Crew Chief/Geophysicist managed day-to-day operations. The Crew Chief directed all surveying activities and ensured delivery of daily logs, raw and field-processed data, and daily QC documentation to the site manager. All data were downloaded daily, posted to Earth Tech's FTP site, and copied to CD-ROM for transfer and archival.

The geophysical survey team consisted of an instrument operator (Team Lead) and an assistant to aid in proper GPS functioning and tracking control. The teams were required to maintain a field notebook that detailed pertinent activities, survey transect features, and field conditions encountered in the performance of the geophysical characterization. A field sketch map of surveyed transects was made during the EM data collection. All daily activities related to data collection were documented in field notebooks by each survey team leader.

3.1.2.2 Detection Equipment

The instruments chosen for this project were selected based on a proven capability for the detection required for this project and the proposed residential end use. Because the project site was an OB/OD disposal area and there is evidence of non-ferrous MEC remnants/munitions debris at the surface, only EM systems that respond to all metals were used to detect and map MEC/MPPEH or MD. Geophysical instruments (hand-held and/or towed) used during this project were:

- Geonics EM 61 MK 2
- White PI SurfMaster
- Schonstedt GA-52cx (to enhance safe intrusive exploration of anomalies)

Geonics EM61 Mk2

Data collection on the survey area was conducted using 3 EM 61 MK 2 push/pull carts and survey team operators. The EM61 Mk2 is a high sensitivity, high resolution time-domain metal detector that detects both ferrous and non-ferrous metals. Survey speed was constrained to collect data at approximately 0.5-foot intervals or less along each survey line. Local positioning and geo-referencing was accomplished using a Leica SR530 RTK GPS system with a roving GPS antenna mounted on the array.

EM 61 Detection Cart and Survey Team

White PI SurfMaster

The White PI SurfMaster is a transient EM metal detector that offers all-metals detection to depths of approximately 1 foot. The systems were used solely as a safety enhancement for the intrusive anomaly investigations.

Schonstedt GA-52cx Magnetic Locator

The Schonstedt GA-52cx is a hand-held magnetic locator comprised of two fluxgate magnetometers that are aligned and mounted at a fixed distance apart. The systems were used solely as a safety enhancement for the intrusive anomaly investigations.

3.1.2.3 *Data Collection Method*

A master reference GPS base station was established from a known survey marker on the top of the range safety bunker. The 100- by 100-foot grids and markers were surveyed from this master reference point. A master RTK-GPS base station was established each morning prior to starting data collection. Local positioning and geo-referencing of the EM 61 MK 2 system was accomplished using a Leica SR530 RTK GPS system with a roving GPS antenna mounted on the carts.

RTK-GPS Base station on Safety Bunker

Following set-up and warm-up of the geophysical equipment each day (and before ending each survey mission), a standard response to a fixed array of sources (trailer hitch balls) and positional reference data were obtained. The fixed array of sources was laid out on the ground surface and the resulting line mapped (recorded) twice, once in each direction. This check served as a dynamic test of the EM system's response over a pair of fixed sources. This check was performed at the beginning and end of each field day.

Additionally, a two-point GPS reference test was performed at the beginning and end of each day. Measured position coordinates and the difference between daily measurements and the known position were recorded in the field notebook and field data sheet.

Field tests over a geophysical test plot (GPO) were not part of the daily field routine. However, a GPO test plot was constructed at the OWSA EOD Range using inert projectiles and steel pipe sections. Targets ranged from inert 20mm projectiles without nose cones to a simulated 105mm

projectile. The GPO test plot was used to determine and document the detection and resolution performance of each EM 61 MK 2 detection cart deployed for the geophysical investigation and to establish a baseline response and validate instrument performance prior to use for collecting field data. Background, *residual anomalous response*, and *standard response*, were recalculated whenever any critical component of the EM system was repaired or replaced, or in the event changing survey conditions warranted at the site.

The EM 61 MK 2 surveying and data collection consisted of contiguous parallel transects in each of the 100- by 100-foot grids covering the entire 900-foot (274-meter) radius of the project site. Of the grids situated at the edge of the 900-foot radius, only the areas within the 900-foot radius were surveyed. GPS and EM 61 MK 2 data were recorded simultaneously. The geophysical survey team continuously monitored their equipment track and the position of the EM 61 MK2 array during data collection to ensure coverage of the areas of interest. This was accomplished through the use of lane markings, survey stakes, traffic cones, and by maintaining alignment of the array relative to transect grid markers. Trees or topography that would obscure the sky and degrade satellite coverage was noted in the daily field logs.

The EM data (response amplitude and position) were downloaded periodically (at least daily) by the instrument operators to avoid possible data loss or corruption. These data were pre-processed and transmitted by Hi-speed internet to Zonge for final processing and posting on the project FTP site. All collected data, including field notes, maps, standardization and other QC documentation and digital data, were delivered to the Earth Tech Site Manager by the next work day.

3.1.2.4 Geophysical Survey Data, Processing, and Analysis

3.1.2.4.1 Data Parameters

All digitally captured EM data were corrected for instrument-specific factors such as sensor offsets, latency, drift, etc., and correlated with GPS data based upon a local "third order" (1:5,000) monument or survey marker. Since a suitable point was not available, a professional land surveyor established five new survey markers with a minimum of "third order" accuracy.

3.1.2.4.2 Data Processing and Analysis

Earth Tech identified and tabulated the "MEC-like" anomalies that were required for the intrusive investigation (Part 2). To aid in interpretation, the field logs and field data sheets were referenced. The characteristics of anomalies identified during data processing were compared to the discovered sources to verify that the source is representative of the anomaly.

3.1.2.4.3 Initial Field Processing

The field data were checked, corrected, and processed into (ASCII) files. Data file names, transect numbers and location, fiducial marker locations, and transect start and end points (as applicable) were recorded in the field data sheet and data processing log. The data were presented in delineated fields as x, y, z, and $v_1 \ldots v_n$, where x and y are horizontal coordinates, z is the instrument elevation above sea level, and v is the channel (time-gate) response.

Field processing included a symbol posting of the measurement stations along the transects, and generation of EM response profiles of the data for each of the array's receivers. A visual inspection of the data was performed to identify any single-point anomalies, steps in response,

incoherent signal, or excessive noise. All such events were noted and the processing utilized to correct and/or remove these events was described in the processing log. Data gaps or inexplicable data shortages, if not detected during the field review and scheduled for reacquisition, were evaluated to identify the root problem and steps needed for resolution.

3.1.2.4.4 Standard Data Analysis

All corrections, edits, filtering, or normalization of the data used to identify the location of potential MEC anomalies was fully documented in a data processing log. Positional offset between the instrument measuring point and navigational reference datums were corrected. The field logs recorded these offsets, both at the beginning of the day and during data collection; particularly any changes to the configuration of the field arrays that may cause data processing errors were highlighted. Any discrepancies in positional accuracy of the data noted during the field review were described, including steps taken to correct or resolve any QC issues. The landmarks, fiducials, and anomaly locations represented in the processed geophysical data were compared to geophysically referenced spatial data (GIS base maps). The GPS equipment used for locating anomalies was capable of ± 1.0-foot accuracies; allowing features of the GIS that are reflected in the geophysical data to be coincident to within 2.5 feet (0.8 meter) of mapped positions.

Data collected by different EM systems were demoded as necessary to set background levels for each system equal to the same datum. Any sensor biasing, background leveling, or standardization corrections accomplished in the field were noted in the field log and field data sheet. Data were corrected for navigational errors, timing errors, instrument bias, and measurement drift. Instrument drift was corrected using non-linear, spatial high pass filtering which acts to subtract an "average" response value calculated over a defined spatial length from the actual response. This filter did not distinguish between regional variations in response and instrument drift. Data manipulation to accommodate these inputs was fully described in the data processing logs.

To assess usefulness of the data for detecting and resolving MEC-sourced anomalies, noise levels in the data were analyzed to ensure that they were sufficiently low to allow adequate differentiation of signal-to-noise. If it could be clearly discriminated in the field data, motion-induced noise was removed from the data, as was quantifiable transient noise (e.g., single-point spikes).

EM and GPS data streams were merged using timestamps in each stream. The routine latency checks were used to provide corrections and determine how much, if any, offset between clocks and any possible drift between clocks. Data were leveled using a non-linear spatial high pass filter, which smoothed slowly changing background responses to enhance narrow, closed, "spikes" typical of the response to metallic sources.

Automated picking algorithms were used to select anomalous responses for potential intrusive activities. The EM data were inverted using software written by Zonge, and anomalous responses typical of metallic sources were identified based on the inversion results. The transect number and the locations of the anomalies were plotted on a planimetric map. Project geophysical staff screened potential anomalies by comparing their locations with field notes to identify those resulting from cultural clutter. Additional anomalies were selected based on visual inspection of the data.

3.1.2.4.5 Advanced Data Processing, Digital Filtering and Enhancement

The time decay curves recorded by using the multiple time gates of the instrumentation were analyzed to attempt to improve identification of metallic versus "false positive" responses (anomalies for which no metal source could be found). Time decay curves were inverted to the model parameter sphere polarizability. The inversion routine was based on the assumption that responses are generated by a polarizable sphere, with target selections made on locations of anomalously high polarizability. This procedure yielded two advantages over simply picking anomalous responses from a single timegate. First, noise variations over multiple timegates were averaged together thus improving signal to noise. Second, the overall shape of the decay curve that was used by the inversion helped to resolve coherent but subtle low-magnitude anomalous responses from metallic sources. Any variations or results not compatible with the standard data analysis or expectations were reviewed with the Project Geophysicist to determine causative features.

3.1.2.5 Anomaly Selection and Decision Criteria

Anomaly selection was accomplished by identification of discrete responses that were distinct from background levels. Validated software and manual data were reviewed used to select suspect anomalies and to print out target lists ("dig sheets") for the relocation of anomalies.

To identify anomalies of interest, data processing was quantifiable and repeatable, and included:

- Evaluation of QC standardization tests
- Evaluation of latency correction
- Evaluation of field notes for presence of cultural features
- Evaluation of sensor data for spikes, gaps, and sensor failure
- Editing or removal of low quality positional data
- Evaluation of coverage (i.e., data gaps)
- Application of demedian filter to remove sensor drift and level the data to a zero baseline (e.g., a 1,000-point average).
- Following the preprocessing phase, the data analysis included:
- Plotting the sensor data in gridded and pixel format
- Applying filters to the gridded data (when necessary) to aid in target identification
- Selecting targets utilizing an automated, multi-faceted target-picking algorithm
- Identifying additional targets that were not selected using the automated picking routine
- Reviewing data and removing targets attributed to edge effects and cultural features
- Preliminary modeling to produce estimated size and depth for identified targets
- Generating a tabulated output of the final data in XYZ ASCII format
- Plotting a hardcopy map of the data with target locations superimposed
- Producing a final target sheet with position, maximum amplitude, estimated size, and estimated depth.

Data spacing was such that the horizontal position of anomalies could be identified along a given transect to within 3.3 feet (1 meter) of the source location. Processing of digital data included a symbol posting of centerline locations of the sensor array and production of profile and contour maps with the location of anomalies superimposed. In addition, pertinent information concerning anomalies was tabulated in an ASCII file. This table was progressively updated and included:

anomaly identifier, anomalous grade, position (easting and northing) in TSP coordinates, maximum amplitude, estimated size, and estimated depth.

The data processor provided frequency distribution tables and histograms for EM response, maximum anomalous amplitudes, and anomaly grade. Response amplitude was calculated using a demedian filter and a weighted sum average of 25 time-gate responses. Calculation of the time-decay curve slope parameter used the power law decay relationship in log/log space for the decay curve as defined by the selected 25 time gates; this corresponds to the Bslope parameter output by Zonge's inversion software. The NSR parameter was also output by the inversion software. A 33-element convolution match filtered response was calculated that can be applied to data using Geosoft software.

3.1.2.6 Geophysical Data Analysis, Field Reacquisition and Reporting

The geophysical data were analyzed and completed, digital "dig-sheet" results will be provided to the Air Force Center for Environmental Excellence (AFCEE) at project close-out in a MicroSoft Excel spreadsheet or MicroSoft Access table.

All raw and final processed data will be delivered in ASCII files. The files will provided in sets of data collected along transects or grids. Corrections such as for navigation and instrument bias, have been applied, and documented.

3.1.2.7 Complete Geophysical Deliverables

Upon completion of the geophysical investigation, Earth Tech completed data QC checks, copied and indexed all appropriate field data, and will deliver to AFCEE, at project close-out, on optical computer disc (CD-ROM) to include the following:

- Field notes, including field logs
- Daily field data sheets of EM surveying activities
- Standardization response documentation
- QC documentation
- All digital raw and processed data (ASCII format x, y, z, $v_1 \ldots v_n$ files), including QC checks
- Profile/contour plots of the digitally recorded data
- Target anomaly listing and dig-sheet results.

3.1.2.8 Discussion of Geophysical Detection and Mapping Survey Results

More than 8,000 anomaly locations were detected during the geophysical investigation. All areas of the site contain significant numbers of geophysical anomalies, some with significant amplitude. Figure 3-1 shows the distribution of anomalies across the site. From this figure it is clear that the most significant concentration of metallic sources is in the northeastern portion of the site, but several other significant concentrations were detected.

3.2 PART 2 - INTRUSIVE ACTIVITIES AND INVESTIGATION OF LIVE OAK CREEK BED

Start Date: May 2006.

In accordance with the approved ESS dated December 2005, the second phase of field operations consisted of intrusive exploration of suspect geophysical anomalies identified during Part 1 surveys of the 900-foot radius area centered on the EOD range safety bunker. All detected anomalies were investigated and the anomaly sources were identified and removed. Items identified as MPPEH were explosively destroyed. MD were secured on-site for subsequent transfer to a recycler or other disposal facility. Non-munitions debris were stockpiled on-site.

Intrusive investigations on the 900-foot radius surrounding the OWSA EOD Range consisted of the reacquisition of anomaly locations and a point source clearance of the anomalies identified during the Part 1 field operations. The MEC clearance process is further described in section 3.2.2 MEC/MPPEH Recovery and Clearance. Clearance of the Live Oak Creek bed was also accomplished during Part 2 activities using realtime ("Mag and Flag") geophysical survey techniques and hand-held instrumentation. Surface MPPEH and subsurface anomalies were manually explored as they were discovered, followed by removal and disposal of any MPPEH/MD. Soil samples were collected adjacent to any MPPEH items discovered.

Disposal pits identified during the geophysical mapping and/or the intrusive investigations and that were determined to contain high concentrations of small anomalies indicative of burn pit debris, were excavated by earth moving machinery, mechanically sifted, and processed for MEC and MD. Soil samples were collected at the sidewalls and the bottoms of disposal pits excavated during the field effort. The soil samples were submitted to Severn Trent laboratories for analysis of explosive compounds.

3.2.1 Anomaly Reacquisition

Anomaly locations identified by Earth Tech were recovered using RTK/GPS equipment capable of sub-meter accuracy to relocate the coordinates of the center of each identified anomaly. The anomaly reacquisition team refined the anomaly location using a hand-held magnetometer or EM metal detector and methods that were demonstrated and approved at the geophysical test plot. The original anomaly locations were marked with a plastic pin flag based on a staked out GPS point. Hand-held EM metal detectors and hand-held metal detectors were used to sweep an area of 3 feet in all directions from the pin flag location. The location of the recovered anomaly peak was marked with wood lathes, a plastic pin flag, or a clay pigeon. If the reacquisition team did not recover the anomaly, the anomaly coordinate location was reported to the SUXOS and Site Geophysicist for further investigation.

3.2.2 MEC/MPPEH Recovery and Clearance

MEC field clearance operations were conducted at the site upon approval of the ESS for the OWSA EOD Range by DDESB. The hazards associated with MEC/UXO exposure and demolition operations included the possibility of personnel injury or death caused by explosion, fire, fragmentation, or over-pressurization. Extreme caution and adherence to safety procedures was exercised to minimize the hazards associated with the demolition operations used for disposal of MEC. While there are no "hazard-free" procedures for the handling of MEC and explosives, maximum safety was achieved through strict adherence to operational plans, application of relevant safety procedures, and effective supervision of site operations.

3.2.2.1 *Safety Precautions*

Operations involving the potential for exposure to MEC hazards were conducted under the direct supervision of appropriately trained UXO personnel. Only essential personnel were allowed in the work areas while UXO personnel were conducting MEC access, removal, and disposal operations. All other personnel were located a safe distance from the area of operation. Field personnel immediately notified the Senior UXO Supervisor (SUXOS) when a potential MEC item was found.

General EOD safety precautions are contained in EODB 60A-1-1-22 and EOD disposal procedures are in EODB 60A-1-1-31. The SSHP was followed during all operations conducted at the project site. A copy of the SSHP was located in the site office and available for easy reference.

3.2.2.2 *Personnel Qualifications*

Earth Tech maintained personnel files for each employee. These records included copies of licenses, training records, and certificates of qualifications that support employees' placement and position. Prior to an employee's initial assignment or any change in duties/assignments, the Project Manager reviewed the employee's licenses, training records, and certificates to ensure that the employee was qualified to perform the assigned task. Earth Tech ensured UXO-qualified personnel met standards required by AFSC.

An on-site file for all UXO personnel was maintained that included: U.S. Naval EOD School (NAVSCOLEOD) certification, current medical monitoring physical, 40-hour hazardous waste operations (HAZWOPER) safety training certification, 8-hour HAZWOPER supervisor certification, and current annual refresher training, current certificate for CPR training and first aid, and other applicable certifications as required by the project work plan.

3.2.2.3 *Field Teams*

Two UXO teams supported the OWSA EOD Range project site. Site-specific training was conducted for all on-site personnel at the beginning of the project and prior to commencing fieldwork. As new personnel arrived at the site, they were provided site-specific training prior to commencing fieldwork.

All MEC work was performed under the direction of a SUXOS who was a graduate of the U.S. Naval EOD School, Indian Head, Maryland. The SUXOS ensured that MEC personnel conducted operations at the site in accordance with the work plan and in a systematic manner using proven operating methods and techniques. All activities were conducted under the direction, supervision, and observation of the SUXOS (or a UXO Supervisor during the UXO escort activities). Upon completion of demolition and after assuming there were no residual hazards, the SUXOS authorized the resumption of site operations.

A UXO Safety Officer (UXOSO) who met all applicable requirements of USACE DID MR-025 was responsible for implementing and enforcing the safety and health requirements listed in the SSHP.

The UXOQC met all applicable requirements of USACE DID MR-025. The UXOQC was responsible for implementing and enforcing the QC Plan.

3.2.2.4 *Site Control Plan*

Site Control During MEC Operations

Fencing was maintained to limit public access to the project site. The main access point to the project site is from White Settlement Road. The project site is on the west side of the OWSA EOD Range. Signs in English and Spanish were posted at the entrance and around the perimeter of the project site. These signs read:

"Keep Out, Former Military Demolition Range, Hazardous Conditions May be Present"

Visitors did not have free access to the project site and were required to attend a safety briefing, sign a visitor log, and were escorted while onsite. Fieldwork shut down if an unescorted visitor entered the project site. Notification to local residences was made 30 days prior to initiation of any clearance activities and was closely coordinated with the AFCEE and local law enforcement authorities.

Prior to the start of intrusive activities, the SUXOS and UXOSO verified that the area around the operating site was clear of all non-essential personnel and that other UXO supervisors were notified.

Exclusion Zone Control

The exclusion zone (EZ) was established using the 1/600 Distance (341 feet) based on the largest munition found during the 1995 clearance (105mm Projectile). When performing any subsurface excavations and intrusive MEC investigations only essential personnel were allowed inside the EZ to keep the community and remediation personnel not directly involved with detection and removal activities away from hazardous operations.

3.2.2.5 *Realtime Investigation of Live Oak Creek Bed*

An area extending out 25 feet from the centerline of Live Oak Creek was cleared of surficial MEC/MPPEH using hand-held all-metals detectors. The MEC clearance team conducted a realtime geophysical mapping, detection, and clearance ("mag and flag") of 25-foot by 100-foot grids and recovered any detected MEC/MPPEH or other MD by systematically sweeping each grid using a 5-foot separation distance and visually inspecting the ground 2.5 feet to either side of each individual. Hand-held all-metals detectors were used to locate subsurface anomaly sources and GPS units were used to record the track of the clearance teams and for marking the location of MEC/MPPEH items found during the clearance.

One 20mm HE projectile was recovered during the realtime MEC/MPPEH clearance activities (see Section 4.0).

3.2.2.6 *MEC Removal/Clearance Operations Within the OWSA EOD Range*

3.2.2.6.1 MEC Intrusive Investigation Procedures

Manual Investigation

The equipment requirements for this activity included:

- Instrumentation (hand-held, site-tested metal detectors [e.g., White Pulse Induction SurfMaster, Schonstedt GA-52cx, etc.]) used to assess proximity to subsurface metallic anomalies and/or MEC during progress of excavation

- Miscellaneous common hand tools (e.g., screwdrivers, digging implements)
- Hardcopy forms and logbooks to record activities.

The actual investigative excavation nominally progressed in 6-inch lifts. To assure a margin of safety for the UXO teams, the instruments used to assess the proximity of subsurface metallic anomaly sources were capable of "outreaching" the penetration of the digging implements. Therefore, instrumentation used to ensure personnel safety during intrusive operations was capable of detecting a 20mm HE projectile at 12 inches bgs. Each instrument was checked daily at a standard location to ensure proper equipment function and operation.

Near-Surface Anomalies - Near-surface anomaly sources were those that were partially exposed or suspected to be within 1 foot of the surface and that can be excavated using hand tools. These anomalies were excavated by carefully removing the earth overburden using a hand shovel/trowel or other small digging implement. Throughout the excavation, the UXO Technicians used site-tested detection instrumentation to check and verify the proximity of the anomaly source.

Subsurface Anomalies - Subsurface anomalies were those caused by sources that are more deeply buried (>1 foot bgs). Only hand implements were used to excavate anomalies due to biological resource issues. Manual digging tools were used to excavate the earth overburden in 6-inch lifts. After each lift, the anomaly location was redefined with a site-tested metal detector and the anomaly source sought using hand tools. This process continued until the source of the anomaly was been uncovered and identified.

Mechanized Investigation

OB/OD pits containing high densities of anomalies were excavated using a mechanized backhoe. The excavated dirt from the pits were spread out on a flat surface and examined for MEC and MD. The process to be used during this effort incorporated mechanical excavation and hand sifting of the material. Specific locations, such as buried disposal trenches were excavated to undisturbed soil and/or bedrock.

Verification of Anomaly Source Removal

The project geophysicist and the MEC team supervisors reviewed the data for undiscovered anomalies. If there were no clear surface sources (e.g., terrain, vegetation, cultural clutter), and the data at that specific site was determined critical to meet the DQO, the locations were revisited with the original geophysical system to confirm anomalous response. If an anomaly was verified, the investigation was completed to depth of detection. A 36-inch-diameter hole was dug to no less than 18 inches deep unless a representative source was discovered before the excavation reached these dimensions. The field anomaly map, digital data image, and MEC sampling results for each transect investigated were compared by the project geophysicist to ensure the discovered sources are representative of the anomaly signature. Where review of the dig results indicated a potentially missed source, the original anomaly was revisited.

A description of all MEC, munitions debris, and non-munitions debris recovered was recorded and incorporated into the project database **(Appendix A).** MEC located during the subsurface search were reported to the SUXOS. Recorded data included, where possible, size, estimated weight, orientation, depth bgs, and description of the item excavated.

3.2.2.7 MEC Identification and Removal

MEC clearance crews positively identified recovered anomaly source types as non-MD, MD, or MEC/MPPEH. The crews recorded anomaly source type, depth, dimensions, estimated weight, and condition. An item was identified as MEC if it could not be determined whether explosives were present. MEC items were left in place and flagged for further inspection by the demolition team. Excavated MD items were collected and temporarily stored at collection points at the site.

After the MEC clearance team collected MD items and flagged potential MEC and MEC items, the demolition team further inspected all flagged items to make a final determination if an item was MEC or MD. The demolition team also further inspected the non-MD and MD items collected by the MEC clearance crew to certify that these items were not MEC. Once certified as not MEC, the non-MD and MD items were moved to a central on-site location.

Recovered MD were separated from non-MD scrap metal and inspected for the presence of explosive or other hazardous material. Non-MD scrap is material that could not possibly contain any MPPEH, such as a discarded automobile wheel or length of barbed wire. Non-MD scrap was placed in bins that were under the control of the SUXOS prior to final inspection and release of the scrap material to a local scrap dealer (see Section 3.2.3.8 Disposition of Scrap).

Utilizing the applicable technical manuals, the item was identified based on size, shape, and any visible markings. The demolition team inspected each MEC item to determine if it was acceptable to move (i.e., the item can be moved with minimal risk). The inspection was directed by the SUXOS in conjunction with the UXOSO. Their determination was based on available Ordnance Technical Manual data, training, and professional knowledge, using the following criteria in conjunction with the MEC Process Flowchart (Figure 3-2).

Each MEC item was inspected to determine if it is armed or unarmed, and if it was unsafe to move due to damage. MEC items that were armed or determined hazardous due to damage, or whose status could not be safely evaluated due to deterioration or positioning, were considered unsafe to move. MEC items that were unarmed and not determined hazardous due to damage were considered acceptable to move. Small quantities of MEC that could be picked up (as determined by the SUXOS) were transported to a centralized demolition area on the OWSA EOD Range. These items were stored for the purposes of a consolidated demolition shot.

MEC/MPPEH items were discovered in all quadrants of the OWSA EOD Range and within the Live Oak Creek bed. Fifteen (15) MPPEH items were disposed of during MEC disposal operations, including one 20mm HE projectile recovered from Live Oak Creek bed. Additionally, 50 pieces of mild detonating cord shield were explosively vented to ensure no hazards were present. A complete list of all MPPEH and MD items discovered during the removal operation is included as **Appendix A**.

All MEC items were positively identified prior to movement or disposal. No chemical warfare materiel (CWM) was discovered at this site.

Notes and Source Data

1) Survey datum is NAD 1983 State Plane Texas North Central FIPS 4202 Feet.
2) Aerial Photogrammetry from North Central Texas Council of Governments 2005

LEGEND

- Mapping Survey Results
- 900ft Radius Boundary

Figure 3-1
Geophysical Detection and Mapping Survey Results
Munitions Response Program Clearance
Tarrant County, Texas
September 28, 2006

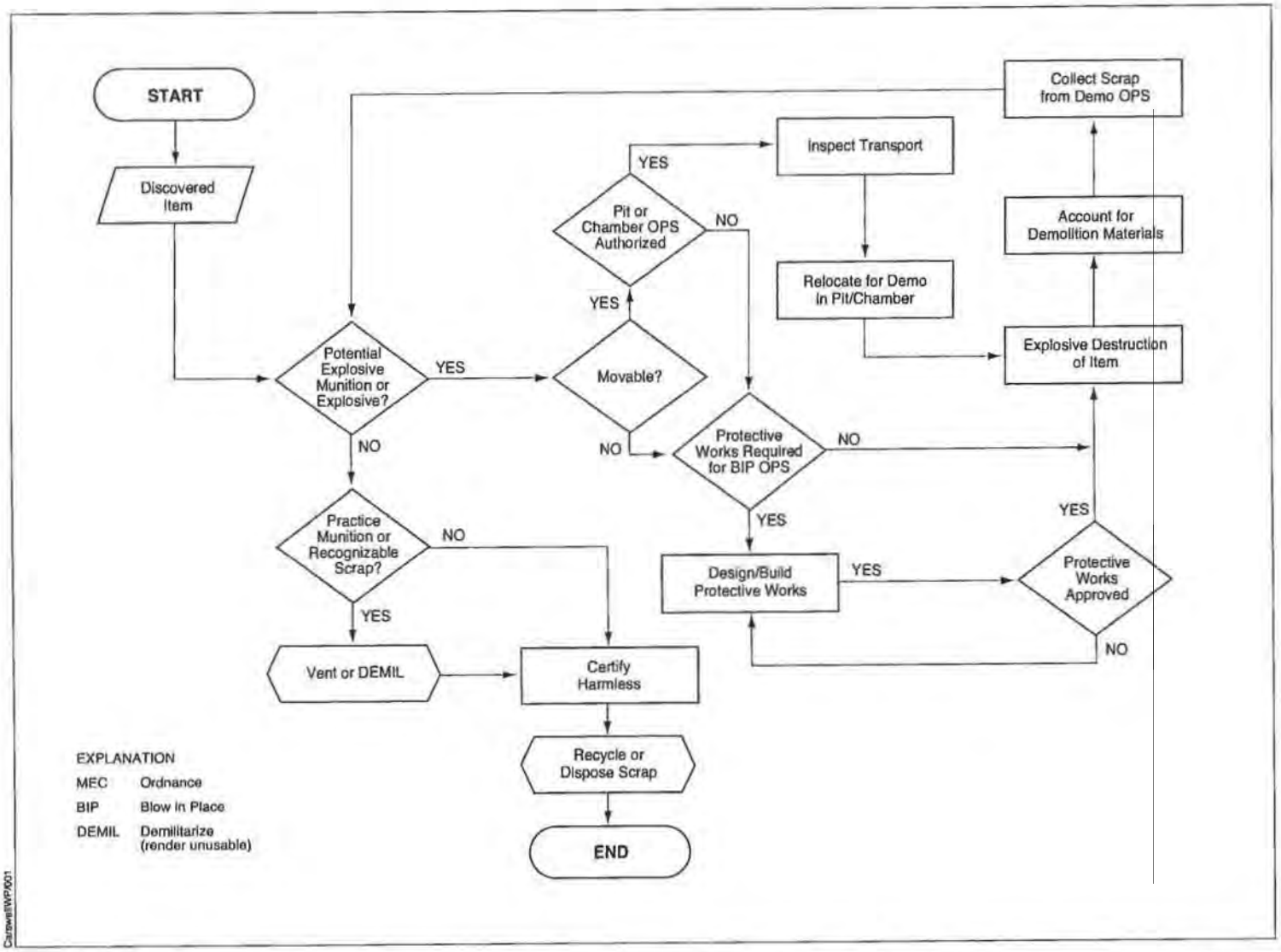
0 50 100 150 200 Feet

EarthTech

THIS PAGE INTENTIONALLY LEFT BLANK

CRSWL AR # 744 Page 42 of 284

Figure 3-2. Munitions and Explosives of Concern Process Flowchart.



CRSWL AR # 744 Page 43 of 284

THIS PAGE INTENTIONALLY LEFT BLANK

4.0 INTRUSIVE INVESTIGATION RESULTS

4.1 1995 CLEARANCE

During August and September 1995, EOD personnel from Hill AFB swept and cleared approximately 58.5 acres of the OWSA EOD Range and 6 acres of Live Oak Creek. An Mk 26 ordnance locator was used to locate MEC during the clearance. As anomalies were detected, they were excavated and removed by hand when possible. Twelve areas were identified that could not be excavated by hand; these were marked and later unearthed using an excavator. Six of the 12 areas were munitions pits as deep as 20 feet bgs.

Items located during the 1995 clearance consisted of the following:

- 105mm HE Projectile
- 3-inch HE Projectile
- M229 2.75-inch HE Warhead
- M57 Hand Grenade
- 50 Cubic Yards of Soil Containing Expended Aircraft Starter Cartridges
- 10 - M55A2 20mm TP Projectiles
- 2 tons - Ordnance Scrap Metal.

4.2 2006 ORDNANCE REMOVAL/CLEARANCE

Between November 2005 and August 2006, Earth Tech removed in excess of 12,000 surface and subsurface items. Only 15 MPPEH were found. These included:

- Nine 20mm HE projectiles,
- One 20mm APT projectile (tracer),
- Three M103 bomb nose fuzes,
- One 40mm cartridge, and
- One illumination flare.

Of the over 12,000 items recovered during the field effort, approximately 10,000 items were non-MD scrap, approximately 1,185 items were MD, and 15 items were MPPEH. The types and quantities of MPPEH destroyed by demolition are listed in Table 4-1. A complete list of all MPPEH and MD items discovered during the removal operation is included. Appendix A, and locations of MPPEH items are depicted on Figure 4-1.

Eighteen soil samples were collected and submitted for laboratory analysis of explosive compounds. Soil samples were collected adjacent to the MPPEH items and at the sidewalls and bottoms of disposal pits excavated during the field effort. No explosive compounds were detected above laboratory detection limits (Table 4-2). The laboratory report is included as Appendix B. Soil sample locations are depicted on Figure 4-1.

Table 4-1. Recovered MPPEH Items

Grid/Anomaly number	Classification	Item recovered	Depth (inches bgs)	Contents	Results
J16_85	MPPEH	20mm projectile	3	High Explosive	Destroyed
L15_229	MPPEH	20mm projectile	3	Armor Piercing-Tracer	Destroyed
L13_232	MPPEH	20mm projectile	3	High Explosive	Destroyed
F12_199	MPPEH	20mm projectile	3	High Explosive	Destroyed
K6_59	MPPEH	Signal Flare	6	Pyrotechnic material	Destroyed
G15_248	MPPEH	40mm grenade cartridge	6	Propelling charge	Destroyed
G10_5	MPPEH	20mm projectile	24[1]	High Explosive	Destroyed
E13_119	MPPEH	20mm projectile	24[1]	High Explosive	Destroyed
H13_5	MPPEH	(4) 20mm projectile	24[1]	High Explosive	Destroyed
H13_10	MPPEH	(3) M103 Bomb nose fuze	24[1]	HE Booster	Destroyed
Various grids	MD	Mild Detonating Cord (MDC) Shield	N/A	Possible Energetic Material	Destroyed
K13	MD	(8) Civilian Flameless Dust Grenades	24	Energetic Material and Irritating Agent (CS)	Destroyed
F10_283	MD	20mm projectile	0	Empty	MD Recovered and Inspected
H13_10	MD	(2) M117 General Purpose Bombs	48	Concrete	Inspected / no live boosters
Various Grids	MD	.50 Cal Rounds Starter Cartridge igniters Aircraft Flares	N/A	Smokeless Powder Pyrotechnic material	Destroyed
H13_5	MD	75 mm projectile	24	Concrete	MD Recovered and Inspected

[1]Recovered from excavated trench with other MPPEH and MD

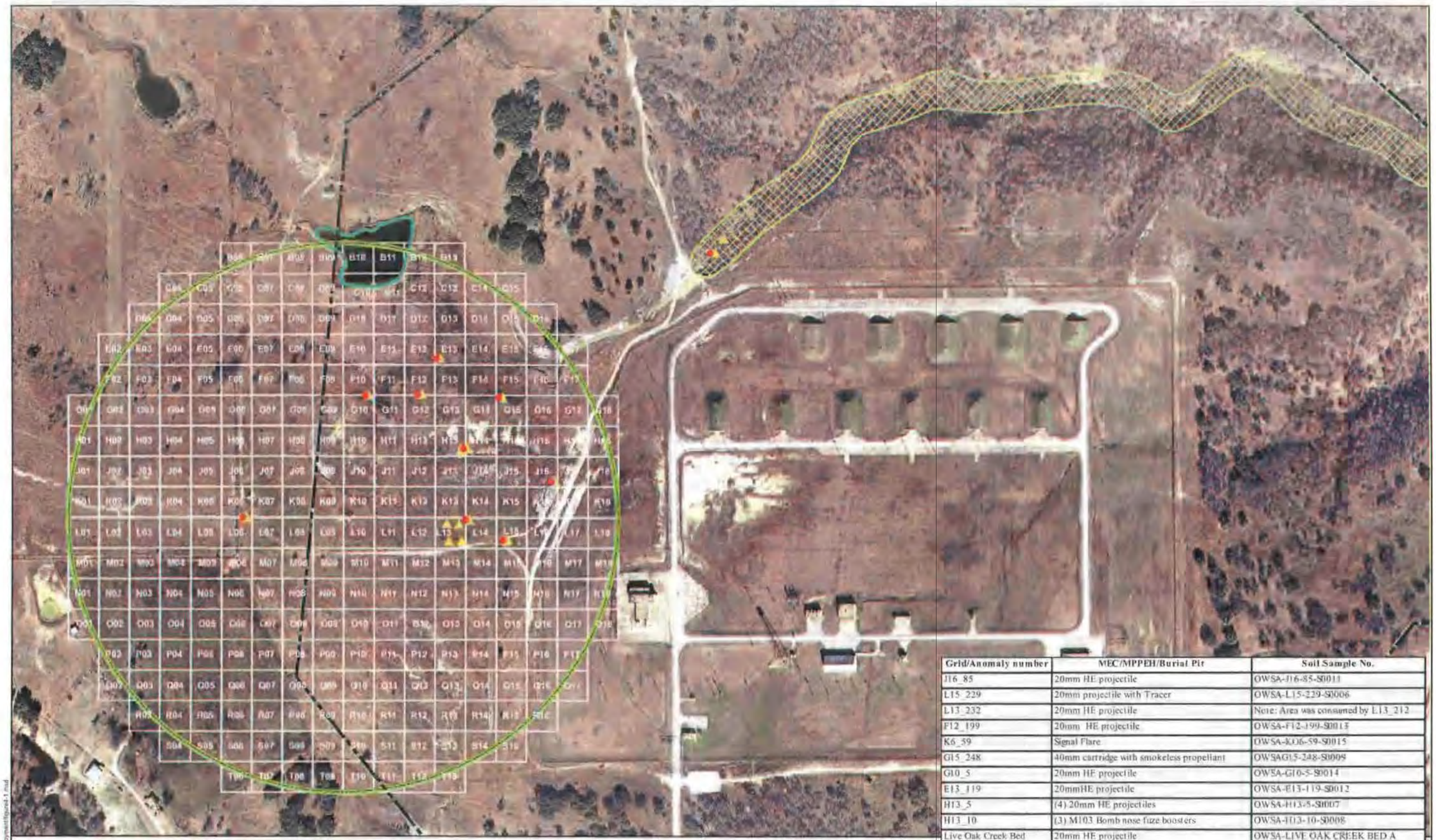
Table 4-2. Soil Sample Analytical Results

Parameter	OWSA-L13-212-S0001	OWSA-L13-212-S0002	OWSA-L13-212-S0003	OWSA-L13-212-S0004	OWSA-L13-212-S0005	OWSA-L15-229-S0006	OWSA-H13-5-S0007	OWSA-H13-10-S0008	OWSA-G15-248-S0009	OWSA-A10-121-S0010A	OWSA-A10-121-S0010B	OWSA-J16-85-S0011	OWSA-E13-119-S0012	OWSA-F12-199-S0013	OWSA-G10-5-S0014	OWSA-K06-59-S0015	OWSA Live Creek Bed A	OWSA Live Creek Bed B	RL	Units	MDL
4-Amino-2,5-dinitrotoluene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.020
2-Amino-4,6-dinitroltoluene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.30	mg/kg	0.100
1,3-dinitrobenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.050
2,4-dinitrotoluene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.020
2,6-dinitrotoluene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.053J	-	-	-	0.25	mg/kg	0.030
HMX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.030
Nitrobenzene	0.069J	0.085J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.050
Nitroglycerin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.50	mg/kg	0.130
2-nitrotoluene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.080
3-nitrotoluene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.070
4-nitrotoluene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.080
PETN	-	-	-	-	-	-	-	-	-	0.43J	-	-	-	-	-	-	-	-	0.50	mg/kg	0.160
RDX	-	-	-	-	-	-	0.11J	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.040
Tetryl	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.050
1,3,5-trinitobenzene	-	-	-	-	-	-	-	-	0.027J	0.048J	0.031J	0.031J	-	-	-	0.033J	-	-	0.25	mg/kg	0.020
2,4,6-trinitrotoluene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.25	mg/kg	0.020

- = Not Detected
J = Estimated result - results less than reporting limit.
RL = Reporting Limit
mg/kg = milligram/kilogram
MDL = Method Detection Limit

THIS PAGE INTENTIONALLY LEFT BLANK

CRSWL AR # 744 Page 48 of 284



Grid/Anomaly number	MEC/MPPEH/Burial Pit	Soil Sample No.
J16_85	20mm HE projectile	OWSA-J16-85-S0011
L15_229	20mm projectile with Tracer	OWSA-L15-229-S0006
L13_232	20mm HE projectile	Note: Area was consumed by L13_212
F12_199	20mm HE projectile	OWSA-F12-199-S0013
K6_59	Signal Flare	OWSA-K06-59-S0015
G15_248	40mm cartridge with smokeless propellant	OWSAG15-248-S0009
G10_5	20mm HE projectile	OWSA-G10-5-S0014
E13_119	20mmHE projectile	OWSA-E13-119-S0012
H13_5	(4) 20mm HE projectiles	OWSA-H13-5-S0007
H13_10	(3) M103 Bomb nose fuze boosters	OWSA-H13-10-S0008
Live Oak Creek Bed	20mm HE projectile	OWSA-LIVE OAK CREEK BED A OWSA-LIVE OAK CREEK BED B
L13_212	Burial Pit 100' long X 50' wide and 20' deep	OWSA-L13-212-S0001 OWSA-L13-212-S0002 OWSA-L13-212-S0003 OWSA-L13-212-S0004 OWSA-L13-212-S0005
QA/QC SAMPLES		OWSA-A10-121-S0010A OWSA-A10-121-S0010B

Notes and Source Data

1) Survey datum is NAD 1983 State Plane Texas North Central FIPS 4202 Feet.
2) Aerial Photogrammetry from North Central Texas Council of Governments 2005

LEGEND

- MEC/MPPEH Clearance Results
- Soil Samples
- 900ft Radius Boundary
- Creek Bed
- Green Area

Figure 4-1
Intrusive Investigation and Realtime MEC/MPPEH Clearance Results and Soil Sample Locations
Munitions Response Program Clearance
Tarrant County, Texas
September 28, 2006

0 75 150 225 300 Feet

EarthTech
tyco

Carswell_NAS_Fthwth_RB\Acqs_Acr_deployment\figure4-1.mxd

THIS PAGE INTENTIONALLY LEFT BLANK

CRSWL AR # 744 Page 50 of 284

5.0 MEC DISPOSAL OPERATIONS

All munitions-related material containing explosives were disposed of by detonation utilizing standard EOD disposal procedures as outlined in EODB 60A-1-1-31 and the Earth Tech Demolition Standard Operating Procedure (SOP).

UXO technicians disposed of MEC and energetically contaminated MD by detonation. Demolition operations began only when all nonessential personnel were out of the fragmentation zone as defined by the MSD of the ordnance being detonated. MEC that was acceptable to move was consolidated to reduce the number of shots. All items that were not acceptable to move were blown in place (BIP) to reduce the risk in handling and movement.

Demolition operations did not proceed until acknowledgement of notice of intent to detonate MEC/MPPEH had been received from AFCEE, local law enforcement authorities, and the Tarrant County Fire Marshall. Authority to initiate the demolition operation setup and the actual detonation of MEC rested solely with the SUXOS. Prior to authorizing the detonation of explosive charges, the SUXOS was responsible for ensuring that all personnel had been evacuated from the demolition area and all personnel had been accounted for. The SUXOS also ensured that all pertinent parties were notified of an intentional detonation and that the area was secure. Upon completion of demolition operations, the demolition team visually inspected each demolition shot. This confirmed that no residual hazards were present and the SUXOS authorized the resumption of site operations.

The MEC Process Flow Chart (Figure 3-2) is a guide to proper disposition of MEC or MD. All demolition operations were performed using standard demolition practices outlined in EODB 60A-1-1-31 and the Earth Tech SOP for demolition operations.

UXO personnel disposed of MEC that could not be moved on a daily basis. If an item could not be moved, it was detonated in place using appropriate engineering controls. AFCEE, local law enforcement authorities, and the Tarrant County Fire Marshall were notified prior to any demolition operations. If demolition operations could not be conducted at the time the item was located, it was secured in place with sand bags. A security guard remained onsite 24 hours a day until safe disposal of the item could be achieved. Access gates from White Settlement Road were locked after normal working hours.

5.1.1 Demolition Team

Earth Tech project team personnel (e.g., Earth Tech's on-site manager, SUXOS, and UXOSO) were on site at all times during disposal operations. The demolition operations team consisted of three UXO-qualified personnel, including the UXOSO, a UXO Demolition Supervisor, and a UXO Technician. The operation was performed under the direction and supervision of the SUXOS, who was charged with the responsibility to ensure that procedures contained in the project work plan and referenced documents were followed. The UXOSO monitored compliance with the safety measures contained in the SSHP and associated documents. In the event of noncompliance, he was vested with the authority to stop or suspend operations. All on-site personnel had the authority to stop work in the event they observed unsafe conditions.

Prior to the start of disposal activities, the UXOSO verified that the area around the operating site was clear of all nonessential personnel and that other UXO supervisors were notified. A minimum separation distance (MSD) was established, appropriate for the disposal of the MEC item, and maintained around the vicinity of the operating site. The MSD was determined by a positive identification of the MEC and a calculation based on data obtained from *Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives* (HNC-ED-CS-S-98-1) or DDESB TP-16.

The approved DDESB ESS contains pre-established MSDs for MEC items suspected at the OWSA EOD Range and Live Oak Creek bed. Personnel remaining on site were limited to those personnel needed to safely and efficiently prepare the item(s) for destruction.

5.1.2 Administrative Controls

In the event that MEC required disposal by demolition, the following notifications were made prior to conducting any in place or disposal pit demolition activity: AFCEE, Tarrant County Fire Marshall, Federal Aviation Administration for air usage, County Sheriff's Department, and property landowners. Prior to initiation of demolition operations, all personnel were evacuated to a distance outside the MSD of the MEC being detonated. Prior to priming of demolition charges, all avenues of ingress were physically blocked by project personnel. Radio communications were maintained among all concerned parties. Avenues of ingress were not opened without the express permission of the UXOSO. A constant state of vigilance was maintained by all personnel to detect and prevent entry into the fragmentation zone.

While preparing MEC for detonation, the SUXOS and UXOSO ensured that the number of personnel on site was kept to the minimum required to safely accomplish the disposal operation.

5.1.3 Engineering Controls

Engineering controls for blast and fragment mitigation were required for destruction of specific MEC items. The MSD was further reduced to 200 feet during demolition operations by the use of engineering controls. Engineering controls used were approved by SUXOS prior to implementation. A copy of the "Use of Sandbags for Mitigation of Fragmentation and Blast Effects due to Intentional Detonation of Munitions" was available at the site office.

No MEC were transported off the site at any time. Transportation of donor explosives complied with all federal, state, and local regulations. Permits other than an ATF explosive user's permit were not required for the OWSA EOD Range.

5.1.4 Operations in Populated Areas

No disposal operations occurred within 1,939 feet of any populated areas.

5.1.5 Off-Site Destruction

No off-site disposal/destruction of MPPEH was conducted during this MEC removal action.

5.2 DISPOSITION OF SCRAP

5.2.1 Scrap Certification Process

A series of inspections conducted during the course of the project ensured that scrap metal released for the project site were free of explosive contamination.

The first inspection occurred when a suspect MEC item was initially encountered. The UXO Technician determined the appropriate disposition of the item utilizing explosive ordnance reconnaissance (EOR) techniques. The UXO Supervisor verified this determination.

Recovered MD was separated from non-MD scrap metal and inspected for the presence of explosive or other hazardous material. Non-MD scrap is material that could not possibly contain any MPPEH, such as discarded runway matting, tin cans or lengths of barbed wire. The SUXOS inspected all scrap metal collected at the end of each workweek and summarize in a daily log the types and estimated quantities/weight of non-munitions debris/scrap removed from the OWSA EOD Range. The SUXOS maintained control of scrap bins (holding areas) to prevent the introduction of hazardous material to previously inspected and certified clean material. Only scrap metal certified as free of MPPEH was placed in the bins. Controls included a lock mechanism that provided positive control of the bin/area. The SUXOS and the UXOQC performed a final inspection immediately prior to release of the scrap material to a local scrap dealer.

Venting of inert items was accomplished, as required, in accordance with EP 385-1-95a *Basic Safety Concepts and Basic Considerations for OE Operations*. Venting consisted of using a jet-perforator explosive charge to pierce an item. This allowed the SUXOS to verify the inert condition as well as to certify the item as "demilitarized."

5.2.2 Scrap Certification Documentation

Earth Tech ensured that scrap metal generated from the project site was properly inspected in accordance with the procedures above. Only personnel who were qualified UXO personnel performed these inspections. The SUXOS certified and an AFCEE safety specialist verified that the scrap metal was free of explosive hazards.

A letter was prepared and used as a turn-in document for the MEC-related scrap metal. The letter was signed by the SUXOS, with the following certification:

> "This certifies and verifies that the Material Potentially Presenting an Explosive Hazard (MPPEH) residue, Range Residue, and/or Explosive Contaminated Property listed have been *100 percent inspected and, to the best of our knowledge and belief, are free of explosive hazards."*

In addition to the data elements required and any locally agreed-to directives, the DD 1348-1A clearly indicated the following for scrap metal:

- Basic material content (type of metal; e.g., steel or mixed)
- Estimated weight
- Unique identification of each of the containers and seals stated as being turned over
- Location where munitions debris was obtained
- Seal identification, if different from the unique identification of the sealed container.

5.2.3 Disposition

Approximately 6,500 pounds of certified, hazard-free MEC scrap generated during this clearance were transported to Mansfield Metals for recycling. The containerized scrap was securely sealed and a chain of custody established for final delivery to the recycling point. Mansfield Metals was identified and contracted with to shred and, if possible, smelt the scrap as soon as possible after receipt.

5.2.4 Chain of Custody and Final Disposition.

Earth Tech, in coordination with AFCEE, arranged for maintaining the chain of custody and final disposition of the certified and verified materials. The certified and verified material were released to Mansfield Metals. Upon receiving the unopened labeled containers each with its unique identified and unbroken seal ensuring a continued chain of custody, and after reviewing and concurring with all the provided supporting documentation, Mansfield Metals signed for having received and agreed with the provided documentation that the sealed containers contained no explosive hazards when received. This signed statement, on company letterhead, is provided in **Appendix C**. The contents of these sealed containers will not be sold, traded, or otherwise given to another party until the contents have been smelted and are only identifiable by their basic content.

Mansfield Metals will send notification and supporting documentation to Earth Tech documenting the sealed containers have been smelted and are now only identifiable by their basic content.

6.0 LAND USE RESTRICTIONS

The objective of this investigation was to identify and remove MPPEH, including MEC and MD residue to allow a residential end use of the site, which is a modification of the original agricultural end use, which was previously approved by DDESB. The only land use restriction applies to the pond, and on the inside face of the bermed area around the pond, as indicated on Figure 4-1, which is designated as a green area and was not drained and investigated, and therefore is excluded from this AAR certification.

THIS PAGE INTENTIONALLY LEFT BLANK

7.0 PUBLIC INVOLVEMENT

Public inquiries were directed to AFCEE. Throughout the project the UXO contractor worked with AFCEE to ensure all adjacent property owners were notified prior to and during project operations. Land parcels, landowners and/or residents that could have been affected by project operations are identified in Table 7-1.

Table 7-1. Adjacent Private Property Information

Land Owner	Residents/Inhabitants	Contact Information (telephone number)
Westpoint Investors, Ltd	None	Jim Ryffel (817) 296-1267 (817) 927-0050
Leonard Enterprises, Inc.	None	O.P. Leonard, Jr. Bob Cooper (817) 335-4261
Rudy Lambert	Yes	(817) 343-2961

THIS PAGE INTENTIONALLY LEFT BLANK

8.0 QUANTITY-DISTANCE

Minimum separation distance (MSD) applies from MEC areas to non-project personnel for ongoing surface or intrusive activities. Project personnel were defined as employees and subcontractors necessary to conduct the MEC removal, as well as any authorized visitors (see Section 6.2). All other personnel were considered non-project personnel. Based on the findings of previous inspections of the OWSA EOD Range there was the potential for encountering a 105mm HE round; therefore, the MSD was initially set at 1,939 feet for all project related field work, including non-intrusive field work. UXO field crews maintained an MSD of at least 341 feet from any other UXO field crew performing fieldwork. These MSDs are based on guidance contained in DDESB Technical Paper 16 - METHODOLOGIES FOR CALCULATING PRIMARY FRAGMENT CHARACTERISTICS, Table B-1, High Explosive Bombs and Projectiles.

All appropriate measures to eliminate/reduce risk for exposure within the EZ were implemented. Such measures (as warning signs and road barricades) were used on site for the duration of the project. Interaction with the public was facilitated through AFCEE.

Engineering controls for demolition of MEC were used as delineated in the Corps of Engineers Huntsville Center (CEHNC) document Use of Sand Bags for Mitigation of Fragmentation and blast effects due to Intentional Detonation of Munitions HNC-ED-CS-S 98-7 and approved by the DDESB on 23 February 1999. These controls were applied as necessary to mitigate fragmentation and blast hazards created during open detonation demolition operations conducted on site. The UXOSO and the SUXOS determined the appropriate engineering controls that were needed during demolition operations.

During the course of the MEC removal, no items were encountered with a greater fragmentation distance than the MGFD established for the project area.

8.1 MAGAZINES

Magazine storage was not utilized at the project site; donor explosives used for the destruction or demilitarization of MEC were procured on an as-needed basis. Donor explosives were transported to the project site by authorized, licensed personnel. Site personnel complied with AFMAN91-201 and all local procedures established for safe movement of explosives on the former Carswell AFB EOD range. The SUXOS was responsible for security of the explosives after they were obtained from the explosives dealer vendor. Under no circumstances were explosive demolition materials stored on site.

8.2 PLANNED OR ESTABLISHED DEMOLITION AREAS

All MEC or MMPEH located during this clearance action were inspected by the SUXOS and UXO QC Specialist and were determined to be safe to move. A demolition area was established at the center of the EOD range to dispose of safe-to-move MEC. Figure 8-1 shows the footprint areas for the project site and the demolition area used during this clearance action. All MPPEH were disposed of by detonation. Disposal operations were conducted as soon as possible after discovery of MPPEH at the site.

8.3 COLLECTION POINTS

The southwest corner of each established grid was the pre-determined collection point. Unfuzed MEC and MPPEH within a search grid were staged at these collection points. The NEW of MPPEH staged at the collection point never exceeded 0.25 pounds

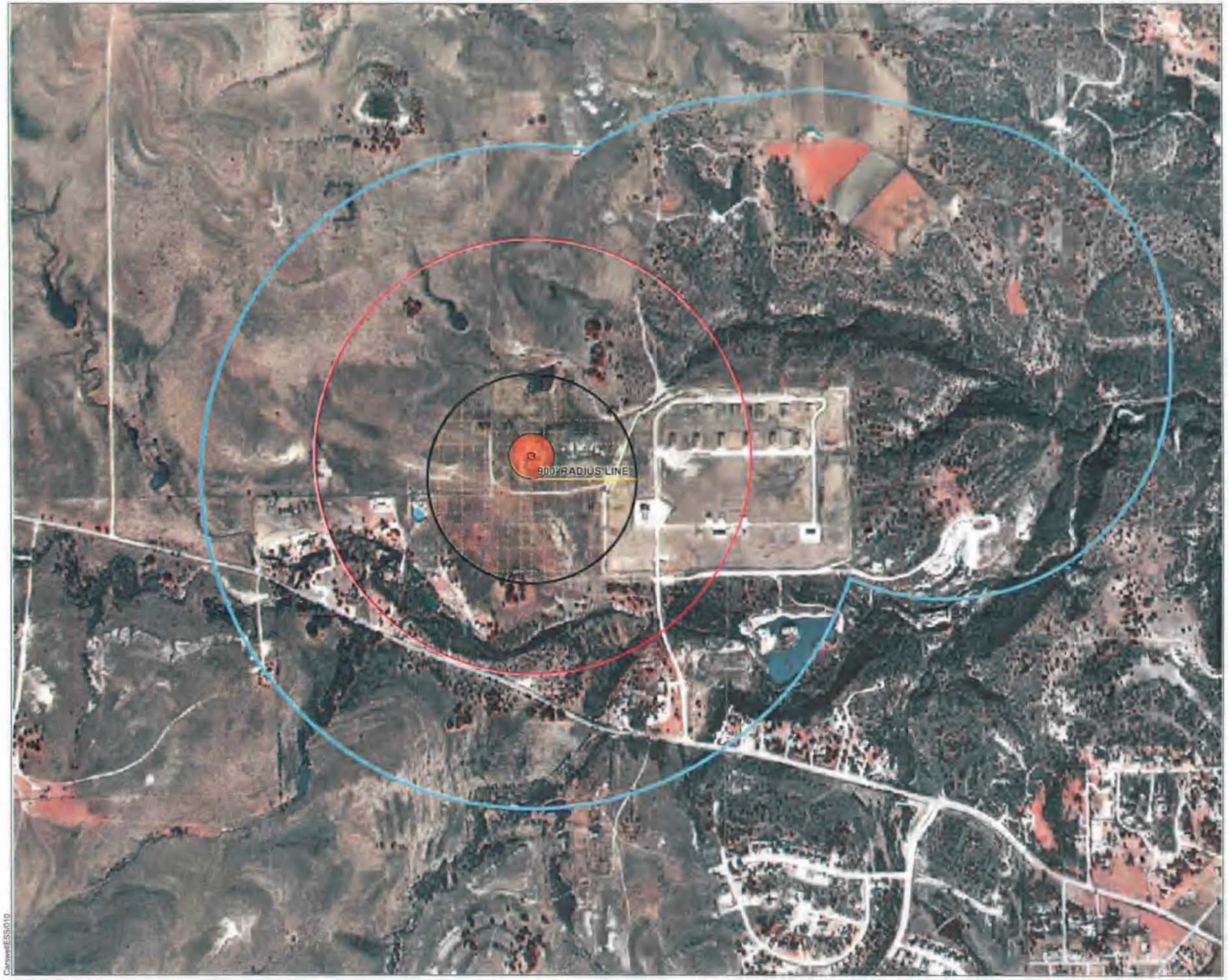
8.4 Q-D MAPS

MGFD 105mm High Explosive projectile

- 1,939-foot EZ without controls
- 341 feet EZ using the 1/600 protocol
- 200-foot EZ with engineering controls

MPM 20mm High Explosive projectile

- 318-feet EZ without controls
- 200 feet EZ using 1/600 protocol
- 200 feet EZ using engineering controls



Exclusion Zones for Outlying MGFD and Project Demolition Pit Former Carswell AFB, Texas

EXPLANATION

- 1,939-Foot (radius) Exclusion Zones - Anticipated Exclusion Zones for MGFD within Project Site
- 900-Foot Radius - Survey Radius
- 1,939-Foot (radius) Exclusion Zone for the Project Demolition Pit
- Demolition Area
- Project Demolition Pit

0 425 850 Feet

Figure 8-1

THIS PAGE INTENTIONALLY LEFT BLANK

CRSWL AR # 744 Page 62 of 284

9.0 REFERENCES

WESTON Solutions, 2004. Final Explosives Safety Submission-DDESB Residential Clearance/ RI for the EOD Range at the offsite WSA, Former Carswell AFB, Texas.

Corps of Engineers Huntsville Center (CEHNC), 1998. *Use of Sandbags for Blast and Fragment Mitigation,* Technical Document ED-CS-98-7.

Department of Defense Explosives Safety Board (DDESB), 2002. *Methodologies for Calculating Primary Fragment Characteristics,* Technical Paper No. 16. 1 December.

Hydrogeologic, Inc., 2001. *Draft Final 2001 Basewide Groundwater Sampling and Analysis Plan NAS Fort Worth JRB, Texas.* March.

United States Army Corp of Engineers (USACE), 2002. Type *II Work Plan,* Number OE-005-01.01. October.

USACE, 2002. *Interim Holding Facility Siting Plan for Recovered Chemical Warfare Material (RCWM) Projects*, Number OE-005-16.01. October.

USACE, 2002. *Physical Security Plan for Recovered Chemical Warfare Material (RCWM) Project Sites*, Number OE-005-17.01. October.

USACE, 2000. *Ordnance and Explosives Response*, Engineering Manual 1110-1-4009. 23 June.

U.S. Army, 29 February 2000, AR 385-10, *The Army Safety Program.*

U.S. Army, 22 May 1987, AR 385-64, *Ammunition and Explosive Safety.*

U.S. Army, 15 December 1987, PAM 385-64, *Ammunition and Explosives Safety Standards.*

U.S. Department of Defense, August 1997, DOD 4145.26-n, *Contractor's Safety Manual for Ammunition and Explosives.*

U.S. Department of Defense, DOD 4160.21M-1, 1991. *Department of Defense Demolition Manual.*

U.S. Army Engineering and Support Center-Huntsville, Interim Guidance Document 02-03, *Procedures for Assessing Munitions with Unknown Fillers*, January 2003.

U.S. Army Engineering and Support Center-Huntsville, 21 April 2004, Interim Guidance Document 04-01, Essential Personnel and Personnel Limits in MEC Exclusion Zones, MMR, Ordnance and Explosives Center of Expertise.

U.S. Army Engineering and Support Center-Huntsville, 23 April 2004, Interim Guidance Document, CEMP-CE, *Notification Procedures for Discovery of RCWM*, April 2004.

U.S. Air Force, Technical Order 60A-1-1-31, *Explosive Ordnance Disposal Procedures.*

U.S. Air Force, Technical Order 60A-1-1-5, Technical Manual, *Explosives Ordnance Disposal Procedures, Access and Recovery of Buried UXO*, 23 July 1991.

U.S. Air Force, Technical Order 60A-1-1-22, Technical Manual, *Explosives Ordnance Disposal Procedures, General EOD Safety Precautions*, 06 May 1998.

U.S. Air Force, Technical Order 60A-1-1-7, Technical Manual, *Explosives Ordnance Disposal Procedures, Demolition Procedures*,

U.S. Air Force, Technical Order 60A-1-1-36, Technical Manual, *Explosives Ordnance Disposal Procedures, Surface Range Clearance; General Information*, 19 December 1997.

U.S. Air Force, AFMAN 91-201, *Air* Force *Explosive Safety Standards*, 18 October 2001.

U.S. Air Force, AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health Program*, 01 June 1996.

APPENDIX A
INTRUSIVE INVESTIGATION RESULTS

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
B06	B06_18_1530em2	15	6.65	4	A	2267855.89	6966460.82	06-Jun-06	Alan Merriman	√													√	CIV	0	10	1	wire		√	3	0.5	0.25	NE-SW	0	√			
B06	B06_31_1530em2	10	3.27	3	C	2267859.27	6966441	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1			√	3	0.5	0.25	N-S	0	√			
B07	B07_14_1530em2	15	8.54	4	A	2267972.33	6966475.34	12-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	flare														√			
B08	B08_18_1531em2	15	22.86	4	A	2268114.34	6966440.9	12-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	scrap														√			
B08	B08_22_1531em2	16	15.48	4	A	2268056.59	6966482.94	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
B08	B08_45_1531em2	12	6.89	4	B	2268033.84	6966447.09	12-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
B08	B08_60_1531em2	12	4.76	4	B	2268101.28	6966453.54	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
B08	B08_65_1531em2	16	4.42	4	A	2268028.49	6966481.35	12-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	scrap														√			
B09	B09_11_1601em2	15	469.22	4	A	2268208.04	6966462.86	13-Jun-06	Alan Merriman	√													√	CIV	0	1	8	steel pipe		√	> 24	1	1	N-S	0	√			
B09	B09_12_1531em2	13	29.1	4	B	2268183.09	6966466	13-Jun-06	Alan Merriman	√													√	CIV	0	1	1	barbless wire		√	9	0.5	0.25	N-S	90	√			
B09	B09_2_1531em2	15	516.2	4	A	2268183.37	6966454.58	13-Jun-06	Alan Merriman	√													√	CIV	0	1	1	t-post		√	> 24	2	1	NE-SW	0	√			
B09	B09_25_1601em2	14	49.32	4	A	2268210	6966459.46	13-Jun-06	Alan Merriman	√													√	CIV	0	1	8	steel pipe		√	> 24	1	1	N-S	0	√			
B09	B09_26_1531em2	11	12.35	4	B	2268205.77	6966465.3	13-Jun-06	Alan Merriman	√													√	CIV	0	1	8	steel pipe		√	> 24	1	1	N-S	0	√			
B09	B09_31_1531em2	13	11.23	4	B	2268201.78	6966468.68	13-Jun-06	Alan Merriman	√													√	CIV	6	3	1	t-post clip		√	3	1	0.25	NE-SW	45	√			
B09	B09_4_1531em2	15	423.42	4	A	2268183.16	6966458.22	13-Jun-06	Alan Merriman	√													√	CIV	0	1	1	t-post		√	> 24	2	1	NE-SW	0	√			
B09	B09_52_1531em2	12	5.83	4	B	2268176.9	6966499.94	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	al scrap		√	3	2	1		0	√			
B09	B09_56_1531em2	11	5.45	4	B	2268208.8	6966467.14	13-Jun-06	Alan Merriman	√													√	CIV	0	1	8	steel pipe		√	> 24	1	0.5	N-S	0	√			
B09	B09_62_1531em2	13	4.65	4	B	2268179.5	6966439.69	13-Jun-06	Alan Merriman	√													√	CIV	0	2	1	t-post clip		√	3	2	0.25	NE-SW	0	√			
B09	B09_64_1531em2	12	4.42	4	B	2268139.34	6966518.05	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire bent		√	3	0.5	0.25		0	√			
B09	B09_68_1531em2	11	4.21	4	B	2268181.83	6966461.69	13-Jun-06	Alan Merriman	√													√	CIV	6	1	1	wire		√	3	1	0.25	N-S	0	√			
B09	B09_71_1531em2	13	4.14	4	B	2268194.51	6966467.91	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	t-post clip		√	3	0.5	0.25	N-S	0	√			
B09	B09_77_1531em2	15	3.55	3	A	2268175.77	6966454.71	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal ap								√	3	2	0.5	N-S	45	√			
B09	B09_78_1531em2	10	3.5	3	C	2268156.82	6966502.41	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
B09	B09_96_1531em2	11	2.76	3	B	2268171.78	6966504.95	13-Jun-06	Alan Merriman	√													√	CIV	0	1	1			√	12	0.5	0.25	N-S	0	√			
B12	B12_104_1602em2	14	7.72	4	A	2268470.8	6966465.02	20-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40 mil body								√	3	2				√			
B12	B12_108_1602em2	13	7.3	4	B	2268478.91	6966462.77	20-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm body								√	3	2				√			
B12	B12_122_1602em2	13	6.14	4	B	2268471.7	6966479.52	20-Jun-06	Alan Merriman	√													√	CIV	6	5	0.5	38 spl rounds		√	3	0.5				√			
B12	B12_140_1602em2	12	5.02	4	B	2268463.28	6966483.82	20-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	fishing wt,flag 5' off on hillsi		√	3	0.5				√			
B12	B12_150_1602em2	13	4.51	4	B	2268436.69	6966472.05	20-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	aluminum can		√	6	4	0.25			√			
B12	B12_151_1602em2	11	4.5	4	B	2268475.82	6966477.82	20-Jun-06	Alan Merriman																			no contact											
B12	B12_167_1602em2	13	4	4	B	2268432.64	6966503.66	20-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	fishing wire		√	3	1	0.25			√			
B12	B12_170_1602em2	10	3.96	4	C	2268457.49	6966451.81	11-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	50 cal							FE	√	6	0.5	0.25	N-S	0	√			
B12	B12_20_1602em2	12	32.7	4	B	2268455.81	6966474.76	20-Jun-06	Alan Merriman	√													√	CIV	0	1	1	scrap mtl,flag 5' off target off		√	3	0.5	0.25			√			
B12	B12_228_1602em2	11	2.77	3	B	2268439.59	6966461.41	20-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	sluminum can		√	6	4	0.25			√			
B12	B12_235_1602em2	11	2.63	3	B	2268439.84	6966451.59	20-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	aluminum can		√	6	4	0.25			√			
B12	B12_7_1602em2	16	170.77	4	A	2268475.02	6966499.3	20-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence post, left in ground		√	24	2	0.5			√			
B12	B12_70_1602em2	16	11.39	4	A	2268514.56	6966462.94	20-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	coors can		√	6	4				√			
B12	B12_74_1602em2	13	10.91	4	B	2268433.79	6966437.03	20-Jun-06	Alan Merriman	√													√	CIV	3	1	0.75	22 shell case		√	3	0.5				√			
B12	B12_76_1602em2	15	10.75	4	A	2268492.08	6966448.41	20-Jun-06	Alan Merriman	√													√	CIV	3	1	1	beer can		√	6	4				√			
B12	B12_86_1602em2	13	9.56	4	B	2268475.98	6966450.77	20-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	bud beer can, aluminum		√	6	4				√			
B12	B12_92_1602em2	13	9.15	4	B	2268496.31	6966467.2	20-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	mech scrap aluminum								√						√			
B12	B12_99_1602em2	16	8.27	4	A	2268505.09	6966438.39	20-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm body								√	3	2	0.25			√			
B13	B13_188_1602em2	11	3.57	3	B	2268615.31	6966443.38	07-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	frag							FE	√	3	1	0.25	N-S	0	√			
B13	B13_64_1602em2	16	12.34	4	A	2268523.47	6966465.65	28-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	closure ring								√	3	0.5	0.25	N-S	0	√			
C04	C04_36_1530em2	12	2.62	3	B	2267692.33	6966339.68	06-Jun-06	Alan Merriman	√													√	CIV	0	1	2	rebar		√	6	0.5	0.5	N-S	0	√			
C05	C05_10_1530em2	15	14.82	4	A	2267755.02	6966376.76	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fuze, pd empty								√	3	1	0.5		45	√			
C05	C05_13_1530em2	14	9.2	4	A	2267720.9	6966341.51	06-Jun-06	Alan Merriman	√													√	CIV	0	2	1	wire		√	3	0.5	0.25	NE-SW	0	√			
C05	C05_35_1530em2	10	2.64	3	C	2267719.02	6966362.08	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	37mm piece								√	3	1	1	NE-SW	45	√			
C06	C06_122_1530em2	9	1.46	1	C	2267858.95	6966398.7	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	piece of wire		√	6	0.5	0.25	E-W	90	√			
C06	C06_22_1530em2	13	7.85	4	B	2267854.89	6966392.16	06-Jun-06	Alan Merriman	√													√	CIV	0	10	1	wire			3	0.5	0.5	E-W	45	√			
C06	C06_23_1530em2	13	7.35	4	B	2267843.08	6966376.58	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	6	0.5	0.25	E-W	0	√			
C06	C06_25_1530em2	14	7	4	A	2267875.41	6966360.2	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	3	0.5	0.25	NE-SW	0	√			
C06	C06_27_1530em2	15	6.64	4	A	2267855.21	6966350.48	06-Jun-06	Alan Merriman	√													√	CIV	3	10	1	fence staples			3	0.5	0.25	NE-SW	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
C06	C06_3_1530em2	16	107.65	4	A	2267890.49	6966360.05	06-Jun-06	Alan Merriman	√							√	ED MD	0	1	1	flare								√	9	2	0.5	E-W	0	√			
C06	C06_30_1530em2	13	6.05	4	B	2267897.52	6966359.83	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	6	0.5	0.25	E-W	0	√			
C06	C06_31_1530em2	14	5.94	4	A	2267898.76	6966425.27	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire			6	0.5	0.25	E-W	0	√			
C06	C06_32_1530em2	13	5.83	4	B	2267862.02	6966414.98	06-Jun-06	Alan Merriman	√													√	CIV	0	2	1	wire		√	6	0.5	0.25	NE-SW	0	√			
C06	C06_33_1530em2	14	5.81	4	A	2267849.73	6966358.66	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	3		0.25	E-W	0	√			
C06	C06_34_1530em2	14	5.72	4	A	2267898.3	6966428.63	06-Jun-06	Alan Merriman	√													√	CIV	6	1	1	wire			6	0.5	0.25	NE-SW	0	√			
C06	C06_35_1530em2	14	5.62	4	A	2267891.87	6966394.53	06-Jun-06	Alan Merriman	√													√	CIV	3	2	1	wire/bolt			6	0.5	0.25	N-S	0	√			
C06	C06_36_1530em2	11	5.6	4	B	2267846.92	6966377.44	06-Jun-06	Alan Merriman	√													√	CIV	0	3	1	wire			3	0.5	0.25	E-W	0	√			
C06	C06_40_1530em2	13	5.02	4	B	2267875.34	6966356.88	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	3	0.5	0.25	NE-SW	0	√			
C06	C06_44_1530em2	15	4.19	4	A	2267892.88	6966363.35	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire			> 24	0.5	0.25	E-W	0	√			
C06	C06_45_1530em2	12	4.1	4	B	2267859.02	6966404.72	06-Jun-06	Alan Merriman	√													√	CIV	0	2	2	wire			9	0.5	0.25	NE-SW	0	√			
C06	C06_49_1530em2	11	3.81	4	B	2267879.18	6966433.34	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire			9	0.5	0.25	E-W	0	√			
C06	C06_53_1530em2	12	3.51	3	B	2267902.23	6966343.69	06-Jun-06	Alan Merriman	√													√	CIV	6	1				√	3	0.5	0.25	NE-SW	0	√			
C06	C06_60_1530em2	9	3.15	3	C	2267848.42	6966371.98	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	3	0.5	0.25	NE-SW	90	√			
C06	C06_64_1530em2	10	2.9	3	C	2267853.73	6966342.88	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence clip		√	3	0.5	0.25	N-S	0	√			
C06	C06_73_1530em2	9	2.51	3	C	2267878.84	6966386.09	19-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	50 cal bullet								√	3	0.5	0.5	E-W	90				
C06	C06_74_1530em2	10	2.46	2	C	2267859.03	6966434.88	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	fence piece		√	6	0.5	0.25	N-S		√			
C06	C06_79_1530em2	9	2.37	2	C	2267828.77	6966381.31	19-Jun-06	Alan Merriman	√													√	CIV	3	2	1	wire		√	6	0.5	0.25	NE-SW	45	√			
C06	C06_8_1530em2	16	30.26	4	A	2267854.36	6966396.41	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire			> 24	0.5	0.25	NE-SW	0	√			
C06	C06_91_1530em2	9	1.97	2	C	2267860.62	6966425.66	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	6	0.5	0.25	E-W	45	√			
C07	C07_19_1530em2	16	8.77	4	A	2267991.12	6966380.91	12-Jun-06	Alan Merriman	√													√	MIL	3	1	1	large metal nut		√	3	2	2	E-W	45	√			
C07	C07_24_1530em2	15	7.03	4	A	2267949.5	6966344.04	12-Jun-06	Alan Merriman	√													√	MIL	6	1	1	fence wire		√	9	0.5	0.25	NE-SW	0	√			
C07	C07_37_1530em2	15	5.56	4	A	2267919.73	6966355	12-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	piece of frag								√	3	0.5	0.25	NE-SW	90	√			
C07	C07_46_1530em2	11	3.97	4	B	2268003.12	6966362.59	12-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	20mm								√	3	0.5	0.5	N-S	45	√			
C07	C07_47_1530em2	12	3.93	4	B	2268009.06	6966420.21	12-Jun-06	Alan Merriman	√													√	MIL	6	1	1	aircraft nut and bolt		√	3	1	1	E-W	90	√			
C07	C07_58_1530em2	12	3.2	3	B	2267953.79	6966353.86	12-Jun-06	Alan Merriman	√													√	CIV	6	1	1	fence wire		√	6	0.5	0.25	NE-SW	45	√			
C07	C07_61_1530em2	11	3.04	3	B	2267998.3	6966403.33	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	length of wire		√	12	0.5	0.25	N-S	0	√			
C07	C07_63_1530em2	11	2.9	3	B	2267928.37	6966356.88	12-Jun-06	Alan Merriman	√													√	CIV	6	1	1	fence wire		√	6	0.5	0.25	N-S	0	√			
C07	C07_65_1530em2	11	2.88	3	B	2268000.02	6966342.3	12-Jun-06	Alan Merriman	√													√	MIL	3	1	1	fence wire		√	12	0.5	0.25	NE-SW	0	√			
C08	C08_14_1530em2	15	11.74	4	A	2268078.37	6966406.14	12-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	37mm,penetrator practice(riot co	√	CIV	3	1	1	scrap								√			
C08	C08_15_1530em2	13	10.98	4	B	2268077.95	6966409.59	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
C08	C08_28_1530em2	16	6.44	4	A	2268114.8	6966389.73	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	fence staple								√			
C08	C08_43_1530em2	12	4.36	4	B	2268115.49	6966403	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
C08	C08_52_1530em2	11	3.55	3	B	2268115.24	6966399.62	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
C08	C08_59_1530em2	11	3.16	3	B	2268065.64	6966341.69	12-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	scrap														√			
C08	C08_62_1530em2	11	3.04	3	B	2268059.79	6966429.47	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
C09	C09_107_1531em2	11	2.47	2	B	2268171.74	6966378.19	13-Jun-06	Alan Merriman	√													√	CIV	0	2	1	t-post clips		√	3	0.5	0.25		0	√			
C09	C09_16_1531em2	15	24.83	4	A	2268179.84	6966430.77	13-Jun-06	Alan Merriman	√													√	CIV	0	10	1	fence post clips		√	3	0.5	0.25	N-S	0	√			
C09	C09_19_1531em2	15	19.23	4	A	2268119.34	6966358.93	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	end cap to catapolt								√	3	2	2		90	√			
C09	C09_21_1531em2	15	15.75	4	A	2268143.45	6966361.99	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	budweiser can		√	3	6	2	N-S	0	√			
C09	C09_28_1531em2	13	11.77	4	B	2268123.55	6966405.04	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	0.5	0.5	N-S	0	√			
C09	C09_3_1531em2	15	430.29	4	A	2268176.7	6966371.02	13-Jun-06	Alan Merriman	√													√	CIV	0	1	4	t-post		√	24	2	0.5	N-S	0	√			
C09	C09_30_1531em2	13	11.35	4	B	2268177.48	6966410.35	13-Jun-06	Alan Merriman	√													√	CIV	0	10	1	t-post clips		√	3	1	0.25		0	√			
C09	C09_32_1531em2	13	10.53	4	B	2268120.95	6966407.98	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	aircriaft part		√	3	2	1		90	√			
C09	C09_33_1531em2	14	9.56	4	A	2268178.3	6966421.39	13-Jun-06	Alan Merriman	√													√	CIV	0	4	1	t-post clips		√	3	1	0.25	N-S	0	√			
C09	C09_39_1531em2	11	7.87	4	B	2268171.36	6966405.54	13-Jun-06	Alan Merriman	√													√	CIV	3	3	1	t-post clip		√	3	2	0.25		0	√			
C09	C09_5_1531em2	15	354.18	4	A	2268177.03	6966374.55	13-Jun-06	Alan Merriman	√													√	CIV	0	1	1	t-post		√	24	2	0.5	N-S	0	√			
C09	C09_51_1531em2	13	5.88	4	B	2268175.66	6966403.95	13-Jun-06	Alan Merriman	√													√	CIV	3	2	1	t-post clips		√	3	0.5	0.25	N-S	0	√			
C09	C09_53_1531em2	10	5.8	4	C	2268175.43	6966407.62	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
C09	C09_61_1531em2	13	4.68	4	B	2268143.59	6966385.08	13-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	frag								√	3	2	0.5	N-S	0	√			
C09	C09_67_1531em2	11	4.33	4	B	2268151.3	6966343.19	13-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	50 cal full up								√	6	0.5	0.5	N-S	0	√			
C09	C09_7_1531em2	16	95.43	4	A	2268164.79	6966379.23	13-Jun-06	Alan Merriman	√							√	ORD MD	0	1	2	m166 fuze w/m14 delay left in pl								√	3	4	4	N-S	0				
C09	C09_70_1531em2	12	4.17	4	B	2268169.83	6966338.59	13-Jun-06	Alan Merriman	√													√	CIV	0	5	1	t-post clips		√	3	0.5	0.25		0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
C09	C09_72_1531em2	10	4.06	4	C	2268173.73	6966389.44	11-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
C09	C09_73_1531em2	10	4.02	4	C	2268177.18	6966401.02	11-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
C09	C09_74_1531em2	13	3.93	4	B	2268171.11	6966360.76	13-Jun-06	Alan Merriman	√													√	CIV	0	1	1	t-post clip		√	3	0.5	0.25		0	√			
C09	C09_75_1531em2	13	3.83	4	B	2268150.98	6966356.05	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal live round								√	6	1	0.5	N-S	0	√			
C09	C09_80_1531em2	11	3.45	3	B	2268173.94	6966381.17	13-Jun-06	Alan Merriman	√													√	CIV	0	2	1	t-post clip		√	3	0.5	0.25		0	√			
C09	C09_81_1531em2	11	3.39	3	B	2268171.38	6966348.72	13-Jun-06	Alan Merriman	√													√	CIV	0	2	1	t-post clip		√	3	0.5	0.25		0	√			
C09	C09_88_1531em2	11	3.08	3	B	2268170.8	6966364.82	13-Jun-06	Alan Merriman	√													√	CIV	0	1	1	t-post clip		√	3	0.5	0.25		0	√			
C09	C09_92_1531em2	13	2.95	3	B	2268163.49	6966375.7	13-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	fuze components								√	3	1	1	N-S	0	√			
C09	C09_99_1531em2	12	2.63	3	B	2268171.43	6966368.4	13-Jun-06	Alan Merriman	√													√	CIV	0	1	1	t-post clip		√	3	0.5	0.25		0	√			
C10	C10_10_1601em2	16	567.24	4	A	2268316.41	6966379.02	13-Jun-06	Alan Merriman	√													√	CIV	> 24	1	≥8	55 gal drum pieces	FE	√	24	6	4	N-S	0	√			
C10	C10_121_1601em2	12	5.12	4	B	2268311.52	6966347.38	13-Jun-06	Alan Merriman	√													√	CIV	0	1	1	nail		√	3	0.5	0.25	N-S	0	√			
C10	C10_132_1601em2	15	4.72	4	A	2268256.34	6966371.82	13-Jun-06	Alan Merriman	√													√	CIV	18	1	2	round metal bracket		√	6	1	1	E-W	45	√			
C10	C10_139_1601em2	12	4.47	4	B	2268266.83	6966349.97	13-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	50 cal round/full up								√	6	2	1	NE-SW	45	√			
C10	C10_149_1601em2	12	4.02	4	B	2268266	6966369.67	13-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	50 cal round/ full up								√	6	1	1	N-S	0	√			
C10	C10_152_1601em2	14	3.98	4	A	2268277.67	6966365.48	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal ctg/ not fired								√	6	1	1	N-S	45	√			
C10	C10_170_1601em2	11	3.4	3	B	2268290.79	6966368.97	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	soda can		√	3	0.5	0.25	NE-SW	0	√			
C10	C10_32_1601em2	15	33.74	4	A	2268266.95	6966357.86	13-Jun-06	Alan Merriman	√													√	CIV	> 24	1	≥8	lg pipe	FE	√	> 24	4	0.5	NE-SW	90	√			
C10	C10_36_1601em2	14	26.45	4	A	2268267.41	6966354.42	13-Jun-06	Alan Merriman	√													√	CIV	> 24	1	≥8	pipe	FE	√	> 24	4	1	NE-SW	90	√			
C10	C10_52_1601em2	13	17.96	4	B	2268266.01	6966362.39	13-Jun-06	Alan Merriman	√													√	CIV	> 24	1	≥8	pipe	FE	√	> 24	4	0.5	NE-SW	90	√			
C10	C10_75_1601em2	16	11.78	4	A	2268316.95	6966382.46	13-Jun-06	Alan Merriman	√													√	CIV	> 24	1	≥8	pipe	FE	√	24	4	0.5	NE-SW	90	√			
C11	C11_10_1602em2	15	91.01	4	A	2268334.78	6966381.94	13-Jun-06	Alan Merriman	√													√	MIL	6	1	2	ejection seat mounting piece (al		√	9	2	0.5	N-S	45	√			
C11	C11_100_1601em2	14	7.07	4	A	2268418.13	6966364.59	13-Jun-06	Alan Merriman	√													√	CIV	12	1	1	small aluminum pieces		√	3	0.5	0.25	N-S	45	√			
C11	C11_120_1601em2	12	5.2	4	B	2268338.04	6966348.12	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	budweiser can		√	6	0.5	0.25	N-S	0	√			
C11	C11_127_1602em2	12	5.66	4	B	2268409.14	6966372.09	13-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	40mm grenade outer sleeve								√	3	0.5	0.25	NE-SW	90	√			
C11	C11_129_1602em2	13	5.62	4	B	2268338.04	6966366.56	13-Jun-06	Alan Merriman	√													√	CIV	6	1	1	chunk of metal		√	3	1	1	NE-SW	45	√			
C11	C11_13_1601em2	15	422.64	4	A	2268326.58	6966353.06	13-Jun-06	Alan Merriman	√													√	CIV	3	1	16	metal post		√	24	2	0.5	E-W	0	√			
C11	C11_132_1602em2	12	5.53	4	B	2268410.59	6966396.6	13-Jun-06	Alan Merriman	√													√	CIV	6	1	1	shotgun shell		√	3	1	1	NE-SW	45	√			
C11	C11_133_1602em2	13	5.48	4	B	2268412.9	6966408.59	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1			√	3	0.5	0.25	N-S	0	√			
C11	C11_136_1601em2	10	4.51	4	C	2268375.84	6966345.2	11-Jul-06	Jim Thoren																			no contact; reqcquired 7/25/06											
C11	C11_14_1601em2	14	373.05	4	A	2268358.54	6966362.3	13-Jun-06	Alan Merriman	√													√	CIV				long piece of pipe,same 30		√	6	2	1	NE-SW	45	√			
C11	C11_147_1602em2	13	4.72	4	B	2268384.28	6966398.67	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	soda can		√	6	0.5	0.25	E-W	45	√			
C11	C11_150_1601em2	11	4.01	4	B	2268321.78	6966352.23	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	budwieser can		√	6	0.5	0.25	SE-NW	90	√			
C11	C11_152_1602em2	13	4.49	4	B	2268413.19	6966417	13-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	40mm grenade outer sleeve								√	3	0.5	0.25	NE-SW	45	√			
C11	C11_173_1602em2	12	3.88	4	B	2268408.05	6966378.7	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	soda can		√	3	0.5	0.25	N-S	0	√			
C11	C11_182_1602em2	13	3.71	4	B	2268319.73	6966395.49	13-Jun-06	Alan Merriman	√													√	CIV	6	1	1	soda can		√	3	0.5	0.25	N-S	0	√			
C11	C11_185_1601em2	12	3.02	3	B	2268320.63	6966370.29	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	small piece of aluminum		√	3	0.5	0.25	NE-SW	0	√			
C11	C11_20_1601em2	13	74.56	4	B	2268320.62	6966347.26	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	flare tube								√	9	4	0.25	NE-SW	45	√			
C11	C11_214_1602em2	11	3.04	3	B	2268411.27	6966368.95	13-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	40mm outer sleeve (grenade)								√	3	0.5	0.25	NE-SW	45	√			
C11	C11_222_1602em2	13	2.83	3	B	2268334.65	6966378.65	13-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	50 cal round base								√	3	0.5	0.25	E-W	90	√			
C11	C11_225_1602em2	11	2.8	3	B	2268320.93	6966369.64	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	small piece of aluminum,same185		√	3	0.5	0.25	NE-SW	0	√			
C11	C11_279_1602em2	12	2	2	B	2268335.13	6966385.49	13-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	50 round ctg								√	6	1	0.25	N-S	0	√			
C11	C11_28_1602em2	16	23.06	4	A	2268404.98	6966382.48	13-Jun-06	Alan Merriman	√													√	CIV	6	1	1	flat piece of metal		√	9	0.5	0.25	NE-SW	45	√			
C11	C11_30_1601em2	14	38.08	4	A	2268358.32	6966358.58	13-Jun-06	Alan Merriman	√													√	CIV	12	1	8	long piece of pipe		√	6	2	1	NE-SW	45	√			
C11	C11_32_1602em2	14	19.39	4	A	2268368.52	6966376.28	13-Jun-06	Alan Merriman																			no contact; reacquired 7/25/06											
C11	C11_48_1602em2	16	14.2	4	A	2268395.51	6966393.69	13-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	40mm grenade outer sleeve								√	3	0.5	0.25	N-S	0	√			
C11	C11_66_1602em2	10	12	4	C	2268380.13	6966343.64	11-Jul-06	Jim Thoren	√							√	ORD MD	> 24	1	0.25	40mm ogive	√	CIV	12	1	0.25	beer can	FE	√	6	0.5	0.25	N-S	0	√			
C11	C11_73_1601em2	12	12.11	4	B	2268379.02	6966344.06	13-Jun-06	Alan Merriman	√													√	CIV	> 24	3	0.25	scrap pipe		√	9	1	1	E-W	90	√			
C11	C11_73_1602em2	15	10.94	4	A	2268357.49	6966382.38	13-Jun-06	Alan Merriman	√													√	CIV	> 24	5	0.25	metal scrape and wipe mesh	FE	√	12	1	1	E-W	90	√			
C11	C11_81_1602em2	14	10.39	4	A	2268417.77	6966379.62	13-Jun-06	Alan Merriman	√													√	CIV	12	1	1	piece of metal		√	9	0.5	0.25	NE-SW	45	√			
C12	C12_124_1603em2	13	4.6	4	B	2268451.15	6966356.59	20-Jun-06	Alan Merriman																			no find within 3',magnet@app 7'											
C12	C12_125_1603em2	12	4.6	4	B	2268479.99	6966433.23	20-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	40mm body								√	3	2				√			
C12	C12_126_1603em2	13	4.59	4	B	2268448.87	6966403.52	20-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.25	40mm body								√	3	2	0.25			√			
C12	C12_130_1603em2	12	4.25	4	B	2268474.59	6966435.68	20-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	steel scrap		√	3	1	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
C12	C12_134_1603em2	11	4.19	4	B	2268452.69	6966412.23	20-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	40mm body								√	3	2	0.25			√			
C12	C12_145_1603em2	11	3.75	4	B	2268445.8	6966421.42	20-Jun-06	Alan Merriman	√													√	CIV	12	1	1	aluminum can		√	6	4	0.25			√			
C12	C12_150_1603em2	11	3.59	3	B	2268486.67	6966342.55	20-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	aluminum can		√	6	4	0.25			√			
C12	C12_153_1603em2	12	3.5	3	B	2268494.63	6966373.19	20-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	40mm windscreen								√	3	0.5				√			
C12	C12_158_1603em2	11	3.23	3	B	2268476.25	6966380.02	20-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	aluminun can		√	6	4	0.25			√			
C12	C12_169_1603em2	12	2.88	3	B	2268494.49	6966424.86	20-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	aluminum scrap		√	3	1	0.25			√			
C12	C12_171_1603em2	11	2.8	3	B	2268461.65	6966416.09	20-Jun-06	Alan Merriman	√													√	CIV	12	1	0.25	diet pepsi can		√	6	4	0.25			√			
C12	C12_178_1603em2	11	2.7	3	B	2268443.3	6966433.75	20-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	aluminum can		√	6	4	0.25			√			
C12	C12_179_1603em2	11	2.7	3	B	2268431.89	6966352.53	20-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	steel frag								√	9	2	0.25			√			
C12	C12_184_1603em2	11	2.53	3	B	2268500.77	6966412.26	20-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	steel scrap		√	3	2	0.25			√			
C12	C12_27_1603em2	16	53.46	4	A	2268506.91	6966337.19	20-Jun-06	Alan Merriman	√							√	ORD MD	3	1	4	fuze vt								√	6	4	0.25			√			
C12	C12_29_1614em2	14	4.55	4	A	2268472.23	6966336.27	20-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	aluminum scrap		√	3	0.5	0.5			√			
C12	C12_30_1614em2	14	4.22	4	A	2268449.09	6966402.65	20-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.25	40mm body, same as 126								√	3	2	0.25			√			
C12	C12_32_1603em2	12	31.5	4	B	2268423.68	6966399.38	20-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part								√	6	2	0.25			√			
C12	C12_34_1603em2	16	25.2	4	A	2268451.42	6966384.64	20-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	aircraft flare								√	9	2	0.25			√			
C12	C12_40_1603em2	15	20.24	4	A	2268472.42	6966388.24	20-Jun-06	Jim Thoren																			no contact, reacquired 8/1/06											
C12	C12_46_1603em2	13	15.54	4	B	2268518.23	6966376.66	20-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	aluminum scrap		√	9	4	0.5			√			
C12	C12_51_1603em2	16	13.58	4	A	2268502.39	6966386.39	20-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	aluminum can		√	6	4	0.25			√			
C12	C12_61_1603em2	14	11.09	4	A	2268418.44	6966379.07	20-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	aluminum scrap		√	3	1	0.25			√			
C12	C12_77_1603em2	13	8.76	4	B	2268474.65	6966342.8	20-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	aluminum scrap		√	6	2	0.25			√			
C12	C12_81_1603em2	14	8.22	4	A	2268470.62	6966367.8	20-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	aluminum fuze scrap								√	3		0.25			√			
C12	C12_85_1603em2	14	7.88	4	A	2268433.02	6966435.08	20-Jun-06	Alan Merriman	√													√	CIV	3	1	1	hair pin		√	3					√			
C12	C12_93_1603em2	14	7.35	4	A	2268447.85	6966366.3	20-Jun-06	Alan Merriman	√							√	ORD MD	6	4	0.25	m407a1 40mm body								√	6	4	0.25			√			
C12	C12_96_1603em2	14	7.12	4	A	2268439.37	6966360.11	20-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25			√	3	2	0.25			√			
C13	C13_106_1603em2	14	5.77	4	A	2268551.26	6966367.77	28-Jun-06	Alan Merriman	√							√	ED MD	6	1	0.25	40mm cart							AL	√	3	1	1	NE-SW	45	√			
C13	C13_107_1603em2	13	5.72	4	B	2268551.55	6966430.91	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							FE	√	3	1	0.25	N-S	0	√			
C13	C13_117_1603em2	14	4.98	4	A	2268598.51	6966349.74	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze piece							FE	√	3	1	1	NE-SW	45	√			
C13	C13_122_1603em2	14	4.74	4	A	2268548.83	6966389.84	28-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	soda can	AL	√	6	0.5	0.25	N-S	45	√			
C13	C13_131_1603em2	13	4.24	4	B	2268523.9	6966385.4	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							FE	√	3	2	0.5	N-S	0	√			
C13	C13_39_1603em2	13	21.44	4	B	2268526.38	6966379.11	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.5	hosreshoe	FE	√	6	6	0.25	N-S	0	√			
C13	C13_54_1603em2	15	13.05	4	A	2268567.02	6966356.15	28-Jun-06	Alan Merriman	√													√	MIL	6	1	0.25	piece of alum	AL	√	3	1	1	NE-SW	45	√			
C13	C13_59_1603em2	15	11.24	4	A	2268560.28	6966383.21	28-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	soda can	AL	√	6	0.5	0.25	NE-SW	90	√			
C13	C13_62_1603em2	15	10.87	4	A	2268556.3	6966342.02	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm casing							AL	√	3	0.5	0.25	NE-SW	45	√			
C13	C13_64_1603em2	14	10.27	4	A	2268610.92	6966343.09	28-Jun-06	Alan Merriman	√													√	CIV	3			hinge/door	FE	√	3	0.5	0.25	N-S	0	√			
C13	C13_66_1603em2	13	10.05	4	B	2268520.3	6966415.06	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							FE	√	6	2	0.25	N-S	0	√			
C13	C13_67_1603em2	15	9.92	4	A	2268548.87	6966399.11	28-Jun-06	Alan Merriman	√													√	MIL	0	1	0.25	flat piece of metal		√	6	4	0.25	N-S	0	√			
C13	C13_70_1603em2	16	9.21	4	A	2268572.32	6966430.52	28-Jun-06	Alan Merriman	√													√	MIL	6	1	0.25	aircraft part/aluminum	AL	√	6	0.5	0.5	E-W	90	√			
C13	C13_71_1603em2	11	9.2	4	B	2268618.01	6966348.45	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	aluminum can	AL	√	6	4	0.25	N-S	0	√			
C13	C13_79_1603em2	14	8.39	4	A	2268583.78	6966360.18	28-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	vt fuze antenna							FE	√	6	0.5	0.5	E-W	90	√			
C13	C13_87_1603em2	13	7.63	4	B	2268528.34	6966376.06	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	horseshoe	FE	√	6	6	0.25	N-S	0	√			
C13	C13_95_1603em2	14	7.24	4	A	2268609.54	6966417.39	28-Jun-06	Alan Merriman	√													√	MIL	0	1	0.25	flat piece of steel	FE	√	6	2	0.5	NE-SW	0	√			
C14	C14_100_1603em2	15	6.46	4	A	2268657.87	6966371.26	22-Jun-06	Alan Merriman	√													√	CIV	0	1	0.75	hot wire post		√	> 24	0.5	0.5	N-S	0	√			
C14	C14_104_1603em2	13	5.95	4	B	2268653.02	6966359.93	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	aluminum scrap		√	3	0.5	0.25			√			
C14	C14_11_1603em2	15	133.19	4	A	2268716	6966361.33	22-Jun-06	Alan Merriman	√													√	CIV	0	1	1	hot wire post		√	> 24	0.5	0.5			√			
C14	C14_119_1603em2	13	4.86	4	B	2268698.96	6966387.76	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m407a1 ogive								√	3	1	0.25			√			
C14	C14_127_1603em2	12	4.57	4	B	2268707.2	6966347.39	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	hot wire post bracket		√	> 24	0.5	0.5	N-S	0	√			
C14	C14_143_1603em2	12	3.76	4	B	2268630.6	6966366.1	22-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50 cal ap/9mm bullet								√	3	0.5	0.25			√			
C14	C14_146_1603em2	12	3.72	4	B	2268647.73	6966348.65	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m407a1 ogive								√	3	1	0.5	N-S	0	√			
C14	C14_152_1603em2	11	3.5	3	B	2268624.41	6966346.88	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	scrap metal/ fuze parts								√	3	1	0.25			√			
C14	C14_161_1603em2	11	3.12	3	B	2268639.56	6966342.35	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	steel scrap ac parts		√	3	1	0.25			√			
C14	C14_163_1603em2	12	3.04	3	B	2268696.39	6966337.91	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	t-post bracket		√	> 24	0.5	0.5	NE-SW	45	√			
C14	C14_44_1603em2	15	16.84	4	A	2268661.77	6966365.08	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	hot wire post bracket		√	> 24	0.5	0.5	N-S	0	√			
C14	C14_57_1603em2	13	12.16	4	B	2268701.35	6966350.31	22-Jun-06	Alan Merriman	√													√	MIL	3	2	0.25	scrap metal/ ac parts		√	3	1	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
C14	C14_7_1603em2	15	185.03	4	A	2268659.91	6966367.98	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	hot wire post		√	> 24	0.5	0.5	N-S	0	√			
C14	C14_75_1603em2	15	8.83	4	A	2268660.3	6966420.66	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	aluminum scrap/ac parts		√	3	1	0.25			√			
C14	C14_8_1603em2	15	180.33	4	A	2268717.42	6966358.05	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	hot wire post bracket		√	> 24	0.5	0.5	N-S	0	√			
C14	C14_88_1603em2	13	7.63	4	B	2268691.93	6966341.22	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m166 fuze bar								√	3	1	0.25	N-S	0	√			
C14	C14_98_1603em2	14	6.74	4	A	2268709.81	6966336.72	22-Jun-06	Alan Merriman	√							√	ORD MD	3	2	2	m166 fuze bar, 20mm expended								√	3	1	0.25	N-S	0	√			
C15	C15_114_1603em2	12	5.28	4	B	2268747.24	6966350.76	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	steel pin	FE	√	3	1	0.5	N-S	0	√			
C15	C15_116_1603em2	13	5.05	4	B	2268738.34	6966350.43	06-Jul-06	Alan Merriman	√													√	CIV	24	1	0.5	scrap metal	FE	√	6	4	0.25	N-S	0	√			
C15	C15_19_1603em2	11	82.65	4	B	2268731.51	6966367.72	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	hotwire post	FE	√	> 24	0.5	0.25	N-S	0	√			
C15	C15_196_1603em2	13	2.3	2	B	2268727.99	6966372.9	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	hotwire post	FE	√	> 24	0.5	0.25	N-S	0	√			
C15	C15_25_1614em2	9	5.53	4	C	2268772.38	6966336.89	11-Jul-06	Jim Thoren																			no contact											
C15	C15_37_1603em2	10	21.84	4	C	2268724.93	6966357.86	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	bracket	FE	√	6	4	0.5	N-S	0	√			
C15	C15_4_1603em2	15	226.58	4	A	2268728.45	6966369.2	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	hotwire post	FE	√	> 24	0.5	0.25	E-W	0	√			
C15	C15_45_1603em2	11	16.5	4	B	2268731.3	6966371.04	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	hotwire post	FE	√	> 24	0.5	0.25	N-S	0	√			
C15	C15_90_1603em2	14	7.51	4	A	2268754.3	6966337.53	06-Jul-06	Alan Merriman	√							√	ORD MD	24	1	0.5	vt fuze antenna							FE	√	3	0.5	0.5	NE-SW	45	√			
D04	D04_33_1528em2	16	32.54	4	A	2267680.9	6966261.33	06-Jun-06	Alan Merriman	√							√	ED MD	3	1	2	unknown fuze								√	3	4	4	E-W	0	√			
D04	D04_91_1528em2	9	2.21	2	C	2267708.09	6966268.59	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	length of wire		√	9	0.5	0.25	N-S	0	√			
D05	D05_11_1530em2	16	13.55	4	A	2267801.02	6966311.61	06-Jun-06	Alan Merriman	√							√	ORD MD	3	3	1	fuze, pd nose								√	3	4	4		45	√			
D05	D05_2_1530em2	16	129.98	4	A	2267790.16	6966277.82	06-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	wire pieces	FE	√	6	0.5	0.25	N-S	0				
D05	D05_20_1530em2	14	6.19	4	A	2267797.63	6966288.1	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	9	0.5	0.25	N-S	45	√			
D05	D05_26_1530em2	12	4.52	4	B	2267815.81	6966258.05	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag, 37mm piece (HE)								√	3	1	0.5	NE-SW	0	√			
D05	D05_30_1530em2	13	3.46	3	B	2267735.81	6966289.3	06-Jun-06	Alan Merriman	√							√	ORD MD	6	1	2	unknown								√	6	4	4	E-W	45	√			
D05	D05_5_1530em2	16	73.33	4	A	2267739.38	6966289.88	06-Jun-06	Alan Merriman	√													√	CIV	6	1	1	wire			12	0.5	0.25	N-S	0	√			
D05	D05_6_1530em2	15	72.07	4	A	2267730.02	6966248.81	06-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	flare, slap								√	6	2	0.5	E-W	0	√			
D05	QAdig_D05_152		15.3		QA	2267773.57	6966246.26	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25			√			
D06	D06_10_1531em2	15	32.08	4	A	2267874.29	6966237.38	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1			√	6	6	0.25	N-S	0	√			
D06	D06_11_1530em2	13	17.32	4	B	2267846.66	6966237.48	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	12	0.5	0.25	N-S	45	√			
D06	D06_118_1531em2	10	2.21	2	C	2267859.7	6966265.4	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	barb wire		√	9	0.5	0.25	E-W	0	√			
D06	D06_119_1531em2	9	2.18	2	C	2267859.51	6966322.38	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence clip		√	6	0.5	0.25	E-W	90	√			
D06	D06_124_1531em2	9	2.05	2	C	2267869.45	6966318.14	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	metal banding		√	6	0.5	0.25	N-S	0	√			
D06	D06_13_1531em2	12	27.79	4	B	2267904.1	6966239.39	06-Jun-06	Alan Merriman	√													√	CIV	6	1	2	rebar		√	> 24	0.5	0.5	E-W	0	√			
D06	D06_15_1531em2	13	25.44	4	B	2267906.74	6966254.23	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	12	0.5	0.5	N-S	0	√			
D06	D06_17_1531em2	14	24.11	4	A	2267908.18	6966250.73	06-Jun-06	Alan Merriman	√													√	CIV	12	1	2	stake		√	12	1	1	N-S	0	√			
D06	D06_20_1531em2	10	16.66	4	C	2267912.74	6966246.86	19-Jun-06	Alan Merriman	√													√	CIV	24	2	0.25	rebar pieces	FE	√	12	0.5	0.5	NE-SW	45	√			
D06	D06_25_1531em2	12	12.79	4	B	2267917.56	6966259.51	06-Jun-06	Alan Merriman	√													√	CIV	12	1	1	rebar		√	9	0.5	0.5	N-S	0	√			
D06	D06_27_1531em2	9	12.2	4	C	2267916.05	6966246.85	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	rebar		√	9	0.5	0.5	N-S	0	√			
D06	D06_29_1531em2	12	11.45	4	B	2267918.19	6966264.01	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	6	0.5	0.25	E-W	0	√			
D06	D06_35_1531em2	13	9.27	4	B	2267867.38	6966262.23	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	12	0.5	0.25	E-W	0	√			
D06	D06_4_1530em2	15	97.13	4	A	2267833.41	6966261.17	06-Jun-06	Alan Merriman	√													√	CIV	3	1	2	rebar		√	> 24	0.5	0.5	E-W	0	√			
D06	D06_41_1531em2	13	7.82	4	B	2267862.91	6966263.75	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	12	0.5	0.25	N-S	0	√			
D06	D06_42_1531em2	12	7.68	4	B	2267908.36	6966258.3	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	12	0.5	0.5	N-S	0	√			
D06	D06_44_1531em2	14	6.91	4	A	2267875.7	6966254.6	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	9	0.5	0.25	NE-SW	45	√			
D06	D06_5_1530em2	13	81.24	4	B	2267836.94	6966260.87	06-Jun-06	Alan Merriman	√													√	CIV	3	1	2	rebar		√	> 24	0.5	0.5	E-W	0	√			
D06	D06_50_1530em2	13	3.68	4	B	2267849.16	6966247.8	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	3	1	0.25		0	√			
D06	D06_50_1531em2	13	6.01	4	B	2267860.26	6966252.12	06-Jun-06	Alan Merriman	√													√	CIV	6	1	1	Banding		√	3	0.5	0.25	E-W	45	√			
D06	D06_54_1531em2	9	5.63	4	C	2267909.88	6966239.05	19-Jun-06	Alan Merriman	√													√	CIV	12	1	2	rebar		√	9	0.5	0.5	N-S	0	√			
D06	D06_55_1531em2	7	5.58	4	D	2267901.59	6966242.19	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail, nail	FE	√	3	0.5	0.25	N-S	45	√			
D06	D06_59_1531em2	11	4.84	4	B	2267868.75	6966321.42	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	6	0.5	0.25		0	√			
D06	D06_63_1531em2	14	4.56	4	A	2267879.46	6966329.75	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	6	0.5	0.25	N-S	0	√			
D06	D06_66_1530em2	10	2.87	3	C	2267833.91	6966243.84	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence clip		√	6	0.5	0.25	NE-SW	45	√			
D06	D06_66_1531em2	9	4.4	4	C	2267914.1	6966250.47	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	37mm piece								√	6	0.5	0.5	NE-SW	45	√			
D06	D06_76_1531em2	13	3.57	3	B	2267873.41	6966241.7	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	6	6	0.25	N-S	0	√			
D06	D06_8_1531em2	14	73.51	4	A	2267908.2	6966246.54	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	12	0.5	0.5		90	√			
D06	D06_84_1531em2	12	3.17	3	B	2267859.55	6966277.17	06-Jun-06	Alan Merriman	√													√	CIV	0	2	1	wire		√	6	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
D06	D06_85_1531em2	10	3.13	3	C	2267864.27	6966271.84	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	metal barb (small)		√	3	0.5	0.25	NE-SW	0	√			
D06	D06_89_1531em2	11	3.06	3	B	2267889.35	6966242.71	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	6	0.5	0.25	N-S	45	√			
D06	D06_9_1530em2	12	21.14	4	B	2267850.03	6966236.84	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	9	0.5	0.25	NE-SW	45	√			
D06	D06_9_1531em2	12	44.11	4	B	2267916.13	6966242.04	06-Jun-06	Alan Merriman	√													√	CIV	12	1	1	rebar		√	9	0.5	0.25	N-S	0	√			
D07	D07_34_1531em2	12	9.39	4	B	2267920.43	6966248.34	12-Jun-06	Jim Thoren	√													√	CIV	12	1	1	rebar								√			
D07	D07_49_1531em2	13	6.31	4	B	2268006.31	6966278.65	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
D07	D07_57_1531em2	13	5.21	4	B	2267944.28	6966331.25	12-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
D07	D07_97_1531em2	11	2.73	3	B	2268004.27	6966285.46	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
D08	D08_14_1531em2	16	25.77	4	A	2268029.19	6966329.79	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
D08	D08_23_1531em2	15	15.36	4	A	2268106.36	6966277.93	12-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	flare														√			
D08	D08_38_1531em2	16	7.9	4	A	2268090.8	6966323.17	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
D08	D08_43_1531em2	16	7.16	4	A	2268038.13	6966259.57	12-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
D08	D08_46_1531em2	12	6.61	4	B	2268089.41	6966282.7	12-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	20mm projo														√			
D08	D08_69_1531em2	15	4.2	4	A	2268028.45	6966326.31	12-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	frag														√			
D08	D08_94_1531em2	12	2.88	3	B	2268097.24	6966295.34	12-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
D09	D09_113_1601em2	13	5.85	4	B	2268167.87	6966320.41	13-Jun-06	Alan Merriman	√													√	CIV	0	5	1	fence clips		√	3	0.5	0.25	E-W	45	√			
D09	D09_115_1601em2	14	5.66	4	A	2268163.73	6966270.23	13-Jun-06	Alan Merriman	√													√	CIV	0	3	1	chain link pieces		√	3	0.5	0.25	E-W	90	√			
D09	D09_117_1601em2	13	5.55	4	B	2268159.34	6966301.91	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	metal piece		√	3	0.5	0.25	E-W	0	√			
D09	D09_118_1601em2	12	5.41	4	B	2268180.74	6966275.7	13-Jun-06	Alan Merriman	√													√	MIL	6	1	1	piece of metal		√	12	0.5	0.25	NE-SW	45	√			
D09	D09_128_1601em2	10	4.9	4	C	2268166.62	6966301.9	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
D09	D09_145_1601em2	13	4.25	4	B	2268170.05	6966295.38	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	20mm ctg								√	6	2	2	E-W	45	√			
D09	D09_153_1601em2	13	3.95	4	B	2268203.79	6966317.84	13-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	50 cal round/full up									6	1	1	NE-SW	45	√			
D09	D09_154_1601em2	13	3.91	4	B	2268164.28	6966280.52	13-Jun-06	Alan Merriman	√													√	CIV	3	5	1	fence clips		√	3	0.5	0.25	E-W	45	√			
D09	D09_155_1601em2	12	3.91	4	B	2268162.91	6966261.63	13-Jun-06	Alan Merriman	√													√	MIL	6	1	1	piece of metal (same as 44)		√	9	0.5	0.25	NE-SW	45	√			
D09	D09_156_1601em2	13	3.88	4	B	2268161.77	6966251.86	13-Jun-06	Alan Merriman	√													√	CIV	0	1	1			√	3	0.5	0.25	E-W	45	√			
D09	D09_159_1601em2	12	3.75	4	B	2268166.62	6966283.56	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	small piece of metal		√	3	0.5	0.25	N-S	0	√			
D09	D09_162_1601em2	13	3.68	4	B	2268150.86	6966283.27	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	metal nose cone								√	6	1	1	NE-SW	45	√			
D09	D09_171_1601em2	11	3.32	3	B	2268172.08	6966277.69	13-Jun-06	Alan Merriman	√													√	MIL	6	1	1	piece of metal		√	3	0.5	0.25	NE-SW	90	√			
D09	D09_187_1601em2	11	3	3	B	2268160.78	6966238.55	13-Jun-06	Alan Merriman	√													√	CIV	3	2	1	metal pieces		√	3	0.5	0.25	NE-SW	45	√			
D09	D09_196_1601em2	12	2.74	3	B	2268153.48	6966323.06	13-Jun-06	Alan Merriman	√													√	CIV	12	1	1	aluminum can		√	6	0.5	0.5	E-W	90	√			
D09	D09_28_1601em2	14	39.46	4	A	2268132.38	6966324.35	13-Jun-06	Alan Merriman	√													√	CIV	3	2	1	mule shoe, metal		√	9	1	0.5	E-W	0	√			
D09	D09_44_1601em2	14	23.15	4	A	2268161.27	6966258.52	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	piece of metal		√	9	0.5	0.25	N-S	0	√			
D09	D09_60_1601em2	16	16.05	4	A	2268211.89	6966284.01	13-Jun-06	Alan Merriman	√													√	MIL	6	1	1	chunk of metal		√	6	0.5	0.25	NE-SW	45	√			
D09	D09_69_1601em2	13	13.23	4	B	2268206.73	6966313.47	13-Jun-06	Alan Merriman	√													√	CIV	6	1	1	aluminum		√	3	0.5	0.5	N-S	0	√			
D09	D09_77_1601em2	15	11.48	4	A	2268146.67	6966253.15	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	flare ctg								√	6	1	1	NE-SW	45	√			
D09	D09_96_1601em2	14	7.3	4	A	2268211.43	6966280.58	13-Jun-06	Alan Merriman	√													√	CIV	6	1	1	aluminum can		√	3	0.5	0.25	N-S	0	√			
D10	D10_107_1601em2	14	6.43	4	A	2268315.19	6966251.96	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm 407a1								√	3	1	1		45	√			
D10	D10_114_1601em2	13	5.82	4	B	2268294.29	6966249.98	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm frag sleeve								√	3	2	1	N-S	0	√			
D10	D10_116_1601em2	13	5.61	4	B	2268219.38	6966265.39	13-Jun-06	Alan Merriman	√													√	CIV	3	2	1	bolt scrap		√	3	1	1	NE-SW	45	√			
D10	D10_119_1601em2	14	5.33	4	A	2268315.21	6966322.89	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm m407a1								√	3	2	2	E-W	90	√			
D10	D10_122_1601em2	12	5.03	4	B	2268304.49	6966249.91	13-Jun-06	Alan Merriman	√							√	ORD MD	3	2	1	40mm m407a1								√	3	2	1		0	√			
D10	D10_123_1601em2	14	5	4	A	2268228.67	6966290.59	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fuze parts								√	3	2	2	N-S	0	√			
D10	D10_127_1601em2	14	4.93	4	A	2268317.94	6966261.69	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	2	0.5	N-S	0	√			
D10	D10_130_1601em2	13	4.81	4	B	2268285.65	6966272.96	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm m407a1								√	3	2	1		0	√			
D10	D10_137_1601em2	13	4.5	4	B	2268269.78	6966293.83	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	6	4	0.25	N-S	45	√			
D10	D10_161_1601em2	13	3.68	4	B	2268285.8	6966285.43	13-Jun-06	Alan Merriman	√							√	ORD MD				40mm m407a1 ojive								√	3	2	1		0	√			
D10	D10_175_1601em2	11	3.19	3	B	2268226.38	6966318.55	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap		√	3	2	0.25	NE-SW	45	√			
D10	D10_182_1601em2	11	3.07	3	B	2268315.98	6966267.05	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	aircraft scrap		√	3	2	1			√			
D10	D10_200_1601em2	12	2.67	3	B	2268278.58	6966297.52	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	0.5	0.5	E-W	45	√			
D10	D10_38_1601em2	14	25.95	4	A	2268298.09	6966304.94	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	6	2	2	E-W	90	√			
D10	D10_48_1601em2	16	20.11	4	A	2268228.7	6966301.72	13-Jun-06	Alan Merriman	√													√	MIL	6	1	1	scrap		√	3	1	1			√			
D10	D10_61_1601em2	16	15.28	4	A	2268236.24	6966261.7	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fuze parts								√	3	1	1	E-W	0	√			
D10	D10_66_1601em2	14	13.86	4	A	2268299.66	6966286.48	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm 407a1 body								√	3	2	2	E-W	90	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
D10	D10_70_1601em2	13	12.72	4	B	2268305.62	6966305.07	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m407a1 ogive								√	3	2	0.25			√			
D10	D10_76_1601em2	15	11.5	4	A	2268299.09	6966258.12	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm m407a1								√	3	1	1	N-S	0	√			
D10	D10_78_1601em2	14	11.28	4	A	2268313.4	6966300.66	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	coors light can		√	6	2	2	N-S	0	√			
D10	D10_80_1601em2	13	10.74	4	B	2268299.83	6966300.59	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm m407a1 body								√	3	2	2	E-W	90	√			
D10	D10_85_1601em2	14	9.19	4	A	2268313.22	6966310.12	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm m407a1 body								√	3	2	2	N-S	0	√			
D10	D10_86_1601em2	12	8.6	4	B	2268317.83	6966242.3	13-Jun-06	Alan Merriman	√							√	ORD MD				40mm m407a1 practice ctg								√	3	1	1		90	√			
D10	D10_87_1601em2	13	8.57	4	B	2268268.36	6966297.04	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm m407a1 sleeve								√	3	1	1	N-S	90	√			
D10	D10_91_1601em2	13	7.65	4	B	2268292.69	6966289.09	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm m407a1 ctg								√	3	2	2	N-S	0	√			
D11	D11_110_1602em2	15	6.93	4	A	2268372.69	6966297.78	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m407a1 body								√	3	2	0.25	N-S	45	√			
D11	D11_111_1602em2	14	6.78	4	A	2268403.84	6966252.88	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	rocket scrap								√	3	2	2			√			
D11	D11_112_1602em2	14	6.77	4	A	2268356.9	6966274.44	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m407a1 body								√	3	2	0.25	NE-SW	0	√			
D11	D11_117_1602em2	13	6.37	4	B	2268331.96	6966261.73	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m407a1 fuze internal parts								√	3	0.5	0.25			√			
D11	D11_121_1602em2	13	6.16	4	B	2268343.31	6966291.67	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	van, fuze, vt, m166								√	3	1	0.5	NE-SW	45	√			
D11	D11_128_1602em2	13	5.64	4	B	2268319.02	6966262.1	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	2	0.5	N-S	0	√			
D11	D11_130_1602em2	13	5.55	4	B	2268362.26	6966280.03	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m407a1 body								√	3	2	0.5	E-W	90	√			
D11	D11_137_1602em2	12	5.26	4	B	2268344.91	6966295.56	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	military		√	3	6	0.25	NE-SW	45	√			
D11	D11_141_1602em2	12	4.98	4	B	2268327.15	6966261.4	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap		√	3	2	1	N-S	0	√			
D11	D11_144_1602em2	12	4.82	4	B	2268402.56	6966312.37	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap		√	3	2	2			√			
D11	D11_161_1602em2	12	4.14	4	B	2268405.1	6966316.04	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap		√	3	2	2			√			
D11	D11_166_1602em2	12	4.01	4	B	2268374.28	6966251.99	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m407a1 ogive								√	3	2	1	N-S	0	√			
D11	D11_175_1602em2	12	3.79	4	B	2268392.73	6966295.32	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap metal		√	6	2	0.25	NE-SW	45	√			
D11	D11_179_1602em2	12	3.75	4	B	2268374.61	6966238.14	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	bolt		√	3	1	1	E-W	0	√			
D11	D11_200_1602em2	11	3.24	3	B	2268331.65	6966317.21	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	rocket motor scrap								√	6	2	0.25	NE-SW	0	√			
D11	D11_203_1602em2	11	3.22	3	B	2268367.71	6966335.91	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fuze bar m166								√	6	2	0.5	E-W	45	√			
D11	D11_212_1602em2	11	3.08	3	B	2268340.12	6966292.81	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fuze parts								√	3	1	0.5	NE-SW	45	√			
D11	D11_22_1602em2	15	26.74	4	A	2268393.32	6966261.35	13-Jun-06	Alan Merriman	√													√	MIL	6	1	1	aircraft scrap		√	3	4	0.5	N-S	0	√			
D11	D11_239_1602em2	11	2.5	3	B	2268398.8	6966309.18	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap metal		√	6	2	0.25	SE-NW	45	√			
D11	D11_24_1602em2	15	25.95	4	A	2268366.52	6966280.34	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	3.5" fuze								√	3	2	1	NE-SW	45	√			
D11	D11_33_1602em2	13	19.24	4	B	2268383.78	6966248.8	13-Jun-06	Alan Merriman	√													√	CIV	3	1	1	handle		√	9	1	1	N-S	0	√			
D11	D11_35_1602em2	16	18.44	4	A	2268340.34	6966281.05	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m407a1 body, fuze parts								√	3	2	2	N-S	0	√			
D11	D11_37_1602em2	13	17.97	4	B	2268408.89	6966237	13-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap metal		√	9	4	1	N-S	0	√			
D11	D11_40_1602em2	15	16.15	4	A	2268358.39	6966292.77	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fuze parts								√	3	2	0.25	NE-SW	0	√			
D11	D11_60_1602em2	14	12.49	4	A	2268378.37	6966272.7	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m407a1 body								√	3	2	0.25	E-W	90	√			
D11	D11_72_1602em2	15	11.1	4	A	2268334.31	6966331.07	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m407a1 body								√	3	2	0.25	N-S	0	√			
D11	D11_93_1602em2	16	9.13	4	A	2268318.71	6966241.29	13-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm m407a1 practice								√	3	1	1		90	√			
D12	D12_102_1321em2	16	13.84	4	A	2268475.62	6966273.73	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap steel		√	12	4	0.25			√			
D12	D12_103_1321em2	16	13.78	4	A	2268433.9	6966320.27	20-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	aluminum can		√	6	4	0.25			√			
D12	D12_126_1321em2	12	10.86	4	B	2268490.09	6966239.22	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap, steel		√	6	2	0.25			√			
D12	D12_143_1321em2	11	9.6	4	B	2268496.06	6966237.96	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze antenna								√	6	1	1			√			
D12	D12_146_1321em2	14	9.47	4	A	2268493.37	6966317.15	20-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.5	fuze bracket								√	6	2	0.25			√			
D12	D12_166_1321em2	13	7.99	4	B	2268515.06	6966310.12	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	m407a1 40mm body								√	6	4	0.25			√			
D12	D12_188_1321em2	13	6.93	4	B	2268506.81	6966268.98	20-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	aluminum can, fuze body								√	6	4	0.25			√			
D12	D12_20_1321em2	16	78.05	4	A	2268430.96	6966316.35	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	4	vt fuze well								√	6	6	0.25			√			
D12	D12_211_1321em2	13	6.12	4	B	2268457.35	6966312.96	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap, steel		√	6	4	0.25			√			
D12	D12_221_1321em2	13	5.75	4	B	2268481.02	6966246.13	20-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap, steel		√	3	1	1			√			
D12	D12_224_1321em2	13	5.67	4	B	2268461.74	6966263.63	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part								√	3	0.5	0.25			√			
D12	D12_227_1321em2	12	5.58	4	B	2268452.95	6966310.91	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.5	aluminum can		√	6	4	0.25			√			
D12	D12_254_1321em2	13	4.76	4	B	2268452.7	6966302.27	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	3	1	1			√			
D12	D12_281_1321em2	11	4.06	4	B	2268466.89	6966249.48	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel		√	6	1	0.25			√			
D12	D12_302_1321em2	11	3.6	3	B	2268491.4	6966310.2	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, aluminum		√	6	2	0.25			√			
D12	D12_327_1321em2	11	3.32	3	B	2268503.71	6966326.46	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	0.5	0.25			√			
D12	D12_328_1321em2	11	3.31	3	B	2268447.52	6966241.39	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	1	0.25			√			
D12	D12_333_1321em2	11	3.27	3	B	2268437.94	6966293.12	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	0.5	0.25						

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																		
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
D12	D12_405_1321em2	11	2.56	3	B	2268502.62	6966276.86	20-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.5	fuze bracket								√	6	2	0.25			√			
D12	D12_45_1321em2	16	30	4	A	2268429.67	6966287	20-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	frag								√	12	4	0.25			√			
D12	D12_47_1321em2	15	28.53	4	A	2268512.43	6966320	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap, steel		√	12	4	0.25			√			
D12	D12_78_1321em2	13	18.08	4	B	2268472.51	6966331.63	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part								√	3	2	0.25			√			
D12	D12_97_1321em2	16	14.81	4	A	2268499.3	6966264.42	20-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.5	vt, fuze bracket								√	6	2	0.25			√			
D13	D13_1_1603em2	16	644.49	4	A	2268587.58	6966237.39	28-Jun-06	Alan Merriman	√							√	ORD MD	0	1	2	ammo can lid/50 cal mz							FE	√	6	> 6	1	NE-SW	45	√			
D13	D13_102_1603em2	13	6.17	4	B	2268611.98	6966291.93	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	1	0.25			√			
D13	D13_103_1603em2	13	5.96	4	B	2268522.13	6966288.23	07-Jul-06	Jim Thoren	√							√	ORD MD	12	1	0.25	fuze bracket							FE	√	6	4	0.25			√			
D13	D13_110_1603em2	11	5.56	4	B	2268548.38	6966241.34	07-Jul-06	Jim Thoren																			No Contact											
D13	D13_111_1603em2	15	5.47	4	A	2268541.07	6966336.15	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25		FE	√	3	2	0.5	N-S	45	√			
D13	D13_112_1603em2	11	5.45	4	B	2268553.16	6966309.71	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							FE	√	3	4	0.25			√			
D13	D13_120_1603em2	12	4.85	4	B	2268544.58	6966302.55	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	scrap							FE	√	3	2	0.25			√			
D13	D13_123_1603em2	13	4.64	4	B	2268590.76	6966282.45	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	2	0.25			√			
D13	D13_129_1603em2	11	4.35	4	B	2268606.85	6966237.64	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bracket	AL	√	3	2	0.25			√			
D13	D13_132_1603em2	13	4.23	4	B	2268583.19	6966255.89	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25		AL	√	3	1	1			√			
D13	D13_133_1603em2	13	4.22	4	B	2268554.3	6966243.02	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	1	0.25			√			
D13	D13_135_1603em2	13	4.15	4	B	2268590.76	6966299.7	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	can	AL	√	6	4	0.25			√			
D13	D13_137_1603em2	10	4.08	4	C	2268526.32	6966261.59	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	aluminum scrap							AL	√	3	4	0.25	N-S	0	√			
D13	D13_138_1603em2	11	3.91	4	B	2268522.77	6966293.03	07-Jul-06	Jim Thoren	√													√	MIL	6	1	0.25	scrap	AL	√	3	0.5	0.5			√			
D13	D13_141_1603em2	13	3.82	4	B	2268606.47	6966310.11	07-Jul-06	Jim Thoren																			No Contact											
D13	D13_148_1603em2	12	3.66	4	B	2268545.56	6966319.91	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	can	AL	√	6	2	0.25			√			
D13	D13_154_1603em2	11	3.44	3	B	2268599.78	6966320.05	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze bracket							FE	√	3	1	0.25			√			
D13	D13_155_1603em2	11	3.4	3	B	2268618.27	6966333.83	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	can	AL	√	6	4	0.25			√			
D13	D13_173_1603em2	11	2.79	3	B	2268580.67	6966293.17	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	AL	√	3	1	0.25			√			
D13	D13_176_1603em2	11	2.7	3	B	2268562.46	6966246.73	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 PROJO							CU	√	3	0.5	0.25			√			
D13	D13_2_1603em2	13	306.93	4	B	2268606.29	6966242.01	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	rod	FE	√	> 24	0.5	0.25			√			
D13	D13_24_1603em2	13	64.45	4	B	2268592.3	6966245.16	07-Jul-06	Jim Thoren	√							√	ORD MD	6	1	1	fragment							FE	√	12	4	0.5			√			
D13	D13_25_1603em2	15	62.17	4	A	2268548.77	6966236.95	28-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire handle	FE	√	12	0.5	0.5	N-S	0	√			
D13	D13_30_1603em2	14	35.93	4	A	2268618.3	6966307.12	28-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	mk166 fuze part							FE	√	6	2	0.25	N-S	45	√			
D13	D13_35_1603em2	14	23.94	4	A	2268589.24	6966275.44	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part							FE	√	6	2	0.5	N-S	45	√			
D13	D13_38_1603em2	15	21.67	4	A	2268567.48	6966326.09	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part							FE	√	6	4	0.5	N-S	45	√			
D13	D13_41_1603em2	14	20.14	4	A	2268583.9	6966252.34	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	mk166 fuze part							FE	√	6	2	1	N-S	0	√			
D13	D13_42_1603em2	12	18.49	4	B	2268616.46	6966288.9	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	2	0.25			√			
D13	D13_43_1603em2	12	17.52	4	B	2268616.12	6966239.66	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	2	0.25			√			
D13	D13_47_1603em2	10	15.14	4	C	2268591.28	6966307.2	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	steel handle	FE	√	6	0.5	0.25	N-S	0	√			
D13	D13_48_1603em2	14	14.93	4	A	2268561.7	6966272.45	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part/strap							FE	√	6	2	0.5	N-S	0	√			
D13	D13_49_1603em2	15	14.26	4	A	2268550.05	6966330.76	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	scrap/frag							AL	√	3	1	0.5	N-S	45	√			
D13	D13_50_1603em2	14	13.74	4	A	2268588.95	6966295.02	28-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze part							FE	√	3	2	1	N-S	45	√			
D13	D13_52_1603em2	13	13.43	4	B	2268587.48	6966305.35	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	40 mm body							AL	√	3	2	0.25			√			
D13	D13_53_1603em2	14	13.38	4	A	2268607.23	6966306.86	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	mk166 fuze strap							FE	√	3	2	0.5	N-S	0	√			
D13	D13_60_1603em2	14	11.11	4	A	2268586.59	6966264.62	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	bdu-33 frag/steel							FE	√	6	4	1	N-S	0	√			
D13	D13_68_1603em2	13	9.52	4	B	2268581.81	6966318.02	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	40 mm cart. Case							AL	√	3	2	0.25			√			
D13	D13_72_1603em2	15	9.05	4	A	2268615.8	6966318.63	28-Jun-06	Alan Merriman	√													√	MIL	0	1	0.5	ac parts/steel	FE	√	3	2	0.5	N-S	0	√			
D13	D13_74_1603em2	10	8.89	4	C	2268585.02	6966273.73	11-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	40mm body							AL	√	3	0.5	0.25	N-S	0	√			
D13	D13_76_1603em2	11	8.79	4	B	2268548.24	6966246.41	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fragment							FE	√	6	1	0.5			√			
D13	D13_78_1603em2	13	8.54	4	B	2268546.54	6966249.22	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	2	0.25			√			
D13	D13_82_1603em2	9	8.17	4	C	2268525.05	6966256.23	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							AL	√	3	0.5	2	N-S	0	√			
D13	D13_83_1603em2	14	8.09	4	A	2268577.35	6966281.29	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	thin cased frag							FE	√	9	4	0.25	NE-SW	0	√			
D13	D13_84_1603em2	13	8.04	4	B	2268613.42	6966243.94	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	2	1			√			
D13	D13_86_1603em2	14	7.8	4	A	2268589.76	6966241.77	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ac parts	AL	√	3	2	0.25	N-S	0	√			
D13	D13_91_1603em2	13	7.47	4	B	2268568.36	6966267.8	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25		AL	√	6	2	0.25			√			
D14	D14_10_1603em2	12	168.64	4	B	2268618.35	6966254.74	22-Jun-06	Alan Merriman	√													√	CIV	0	2	2	hot wire post & post bracket		√	> 24	0.5	0.5	SE-NW	0	√			
D14	D14_105_1603em2	13	5.78	4	B	2268625.99	6966335.25	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ac frag		√	3	2	0.5	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
D14	D14_108_1603em2	12	5.69	4	B	2268688.6	6966288.17	22-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.75	frag bolt								√	3	1	1	N-S	90	√			
D14	D14_109_1603em2	14	5.66	4	A	2268693.46	6966309.63	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.5	frag								√						√			
D14	D14_113_1603em2	13	5.41	4	B	2268636.16	6966321.78	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	fuze component														√			
D14	D14_115_1603em2	15	5.16	4	A	2268643.68	6966306.91	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire, curved		√	6	0.5	0.25	N-S	0	√			
D14	D14_118_1603em2	12	4.95	4	B	2268659.05	6966239.48	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ac frag								√			
D14	D14_12_1603em2	12	105.91	4	B	2268625.16	6966257.83	22-Jun-06	Alan Merriman	√													√	CIV	0	2	2	hot wire post & piece of ac frag		√	> 24	0.5	0.5	NE-SW	0	√			
D14	D14_121_1603em2	12	4.82	4	B	2268626.66	6966320.17	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal								√	3	0.5	0.5	E-W	0	√			
D14	D14_128_1603em2	11	4.39	4	B	2268670.88	6966243.74	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ac frag								√			
D14	D14_13_1603em2	11	104.39	4	B	2268620.52	6966257.91	22-Jun-06	Alan Merriman	√													√	CIV	0	1	2	hot wire post		√	> 24	0.5	0.5	SE-NW	0	√			
D14	D14_136_1603em2	12	4.14	4	B	2268635.88	6966239.7	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	ac frag		√						√			
D14	D14_140_1603em2	11	3.88	4	B	2268649.55	6966290.08	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.5	fence bracket								√			
D14	D14_142_1603em2	12	3.76	4	B	2268627.77	6966296.62	22-Jun-06	Alan Merriman	√													√	MIL	0	1	0.25	ac frag								√			
D14	D14_156_1603em2	11	3.39	3	B	2268712.55	6966247.64	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	steel scrap								√			
D14	D14_157_1603em2	11	3.25	3	B	2268626.48	6966264.94	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.5	fence bracket								√			
D14	D14_159_1603em2	11	3.22	3	B	2268643.31	6966252.84	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ac seat part		√	3	1	1	E-W	0	√			
D14	D14_162_1603em2	11	3.05	3	B	2268668.88	6966311.4	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.5	fence bracket								√			
D14	D14_165_1603em2	11	2.97	3	B	2268710.34	6966259.07	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.5	ac seat part		√	3	1	1	N-S	0	√			
D14	D14_170_1603em2	11	2.82	3	B	2268622.23	6966282.62	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.5	5/8 x 2 carage bolt		√					90	√			
D14	D14_175_1603em2	11	2.72	3	B	2268687.36	6966328.67	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.5	fence bracket		√	3	4	0.25	N-S	90	√			
D14	D14_18_1603em2	12	8.85	4	B	2268684.86	6966285.59	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40 ogive														√			
D14	D14_29_1603em2	16	38.18	4	A	2268627.28	6966327.78	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.75	steel scrap	FE	√	6	4	0.25	NE-SW	0	√			
D14	D14_3_1603em2	15	230.94	4	A	2268639.82	6966277.55	22-Jun-06	Alan Merriman	√													√	CIV	3	2	2	hot wire post brackt spiraled#58		√	> 24	0.5	0.5	NE-SW	0	√			
D14	D14_31_1603em2	15	32.46	4	A	2268657.63	6966297.11	22-Jun-06	Alan Merriman	√													√	CIV	0	2	2	hot wire post bracket #5		√	> 24	0.5	0.5	SE-NW	0	√			
D14	D14_33_1603em2	14	28.42	4	A	2268714.98	6966242.21	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.5	seat party		√						√			
D14	D14_5_1603em2	15	219.49	4	A	2268660.06	6966300.71	22-Jun-06	Alan Merriman	√													√	CIV	0	2	2	hot wire post & bracket		√	> 24	0.5	0.5	SE-NW	0	√			
D14	D14_55_1603em2	13	12.35	4	B	2268663.16	6966289.92	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	166 fuze bar								√	3	1	0.5	NE-SW	0	√			
D14	D14_56_1603em2	13	12.25	4	B	2268643.91	6966270.16	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm body														√			
D14	D14_58_1603em2	14	11.71	4	A	2268639.88	6966280.97	22-Jun-06	Alan Merriman	√													√	CIV	3	2	2	hot wire post & bracket		√	> 24	0.5	0.5	NE-SW	0	√			
D14	D14_6_1603em2	15	213.69	4	A	2268645.61	6966298.93	22-Jun-06	Alan Merriman	√													√	CIV	0	1	2	hot wire post s curve #65		√	> 24	0.5	0.5	N-S	0	√			
D14	D14_65_1603em2	15	10.2	4	A	2268644.35	6966303.54	22-Jun-06	Alan Merriman	√													√	CIV	0	1	2	hot wire post s curved #6		√	> 24	0.5	0.5	N-S	0	√			
D14	D14_69_1603em2	15	9.31	4	A	2268697.97	6966291.29	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.5	ac part								√			
D14	D14_73_1603em2	12	8.99	4	B	2268711.7	6966243.71	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	fuze bar 166								√	3	1	1	E-W	0	√			
D14	D14_89_1603em2	13	7.63	4	B	2268674.63	6966295.65	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	6	1	0.25	E-W	0	√			
D14	D14_9_1603em2	12	178.64	4	B	2268623.56	6966260.75	22-Jun-06	Alan Merriman	√													√	CIV	0	1	2	hot wire post								√			
D14	D14_92_1603em2	14	7.36	4	A	2268705.51	6966312.47	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.75	frag steel								√						√			
D14	D14_94_1603em2	13	7.34	4	B	2268642.95	6966266.7	22-Jun-06	Alan Merriman	√													√	MIL	3	1	1	ac part											
D14	D14_97_1603em2	13	6.87	4	B	2268627.88	6966245.61	22-Jun-06	Alan Merriman	√													√	MIL	3	3	1	seat part ac, bolt, fuze bar		√	3	1	1	E-W	45	√			
D15	D15_120_1604em2	13	7.7	4	B	2268759.79	6966304.8	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	metal pin	FE	√	3	0.5	0.25	N-S	0	√			
D15	D15_13_1604em2	13	126.06	4	B	2268774.67	6966300.58	06-Jul-06	Alan Merriman	√													√	MIL	0	1	0.5	wire	FE	√	> 24	0.5	0.25	N-S	0	√			
D15	D15_133_1604em2	13	6.73	4	B	2268776.45	6966317.89	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.5	metal shim	FE	√	3	1	0.25	E-W	0	√			
D15	D15_143_1604em2	14	6.22	4	A	2268803.54	6966272.25	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze strap, vt							FE	√	3	1	0.25	N-S	0	√			
D15	D15_156_1604em2	13	5.27	4	B	2268765.41	6966274.78	06-Jul-06	Jim Thoren	√													√	CIV	> 24	1	0.25	scrap metal & metal pipe	FE	√	9	4	0.25	N-S	45	√			
D15	D15_183_1604em2	11	3.94	4	B	2268786.1	6966303.56	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	3	0.5	0.5	N-S	0	√			
D15	D15_19_1604em2	14	95.18	4	A	2268795.33	6966262.96	06-Jul-06	Alan Merriman	√													√	CIV	0	1	≥8	bulldozer claw	FE	√	24	> 6	1	N-S	0	√			
D15	D15_2_1604em2	11	1986.37	4	B	2268795.85	6966259.55	06-Jul-06	Alan Merriman	√													√	CIV	0	1	≥8	bulldozer claw	FE	√	24	> 6	1	N-S	0	√			
D15	D15_208_1604em2	11	3.31	3	B	2268794.2	6966311.54	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	metal plug	FE	√	3	1	0.5	N-S	0	√			
D15	D15_21_1604em2	15	84.95	4	A	2268801.96	6966313.75	06-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	flare casing mt							AL	√	6	2	1	N-S	0	√			
D15	D15_3_1604em2	13	799.54	4	B	2268771.41	6966298.88	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	> 24	0.5	0.25	N-S	0	√			
D15	D15_33_1604em2	10	52.3	4	C	2268787.46	6966289.96	11-Jul-06	Jim Thoren	√													√	CIV	> 24	2	0.25	rebar pieces	FE		12	0.5	0.5	NE-SW	45	√			
D15	D15_34_1604em2	13	50.68	4	B	2268795.23	6966317.63	06-Jul-06	Alan Merriman	√													√	MIL	0	1	0.25	scrap metal	FE	√	9	4	0.25	NE-SW	0	√			
D15	D15_60_1604em2	15	21.58	4	A	2268739.91	6966258.55	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze strap, vt							FE	√	6	1	0.25	N-S	45	√			
D15	D15_61_1604em2	11	19.8	4	B	2268782.81	6966288.22	06-Jul-06	Alan Merriman	√													√	CIV	> 24	1	0.25	lg piece of rebar	FE	√	24	2	2	E-W	90	√			
D15	D15_7_1604em2	13	267.57	4	B	2268786.7	6966293.16	06-Jul-06	Alan Merriman	√													√	CIV	> 24	1	≥8	lg piece of rebar	FE	√	> 24	2	2	E-W	90	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
D15	D15_76_1604em2	16	15.35	4	A	2268751.29	6966242.16	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze strap, vt							FE	√	6	1	0.25	N-S	45	√			
D16	D16_108_1604em2	12	8.94	4	B	2268849.73	6966238.48	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze scrap alum metal							AL	√	6	0.5	0.5	E-W	0	√			
D16	D16_230_1604em2	11	2.88	3	B	2268835.8	6966292.63	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	fuze scrap alum metal							AL	√	3	1	0.5	N-S	0	√			
D16	D16_239_1604em2	11	2.71	3	B	2268852.77	6966249.16	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm HE, Expended							FE	√	3	0.5	0.25	N-S	45	√			
D16	D16_31_1604em2	14	54.15	4	A	2268843.5	6966243.31	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap		√	6	2	0.25			√			
D16	D16_42_1604em2	14	38.48	4	A	2268827.05	6966300.11	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	scrap, brass							OTHER	√	3	2	0.25			√			
D16	D16_52_1604em2	14	26.69	4	A	2268850.27	6966275.23	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt bracket								√	6	2	0.25			√			
E02	E02_01_612_mag			99	M	2267479.104	6966261.265	12-Jun-06	Alan Merriman	√													√	CIV	6	1	1	scrap metal								√			
E03	E03_21_1529em2	16	13.81	4	A	2267561.88	6966199.73	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fuze, mt 100 series								√	3	2	2	E-W	0	√			
E03	E03_28_1529em2	14	7.76	4	A	2267613.35	6966164.67	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap		√	3	2	0.25	N-S	45	√			
E03	E03_35_1529em2	10	2.78	3	C	2267617.78	6966159.74	19-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	fence piece,metal,cast steel,1/4		√	3	4	0.25	NE-SW	45	√			
E03	E03_39_1529em2	9	2.46	2	C	2267564.36	6966194.25	19-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	frag,37mm,m63 mod1,prac,cast ste								√	3	0.5	0.5	N-S	0	√			
E04	E04_13_1529em2	15	94.32	4	A	2267709.98	6966177.06	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	4	bomb end cap piece								√	9	0.5	0.5	N-S	0	√			
E04	E04_20_1529em2	15	13.86	4	A	2267673.47	6966169.17	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	2	bomb fuze								√	3	4	4	E-W	45	√			
E04	E04_31_1529em2	13	6.71	4	B	2267688.47	6966147.7	06-Jun-06	Alan Merriman																			no contact											
E04	E04_32_1529em2	12	4.96	4	B	2267620.46	6966153.25	06-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	37 mm piece								√	6	1	0.5	E-W	0	√			
E04	E04_33_1529em2	10	3.18	3	C	2267713.3	6966144.06	19-Jun-06	Alan Merriman	√							√	ORD MD	3	3	0.25	3 piec,,37mm,m63 mod1,prac								√	3	0.5	0.25	N-S	0	√			
E04	E04_36_1529em2	11	2.61	3	B	2267675.38	6966144.2	06-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	small end cap								√	3	0.5	0.25	N-S	0	√			
E05	E05_26_1528em2	13	95.49	4	B	2267811.16	6966194.5	06-Jun-06	Alan Merriman	√													√	CIV	3	1	2	rebar		√	24	0.5	0.25	NE-SW	0	√			
E05	E05_28_1528em2	13	51.4	4	B	2267810	6966224.03	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	12	0.5	0.25	NE-SW	0	√			
E05	E05_29_1528em2	14	50.7	4	A	2267812.79	6966206.84	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	12	0.5	0.25	NE-SW	0	√			
E05	E05_35_1528em2	12	27.02	4	B	2267806.59	6966201.45	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	12	0.5	0.5	NE-SW		√			
E05	E05_36_1528em2	12	26.27	4	B	2267807.04	6966198.03	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	piece of rebar		√	3	0.5	0.25	NE-SW	0	√			
E05	E05_37_1528em2	13	26.17	4	B	2267808.11	6966220.76	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	12	0.5	0.25	NE-SW	0	√			
E05	E05_49_1528em2	15	8.37	4	A	2267781.73	6966138.25	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail, bent		√	6	0.5	0.25	E-W	0	√			
E05	E05_50_1528em2	11	7.33	4	B	2267810.73	6966204.18	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	12	0.5	0.25	NE-SW	0	√			
E05	E05_60_1528em2	12	4.39	4	B	2267766.87	6966214.58	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	cad/cart								√	3	1	2	E-W	45	√			
E06	E06_104_1601em2	12	6.78	4	B	2267896.22	6966197.04	17-Aug-06	Alan Merriman	√													√	CIV	18	1	1	wire, wire								√			
E06	E06_106_1601em2	14	6.62	4	A	2267899.22	6966163.29	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1			√	3	0.5	0.25	E-W	0	√			
E06	E06_108_1601em2	10	6.15	4	C	2267917.88	6966179.47	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	reinforcing mesh / wire		√	6	0.5	0.25	NE-SW	45	√			
E06	E06_109_1601em2	13	6.04	4	B	2267882.03	6966178.34	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1			√	12	0.5	0.25	N-S	0	√			
E06	E06_12_1601em2	16	445.21	4	A	2267916.29	6966197.62	06-Jun-06	Alan Merriman	√													√	CIV	18	1	1	wire mesh											
E06	E06_129_1601em2	11	4.83	4	B	2267881.34	6966145.3	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	3	0.5	0.25	N-S	0	√			
E06	E06_131_1601em2	12	4.74	4	B	2267883.84	6966149.77	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	6	0.5	0.25	E-W	0	√			
E06	E06_133_1601em2	10	4.68	4	C	2267883.76	6966181.67	19-Jun-06	Alan Merriman	√													√	CIV	6	2	1	nail / piece of cr wire		√	3	0.5	0.25	NE-SW	0	√			
E06	E06_140_1601em2	12	4.44	4	B	2267900.19	6966179.71	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	9	0.5	0.25	NE-SW	0	√			
E06	E06_142_1601em2	12	4.4	4	B	2267884.26	6966205.66	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	6	0.5	0.25	N-S	0	√			
E06	E06_147_1601em2	11	4.11	4	B	2267883.81	6966187.97	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	9	0.5	0.25	N-S	0	√			
E06	E06_148_1601em2	12	4.03	4	B	2267892.44	6966202.98	06-Jun-06	Alan Merriman	√													√	CIV	12	1		concrete											
E06	E06_158_1601em2	13	3.81	4	B	2267889.29	6966220.73	06-Jun-06	Alan Merriman	√													√	CIV				drainage-culvert											
E06	E06_164_1601em2	10	3.62	4	C	2267872.42	6966185.19	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	barbed wire		√	6	0.5	0.25	NE-SW	0	√			
E06	E06_165_1601em2	11	3.6	3	B	2267865.43	6966182.31	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	3	0.5	0.25	N-S	0				
E06	E06_173_1601em2	9	3.28	3	C	2267903.66	6966209.91	19-Jun-06	Alan Merriman	√													√	CIV	> 24	4	2	rebar lengths	FE	√	9	0.5	0.5	NE-SW	45	√			
E06	E06_181_1601em2	9	3.1	3	C	2267917.97	6966182.98	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire mesh (same as 108)	FE	√						√			
E06	E06_184_1601em2	9	3.02	3	C	2267899.96	6966196.05	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire	FE	√	6		0.25	E-W	0	√			
E06	E06_188_1601em2	11	2.96	3	B	2267913.86	6966184.04	06-Jun-06	Alan Merriman	√													√	CIV	6	1	4	concrete											
E06	E06_190_1601em2	9	2.79	3	C	2267867.01	6966175.67	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	metal staple	FE	√	3	0.5	0.25	E-W	90	√			
E06	E06_197_1601em2	10	2.72	3	C	2267914.45	6966233.3	19-Jun-06	Alan Merriman	√													√	CIV	> 24	1	4	rebar lengths	FE	√	24	1	1	NE-SW	45	√			
E06	E06_209_1601em2	9	2.49	2	C	2267871.79	6966203.47	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail		√	3	0.5	0.25	NE-SW	45	√			
E06	E06_213_1601em2	8	2.44	2	D	2267868.78	6966198.45	17-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	wire	FE	√	3	0.5	0.25	NE-SW	0	√			
E06	E06_215_1601em2	10	2.43	2	C	2267902.37	6966164.24	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	3	0.5	0.25	N-S	0	√			
E06	E06_22_1601em2	15	62.57	4	A	2267860.05	6966198.66	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	6	6	0.25		0	√			
E06	E06_229_1601em2	10	2.3	2	C	2267906.59	6966202.48	19-Jun-06	Alan Merriman	√													√	CIV	24	4	2	rebar lengths	FE		9	0.5	0.5	NE-SW	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
E06	E06_234_1601em2	9	2.23	2	C	2267905.12	6966166.83	19-Jun-06	Alan Merriman	√													√	CIV	3	1	0.75	wire		√	6		0.25	N-S	45	√			
E06	E06_243_1601em2	9	2.14	2	C	2267886.79	6966151.55	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	length of wire		√	9	0.5	0.25	NE-SW	45	√			
E06	E06_252_1601em2	9	2.05	2	C	2267870.39	6966149.12	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	ball of barb wire		√	6	0.5	0.5	E-W	90	√			
E06	E06_26_1601em2	12	44.19	4	B	2267906.11	6966191.5	06-Jun-06	Alan Merriman	√													√	CIV	6	1	2	pipe		√	9	1	1	E-W	45	√			
E06	E06_264_1601em2	11	1.95	2	B	2267881.84	6966138.77	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	3	0.5	0.25	N-S	0	√			
E06	E06_27_1528em2	14	63.43	4	A	2267855.08	6966229	06-Jun-06	Alan Merriman	√													√	CIV	3	1	2	wire fence		√	> 24	0.5	0.25	N-S	0	√			
E06	E06_32_1528em2	15	35.26	4	A	2267838.66	6966145.76	06-Jun-06	Alan Merriman	√													√	CIV	0	2	1	wire		√	24	0.5	0.25	N-S	0	√			
E06	E06_33_1601em2	16	30.59	4	A	2267916.08	6966145.02	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fragment							FE	√	3	2	0.25	NE-SW	0	√			
E06	E06_38_1528em2	12	25.99	4	B	2267849.52	6966236.11	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rebar		√	12	0.5	0.5	N-S	0	√			
E06	E06_42_1528em2	10	16.38	4	C	2267854.11	6966224.07	19-Jun-06	Alan Merriman	√													√	CIV	6	2	1	wire & clip		√	6	0.5	0.25	NE-SW	45	√			
E06	E06_44_1528em2	13	11.44	4	B	2267849.95	6966226.83	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	12	0.5	0.25	N-S	45	√			
E06	E06_45_1528em2	14	11.06	4	A	2267847.66	6966185.67	16-Aug-06	Alan Merriman	√													√	CIV	3	1	1	staple, fence wire		√	3	0.5	0.25	E-W	45	√			
E06	E06_47_1528em2	13	9.06	4	B	2267843.48	6966157.06	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	can			3	2	0.25	N-S	0	√			
E06	E06_51_1528em2	13	7.25	4	B	2267850.95	6966154.94	06-Jun-06	Alan Merriman	√													√	CIV	0	2	1	wire		√	9	0.5	0.25	N-S	0	√			
E06	E06_53_1601em2	11	17.94	4	B	2267909.96	6966193.09	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap			3	1	1		0	√			
E06	E06_54_1528em2	10	6.31	4	C	2267853.39	6966236.33	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	3	0.5	0.25	E-W	90	√			
E06	E06_57_1528em2	10	5.46	4	C	2267848.78	6966160.61	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	wire		√	12	0.5	0.25	N-S	0	√			
E06	E06_58_1601em2	16	16.67	4	A	2267863.17	6966175.07	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	barb wire		√	3	2	0.25	E-W	0	√			
E06	E06_61_1528em2	11	4.22	4	B	2267881.51	6966145.18	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	barb wire		√	3	0.5	0.25	N-S	0	√			
E06	E06_62_1601em2	16	14.88	4	A	2267912.71	6966198.84	06-Jun-06	Alan Merriman	√													√	CIV	18	1	1	wire mesh											
E06	E06_72_1601em2	13	12.36	4	B	2267863.69	6966199.15	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	6	6	0.25		0	√			
E06	E06_74_1601em2	14	11.99	4	A	2267878.16	6966178.09	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	12	0.5	0.25	E-W	0	√			
E06	E06_76_1528em2	9	2.86	3	C	2267847.92	6966156.52	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	metal staple		√	3	0.5	0.25	NE-SW	90	√			
E06	E06_79_1528em2	10	2.71	3	C	2267848.31	6966164.35	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	wire (same as 57)		√	12	0.5	0.25	N-S	0	√			
E06	E06_81_1601em2	14	10.42	4	A	2267858.63	6966230.27	06-Jun-06	Alan Merriman	√													√	CIV	6	1	1	barb wire		√	> 24	0.5	0.25	N-S	0	√			
E06	E06_82_1528em2	10	2.65	3	C	2267823.03	6966167.77	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal bullet								√	3	0.5	0.5	NE-SW	45	√			
E06	E06_84_1601em2	10	9.37	4	C	2267859.62	6966192.61	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	barbed wire / old school		√	6	0.5	0.25	NE-SW	0	√			
E06	E06_86_1528em2	9	2.38	2	C	2267887.38	6966147.83	19-Jun-06	Alan Merriman	√							√	ORD MD	12	1	1	shot gun primer								√	3	0.5	0.25	NE-SW	45	√			
E06	E06_89_1601em2	13	8.09	4	B	2267865.32	6966235.41	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	9	0.5	0.25	N-S	0	√			
E06	E06_93_1601em2	13	7.56	4	B	2267864.01	6966230.92	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40 mm frag sleeve								√	3	2	0.25	N-S	0	√			
E07	E07_1_1601em2	13	6984.75	4	B	2267923.2	6966216.43	12-Jun-06	Jim Thoren	√													√	CIV	0	1		culvert											
E07	E07_101_1601em2	13	6.86	4	B	2267939.49	6966217.19	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	aluminum can								√			
E07	E07_110_1601em2	13	6.02	4	B	2267936.8	6966212.7	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E07	E07_111_1601em2	9	5.9	4	C	2267929.48	6966201.61	11-Jul-06	Jim Thoren																			no find											
E07	E07_112_1601em2	8	5.88	4	D	2267924.97	6966198.08	11-Jul-06	Jim Thoren	√													√	CIV	12	1	2	rebar	FE	√	24	0.5	0.25	N-S	0	√			
E07	E07_126_1601em2	11	4.97	4	B	2267944.67	6966205.75	12-Jun-06	Jim Thoren	√													√	CIV	12	1	1	wire								√			
E07	E07_135_1601em2	11	4.51	4	B	2268017.82	6966178.09	12-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	50 cal														√			
E07	E07_141_1601em2	11	4.42	4	B	2267934.69	6966217.89	12-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E07	E07_15_1601em2	12	336.41	4	B	2267927.55	6966216.32	12-Jun-06	Jim Thoren	√													√	CIV	0	1		culvert											
E07	E07_151_1601em2	11	3.99	4	B	2267970.02	6966199.2	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire								√			
E07	E07_17_1601em2	8	90.06	4	D	2267934.88	6966224.61	11-Jul-06	Jim Thoren	√													√	CIV	3	1	2	rebar	FE	√	12	0.5	0.5	N-S	0	√			
E07	E07_18_1601em2	12	85.94	4	B	2267922.16	6966204.73	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	rebar								√			
E07	E07_192_1601em2	11	2.78	3	B	2267997.28	6966203	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E07	E07_21_1601em2	12	64.9	4	B	2267931.5	6966222.8	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	rebar								√			
E07	E07_24_1601em2	12	52.94	4	B	2267928.65	6966197.95	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	rebar								√			
E07	E07_29_1601em2	13	38.79	4	B	2267921.67	6966180.7	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	rebar								√			
E07	E07_34_1601em2	11	30.17	4	B	2267934.79	6966200.88	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
E07	E07_4_1601em2	15	3063.75	4	A	2267919.92	6966217.02	12-Jun-06	Jim Thoren	√													√	CIV	0	1		culvert											
E07	E07_42_1601em2	13	23.41	4	B	2267925.05	6966220.78	12-Jun-06	Jim Thoren	√													√	CIV	12	1	1	rebar								√			
E07	E07_43_1601em2	12	23.27	4	B	2267924.68	6966236.04	17-Aug-06	Jim Thoren	√													√	CIV	12	1	1	rebar, rebar								√			
E07	E07_45_1601em2	9	22.92	4	C	2267930.74	6966219.34	11-Jul-06	Jim Thoren	√													√	CIV	> 24	2	0.25	rebar lengths	FE	√	12	1	1	NE-SW	90	√			
E07	E07_46_1601em2	12	20.65	4	B	2267928.05	6966227.66	12-Jun-06	Jim Thoren	√													√	CIV	12	1	1	rebar								√			
E07	E07_47_1601em2	12	20.49	4	B	2267937.52	6966222.5	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	rebar								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
E07	E07_51_1601em2	10	18.58	4	C	2267939.66	6966206.24	11-Jul-06	Jim Thoren	√													√	CIV	12	1	0.5	wire bundel	FE	√	12	6	0.25	N-S	0	√			
E07	E07_54_1601em2	11	17.21	4	B	2267931.25	6966206.09	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	rebar								√			
E07	E07_55_1601em2	16	17.06	4	A	2267919.78	6966197.61	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	rebar								√			
E07	E07_65_1601em2	15	14.12	4	A	2267997.49	6966196.9	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
E07	E07_83_1601em2	10	9.7	4	C	2267942.77	6966228.44	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
E07	E07_88_1601em2	12	8.41	4	B	2267997.9	6966180.91	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E08	E08_102_1601em2	14	6.83	4	A	2268091.61	6966153.09	12-Jun-06	Jim Thoren	√													√	CIV	0	1		wire (left in ground)											
E08	E08_103_1601em2	13	6.8	4	B	2268104.03	6966213.56	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire								√			
E08	E08_124_1601em2	13	4.98	4	B	2268104.53	6966233.2	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E08	E08_125_1601em2	12	4.97	4	B	2268086.09	6966162.58	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
E08	E08_138_1601em2	12	4.5	4	B	2268081.48	6966169.41	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	aluminum can								√			
E08	E08_143_1601em2	10	4.39	4	C	2268081.18	6966156.78	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap metal		√	3	2	0.5	N-S	0				
E08	E08_16_1601em2	16	105.73	4	A	2268073.22	6966231.94	12-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
E08	E08_163_1601em2	12	3.62	4	B	2268071.37	6966144.67	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E08	E08_169_1601em2	10	3.48	3	C	2268034.18	6966187.49	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
E08	E08_19_1601em2	15	83.39	4	A	2268085.88	6966140.73	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire and scrap								√			
E08	E08_195_1601em2	11	2.75	3	B	2268076.49	6966205.27	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E08	E08_23_1601em2	16	54.84	4	A	2268087.62	6966205.89	12-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	flare	√	MIL	0	1	1	scrap								√			
E08	E08_35_1601em2	9	28.22	4	C	2268089.82	6966143.67	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.75	bolt	FE	√	12	0.5	0.5	N-S	0	√			
E08	E08_37_1601em2	13	26.15	4	B	2268080.11	6966145.41	12-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E08	E08_40_1601em2	15	24.91	4	A	2268040.88	6966169.18	12-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	fuze mu05														√			
E08	E08_41_1601em2	16	23.45	4	A	2268095.24	6966233.35	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E08	E08_50_1601em2	10	18.88	4	C	2268076.65	6966233.48	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze frag (20mm)							FE	√	3	0.5	0.5	N-S	0	√			
E08	E08_56_1601em2	14	16.91	4	A	2268114.41	6966186.94	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	bolt								√			
E08	E08_59_1601em2	16	16.09	4	A	2268035.11	6966144.98	12-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
E08	E08_64_1601em2	10	14.31	4	C	2268086.45	6966145.38	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
E08	E08_67_1601em2	12	13.57	4	B	2268037.89	6966196.6	12-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E08	E08_68_1601em2	13	13.44	4	B	2268033.97	6966194.54	12-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E08	E08_71_1601em2	13	12.67	4	B	2268093.49	6966209.72	12-Jun-06	Jim Thoren	√													√	CIV	0	1	1	aluminum								√			
E08	E08_79_1601em2	16	11.14	4	A	2268040.52	6966228.96	12-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E08	E08_92_1601em2	12	7.6	4	B	2268087.5	6966165.57	12-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	blank ammo														√			
E08	E08_94_1601em2	13	7.55	4	B	2268046.03	6966210.63	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E08	E08_97_1601em2	13	7.29	4	B	2268049.16	6966145.89	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
E08	E08_99_1601em2	14	7.11	4	A	2268113.62	6966179.08	12-Jun-06	Jim Thoren	√													√	CIV	12	1	1	wire								√			
E09	E09_1_1602em2	15	1245.35	4	A	2268157.13	6966174.02	14-Jun-06	Jim Thoren	√													√	CIV				fence post left in ground											
E09	E09_101_1602em2	13	8.09	4	B	2268165.88	6966144.84	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E09	E09_107_1602em2	13	7.43	4	B	2268189.98	6966152.04	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E09	E09_11_1602em2	16	88.88	4	A	2268174.29	6966151.8	14-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
E09	E09_113_1602em2	10	6.67	4	C	2268125.62	6966191.3	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	bomb frag							CU	√	3	4	0.5	N-S	0	√			
E09	E09_115_1602em2	12	6.56	4	B	2268138.75	6966214.44	14-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	20mm								√	3	0.5				√			
E09	E09_12_1602em2	13	76.84	4	B	2268183.77	6966147.01	14-Jun-06	Jim Thoren	√							√	ORD MD	3	1	4	frag														√			
E09	E09_120_1602em2	13	6.2	4	B	2268157.03	6966200.82	14-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
E09	E09_124_1602em2	13	5.89	4	B	2268157.73	6966210.29	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
E09	E09_126_1602em2	11	5.7	4	B	2268203.4	6966140.55	14-Jun-06	Jim Thoren	√													√	CIV	12	1	1	bolt		√	6	0.5	0.5			√			
E09	E09_13_1602em2	13	59.23	4	B	2268185.75	6966143.31	14-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	fuze scrap														√			
E09	E09_134_1602em2	12	5.47	4	B	2268177.16	6966163.44	14-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
E09	E09_138_1602em2	12	5.15	4	B	2268198.49	6966168.34	14-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
E09	E09_142_1602em2	13	4.95	4	B	2268217.34	6966138.48	14-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.25	20mm shell casing							OTHER	√	3	0.5	0.25	N-S	0	√			
E09	E09_143_1602em2	14	4.82	4	A	2268198.34	6966222.82	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E09	E09_146_1602em2	12	4.73	4	B	2268176.85	6966191.67	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
E09	E09_149_1602em2	16	4.64	4	A	2268156.03	6966191.5	14-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
E09	E09_15_1602em2	11	55.78	4	B	2268216.66	6966150.89	14-Jun-06	Jim Thoren	√													√	CIV	18	1	2	scrap		√	12	4	0.25			√			
E09	E09_153_1602em2	10	4.47	4	C	2268168.79	6966149.83	11-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze frag							FE	√	6	2	0.5	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
E09	E09_154_1602em2	12	4.44	4	B	2268167.84	6966209.27	14-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	20mm								√	3	0.5	0.25			√			
E09	E09_155_1602em2	11	4.42	4	B	2268178.38	6966171.73	14-Jun-06	Jim Thoren	√													√	MIL	12	1	1	scrap aluminum								√			
E09	E09_158_1602em2	9	4.31	4	C	2268150.23	6966165.47	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0				
E09	E09_160_1602em2	7	4.15	4	D	2268153.32	6966180.63	11-Jul-06	Jim Thoren	√													√	CIV				metal pole, left in ground	FE										
E09	E09_163_1602em2	12	4.09	4	B	2268213.3	6966144.98	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E09	E09_164_1602em2	13	4.05	4	B	2268139.34	6966171.71	14-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
E09	E09_165_1602em2	12	4.05	4	B	2268151.88	6966206.94	14-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal														√			
E09	E09_17_1602em2	16	46.94	4	A	2268137.35	6966167.77	16-Aug-06	Jim Thoren	√													√	MIL	6	1	1	scrap, too small to find								√			
E09	E09_171_1602em2	12	3.93	4	B	2268158.05	6966222.85	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
E09	E09_174_1602em2	12	3.85	4	B	2268189.69	6966168.45	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E09	E09_177_1602em2	14	3.76	4	A	2268186.53	6966235.81	14-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	frag								√	12	2	0.25			√			
E09	E09_178_1602em2	11	3.76	4	B	2268213.61	6966181.37	14-Jun-06	Jim Thoren	√													√	CIV	6	1	1	fence stapler								√			
E09	E09_18_1602em2	14	36.55	4	A	2268214.97	6966154.31	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E09	E09_180_1602em2	11	3.74	4	B	2268159	6966229.71	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
E09	E09_181_1602em2	11	3.73	4	B	2268194.45	6966171.06	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E09	E09_183_1602em2	11	3.7	4	B	2268158.84	6966170.98	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E09	E09_184_1602em2	12	3.68	4	B	2268142.23	6966197.93	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E09	E09_187_1602em2	11	3.61	4	B	2268151.38	6966156.99	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
E09	E09_189_1602em2	12	3.57	3	B	2268145.44	6966184.05	14-Jun-06	Jim Thoren	√							√	ORD MD	12	1	1	part of fuze														√			
E09	E09_19_1602em2	10	36.2	4	C	2268207.91	6966147.77	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap metal	OTHER	√	24	> 6	0.25	N-S	0	√			
E09	E09_191_1602em2	13	3.46	3	B	2268173	6966155.05	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E09	E09_194_1602em2	12	3.37	3	B	2268198.66	6966139.33	14-Jun-06	Jim Thoren	√													√	MIL	12	1	1	scrap								√			
E09	E09_2_1602em2	12	1168.89	4	B	2268155.34	6966177.52	14-Jun-06	Jim Thoren	√													√	CIV				fence post left in ground											
E09	E09_204_1602em2	11	3.2	3	B	2268180.78	6966176.36	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E09	E09_208_1602em2	11	3.13	3	B	2268193.49	6966159.22	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E09	E09_209_1602em2	11	3.12	3	B	2268145.9	6966145.09	14-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
E09	E09_232_1602em2	11	2.67	3	B	2268187.28	6966153.91	14-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal														√			
E09	E09_258_1602em2	11	2.19	2	B	2268198.83	6966143.47	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E09	E09_3_1602em2	12	1037.86	4	B	2268156.02	6966182.62	14-Jun-06	Jim Thoren	√													√	CIV				fence post left in ground											
E09	E09_30_1602em2	10	21.12	4	C	2268188.68	6966148.65	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap	FE	√	6	2	0.25	N-S	0	√			
E09	E09_31_1602em2	15	20.45	4	A	2268140.46	6966191.7	14-Jun-06	Jim Thoren	√													√	CIV	24	1	1	wire		√	24	0.5	0.25			√			
E09	E09_36_1602em2	16	18.25	4	A	2268154.19	6966170.96	16-Aug-06	Jim Thoren	√													√	CIV				fence post left in ground											
E09	E09_38_1602em2	12	17.91	4	B	2268214.73	6966140.95	14-Jun-06	Jim Thoren	√													√	CIV	6	1	1	bolt		√	9	0.5	0.5			√			
E09	E09_4_1602em2	14	651.76	4	A	2268155.41	6966187.61	14-Jun-06	Jim Thoren	√													√	CIV				fence post left in ground											
E09	E09_41_1602em2	14	16.13	4	A	2268184.83	6966157.8	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E09	E09_55_1602em2	16	13.18	4	A	2268148.73	6966169.24	16-Aug-06	Jim Thoren	√													√	CIV	3	1	1	wire, wire								√			
E09	E09_56_1602em2	15	13.18	4	A	2268130.7	6966182.88	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E09	E09_61_1602em2	13	12.49	4	B	2268182.42	6966136.69	14-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	frag								√	6	4	0.25			√			
E09	E09_77_1602em2	13	10.5	4	B	2268141.73	6966174.03	14-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap		√	12	6	0.25			√			
E09	E09_79_1602em2	12	10.45	4	B	2268154.64	6966165.34	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
E09	E09_8_1602em2	16	123.88	4	A	2268216.25	6966169	14-Jun-06	Jim Thoren	√							√	ORD MD	0	1	8	vt fuze														√			
E09	E09_84_1602em2	13	9.67	4	B	2268128.52	6966193	14-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire		√	3	0.5	0.25			√			
E09	E09_90_1602em2	13	9.38	4	B	2268146.88	6966180.59	14-Jun-06	Jim Thoren	√							√	ORD MD	12	1	1	part of fuze														√			
E09	E09_96_1602em2	13	8.85	4	B	2268203.73	6966149.9	14-Jun-06	Jim Thoren	√													√	CIV	12	1	1	scrap								√			
E09	E09_97_1602em2	12	8.53	4	B	2268162.91	6966204.4	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_100_1602em2	13	8.09	4	B	2268243.17	6966151.97	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_123_1602em2	13	5.9	4	B	2268305.82	6966206.55	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E10	E10_125_1602em2	13	5.79	4	B	2268224.04	6966155.77	14-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
E10	E10_131_1602em2	15	5.55	4	A	2268226.98	6966200.4	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_136_1602em2	13	5.37	4	B	2268279.18	6966174.59	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_139_1602em2	13	5.09	4	B	2268258.07	6966158.38	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E10	E10_14_1602em2	13	56.67	4	B	2268227.52	6966143.98	14-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap		√	24	4	0.25			√			
E10	E10_145_1602em2	11	4.74	4	B	2268264.83	6966161.38	14-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
E10	E10_148_1602em2	12	4.7	4	B	2268225.34	6966182.62	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_157_1602em2	10	4.32	4	C	2268239.45	6966153.48	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25	N-S	0	√			
E10	E10_159_1602em2	12	4.25	4	B	2268308.44	6966211.1	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_162_1602em2	13	4.14	4	B	2268269.95	6966184.9	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_185_1602em2	12	3.67	4	B	2268310.23	6966223.17	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_192_1602em2	11	3.44	3	B	2268236.92	6966137.83	14-Jun-06	Jim Thoren	√													√	CIV	> 24	1	1	scrap metal	FE	√	3	0.5	0.5	NE-SW	45	√			
E10	E10_197_1602em2	11	3.33	3	B	2268265.15	6966209.36	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_199_1602em2	11	3.24	3	B	2268307.38	6966161.76	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_216_1602em2	11	2.98	3	B	2268298.81	6966207.41	14-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	frag														√			
E10	E10_224_1602em2	12	2.82	3	B	2268226.33	6966149.07	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E10	E10_233_1602em2	11	2.67	3	B	2268250.6	6966150.64	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E10	E10_25_1602em2	13	25.52	4	B	2268230.42	6966141.16	14-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
E10	E10_26_1602em2	14	25.35	4	A	2268226.22	6966152.7	14-Jun-06	Jim Thoren	√													√	CIV	12	1	1	scrap								√			
E10	E10_29_1602em2	15	21.34	4	A	2268261.48	6966150.34	14-Jun-06	Jim Thoren	√													√	MIL	3	2	2	scrap								√			
E10	E10_299_1602em2	12	1.81	1	B	2268241.01	6966136.81	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E10	E10_34_1602em2	14	18.94	4	A	2268245.62	6966175.11	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_43_1602em2	13	15.95	4	B	2268218.41	6966146.5	14-Jun-06	Jim Thoren	√													√	MIL	12	1	1	scrap								√			
E10	E10_46_1602em2	14	14.78	4	A	2268298.43	6966227.15	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E10	E10_49_1602em2	16	14.16	4	A	2268245.67	6966144.68	14-Jun-06	Jim Thoren	√							√	ORD MD	12	1	1	flare								√	12	2	0.25			√			
E10	E10_52_1602em2	14	13.68	4	A	2268299.7	6966210.96	14-Jun-06	Jim Thoren	√													√	MIL	3	3	1	scrap								√			
E10	E10_53_1602em2	16	13.39	4	A	2268272.12	6966218.5	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E10	E10_54_1602em2	13	13.33	4	B	2268225.6	6966137.04	14-Jun-06	Jim Thoren	√													√	MIL	6	1	2	scrap								√			
E10	E10_57_1602em2	14	13.02	4	A	2268284.39	6966173.14	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_58_1602em2	14	12.91	4	A	2268284.01	6966207.12	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_62_1602em2	14	12.47	4	A	2268271.06	6966174.62	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_63_1602em2	15	12.46	4	A	2268243.44	6966197.95	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_78_1602em2	13	10.5	4	B	2268251.43	6966139.52	14-Jun-06	Jim Thoren	√													√	MIL	3	3	1	scrap								√			
E10	E10_82_1602em2	13	10.27	4	B	2268250.97	6966180.44	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_83_1602em2	15	9.81	4	A	2268232.17	6966222.38	14-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
E10	E10_87_1602em2	13	9.55	4	B	2268235.56	6966148.95	14-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.25	40mm flare case, empty							AL	√	9	2	0.5	NE-SW	45	√			
E10	E10_89_1602em2	14	9.42	4	A	2268279.04	6966139.7	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_9_1602em2	15	114.49	4	A	2268243.52	6966140.75	14-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
E10	E10_91_1602em2	13	9.24	4	B	2268280.43	6966200.86	14-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	frag														√			
E10	E10_94_1602em2	15	8.99	4	A	2268259.51	6966186.84	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E10	E10_98_1602em2	12	8.31	4	B	2268243.04	6966171.95	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E11	E11_106_1602em2	11	7.56	4	B	2268348.49	6966137	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E11	E11_109_1602em2	13	7.29	4	B	2268410.59	6966223.15	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E11	E11_114_1602em2	14	6.65	4	A	2268319.59	6966179.03	14-Jun-06	Jim Thoren	√													√	CIV	6	1	1	nail		√	3	0.5	0.5			√			
E11	E11_156_1602em2	13	4.39	4	B	2268392.05	6966139.77	14-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
E11	E11_186_1602em2	12	3.66	4	B	2268320.62	6966229.77	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E11	E11_195_1602em2	11	3.35	3	B	2268323.68	6966222.26	14-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
E11	E11_196_1602em2	11	3.34	3	B	2268411.7	6966189.83	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E11	E11_198_1602em2	11	3.31	3	B	2268376.73	6966136.82	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E11	E11_221_1602em2	11	2.91	3	B	2268402.9	6966183.77	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E11	E11_27_1602em2	12	24.47	4	B	2268404.62	6966235.88	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E11	E11_39_1602em2	15	16.96	4	A	2268402.16	6966224.37	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap		√	3	1	0.25			√			
E11	E11_44_1602em2	15	15.85	4	A	2268417.1	6966217.34	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E11	E11_50_1602em2	16	13.92	4	A	2268323.09	6966147.09	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E11	E11_67_1602em2	15	11.8	4	A	2268318.9	6966166.7	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E11	E11_68_1602em2	16	11.61	4	A	2268373.3	6966165.81	14-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
E11	E11_71_1602em2	15	11.21	4	A	2268403.85	6966194.17	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E11	E11_75_1602em2	16	10.87	4	A	2268364.21	6966155.82	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E11	E11_80_1602em2	15	10.45	4	A	2268334.97	6966189.33	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
E11	E11_85_1602em2	13	9.59	4	B	2268384.7	6966140.87	14-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
E11	E11_88_1602em2	13	9.52	4	B	2268414.88	6966188.36	14-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
E12	E12_110_1321em2	15	12.82	4	A	2268503.01	6966225.86	20-Jun-06	Jim Thoren	√													√	MIL	3	2	0.5	scrap, steel		√	3	2				√			
E12	E12_123_1321em2	14	11.36	4	A	2268447.26	6966144.34	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	3	2	0.25			√			
E12	E12_130_1321em2	14	10.75	4	A	2268435.25	6966138.09	20-Jun-06	Jim Thoren	√							√	EMAT MD	3	1	0.5	mdf								√	9	1	0.25			√			
E12	E12_141_1321em2	13	9.85	4	B	2268480.45	6966177.53	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze antenna								√	6	2	1			√			
E12	E12_142_1321em2	13	9.73	4	B	2268510.07	6966138.05	20-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	m407a1 40mm body								√	3	1	0.25			√			
E12	E12_147_1321em2	14	9.44	4	A	2268460.28	6966157.43	20-Jun-06	Jim Thoren	√													√	CIV	3	2	0.5	scrap, steel		√	9	1	0.25			√			
E12	E12_154_1321em2	13	8.98	4	B	2268509.77	6966201.31	20-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	aluminum scrap		√	3	4	0.25			√			
E12	E12_155_1321em2	13	8.97	4	B	2268476.16	6966139.51	20-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	vt fuze part								√	6	2	1			√			
E12	E12_156_1321em2	11	8.89	4	B	2268480.07	6966155.84	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	6	1	0.25			√			
E12	E12_161_1321em2	14	8.43	4	A	2268490.83	6966173.59	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap, steel		√	3	2	0.25			√			
E12	E12_167_1321em2	13	7.91	4	B	2268487.3	6966188.55	20-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	barb wire		√	24	0.5	0.25			√			
E12	E12_174_1321em2	15	7.61	4	A	2268473.08	6966210.29	20-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap, steel		√	6	4	0.25			√			
E12	E12_175_1321em2	10	7.52	4	C	2268480.52	6966187.28	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket, vt							FE	√	3	2	0.25	N-S	0	√			
E12	E12_180_1321em2	13	7.29	4	B	2268423.96	6966217.17	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	m407a1 40mm body								√	3	2	0.25			√			
E12	E12_193_1321em2	13	6.8	4	B	2268511.99	6966145.02	20-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	m407a1 40mm body								√	6	2	0.25			√			
E12	E12_194_1321em2	11	6.76	4	B	2268465.83	6966140.81	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, aluminum		√	3	0.5	0.5			√			
E12	E12_200_1321em2	15	6.64	4	A	2268517.73	6966156.52	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	small gage wire		√	12	0.5	0.25			√			
E12	E12_205_1321em2	13	6.4	4	B	2268433.02	6966226.81	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.75	aluminum scrap		√	3	0.5	0.25			√			
E12	E12_214_1321em2	13	6.04	4	B	2268467.57	6966197.88	20-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	ejection seat part		√	6	1	0.25			√			
E12	E12_225_1321em2	11	5.65	4	B	2268434.66	6966223.74	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.75	aluminum scrap		√	3	0.5	0.25			√			
E12	E12_23_1321em2	13	65.69	4	B	2268515.45	6966206.39	20-Jun-06	Jim Thoren	√													√	CIV	6	1	4	scrap, steel		√	12	4	0.5			√			
E12	E12_250_1321em2	14	4.96	4	A	2268459.46	6966218.62	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	6	4	0.25			√			
E12	E12_253_1321em2	11	4.79	4	B	2268424.43	6966202.47	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	aluminum scrap		√	3	1	0.5			√			
E12	E12_266_1321em2	13	4.42	4	B	2268456.87	6966173.08	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	6	2	0.25			√			
E12	E12_268_1321em2	11	4.4	4	B	2268477.2	6966180.09	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	0.5	0.25			√			
E12	E12_274_1321em2	12	4.26	4	B	2268508.87	6966146.12	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	aluminum fuze part								√	3	0.5	0.25			√			
E12	E12_276_1321em2	11	4.21	4	B	2268447.39	6966195.95	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, aluminum		√	3	1	0.5			√			
E12	E12_279_1321em2	11	4.08	4	B	2268436.58	6966193.86	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag								√	3	1	0.25			√			
E12	E12_290_1321em2	12	3.8	4	B	2268429.27	6966202.51	20-Jun-06	Jim Thoren	√													√	CIV	3	2	0.75	aluminum scrap		√	3	1	0.25			√			
E12	E12_319_1321em2	12	3.43	3	B	2268515.95	6966214.85	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum can		√	6	4	0.25			√			
E12	E12_329_1321em2	11	3.3	3	B	2268469.51	6966173.66	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	barb wire		√	12	0.5	0.25			√			
E12	E12_354_1321em2	12	3.02	3	B	2268513.3	6966227.36	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum can		√	6	4	0.25			√			
E12	E12_355_1321em2	11	3.01	3	B	2268499.76	6966145.57	20-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.5	vt fuze antenna								√	6	2	1			√			
E12	E12_361_1321em2	12	2.93	3	B	2268516.28	6966163.79	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel			6	4	0.25			√			
E12	E12_370_1321em2	11	2.84	3	B	2268483.71	6966171.7	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	1	0.25			√			
E12	E12_385_1321em2	11	2.75	3	B	2268459.3	6966205.88	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	40mm windscreen								√	3	1	0.25			√			
E12	E12_60_1321em2	13	22.25	4	B	2268481.38	6966163	20-Jun-06	Jim Thoren	√													√	CIV	3	1	1			√	12	2	0.25			√			
E12	E12_74_1321em2	13	18.38	4	B	2268473.99	6966234.14	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	ejection seat cart								√	6	2				√			
E12	E12_90_1321em2	13	16.22	4	B	2268477.91	6966163.47	20-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap, steel		√	12	2	0.25			√			
E12	E12_91_1321em2	14	15.6	4	A	2268504.29	6966146.7	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	m407a1 40mm body								√	3	2	0.25			√			
E12	E12_92_1321em2	14	15.16	4	A	2268474.81	6966191.66	20-Jun-06	Jim Thoren	√													√	MIL	6	1	1	ejection seat part		√	6	0.5	0.25			√			
E13	E13_1_1604em2	13	3735.65	4	B	2268593.91	6966184.67	21-Jun-06	Alan Merriman	√													√	MIL	6	1	≥8	large metal plate		√	24	> 6	0.5	E-W	90	√			
E13	E13_10_1604em2	11	208.69	4	B	2268598.47	6966184.38	21-Jun-06	Alan Merriman	√													√	CIV	6	1	1	aluminum disk		√	3	0.5	0.25	N-S	0	√			
E13	E13_100_1604em2	13	10.42	4	B	2268563.77	6966179.83	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	m407a1 body,stainless ac fitting														√			
E13	E13_101_1604em2	14	10.42	4	A	2268605.13	6966142.33	21-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	m407a1 body														√			
E13	E13_103_1604em2	13	9.55	4	B	2268598.3	6966188.12	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ac part ,ferrous, seat parts		√	3	0.5	0.5	N-S	0	√			
E13	E13_105_1604em2	14	9.22	4	A	2268559.91	6966205.72	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m407a1														√			
E13	E13_106_1604em2	12	9.22	4	B	2268574.46	6966163.33	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.5	frag ferrous								√	3	2	0.5	N-S	0	√			
E13	E13_109_1604em2	12	8.68	4	B	2268578.21	6966219.04	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	aluminum ac scrap								√			
E13	E13_11_1604em2	14	156.07	4	A	2268593.06	6966229.9	21-Jun-06	Alan Merriman	√													√	MIL	6	1	1	long metal rod		√	> 24	0.5	0.5	NE-SW	0	√			
E13	E13_111_1604em2	12	8.6	4	B	2268573.21	6966136.62	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	aluminum ac part														√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
E13	E13_112_1604em2	12	8.55	4	B	2268584.8	6966172.55	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	3/16 wire bucket handle		√	12	0.5	0.25	N-S	0	√			
E13	E13_113_1604em2	13	8.26	4	B	2268550.15	6966182.63	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m166 fuze bar								√	3	1	0.5	N-S	0	√			
E13	E13_115_1604em2	15	8.1	4	A	2268618.03	6966142.7	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25			√						√			
E13	E13_116_1604em2	14	7.92	4	A	2268544.72	6966198.21	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	part,ferrous,3/8x4" bar-sto								√	3	0.5	0.25	E-W	0	√			
E13	E13_119_1604em2	10	7.71	4	C	2268520.87	6966155.81	11-Jul-06	Jim Thoren	√	√	ORD	> 24	1	0.5	20mm HE													FE	√	3	1	0.25			√			
E13	E13_12_1604em2	14	135.18	4	A	2268587.92	6966219.95	21-Jun-06	Alan Merriman	√													√	MIL	3	1	1	electric fence post		√						√			
E13	E13_122_1604em2	14	7.59	4	A	2268550.11	6966136.68	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.5	ferrous ac part		√	9	2	0.5	N-S	0	√			
E13	E13_125_1604em2	13	7.33	4	B	2268564.15	6966166.48	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m407a1 body														√			
E13	E13_129_1604em2	11	7.01	4	B	2268595.4	6966189.98	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	3	1	1 live ac flare & 2 str carts	√	CIV	> 24	> 10	1	wire and scrap	FE	√	> 24	> 6	> 4			√			
E13	E13_131_1604em2	15	6.84	4	A	2268575.67	6966206.14	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	aluminun ac scrap								√			
E13	E13_134_1604em2	13	6.71	4	B	2268526.23	6966145.66	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m407a1 body														√			
E13	E13_135_1604em2	12	6.63	4	B	2268579.41	6966169.95	21-Jun-06	Alan Merriman	√													√	MIL	3	2	0.25	ac scrap aluminum								√			
E13	E13_136_1604em2	12	6.6	4	B	2268608.17	6966184.15	21-Jun-06	Alan Merriman	√							√	ORD MD	24	1	0.25	vt fuze bracket							FE	√	6	4	0.25	N-S	45	√			
E13	E13_137_1604em2	13	6.6	4	B	2268524.13	6966187.66	21-Jun-06	Alan Merriman	√													√	MIL				steel disk								√			
E13	E13_14_1604em2	13	118.03	4	B	2268530.88	6966163.21	21-Jun-06	Alan Merriman	√													√	CIV	3	1	1	electric fence post		√	6	0.5	0.25	NE-SW	45	√			
E13	E13_144_1604em2	13	6.16	4	B	2268579.67	6966137.1	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m166 fuze bar	√	MIL	3	1	0.25	aluminum scrap/ ac part		√	3	1	0.5	N-S	0	√			
E13	E13_146_1604em2	12	6.04	4	B	2268529.88	6966147.03	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m407a1 body														√			
E13	E13_149_1604em2	13	5.95	4	B	2268564.16	6966171.12	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	m166 fuze parts														√			
E13	E13_15_1604em2	14	116.51	4	A	2268541.05	6966163.05	21-Jun-06	Alan Merriman	√													√	CIV	3	1	4	metal rod(same as item 6)		√	> 24	0.5	0.5	E-W		√			
E13	E13_153_1604em2	13	5.61	4	B	2268560.05	6966177.93	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	m407a1 ogive/seat part,ac,ferrou								√	3	1	0.5	N-S	0	√			
E13	E13_154_1604em2	13	5.37	4	B	2268536.7	6966143.74	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m407a1 body														√			
E13	E13_159_1604em2	13	5.17	4	B	2268568.8	6966174.25	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	frag/fuze parts aluminum														√			
E13	E13_16_1604em2	13	112.86	4	B	2268523.92	6966157.41	21-Jun-06	Alan Merriman	√													√	CIV	3	1	4	long metal rod		√	> 24	0.5	0.5	E-W	45	√			
E13	E13_161_1604em2	12	4.97	4	B	2268560	6966212.18	21-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	projectile frag ferrous								√	9	2	0.25	N-S	0	√			
E13	E13_162_1604em2	13	4.9	4	B	2268592.91	6966210.43	21-Jun-06	Alan Merriman	√													√	MIL	6	2	0.25	1 piece of alum,1 piece of steel								√			
E13	E13_164_1604em2	12	4.71	4	B	2268597.93	6966153.53	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	10 gauge ferrous wire handle		√	12	0.5	0.25	NE-SW	45	√			
E13	E13_166_1604em2	12	4.69	4	B	2268610.16	6966187.38	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	aluminum ac part smaller than 20								√			
E13	E13_17_1604em2	14	108.63	4	A	2268533.5	6966169.75	21-Jun-06	Alan Merriman	√													√	CIV	3	2	4	2 mtl rods (same as iem 9)		√	> 24	0.5	0.5	E-W	0				
E13	E13_170_1604em2	13	4.45	4	B	2268576.2	6966146.12	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m166 fuze bar								√	3	1	0.5	N-S	45	√			
E13	E13_172_1604em2	10	4.39	4	C	2268591.23	6966142.07	11-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze part							FE	√	3	0.5	0.25	N-S	0	√			
E13	E13_18_1604em2	12	102.87	4	B	2268589.79	6966228.62	21-Jun-06	Alan Merriman	√													√	MIL	6	1	1	long piece of mtl rod(same as 1		√	> 24	0.5	0.5	NE-SW	0	√			
E13	E13_180_1604em2	13	4.04	4	B	2268522.34	6966209.19	21-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	m407a1 body														√			
E13	E13_181_1604em2	9	3.97	4	C	2268614.36	6966165.52	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	3	0.5	0.25	N-S	0	√			
E13	E13_182_1604em2	12	3.96	4	B	2268533.3	6966226.52	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	metallic rusted metal ferrous								√			
E13	E13_184_1604em2	13	3.92	4	B	2268605.27	6966200.7	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	aluminum scrap								√			
E13	E13_187_1604em2	11	3.83	4	B	2268555.77	6966187.96	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ac part/seat part ferrous		√	3	0.5	0.5	E-W	0	√			
E13	E13_190_1604em2	11	3.79	4	B	2268610.51	6966166.63	21-Jun-06	Alan Merriman																			no find											
E13	E13_191_1604em2	13	3.78	4	B	2268548.24	6966234.9	21-Jun-06	Alan Merriman																			no find											
E13	E13_199_1604em2	11	3.55	3	B	2268522.66	6966184.49	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap metal disk/steel								√			
E13	E13_20_1604em2	14	87.01	4	A	2268574.5	6966212.38	21-Jun-06	Alan Merriman	√													√	CIV	0	2	2	electronic fence post&piece of a		√	24	0.5	0.25	N-S	0	√			
E13	E13_205_1604em2	11	3.43	3	B	2268593.4	6966207.01	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	steel ac part		√	3	0.5	0.5	N-S	0	√			
E13	E13_206_1604em2	10	3.41	3	C	2268606.63	6966154.99	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.25	N-S	0	√			
E13	E13_211_1604em2	11	3.25	3	B	2268555.74	6966221.88	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.5	metalic ferrous scrap								√			
E13	E13_215_1604em2	11	3.16	3	B	2268576.98	6966166.69	21-Jun-06	Alan Merriman	√													√	MIL	3	2	0.5	ac parts, ferrous		√	6	0.5	0.25	N-S	0	√			
E13	E13_22_1604em2	12	74.65	4	B	2268524.17	6966161.3	21-Jun-06	Alan Merriman	√													√	CIV	3	1	4	long metal rod (same as h17#16)		√	> 24	0.5	0.5	E-W	45	√			
E13	E13_228_1604em2	11	2.93	3	B	2268613.47	6966174.46	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	small ferrous frag								√	3	0.5	0.25	N-S	0	√			
E13	E13_23_1604em2	14	73.78	4	A	2268595.44	6966181.64	21-Jun-06	Alan Merriman	√													√	MIL	6	1	≥8	lg mtl plate(same at item 1)		√	24	> 6	0.5	E-W	90				
E13	E13_232_1604em2	15	2.85	3	A	2268542.85	6966156.29	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m166 fuze bar								√	3	1	0.5	N-S	0	√			
E13	E13_235_1604em2	11	2.82	3	B	2268555.7	6966174.41	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m407a1 ogive								√						√			
E13	E13_242_1604em2	12	2.69	3	B	2268585.92	6966146.33	21-Jun-06	Alan Merriman	√													√	MIL	3	2	0.25	msdc ferrule aluminum								√			
E13	E13_25_1604em2	15	71.42	4	A	2268584.33	6966176.93	21-Jun-06	Alan Merriman	√													√	CIV	6	1	1	metal plate		√	6	2	0.25	N-S	0	√			
E13	E13_251_1604em2	11	2.56	3	B	2268576.51	6966149.87	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m166 fuze bar								√	3	1	0.5	NE-SW	0	√			
E13	E13_256_1604em2	11	2.45	2	B	2268590.5	6966215.79	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	3/16 wire		√	6	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
E13	E13_30_1604em2	13	55	4	B	2268587.05	6966235.12	21-Jun-06	Alan Merriman	√													√	CIV	3	1	1	electric fence post		√	6	0.5	0.25	N-S	0	√			
E13	E13_35_1604em2	14	50.12	4	A	2268542.61	6966173.02	16-Aug-06	Alan Merriman	√							√	ORD MD	6	2	1	2 piece 2vt fuzes,m166,small arm								√	9	2	0.25	N-S	0	√			
E13	E13_38_1604em2	9	43.45	4	C	2268589.56	6966222.97	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap	FE	√	3	4	0.25	N-S	0	√			
E13	E13_39_1604em2	12	43.3	4	B	2268529.57	6966159.57	21-Jun-06	Alan Merriman	√													√	CIV	3	1	1	electric fence post(same as 14)		√	6	0.5	0.25	NE-SW	45	√			
E13	E13_4_1604em2	16	776.04	4	A	2268560.2	6966167.95	21-Jun-06	Alan Merriman	√													√	MIL	6	3	1	3 pieces of scrap metal		√	3	0.5	0.25	N-S	0	√			
E13	E13_40_1604em2	14	42.58	4	A	2268592.29	6966187.76	21-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	≥8	concrete block, wire and scrap	OTHER		> 24	> 6	> 4			√			
E13	E13_43_1604em2	14	36.23	4	A	2268568.68	6966184.53	21-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	piece of vt fuze								√	9	2	0.25	N-S	45	√			
E13	E13_44_1604em2	14	33.63	4	A	2268614.59	6966170.25	21-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	fin, fuze arming assembly								√	6	0.5	0.25	E-W	90	√			
E13	E13_45_1604em2	13	32.45	4	B	2268537.77	6966188.15	21-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	piece of vt fuze								√	6	4	0.5	NE-SW	45	√			
E13	E13_46_1604em2	10	32.32	4	C	2268538.41	6966165.16	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	sheet metal	FE	√	6	4	0.25	N-S	0	√			
E13	E13_48_1604em2	13	30.57	4	B	2268583.42	6966161.55	21-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	40mm genade outer casing								√	3	2	0.25	N-S	0	√			
E13	E13_5_1604em2	16	335.42	4	A	2268604.94	6966176.03	16-Aug-06	Alan Merriman	√													√	MIL	18	1	≥8	55 gal drum lid, rust flakes		√	> 24	> 6	0.25	NE-SW	45	√			
E13	E13_50_1604em2	15	28.99	4	A	2268557.41	6966157.56	21-Jun-06	Alan Merriman	√							√	ORD MD	12	1	1	metal piece from vt fuze								√	6	4	0.25	N-S	0	√			
E13	E13_56_1604em2	13	23.23	4	B	2268586.66	6966187.06	21-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	2	pieceof 55 gal drum and scrap	FE	√	12	0.5	0.25	NE-SW	0	√			
E13	E13_6_1604em2	14	326.09	4	A	2268542.26	6966159.83	21-Jun-06	Alan Merriman	√													√	CIV	3	1	4	metal rod		√	> 24	0.5	0.5	E-W	0	√			
E13	E13_66_1604em2	15	18.57	4	A	2268518.37	6966174.61	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	1	20mm piece and chunk of aluminum								√	3	1	1	NE-SW	45	√			
E13	E13_68_1604em2	13	17.49	4	B	2268536.74	6966194.23	21-Jun-06	Alan Merriman	√							√	ORD MD	3	3	1	40mm casing & 2 chunks of alumin								√	3	2	0.25	N-S	0	√			
E13	E13_71_1604em2	13	16.26	4	B	2268586.27	6966166.79	21-Jun-06	Alan Merriman	√													√	CIV	6	1	1	piece of scrap		√	6	0.5	0.25	NE-SW	45	√			
E13	E13_74_1604em2	13	15.62	4	B	2268569.01	6966161.46	21-Jun-06	Alan Merriman	√							√	ORD MD	6	2	1	piece of vt fuze & mtl chunk								√	3	0.5	0.5	E-W	90	√			
E13	E13_75_1604em2	12	15.5	4	B	2268609.01	6966180.72	21-Jun-06	Alan Merriman	√													√	MIL	18	1	1	lg pieces of aluminum		√	9	6	0.5	NE-SW	45	√			
E13	E13_77_1604em2	13	15.18	4	B	2268547.48	6966166.07	21-Jun-06	Alan Merriman	√							√	ORD MD	12	1	1	bottom piece of a flare canister								√	6	0.5	0.25	E-W	90	√			
E13	E13_78_1604em2	15	15.05	4	A	2268608.59	6966163.56	21-Jun-06	Alan Merriman	√							√	ORD MD	12	1	1	piece of vt fuze								√	9	0.5	0.25	NE-SW	90	√			
E13	E13_79_1604em2	12	14.68	4	B	2268575.88	6966222.19	21-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	round aluminum disk								√	3	0.5	0.5	NE-SW	45	√			
E13	E13_8_1604em2	15	222.93	4	A	2268577.9	6966210.69	21-Jun-06	Alan Merriman	√													√	CIV	0	2	2	electric fence post & alum piece		√	24	0.5	0.25	N-S	0	√			
E13	E13_81_1604em2	11	14.08	4	B	2268617.71	6966160.31	21-Jun-06	Alan Merriman	√													√	MIL	12	1	1	piece of metal tubing		√	9	0.5	0.5	NE-SW	45	√			
E13	E13_82_1604em2	13	14	4	B	2268586.17	6966153.3	21-Jun-06	Alan Merriman	√													√	CIV	12	3	1	1 piece of mtl & 2 of aluminum		√	3	0.5	0.5	NE-SW	90	√			
E13	E13_86_1604em2	13	13.37	4	B	2268534.67	6966153.88	21-Jun-06	Alan Merriman	√							√	ORD MD	6	2	1	metal piece from vt fuze								√	6	4	0.25	NE-SW	45	√			
E13	E13_87_1604em2	13	12.84	4	B	2268594.94	6966148.9	21-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	metal piece of vt fuze								√	6	0.5	0.25	N-S	0	√			
E13	E13_89_1604em2	13	12.18	4	B	2268573.83	6966230.09	21-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	m166 fuze bar								√	3	1	0.5	E-W	0	√			
E13	E13_9_1604em2	13	222.41	4	B	2268532.35	6966166.44	21-Jun-06	Alan Merriman	√													√	CIV	3	2	4	2 metal rods		√	> 24	0.5	0.5	E-W	0	√			
E13	E13_90_1604em2	15	12.06	4	A	2268604.84	6966226.5	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	metal fuze components/ferrous														√			
E13	E13_92_1604em2	13	11.84	4	B	2268574.64	6966180.67	21-Jun-06	Alan Merriman	√							√	ORD MD	0	2	0.25	m166 fuze bar	√	CIV	3	1	0.25	beer can		√	3	1	0.5	N-S	0	√			
E13	E13_93_1604em2	11	11.84	4	B	2268587.08	6966142.84	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m166 fuze bar								√	3	1	0.5	N-S	0	√			
E13	E13_95_1604em2	12	11.69	4	B	2268584.35	6966192.29	21-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	1	wire and scrap	FE	√	12	0.5	0.25			√			
E13	E13_96_1604em2	14	11.67	4	A	2268568.21	6966147.77	21-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.5	75 or 90mm apt/aphe frag ferrous														√			
E13	E13_99_1604em2	13	10.56	4	B	2268554.06	6966177.84	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	m407a1 body, ogive														√			
E14	E14_102_1604em2	15	9.59	4	A	2268676.44	6966202.91	22-Jun-06	Alan Merriman	√													√	MIL	6	1	0.25	chunk of aluminum	AL	√	6	0.5	0.5	E-W	90	√			
E14	E14_104_1604em2	13	9.48	4	B	2268640.43	6966215.62	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	VT fuze stabalizer								√	6	0.5	0.25	NE-SW	45	√			
E14	E14_110_1604em2	13	8.65	4	B	2268714.55	6966190.14	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze stabalizer								√	6	1	0.25	NE-SW	0	√			
E14	E14_117_1604em2	12	7.84	4	B	2268653.93	6966172.42	22-Jun-06	Alan Merriman	√													√	CIV	12	1	0.25	chunk of aluminum		√	3	0.5	0.25	NE-SW	90	√			
E14	E14_118_1604em2	13	7.8	4	B	2268655.77	6966178.55	22-Jun-06	Alan Merriman	√													√	MIL	6	2	0.25			√	3	0.5	0.25	NE-SW	0	√			
E14	E14_121_1604em2	14	7.65	4	A	2268639.44	6966196.31	22-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.25	40mm grenade casing								√	3	0.5	0.25	NE-SW	0	√			
E14	E14_123_1604em2	15	7.55	4	A	2268654.9	6966235.14	22-Jun-06	Alan Merriman	√							√	ED MD	3	1	0.25	40mm cart/unsure of condition								√	3	2	2			√			
E14	E14_127_1604em2	12	7.24	4	B	2268708.02	6966192.99	22-Jun-06	Alan Merriman	√							√	ED MD	3	1	0.25	40mm cart								√	3	1	1	NE-SW	45	√			
E14	E14_130_1604em2	15	6.88	4	A	2268710.9	6966204.18	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	VT fuze stabalizer								√	6	2	0.25	NE-SW	45	√			
E14	E14_142_1604em2	13	6.44	4	B	2268665.25	6966227.46	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	VT stabalizer/metal								√	3	0.5	0.5	E-W	90	√			
E14	E14_145_1604em2	13	6.14	4	B	2268698.26	6966230.43	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of VT fuze-same item as 80								√	9	4	0.25	NE-SW	45	√			
E14	E14_147_1604em2	14	5.96	4	A	2268634.7	6966229.75	22-Jun-06	Alan Merriman	√							√	ED MD	6	1	0.25	40mm cart/unsure of complete exp								√	3	2	2	NE-SW	45	√			
E14	E14_148_1604em2	13	5.95	4	B	2268666.34	6966179.01	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze stabalizer								√	6	0.5	0.25	NE-SW	45	√			
E14	E14_150_1604em2	14	5.91	4	A	2268658.42	6966151.05	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	piece of metal-same item as 189		√	6	2	0.25	N-S	0	√			
E14	E14_151_1604em2	14	5.86	4	A	2268687.09	6966164.27	22-Jun-06	Alan Merriman	√													√	MIL	6	1	0.25	piece of metal		√	3	0.5	0.25	NE-SW	90	√			
E14	E14_152_1604em2	12	5.8	4	B	2268688.23	6966196.86	22-Jun-06	Alan Merriman	√													√	MIL	6	1	0.25	chunk of metal		√	3	0.5	0.5	NE-SW	0	√			
E14	E14_155_1604em2	13	5.3	4	B	2268685.62	6966209.35	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze stabalizer								√	3	0.5	0.5	N-S	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
E14	E14_157_1604em2	11	5.24	4	B	2268699.73	6966145.02	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	piece of wire		√	6	0.5	0.25	NE-SW	0	√			
E14	E14_158_1604em2	10	5.22	4	C	2268620.77	6966162.13	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap, steel	FE	√	3	2	0.25	N-S	0	√			
E14	E14_165_1604em2	12	4.7	4	B	2268696.97	6966181.73	22-Jun-06	Alan Merriman	√													√	MIL	6	2	0.25	flat pieces of metal		√	3	0.5	0.25	NE-SW	45	√			
E14	E14_167_1604em2	13	4.66	4	B	2268628.54	6966163.97	22-Jun-06	Alan Merriman	√													√	MIL	6	2	0.25	flat piece of metal		√	3	0.5	0.25	NE-SW	45	√			
E14	E14_168_1604em2	12	4.62	4	B	2268660.55	6966160.73	22-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	fence staple		√	3	0.5	0.25	NE-SW	90	√			
E14	E14_173_1604em2	12	4.38	4	B	2268626.34	6966181.38	22-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	pieces of aluminum	AL	√	3	1	0.25	NE-SW	45	√			
E14	E14_176_1604em2	10	4.23	4	C	2268648.13	6966173.54	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag							FE	√	3	1	0.25	N-S	0	√			
E14	E14_178_1604em2	12	4.14	4	B	2268717	6966154.77	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze stablizer								√	3	0.5	0.25	N-S	45	√			
E14	E14_185_1604em2	12	3.9	4	B	2268693.04	6966222.92	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of vt fuze								√	9	0.5	0.25	NE-SW	45	√			
E14	E14_188_1604em2	13	3.82	4	B	2268698.18	6966165.48	22-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	piece of aluminum	AL	√	6	0.5	0.25	NE-SW	90	√			
E14	E14_189_1604em2	13	3.81	4	B	2268657.65	6966147.78	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	piece of metal		√	6	2	0.25	N-S	0	√			
E14	E14_194_1604em2	11	3.68	4	B	2268621.33	6966181.39	22-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	smal piece of aluminum	AL	√	3	0.5	0.25	N-S	45	√			
E14	E14_207_1604em2	12	3.35	3	B	2268680.64	6966196.59	22-Jun-06	Alan Merriman	√													√	CIV	12	1	0.25	flat metal washer		√	3	0.5	0.25	NE-SW	0	√			
E14	E14_217_1604em2	11	3.15	3	B	2268715.84	6966165.87	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze part								√	3	0.5	0.25	N-S	0	√			
E14	E14_218_1604em2	11	3.13	3	B	2268661.84	6966185.18	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze stabalizer								√	6	0.5	0.5	E-W	45	√			
E14	E14_219_1604em2	11	3.12	3	B	2268705.08	6966186.66	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	metal frag								√	3	0.5	0.25	NE-SW	45	√			
E14	E14_224_1604em2	11	3.07	3	B	2268704.27	6966170.91	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.5	piece of frag/metal								√	3	0.5	0.25	NE-SW	90	√			
E14	E14_231_1604em2	11	2.85	3	B	2268627.16	6966155.64	22-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	small piece of aluminum	AL	√	6	0.5	0.25	NE-SW	90	√			
E14	E14_238_1604em2	11	2.71	3	B	2268669.66	6966187.01	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze component/aluminum							AL	√	3	1	0.5	E-W	45	√			
E14	E14_248_1604em2	12	2.6	3	B	2268623.97	6966208.85	22-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.25	VT fuze part								√	6	0.5	0.5	NE-SW	45	√			
E14	E14_26_1604em2	16	63.4	4	A	2268675.72	6966212.71	22-Jun-06	Alan Merriman	√													√	CIV	6	1	0.5	5 gallon backet led/metal	OTHER	√	12	0.5	0.25	E-W	0	√			
E14	E14_28_1604em2	13	58.11	4	B	2268623.77	6966212.42	22-Jun-06	Alan Merriman	√													√	CIV	3	1	2	machinery part		√	6	4	2	N-S	0	√			
E14	E14_32_1604em2	14	52.46	4	A	2268696.3	6966170.98	22-Jun-06	Alan Merriman	√							√	ORD MD	6	2	0.25	2 pieces of VT fuze								√	6	2	0.25	NE-SW	0	√			
E14	E14_36_1604em2	16	48.68	4	A	2268706.94	6966153	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	Vt fuze parts (stabalizer/piece)								√	6	0.5	0.25	N-S	45	√			
E14	E14_37_1604em2	11	47.1	4	B	2268688.44	6966167.34	22-Jun-06	Alan Merriman	√													√	MIL	12	1	0.5	large ball of wire		√	12	0.5	0.25	NE-SW	90	√			
E14	E14_51_1604em2	13	28.75	4	B	2268626.85	6966218.4	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze part								√	9	2	0.25	NE-SW	45	√			
E14	E14_54_1604em2	16	23.37	4	A	2268677.87	6966235.81	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of Vt fuze stabalizer								√	3	0.5	0.25	NE-SW	45	√			
E14	E14_57_1604em2	15	23.06	4	A	2268634.04	6966203.12	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	VT fuze pt								√	9	0.5	0.25	NE-SW	45	√			
E14	E14_58_1604em2	14	22.67	4	A	2268632.95	6966147.39	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	VT fuze pt								√	9	2	0.25	NE-SW	90	√			
E14	E14_59_1604em2	14	22.35	4	A	2268644.69	6966228.7	22-Jun-06	Alan Merriman	√													√	MIL	3	2	0.25	2 pieces of metal		√	3	2	2	NE-SW	45	√			
E14	E14_63_1604em2	15	19.23	4	A	2268651.66	6966204.37	22-Jun-06	Alan Merriman	√													√	MIL	6	1	0.5	ejection seat part		√	9	1	0.25	E-W	90	√			
E14	E14_67_1604em2	14	17.62	4	A	2268684.81	6966158.17	22-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	metal plate		√	6	2	0.25	NE-SW	45	√			
E14	E14_70_1604em2	15	16.57	4	A	2268654.2	6966194.73	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	VT fuze piece								√	9	4	0.25	NE-SW	0	√			
E14	E14_72_1604em2	13	15.85	4	B	2268680.6	6966193.24	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	piece from VT fuze								√	9	2	0.25	NE-SW	45	√			
E14	E14_73_1604em2	14	15.78	4	A	2268660.57	6966212.36	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	VT fuze part								√	3	2	0.25	NE-SW	45	√			
E14	E14_80_1604em2	15	14.44	4	A	2268619.8	6966232.25	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of VT fuze/metal								√	6	4	0.25	NE-SW	45	√			
E14	E14_83_1604em2	14	13.84	4	A	2268663.92	6966222.2	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	flat piece of metal								√			
E14	E14_85_1604em2	13	13.49	4	B	2268697.7	6966226.25	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of VT fuze								√	9	4	0.25	NE-SW	90	√			
E14	E14_88_1604em2	14	12.39	4	A	2268676.41	6966232.66	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of VT fuze								√	9	4	0.25	NE-SW	45	√			
E14	E14_91_1604em2	14	12.01	4	A	2268700.76	6966203.23	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	flat piece of metal		√	9	6	0.25	NE-SW	45	√			
E14	E14_94_1604em2	13	11.72	4	B	2268675.84	6966191.62	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze stabalizer								√	6	0.5	0.5	NE-SW	90	√			
E14	E14_97_1604em2	13	11.54	4	B	2268667	6966175.58	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	metal pin/rod		√	6	0.5	0.25	NE-SW	0	√			
E14	E14_98_1604em2	13	10.9	4	B	2268644.04	6966212.49	22-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	large ball of barbed wire		√	24	0.5	0.25	NE-SW	45	√			
E15	E15_110_1610em2	14	6.88	4	A	2268768.97	6966220.77	06-Jul-06	Alan Merriman	√							√	ORD MD	3	3	0.25	fuze parts, vt							FE	√	3	0.5	0.25	N-S	45	√			
E15	E15_116_1610em2	12	6.3	4	B	2268722.07	6966172.13	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal with brass							FE	√	3	0.5	0.25	N-S	0	√			
E15	E15_118_1610em2	12	6.22	4	B	2268802.82	6966185.73	06-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50cal jacket/ eat part with copp							AL	√	3	1	1	N-S	0				
E15	E15_121_1610em2	10	6.06	4	C	2268808.1	6966234.53	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	aluminum scrap							AL	√	6	0.5	0.5	N-S	0	√			
E15	E15_124_1610em2	12	5.96	4	B	2268769.91	6966191.42	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	nails, staples	FE	√	3	0.5	0.25	N-S	0	√			
E15	E15_129_1610em2	12	5.62	4	B	2268812.08	6966232.58	06-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	ac scrap	AL	√	3	1	1	N-S	0	√			
E15	E15_130_1610em2	10	5.36	4	C	2268770.08	6966197.82	11-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze part, vt							FE	√	3	0.5	0.25	N-S	0	√			
E15	E15_131_1610em2	12	5.26	4	B	2268802.13	6966200.95	06-Jul-06	Alan Merriman	√													√	CIV	24	10	0.25	nails	FE		6	0.5	0.25	N-S	0	√			
E15	E15_136_1610em2	15	5.02	4	A	2268812.63	6966199.71	16-Aug-06	Alan Merriman	√													√	CIV	24	2	0.25	scrap metal, scrap metal	FE	√	6	2	0.5	NE-SW	45	√			
E15	E15_146_1610em2	11	4.5	4	B	2268774.36	6966160.77	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze base							OTHER	√	3	1	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
E15	E15_148_1610em2	12	4.42	4	B	2268784.78	6966150.27	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	aluminum can	AL	√	6	4	0.25	N-S	0	√			
E15	E15_15_1610em2	15	54.93	4	A	2268739.2	6966200.38	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	scrap	AL	√	6	0.5	0.25	NE-SW	0	√			
E15	E15_153_1610em2	11	4.07	4	B	2268730.55	6966148.21	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	3	0.5	0.5	NE-SW	0	√			
E15	E15_158_1610em2	11	3.9	4	B	2268800	6966139.05	06-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	50 cal							CU	√	3	0.5	0.25	N-S	0	√			
E15	E15_159_1610em2	12	3.84	4	B	2268776.05	6966142.12	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze booster mt							FE	√	3	1	1	N-S	0	√			
E15	E15_163_1610em2	11	3.58	3	B	2268776.92	6966216	06-Jul-06	Alan Merriman	√													√	MIL	3	2	0.25	ac parts, seat	FE	√	3	0.5	0.25	SE-NW	45	√			
E15	E15_174_1610em2	11	3.29	3	B	2268783.72	6966197.95	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap metal	FE	√	3	6	2	N-S	45	√			
E15	E15_179_1610em2	10	3.19	3	C	2268787.53	6966187.38	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE							√			
E15	E15_191_1610em2	12	3.01	3	B	2268752.7	6966218.74	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	frag, unknown							FE	√	3	0.5	0.25	NE-SW	0	√			
E15	E15_22_1610em2	15	36.3	4	A	2268813.59	6966203.04	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	steel bar	FE	√	6	0.5	0.5	N-S	0	√			
E15	E15_30_1610em2	15	26.7	4	A	2268746.34	6966181.54	16-Aug-06	Alan Merriman	√							√	ORD MD	3	2	0.25	small arms,20mm,vt fuze bar							CU	√	3	0.5	0.25	N-S	0	√			
E15	E15_32_1610em2	16	26.16	4	A	2268755.23	6966199.2	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap metal	OTHER	√	3	4	0.25	N-S	45	√			
E15	E15_4_1610em2	16	164.28	4	A	2268796.76	6966174.73	06-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.5	fuze part, vt							FE	√	3	4	2	N-S	0	√			
E15	E15_41_1610em2	16	20.22	4	A	2268723.5	6966228.88	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bar, vt							FE	√	3	1	0.5	NE-SW	0	√			
E15	E15_48_1610em2	15	17.26	4	A	2268795.84	6966189.41	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	3	2	1	N-S	45	√			
E15	E15_51_1610em2	13	16.6	4	B	2268800.88	6966182.71	06-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	fuze parts, vt							FE	√	3	2	0.25	N-S	0	√			
E15	E15_53_1610em2	15	16.18	4	A	2268767.67	6966154.55	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bracket, vt							FE	√	6	1	0.25	N-S	0	√			
E15	E15_54_1610em2	13	14.85	4	B	2268814.55	6966206.61	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	steel bar	FE	√	6	0.5	0.5	N-S	0	√			
E15	E15_57_1610em2	14	14.57	4	A	2268757.05	6966170.09	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	vehicle part	AL	√	3	1	0.25	N-S	0	√			
E15	E15_59_1610em2	16	13.64	4	A	2268793.29	6966171.12	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze strap. Vt							FE	√	6	1	1	N-S	0	√			
E15	E15_7_1610em2	15	94.82	4	A	2268746.26	6966178.05	16-Aug-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze strap, vt fuze bar							FE	√	3	0.5	0.25	NE-SW	0	√			
E15	E15_71_1610em2	13	10.83	4	B	2268724.91	6966144.5	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	in and out box							FE	√	3	1	0.5	N-S	0	√			
E15	E15_74_1610em2	15	10.05	4	A	2268798.05	6966178.58	06-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	explosive bolt mt							FE	√	6	0.5	0.5	N-S	0	√			
E15	E15_75_1610em2	16	9.84	4	A	2268733.43	6966165.92	06-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	vehicle part	AL	√	3	0.5	0.25	NE-SW	0	√			
E15	E15_79_1610em2	13	9.53	4	B	2268801.77	6966204.73	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
E15	E15_85_1610em2	10	8.79	4	C	2268791.27	6966189.41	11-Jul-06	Jim Thoren																			no contact											
E15	E15_86_1610em2	13	8.74	4	B	2268812.55	6966225.12	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire fence, wire	FE	√	6	0.5	0.25	N-S	0	√			
E15	E15_88_1610em2	13	8.59	4	B	2268801.36	6966212.34	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
E15	E15_89_1610em2	13	8.35	4	B	2268795.61	6966185.67	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm ogive piece							FE		3	0.5	0.5	N-S	0	√			
E15	E15_92_1610em2	13	8.09	4	B	2268791.61	6966192.73	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bar, vt							FE	√	3	1	0.5	E-W	0	√			
E15	E15_95_1610em2	12	7.72	4	B	2268764.19	6966170.16	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ac flare part mt							AL	√	3	1	0.25	N-S	0	√			
E15	E15_96_1610em2	13	7.63	4	B	2268735.72	6966195.31	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bar, vt							FE	√	3	0.5	1	N-S	0	√			
E15	E15_97_1610em2	16	7.5	4	A	2268756.07	6966195.56	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	wire, staple	FE	√	12	0.5	0.25	N-S	0	√			
E16	E16_107_1604em2	14	8.97	4	A	2268860.96	6966233.2	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	2	0.25			√			
E16	E16_126_1604em2	13	7.31	4	B	2268830.6	6966212.01	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna							AL	√	3	1	0.5	N-S	0	√			
E16	E16_128_1604em2	10	7.07	4	C	2268841.7	6966173.63	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	wire bundle, wire	FE	√	12	0.5	0.25			√			
E16	E16_132_1604em2	13	6.77	4	B	2268865.01	6966196.8	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna							AL	√	6	0.5	0.5	E-W	0	√			
E16	E16_139_1604em2	12	6.51	4	B	2268821.8	6966142.27	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel rod		√	3	0.5	0.5	N-S	45	√			
E16	E16_140_1604em2	14	6.5	4	A	2268895.44	6966151.92	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	can, aluminum	AL	√	6	4	0.25			√			
E16	E16_141_1604em2	11	6.46	4	B	2268848.49	6966189.02	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	ball of wire	FE	√	9	4	0.25	N-S	45	√			
E16	E16_163_1604em2	9	4.77	4	C	2268861.91	6966164.92	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	> 24	0.5	0.25	N-S	0	√			
E16	E16_201_1604em2	11	3.48	3	B	2268845.55	6966190.56	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	ball of wire	FE	√	6	4	0.25	N-S	0	√			
E16	E16_202_1604em2	11	3.48	3	B	2268865.82	6966193.5	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze scrap							AL	√	3	0.5	0.25	NE-SW	45	√			
E16	E16_223_1604em2	11	3.07	3	B	2268855.2	6966175.2	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	ball of wire		√	9	4	0.25	N-S	45	√			
E16	E16_24_1604em2	15	73.75	4	A	2268854.37	6966219.09	26-Jun-06	Jim Thoren	√													√	MIL	0	1	4	scrap	SS	√	6	2	0.25			√			
E16	E16_266_1604em2	8	2.31	2	D	2268885.96	6966145.9	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
E16	E16_27_1604em2	16	61.22	4	A	2268841.09	6966177.05	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire, left in ground	FE	√	> 24	0.5	0.25						
E16	E16_29_1604em2	14	55.88	4	A	2268852.48	6966144.39	26-Jun-06	Jim Thoren	√							√	ORD MD	0	1	≥8	fuze, vt, 5 lbs							FE	√	6	4	0.25			√			
E16	E16_53_1604em2	15	24.66	4	A	2268886.36	6966230.62	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt bracket							FE	√	6	4	0.25			√			
E16	E16_55_1604em2	14	23.33	4	A	2268834.12	6966218.55	26-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze, vt bracket							FE	√	6	2	0.25			√			
E16	E16_62_1604em2	16	19.27	4	A	2268827.48	6966226.61	26-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze, vt part							FE	√	3	2	0.25			√			
E16	E16_64_1604em2	13	18.98	4	B	2268834.8	6966221.77	26-Jun-06	Jim Thoren																			no contact, reacquired 7/25/06											
E16	E16_69_1604em2	13	17.2	4	B	2268852.64	6966150.18	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket							AL	√	6	1	0.25	NE-SW	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
E17	E17_114_1604em2	14	8.14	4	A	2268960.11	6966141.07	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt antenna							FE	√	6	2	0.25			√			
E17	E17_179_1604em2	11	4.04	4	B	2268951.97	6966144.31	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	1	0.25			√			
E17	E17_186_1604em2	12	3.89	4	B	2268925.34	6966183.62	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	50 cal projo							OTHER	√	3	0.5				√			
E17	E17_233_1604em2	11	2.84	3	B	2268920.91	6966152.48	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
E17	E17_47_1604em2	14	31.54	4	A	2268930.91	6966173.81	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze, vt bracket							FE	√	6	2	0.25			√			
F02	F02_01_612_mag			99	M	2267470.879	6966050.071	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
F02	F02_02_612_mag			99	M	2267480.099	6966058.779	12-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	37mm fragment														√			
F02	F02_03_612_mag			99	M	2267485.162	6966061.131	12-Jun-06	Alan Merriman	√													√	CIV	6	1	1	fence wire								√			
F02	F02_04_612_mag			99	M	2267479.59	6966075.963	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
F02	F02_05_612_mag			99	M	2267461.341	6966128.174	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
F02	F02_06_612_mag			99	M	2267480.466	6966123.113	12-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	37mm fragment														√			
F02	F02_07_612_mag			99	M	2267475.941	6966084.878	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	spark plug								√			
F02	F02_08_612_mag			99	M	2267463.038	6966106.285	12-Jun-06	Alan Merriman	√													√	CIV	6	1	1	fence wire								√			
F02	F02_114_1528em2	9	1.83	1	C	2267448.9	6966046.77	19-Jun-06	Alan Merriman	√													√					iron oxide detected in soil, 18"											
F02	F02_34_1528em2	16	28.27	4	A	2267503.77	6966113.98	06-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	frag	√	CIV	3	2	1	wire		√	6	2	0.5	NE-SW	45	√			
F02	F02_41_1528em2	13	16.92	4	B	2267491.07	6966136.19	06-Jun-06	Alan Merriman	√													√	CIV	3	2	1	wire		√	3	0.5	0.25		90	√			
F02	F02_62_1528em2	12	4.06	4	B	2267504.4	6966091.83	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag 37mm								√	3	1	1		90	√			
F02	F02_64_1528em2	14	3.7	4	A	2267503.47	6966110.59	06-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	frag								√	6	2	0.5	NE-SW	45	√			
F02	F02_65_1528em2	10	3.57	3	C	2267451.53	6966104.16	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	1/4piec of 37mm,m63 mod1,prac(ca								√	3	1	0.5	N-S	0	√			
F03	F03_25_1528em2	16	106.38	4	A	2267597.51	6966073.44	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap			6	4	0.25			√			
F03	F03_46_1528em2	15	9.41	4	A	2267598.89	6966099.95	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap			3	4	0.25		0	√			
F04	F04_40_1528em2	15	19	4	A	2267619.12	6966119.09	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fuze, mt 100 series								√	3	2	2	N-S	45	√			
F04	F04_73_1528em2	10	3.14	3	C	2267620.73	6966082.23	19-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	50 cal ap,300 grn,copper jkt,ste								√	3	0.5	0.5	E-W	0	√			
F05	F05_17_1529em2	16	17.51	4	A	2267766.06	6966116.48	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	flare, slap								√	3	4	0.5	NE-SW		√			
F05	F05_18_1529em2	16	16.45	4	A	2267754.01	6966053.69	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	unknown								√	3	2	2	E-W	45	√			
F05	F05_19_1529em2	16	14.4	4	A	2267808.09	6966121.13	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	4	flare, slap empty								√	3	4	4	E-W	45	√			
F05	F05_22_1529em2	15	11.41	4	A	2267723.32	6966086.1	06-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	chaff/expended								√	6	2	2	E-W	0	√			
F05	F05_23_1529em2	13	10.38	4	B	2267794.09	6966063.79	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire, fence		√	6	0.5	0.25	N-S	0	√			
F05	F05_25_1529em2	14	8.85	4	A	2267738.72	6966088.73	06-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	30mm frag piece								√	6	1	1	NE-SW	0	√			
F05	F05_27_1529em2	13	7.96	4	B	2267764.56	6966090.55	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	chaff								√	3	2	1	SE-NW		√			
F06	F06_103_1528em2	9	1.93	2	C	2267866.82	6966089.02	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	3	0.5	0.25	NE-SW	45	√			
F06	F06_15_1529em2	15	19.59	4	A	2267826.61	6966092.88	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	barb wire		√	3	0.5	0.25	NE-SW	0	√			
F06	F06_24_1529em2	10	9.47	4	C	2267832.35	6966087.09	19-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	staple	FE	√	3	0.5	0.25	N-S	45	√			
F06	F06_29_1529em2	13	7.15	4	B	2267833.83	6966090.63	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	staple		√	3	0.5	0.25			√			
F06	F06_30_1529em2	12	6.8	4	B	2267834.89	6966125.27	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	1	0.5	N-S	45	√			
F06	F06_38_1529em2	11	2.52	3	B	2267831.81	6966105.29	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	barb wire		√	3	0.5	0.25	E-W	0	√			
F06	F06_39_1528em2	15	23.39	4	A	2267899.7	6966077.09	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	nail, service		√	6	0.5	0.25	N-S	90	√			
F06	F06_43_1528em2	16	11.84	4	A	2267860.44	6966068.89	06-Jun-06	Alan Merriman	√													√	CIV	0	2	1	wire		√	6	0.5	0.25	N-S	0	√			
F06	F06_52_1528em2	13	6.62	4	B	2267911.63	6966086.45	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	valve stem		√	3	1	1	E-W	0	√			
F06	F06_53_1528em2	14	6.4	4	A	2267877.54	6966123.2	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1			√	9	0.5	0.25	N-S	0				
F06	F06_58_1528em2	13	5.41	4	B	2267859.88	6966134.88	06-Jun-06	Alan Merriman	√													√	CIV	3	2	1	flat steel		√	3	0.5	0.25	N-S	0	√			
F06	F06_66_1528em2	10	3.43	3	C	2267886.04	6966134.84	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	barbed wire		√	6	0.5	0.25	E-W	90	√			
F06	F06_69_1528em2	12	3.35	3	B	2267859.96	6966087.05	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1			√	9	0.5	0.25	N-S	0	√			
F06	F06_74_1528em2	14	2.94	3	A	2267860.52	6966042.27	06-Jun-06	Alan Merriman	√													√	CIV	6	1	1	nail		√	3	0.5	0.25	N-S	90	√			
F06	F06_89_1528em2	11	2.27	2	B	2267874.21	6966123.95	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	9	0.5	0.25	N-S	0	√			
F06	F06_99_1528em2	9	1.97	2	C	2267863.02	6966079.45	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	6	0.5	0.25	NE-SW	0	√			
F07	F07_115_1414em2	11	2.51	3	B	2267946.37	6966060.55	12-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal														√			
F07	F07_207_1414em2	4	1.04	1	F	2267983.61	6966077.27	17-Aug-06	Alan Merriman	√													√	CIV	0	3	0.25	t-post clip	FE							√			
F07	F07_28_1414em2	16	16.29	4	A	2267998.85	6966083.16	12-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	flare														√			
F07	F07_39_1414em2	16	10.07	4	A	2267970.75	6966069.01	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
F07	F07_53_1414em2	16	6.24	4	A	2268008.91	6966133.08	16-Aug-06	Jim Thoren	√							√	ORD MD	6	1	1	fuze, scrap														√			
F07	F07_54_1414em2	15	6.24	4	A	2267977.26	6966122.77	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
F07	F07_57_1414em2	13	5.95	4	B	2267931.9	6966037.02	12-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
F07	F07_64_1414em2	13	5.19	4	B	2267932.95	6966103.87	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
F07	F07_76_1414em2	13	4.36	4	B	2267997.42	6966115.04	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
F07	F07_82_1414em2	12	3.99	4	B	2267943.88	6966096.65	12-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal														√			
F07	F07_87_1414em2	11	3.82	4	B	2267976	6966095.98	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
F07	F07_92_1414em2	12	3.43	3	B	2267970.1	6966083.7	12-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
F07	QAdig_F07_512		5.8		QA	2267996.06	6966061.72	15-Aug-06	Alan Merriman	√							√	ORD MD	0	1	0.25	50 calibur, brass							OTHER							√			
F08	F08_102_1414em2	11	2.88	3	B	2268074.05	6966063.73	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
F08	F08_108_1414em2	11	2.8	3	B	2268032.59	6966104.36	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
F08	F08_12_1414em2	15	67.64	4	A	2268061.77	6966048.5	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap											
F08	F08_17_1414em2	12	48.61	4	B	2268092.49	6966042.79	13-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
F08	F08_2_1414em2	15	229.15	4	A	2268072.07	6966055.03	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
F08	F08_21_1414em2	16	33.58	4	A	2268090.74	6966063.3	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
F08	F08_25_1414em2	13	20.23	4	B	2268088.58	6966050.07	13-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
F08	F08_26_1414em2	15	18.33	4	A	2268052.48	6966039.45	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
F08	F08_27_1414em2	14	16.66	4	A	2268021.52	6966118.2	16-Aug-06	Jim Thoren	√							√	ORD MD	0	1	0.25	small arms casing	√	CIV	3	1	1	scrap								√			
F08	F08_30_1414em2	15	15.39	4	A	2268062.25	6966077.52	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
F08	F08_35_1414em2	14	11.93	4	A	2268064.5	6966037.98	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
F08	F08_37_1414em2	12	10.76	4	B	2268091.27	6966045.84	13-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
F08	F08_38_1414em2	15	10.15	4	A	2268054.15	6966110.32	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
F08	F08_41_1414em2	15	8.01	4	A	2268035.59	6966081.11	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
F08	F08_43_1414em2	13	7.76	4	B	2268108.09	6966048.09	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire								√			
F08	F08_44_1414em2	15	7.73	4	A	2268104.48	6966036.59	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	20mm														√			
F08	F08_47_1414em2	14	7.46	4	A	2268042.75	6966051.55	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
F08	F08_48_1414em2	12	7.37	4	B	2268112.48	6966056	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
F08	F08_50_1414em2	13	6.67	4	B	2268063.95	6966060.22	13-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
F08	F08_58_1414em2	13	5.9	4	B	2268085.73	6966125.3	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
F08	F08_61_1414em2	12	5.59	4	B	2268029.83	6966062.5	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	20mm projo														√			
F08	F08_63_1414em2	12	5.27	4	B	2268062.96	6966054.67	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
F08	F08_67_1414em2	15	5.06	4	A	2268061.23	6966045.04	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
F08	F08_69_1414em2	13	4.84	4	B	2268078.41	6966038.01	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
F08	F08_86_1414em2	11	3.83	4	B	2268095.51	6966041.45	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
F08	F08_89_1414em2	13	3.76	4	B	2268066.77	6966091	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
F08	F08_95_1414em2	12	3.31	3	B	2268064.32	6966063.92	13-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
F08	F08_96_1414em2	11	3.15	3	B	2268067.55	6966122	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
F08	F08_99_1414em2	12	2.99	3	B	2268034.7	6966070.72	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
F09	F09_105_1415em2	14	15.97	4	A	2268195.57	6966104.07	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	flare mt							AL	√	6	2	0.25	N-S	0	√			
F09	F09_121_1415em2	15	13.81	4	A	2268216	6966127.77	19-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	frag, fuze bracket (vt)							FE	√	6	2	0.25	N-S	0	√			
F09	F09_138_1415em2	12	11.82	4	B	2268162.96	6966040.33	19-Jul-06	Alan Merriman	√													√	CIV	0	4	0.25	ac seat parts, nails	FE	√	6	1	0.25	N-S	0	√			
F09	F09_146_1415em2	13	10.68	4	B	2268181.94	6966136.2	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	scrap							FE	√	3	2	0.25	N-S	0	√			
F09	F09_161_1415em2	14	9.29	4	A	2268169.98	6966045.27	19-Jul-06	Alan Merriman	√													√	MIL	0	5	0.25	ac seat parts, nails	FE	√	3	1	0.25	N-S	0	√			
F09	F09_18_1415em2	16	80.34	4	A	2268199.51	6966101.11	19-Jul-06	Alan Merriman	√							√	ORD MD	0	1	1	frag							FE	√	12	> 6	0.5	N-S	0	√			
F09	F09_193_1415em2	14	7.22	4	A	2268178.84	6966098.85	19-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	scrap	AL	√	3	2	0.25	N-S	0	√			
F09	F09_220_1415em2	12	6.01	4	B	2268157.88	6966040.07	19-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	hinge	FE	√	3	2	0.25	N-S	0	√			
F09	F09_245_1415em2	10	5.09	4	C	2268195.7	6966109.23	19-Jul-06	Alan Merriman																			no find, reacquired 8/7/06											
F09	F09_260_1415em2	10	4.66	4	C	2268189.2	6966039.65	19-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	ac part, 50 cal							OTHER	√	12	0.5	0.25			√			
F09	F09_261_1415em2	13	4.56	4	B	2268178.55	6966051.81	19-Jul-06	Alan Merriman	√													√	MIL	3	3	0.25	ac seat parts	SS	√	3	1	0.5	N-S	0	√			
F09	F09_262_1415em2	13	4.55	4	B	2268190.52	6966100.06	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.5	frag							FE	√	6	1	0.25	N-S	0	√			
F09	F09_268_1415em2	13	4.5	4	B	2268208.13	6966077.26	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm tp (seed item)							FE	√	3	0.5	0.25	N-S	0	√			
F09	F09_281_1415em2	12	4.29	4	B	2268189.33	6966109.01	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40 cad							AL	√	3	0.5	0.25	N-S	0	√			
F09	F09_29_1415em2	13	51.71	4	B	2268162.99	6966036.57	19-Jul-06	Alan Merriman	√													√	MIL	0	3	0.25	ac seat part	SS	√	6	1	0.25	N-S	0	√			
F09	F09_292_1415em2	13	4.07	4	B	2268145.62	6966066.86	17-Aug-06	Alan Merriman	√													√	CIV	0	3	0.25	t-post clips, t-post clip	FE	√	3	0.5	0.25	N-S	0	√			
F09	F09_295_1415em2	13	3.95	4	B	2268217.78	6966077.21	19-Jul-06	Alan Merriman	√													√	MIL	0	1	0.25	ac seat part	SS	√	3	2	0.25	N-S	0	√			
F09	F09_297_1415em2	12	3.94	4	B	2268148.45	6966037.95	19-Jul-06	Alan Merriman	√													√	MIL	0	1	0.25	ac seat part	AL	√	6	1	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
F09	F09_298_1415em2	11	3.9	4	B	2268209.27	6966122.54	19-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	ac seat part	SS	√	3	2	0.25	N-S	0	√			
F09	F09_313_1415em2	13	3.76	4	B	2268141.77	6966037.52	19-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
F09	F09_322_1415em2	12	3.59	3	B	2268142.7	6966045.99	19-Jul-06	Alan Merriman	√													√	CIV	0	4	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
F09	F09_326_1415em2	11	3.57	3	B	2268204.23	6966124.37	19-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	FE	√	3	2	0.25	N-S	0	√			
F09	F09_329_1415em2	11	3.53	3	B	2268215.44	6966091.05	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal (&FE)							CU	√	3	0.5	0.25	N-S	0	√			
F09	F09_330_1415em2	11	3.52	3	B	2268149.16	6966116.3	19-Jul-06	Alan Merriman	√													√	CIV	0	4	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
F09	F09_337_1415em2	11	3.37	3	B	2268173.09	6966046.95	19-Jul-06	Alan Merriman	√							√	ORD MD	3	3	0.25	small arms							FE	√	6	0.5	0.25	N-S	0	√			
F09	F09_344_1415em2	11	3.21	3	B	2268211.79	6966049.74	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal (&FE)							CU	√	3	0.5	0.25	N-S	0	√			
F09	F09_348_1415em2	11	3.12	3	B	2268145.88	6966086.64	19-Jul-06	Alan Merriman	√													√	CIV	0	4	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
F09	F09_358_1415em2	11	2.93	3	B	2268168.27	6966037.02	19-Jul-06	Alan Merriman	√													√	MIL	3	2	0.25	ac parts	FE	√	3	0.5	0.25	N-S	0	√			
F09	F09_370_1415em2	11	2.74	3	B	2268147.38	6966107.29	19-Jul-06	Alan Merriman	√													√	CIV	0	5	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
F09	F09_387_1415em2	12	2.57	3	B	2268161.34	6966050.73	19-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	45 bullet and 38 cal							FE	√	3	0.5	0.25	N-S	0	√			
F09	F09_43_1415em2	13	36.72	4	B	2268217.73	6966041.32	19-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	bolt, nut, washer	FE	√	12	0.5	0.25	N-S	0	√			
F09	F09_59_1415em2	15	29.81	4	A	2268188.46	6966086.03	19-Jul-06	Alan Merriman	√													√	MIL	0	1	1	ac part	SS	√	6	1	0.5	N-S	0	√			
F09	F09_73_1415em2	16	23.6	4	A	2268194.41	6966122.56	19-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	ac seat part	AL	√	6	1	0.5	N-S	0	√			
F10	F10_1_1415em2	15	1483.72	4	A	2268261.98	6966058.28	20-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	lg piece of pipe	FE	√	24	> 6	0.5	NE-SW	45	√			
F10	F10_104_1415em2	15	16.11	4	A	2268305.74	6966086.66	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	1	back end of a 75mm							FE	√	3	4	4	NE-SW	45	√			
F10	F10_106_1415em2	14	15.93	4	A	2268279.95	6966112.35	20-Jul-06	Alan Merriman	√							√	EMAT MD	6	1	0.25	timus pieces tv flare							FE	√	3	2	2	NE-SW	45	√			
F10	F10_116_1415em2	13	14.73	4	B	2268252.82	6966132.77	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	75mm rd fuze							FE	√	3	4	2	NE-SW	45	√			
F10	F10_12_1415em2	16	144.97	4	A	2268252.95	6966108.44	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	pipe	FE	√	6	1	1	NE-SW	45	√			
F10	F10_128_1415em2	12	13.02	4	B	2268278.82	6966037.14	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	metal piece							FE	√	3	2	2	NE-SW	45	√			
F10	F10_135_1415em2	13	12.02	4	B	2268252.52	6966042.02	20-Jul-06	Alan Merriman	√							√	ORD MD	12	3	1	cads/empty, 20mm tp, ac seat scr	√	CIV	3	1	0.25	ammo clips, cal	FE	√	3	1	0.25	NE-SW	45	√			
F10	F10_142_1415em2	14	11.07	4	A	2268288.41	6966111.85	20-Jul-06	Alan Merriman	√													√	MIL	12	1	0.25	metal piece	FE	√	3	4	2	N-S	45	√			
F10	F10_144_1415em2	16	10.85	4	A	2268248.38	6966105.56	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze antenna, vt							FE	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_148_1415em2	12	10.54	4	B	2268302.05	6966048.77	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	chunk of aluminum	AL	√	6	0.5	0.25	NE-SW	45	√			
F10	F10_149_1415em2	13	10.53	4	B	2268266.88	6966083.27	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm casing	√	CIV	0	1	0.25	scrap	AL	√	3	0.5	0.25	N-S	45	√			
F10	F10_15_1415em2	14	100.4	4	A	2268264.59	6966121.34	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	pipe	FE	√	3	1	1	NE-SW	45	√			
F10	F10_151_1415em2	15	10.3	4	A	2268258.55	6966058.94	20-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	large pipe	FE	√	24	> 6	1	N-S	0	√			
F10	F10_152_1415em2	10	10.23	4	C	2268248.33	6966045.2	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	aluminum scrap	AL	√	3	2	0.25	NE-SW	45	√			
F10	F10_153_1415em2	13	10.06	4	B	2268265.52	6966038.05	20-Jul-06	Alan Merriman	√							√	ORD MD	6	3	0.25	50 cal carts							CU	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_154_1415em2	13	10.02	4	B	2268240.9	6966080.52	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm casing							AL	√	3	1	0.25	NE-SW	45	√			
F10	F10_155_1415em2	13	9.76	4	B	2268293.48	6966049.51	20-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.25	flare part							AL	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_157_1415em2	10	9.66	4	C	2268284.5	6966092.08	20-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	56127 part							FE	√	6	0.5	0.5	N-S	90	√			
F10	F10_158_1415em2	13	9.63	4	B	2268257.28	6966136.2	20-Jul-06	Alan Merriman																			no contact, reacquired 8/1/06											
F10	F10_159_1415em2	13	9.51	4	B	2268231.87	6966132.72	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	metal frag							FE	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_160_1415em2	12	9.32	4	B	2268222.76	6966109.12	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	flare piece							AL	√	6	2	0.25	N-S	45	√			
F10	F10_162_1415em2	9	9.16	4	C	2268246.88	6966039.23	20-Jul-06	Alan Merriman	√							√	ORD MD	> 24	1	0.25	ac seat scrap							FE	√	3	2	2	NE-SW	45	√			
F10	F10_167_1415em2	16	8.6	4	A	2268257.23	6966054.42	20-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	45	√			
F10	F10_169_1415em2	13	8.49	4	B	2268242.12	6966055.52	20-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	metal pieces	FE	√	3	0.5	0.25	N-S	45	√			
F10	F10_170_1415em2	13	8.48	4	B	2268261.87	6966076.4	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm casing							AL	√	3	0.5	0.25	N-S	0	√			
F10	F10_172_1415em2	13	8.43	4	B	2268270.2	6966058.23	20-Jul-06	Alan Merriman	√													√	MIL	6	1	0.25	metal plate	FE	√	3	0.5	0.5	E-W	90	√			
F10	F10_177_1415em2	13	7.93	4	B	2268268.59	6966134.31	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	frag piece							FE	√	3	0.5	0.25	NE-SW	45	√			
F10	F10_182_1415em2	12	7.64	4	B	2268267.08	6966073.32	20-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	metal pin frag	FE	√	6	0.5	0.25	N-S	45	√			
F10	F10_185_1415em2	13	7.57	4	B	2268227.92	6966115.62	20-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	scrap metal	FE	√	6	0.5	0.25	NE-SW	45	√			
F10	F10_189_1415em2	13	7.39	4	B	2268239.59	6966121.4	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm casing							AL	√	3	2	0.25	N-S	45	√			
F10	F10_194_1415em2	9	7.16	4	C	2268280.24	6966056.7	20-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	chunk of metal	FE	√	3	2	1	N-S	45	√			
F10	F10_195_1415em2	12	7.09	4	B	2268260.49	6966132.36	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	frag piece							FE	√	3	0.5	0.25	NE-SW	45	√			
F10	F10_202_1415em2	13	6.96	4	B	2268280.02	6966133.24	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm casing							AL	√	3	2	0.25	N-S	45	√			
F10	F10_205_1415em2	11	6.74	4	B	2268222.82	6966134.38	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze bracket, vt							FE	√	6	4	0.25	N-S	45	√			
F10	F10_209_1415em2	14	6.5	4	A	2268252.6	6966087.67	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze antenna, vt							FE	√	3	1	0.25	N-S	45	√			
F10	F10_210_1415em2	14	6.5	4	A	2268313.85	6966104.42	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	40mm casing							AL	√	3	1	1	NE-SW	45	√			
F10	F10_214_1415em2	12	6.24	4	B	2268221.12	6966042.81	20-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	scrap piece	FE	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_216_1415em2	12	6.07	4	B	2268248.14	6966094.73	20-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	aluminum, cable end	FE	√	3	1	0.25	NE-SW	90	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
F10	F10_221_1415em2	13	6	4	B	2268286.16	6966120.48	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm casing							AL	√	3	2	0.25	N-S	45	√			
F10	F10_224_1415em2	13	5.9	4	B	2268255.91	6966046.41	20-Jul-06	Alan Merriman	√							√	ORD MD	12	2	1	ac seat parts m/t	√	CIV	3	4	0.25	ac parts m/t	FE	√	3	1	0.5	NE-SW	45	√			
F10	F10_227_1415em2	12	5.75	4	B	2268245.83	6966126.06	20-Jul-06	Alan Merriman	√													√	CIV	12	1	0.25	50 gal drum plug	FE	√	3	0.5	0.25	N-S	45	√			
F10	F10_228_1415em2	12	5.66	4	B	2268233.12	6966126.95	20-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	ac flare piece							AL	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_229_1415em2	13	5.62	4	B	2268273.74	6966083.11	20-Jul-06	Alan Merriman	√													√	CIV	3	1	1	bucket rim	FE	√	24	4	0.5	NE-SW	90	√			
F10	F10_232_1415em2	13	5.46	4	B	2268232.45	6966089.89	20-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	aluminum scrap	AL	√	6	0.5	0.25	NE-SW	45	√			
F10	F10_235_1415em2	15	5.4	4	A	2268258.6	6966111.04	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze piece, vt							FE	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_237_1415em2	11	5.38	4	B	2268282.97	6966072.1	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	metal frag, vt fuze part							FE	√	3	0.5	0.5	E-W	90	√			
F10	F10_238_1415em2	12	5.37	4	B	2268242.45	6966070.34	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	45	√			
F10	F10_240_1415em2	8	5.36	4	D	2268255.99	6966041.38	20-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	metal frag							FE	√	6	1	0.5	NE-SW	45	√			
F10	F10_241_1415em2	13	5.35	4	B	2268273.63	6966059.73	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	40mm body							AL	√	3	2	0.25	NE-SW	45	√			
F10	F10_243_1415em2	13	5.3	4	B	2268242.59	6966099.09	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	frag piece							FE	√	3	1	0.25	NE-SW	45	√			
F10	F10_246_1415em2	13	5.05	4	B	2268246.23	6966078.93	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	soda can	AL	√	3	0.5	0.25	N-S	45	√			
F10	F10_249_1415em2	12	5.01	4	B	2268271.98	6966110.34	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	aluminum scrap	AL	√	12	0.5	0.25	N-S	45	√			
F10	F10_25_1415em2	13	58.3	4	B	2268260.22	6966064.66	20-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.25	fuze piece							AL	√	9	1	0.25	N-S	45	√			
F10	F10_251_1415em2	13	4.94	4	B	2268286.88	6966056.2	20-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	small frag	FE	√	3	0.5	0.25	NE-SW	45	√			
F10	F10_255_1415em2	12	4.77	4	B	2268240.72	6966128.38	20-Jul-06	Alan Merriman	√													√	MIL	6	1	0.25	metal scrap	FE	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_256_1415em2	10	4.74	4	C	2268280.05	6966119.3	20-Jul-06	Alan Merriman																			no contact											
F10	F10_27_1415em2	13	54.14	4	B	2268268.64	6966120.02	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	pipe	FE	√	3	0.5	0.25	N-S	45	√			
F10	F10_276_1415em2	14	4.37	4	A	2268305.18	6966112.75	20-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	metal part	FE	√	3	2	0.25	N-S	45	√			
F10	F10_278_1415em2	10	4.33	4	C	2268312.18	6966037.59	20-Jul-06	Alan Merriman	√							√	ORD MD	6	2	0.25	38 cal							CU	√	3	0.5	0.25	NE-SW	45	√			
F10	F10_283_1415em2	12	4.18	4	B	2268232.21	6966059.42	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm							FE	√	3	1	1	NE-SW	45	√	√	27-Jul-06	Kelly Hickman
F10	F10_290_1415em2	11	4.1	4	B	2268285.31	6966067.59	20-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	flare piece							AL	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_291_1415em2	10	4.09	4	C	2268312.79	6966041.49	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	metal piece	FE	√	3	0.5	0.25	N-S	45	√			
F10	F10_3_1415em2	16	855.92	4	A	2268277.15	6966050.91	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	large metal piece	FE	√	12	6	2	N-S	45	√			
F10	F10_302_1415em2	11	3.88	4	B	2268270.23	6966080.88	20-Jul-06	Alan Merriman																			no contact											
F10	F10_303_1415em2	13	3.84	4	B	2268316.94	6966093.13	20-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	metal plate	FE	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_32_1415em2	13	46.24	4	B	2268240.71	6966040.73	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze part and frag piece							FE	√	6	0.5	0.5	NE-SW	90	√			
F10	F10_320_1415em2	11	3.63	4	B	2268252.52	6966054.34	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	frag piece							FE	√	3	0.5	0.25	NE-SW	45	√			
F10	F10_336_1415em2	12	3.37	3	B	2268238.95	6966072.53	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	end cap fro tubing							AL	√	3	0.5	0.25	NE-SW	45	√			
F10	F10_353_1415em2	11	3.03	3	B	2268264.99	6966109.39	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	aluminum piece	AL	√	3	0.5	0.25	NE-SW	45	√			
F10	F10_359_1415em2	11	2.92	3	B	2268290.37	6966089.17	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	soda can	AL	√	6	0.5	0.25	N-S	45	√			
F10	F10_363_1415em2	11	2.85	3	B	2268296.88	6966095.93	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	small pt of 40mm fuze							CU	√	3	0.5	0.25	N-S	45	√			
F10	F10_37_1415em2	14	41.48	4	A	2268260.54	6966121.04	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	pipe	FE	√	3	1	1	NE-SW	45	√			
F10	F10_38_1415em2	16	40.7	4	A	2268235.13	6966072.41	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze piece, vt							FE	√	6	4	0.25	N-S	45	√			
F10	F10_382_1415em2	15	2.62	3	A	2268283.59	6966046.14	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	20mm cart							CU	√	3	1	1	E-W	90	√			
F10	F10_4_1415em2	13	761.63	4	B	2268270.09	6966047.15	20-Jul-06	Alan Merriman	√													√	CIV	24	1	0.25	ac scrap	FE	√	> 24	> 6	4	E-W	90	√			
F10	F10_41_1415em2	16	38.14	4	A	2268246.52	6966122.55	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	2.75 rkt motor							FE	√	24	4	0.25	N-S	0	√			
F10	F10_413_1415em2	11	2.35	2	B	2268238.73	6966048.95	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze piece							AL	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_417_1415em2	10	2.32	2	C	2268264.61	6966069.01	20-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	scrap	FE	√	3	2	0.25			√			
F10	F10_5_1415em2	16	383.83	4	A	2268250.58	6966120.78	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	2.75 rkt motor, empty							FE	√	24	4	0.25	NE-SW	0	√			
F10	F10_50_1415em2	14	34.29	4	A	2268273.71	6966050.59	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	large metal piece	FE	√	12	1	1	E-W	90	√			
F10	F10_54_1415em2	16	32.26	4	A	2268226.12	6966055.67	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	metal piece	FE	√	3	0.5	0.25	N-S	45	√			
F10	F10_65_1415em2	10	26.83	4	C	2268237.7	6966039.4	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap and aluminum piece	FE	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_70_1415em2	13	24.89	4	B	2268265.84	6966136.3	20-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	aluminum scrap	AL	√	3	0.5	0.5	NE-SW	45	√			
F10	F10_71_1415em2	16	24.04	4	A	2268265.76	6966057.04	20-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	40mm body							AL	√	3	2	0.25	N-S	45	√			
F10	F10_79_1415em2	14	21.92	4	A	2268272.1	6966119.13	20-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	pipe	FE	√	3	1	1	NE-SW	45	√			
F10	F10_83_1415em2	13	20.04	4	B	2268274.29	6966045.2	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	30 cal bullet							OTHER	√	3	0.5	0.25	N-S	45	√			
F10	F10_85_1415em2	13	19.5	4	B	2268287.03	6966049.36	20-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	lg metal piece	FE	√	12	0.5	0.5	NE-SW	45	√			
F10	F10_88_1415em2	15	18.52	4	A	2268226.21	6966089.37	20-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	aluminum framing	AL	√	9	4	0.25	N-S	45	√			
F10	F10_91_1415em2	13	18.21	4	B	2268281.06	6966065.69	20-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	ventrie device	√	CIV	6	1	0.25	small scrap	FE	√	3	0.5	0.25	NE-SW	45	√			
F10	F10_98_1415em2	12	17.52	4	B	2268233.46	6966041.7	20-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	small arms and frag							FE	√	6	0.5	0.5	NE-SW	45	√			
F11	F11_108_1609em2	14	10.13	4	A	2268334.98	6966132.51	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm casing							AL	√	3	1	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
F11	F11_129_1609em2	12	8.65	4	B	2268407.05	6966119.3	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm casing							AL	√	3	0.5	0.25	NE-SW	45	√			
F11	F11_149_1609em2	11	7.35	4	B	2268336.31	6966039.45	19-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	piece of stainless steel	SS	√	3	1	1	E-W	90	√			
F11	F11_151_1609em2	16	7.21	4	A	2268395.21	6966075.04	19-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	frag piece of a flare							AL	√	6	4	0.25	N-S	45	√			
F11	F11_162_1609em2	12	6.76	4	B	2268362.86	6966108.2	19-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	20mm bullet, tp							FE	√	3	1	1	E-W	90	√			
F11	F11_168_1609em2	14	6.3	4	A	2268358.59	6966130.34	19-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	60mm aluminum rod pusher plate	AL	√	3	0.5	0.5	N-S	45	√			
F11	F11_17_1609em2	12	45.61	4	B	2268380.67	6966105.24	19-Jul-06	Alan Merriman	√							√	ORD MD	6	1	2	lg piece of frag, concrete fille							FE	√	9	6	1	NE-SW	45	√			
F11	F11_173_1609em2	15	6.1	4	A	2268335.03	6966121.65	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm casing							AL	√	3	2	0.25	N-S	0	√			
F11	F11_181_1609em2	11	5.76	4	B	2268410.1	6966091.84	19-Jul-06	Alan Merriman																			no find											
F11	F11_20_1609em2	16	43.03	4	A	2268372.29	6966084.74	19-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	slap flare piece							AL	√	9	2	0.25	N-S	45	√			
F11	F11_206_1609em2	13	4.97	4	B	2268383.99	6966132.73	19-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze part, vt							FE	√	6	4	0.25	N-S	0	√			
F11	F11_217_1609em2	13	4.72	4	B	2268330.6	6966098.73	19-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze piece, vt							FE	√	6	4	0.25	N-S	45	√			
F11	F11_230_1609em2	13	4.35	4	B	2268346.59	6966127.71	19-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	aluminum machine part	AL	√	6	0.5	0.5	NE-SW	45	√			
F11	F11_25_1609em2	16	34.69	4	A	2268387.6	6966040.42	19-Jul-06	Alan Merriman	√													√	MIL	6	1	0.25	ac part	SS	√	9	2	0.5	NE-SW	45	√			
F11	F11_258_1609em2	12	3.81	4	B	2268353.3	6966105.47	19-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	frag piece from aluminum rod							AL	√	3	0.5	0.25	NE-SW	45	√			
F11	F11_28_1609em2	13	31.8	4	B	2268381.22	6966110.28	19-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	flare piece, slap							AL	√	9	2	0.25	N-S	0	√			
F11	F11_291_1609em2	11	3.4	3	B	2268335.01	6966060.47	19-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	20mm frag piece							FE	√	3	0.5	0.25	NE-SW	45	√			
F11	F11_302_1609em2	13	3.22	3	B	2268395.05	6966066.26	19-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	metal piece	FE	√	3	1	1	NE-SW	45	√			
F11	F11_332_1609em2	12	2.87	3	B	2268361.56	6966056.29	19-Jul-06	Alan Merriman																			no find											
F11	F11_347_1609em2	11	2.73	3	B	2268361.35	6966096.88	19-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	50 cal cart							OTHER	√	6	1	0.25	N-S	45	√			
F11	F11_359_1609em2	11	2.59	3	B	2268355.2	6966126.45	19-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	50 calibur cartridge							OTHER	√	6	1	0.25	N-S	45	√			
F11	F11_37_1609em2	13	22.45	4	B	2268404.71	6966114.48	19-Jul-06	Alan Merriman	√							√	ORD MD	12	1	0.25	half of a vt fuze							FE	√	6	4	4	N-S	45	√			
F11	F11_43_1609em2	13	19.24	4	B	2268377.23	6966105.33	19-Jul-06	Alan Merriman																			no find											
F11	F11_60_1609em2	10	14.37	4	C	2268357.46	6966089.57	19-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	beer can	AL	√	6	0.5	0.25	NE-SW	45	√			
F11	F11_66_1609em2	16	14.13	4	A	2268415.2	6966132.75	19-Jul-06	Alan Merriman	√													√	MIL	12	1	0.25	large piece of metal	FE	√	12	4	0.25	N-S	45	√			
F11	F11_72_1609em2	15	13.25	4	A	2268376.28	6966054.77	19-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	four link log chain	SS	√	6	0.5	0.25	NE-SW	45	√			
F11	F11_82_1609em2	16	12.29	4	A	2268390.92	6966040.94	19-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	fuze antenna, vt	√	CIV	6	1	0.25	aluminum piece	FE	√	3	1	0.5	E-W	90	√			
F11	F11_84_1609em2	14	12.12	4	A	2268385.54	6966118.96	19-Jul-06	Alan Merriman	√													√	MIL	6	1	0.25	chunk of aluminum	AL	√	3	1	1	NE-SW	45	√			
F11	F11_92_1609em2	13	11.77	4	B	2268343.34	6966131.84	19-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	40mm casing							AL	√	3	0.5	0.25	NE-SW	45	√			
F12	F12_1_1609em2	15	511.76	4	A	2268430.62	6966124.44	20-Jul-06	Jim Thoren	√							√	ORD MD	12	1	≥8	flare cannister							AL	√	24	> 6	> 4	N-S	0	√			
F12	F12_10_1609em2	14	55	4	A	2268478.02	6966056.62	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	4	fuze, vt							FE	√	3	4	0.25	N-S	0	√			
F12	F12_107_1609em2	11	10.18	4	B	2268445.85	6966061.36	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	grenade spoon							FE	√	6	0.5	0.25	N-S	0	√			
F12	F12_11_1609em2	13	54.3	4	B	2268501.93	6966076.98	20-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	12	6	0.25	N-S	0	√			
F12	F12_114_1609em2	15	9.55	4	A	2268517.2	6966082.12	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	7.62 case							OTHER	√	3	0.5	0.25	N-S	0	√			
F12	F12_12_1609em2	14	52.22	4	A	2268494.6	6966075.62	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	1	fuze, vt							FE	√	6	4	0.25	N-S	0	√			
F12	F12_123_1609em2	9	9.03	4	C	2268472.78	6966056.42	20-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	0.5	0.25	N-S	0	√			
F12	F12_125_1609em2	15	8.96	4	A	2268471.84	6966119.84	20-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	frag							FE	√	6	1	0.25	N-S	0	√			
F12	F12_128_1609em2	15	8.66	4	A	2268426.28	6966069.05	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna							AL	√	6	2	1	N-S	0	√			
F12	F12_136_1609em2	13	7.93	4	B	2268457.62	6966111.15	20-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze bracket							FE	√	6	2	0.25	N-S	0	√			
F12	F12_138_1609em2	16	7.81	4	A	2268481.77	6966056.4	20-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	CU	√	6	2	1	N-S	0	√			
F12	F12_14_1609em2	13	50.18	4	B	2268472.83	6966060.9	20-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	1	0.25	N-S	0	√			
F12	F12_144_1609em2	14	7.59	4	A	2268504.49	6966071.03	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							FE	√	9	4	0.25	N-S	0	√			
F12	F12_145_1609em2	13	7.57	4	B	2268507.72	6966124.03	20-Jul-06	Jim Thoren	√							√	ORD MD	12	1	0.25	40mm body							AL	√	3	2	0.25	N-S	0	√			
F12	F12_146_1609em2	14	7.53	4	A	2268438.47	6966079.72	20-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			
F12	F12_153_1609em2	11	7.1	4	B	2268435.45	6966051.87	20-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap, magnet	FE	√	3	1	0.25	N-S	0	√			
F12	F12_158_1609em2	11	6.98	4	B	2268444.46	6966066.55	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna							AL	√	6	2	1	N-S	0	√			
F12	F12_16_1609em2	12	45.76	4	B	2268464.51	6966115.33	20-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	rod	FE	√	24	0.5	0.5	N-S	0	√			
F12	F12_160_1609em2	12	6.84	4	B	2268475.7	6966042.72	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							FE	√	6	0.5	0.25	N-S	0	√			
F12	F12_163_1609em2	14	6.72	4	A	2268498.01	6966042.95	20-Jul-06	Jim Thoren																			no find											
F12	F12_164_1609em2	13	6.66	4	B	2268441.91	6966069.65	20-Jul-06	Jim Thoren																			no contact											
F12	F12_166_1609em2	10	6.47	4	C	2268483.84	6966106.05	20-Jul-06	Jim Thoren	√													√	CIV	6	1	0.5	scrap	FE	√	6	4	0.25	N-S	0	√			
F12	F12_171_1609em2	11	6.14	4	B	2268464.36	6966049.8	20-Jul-06	Jim Thoren	√													√	CIV	6	2	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
F12	F12_174_1609em2	13	6.07	4	B	2268504.75	6966075.27	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	40mm body							AL	√	3	2	0.25	N-S	0	√			
F12	F12_176_1609em2	10	5.99	4	C	2268467.61	6966044.63	20-Jul-06	Jim Thoren	√													√	CIV	6	4	0.25	scrap metal flakes	FE	√	3	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
F12	F12_177_1609em2	13	5.9	4	B	2268488.57	6966068.6	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag							FE	√	3	1	0.25	N-S	0	√			
F12	F12_182_1609em2	12	5.73	4	B	2268430.59	6966080.07	20-Jul-06	Jim Thoren	√							√	ORD MD	12	1	0.5	frag							SS	√	6	2	0.5	N-S	0	√			
F12	F12_186_1609em2	12	5.64	4	B	2268514.98	6966055.08	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							FE	√	6	0.5	0.25	N-S	0	√			
F12	F12_188_1609em2	11	5.56	4	B	2268511.88	6966125.8	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	40mm ogive							AL	√	3	2	0.25	N-S	0	√			
F12	F12_190_1609em2	11	5.53	4	B	2268514.76	6966130.98	20-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	40mm ogive							AL	√	3	2	0.25	N-S	0	√			
F12	F12_194_1609em2	13	5.38	4	B	2268491.17	6966110.86	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	40mm body							AL	√	3	1	0.25	N-S	0	√			
F12	F12_196_1609em2	14	5.35	4	A	2268426.25	6966124.31	20-Jul-06	Jim Thoren																			no contact											
F12	F12_199_1609em2	12	5.26	4	B	2268459	6966038.91	20-Jul-06	Jim Thoren	√	√	EMAT	3	1	0.25	20mm HE													SS	√	3	1	1	N-S	0	√	√	27-Jul-06	Kelly Hickman
F12	F12_2_1609em2	16	135.98	4	A	2268489.97	6966065.38	20-Jul-06	Jim Thoren	√													√	CIV	3	1	0.75	scrap	FE	√	24	> 6	0.25	N-S	0	√			
F12	F12_200_1609em2	11	5.23	4	B	2268441.68	6966049.62	20-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap	SS	√	12	4	0.25	N-S	0	√			
F12	F12_204_1609em2	13	5.02	4	B	2268450.78	6966107.18	20-Jul-06	Jim Thoren	√							√	ORD MD	6	4	0.25	7.62 carts							OTHER	√	6	0.5	0.25	N-S	0	√			
F12	F12_208_1609em2	12	4.95	4	B	2268447.67	6966047.34	20-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	SS	√	3	1	0.25	N-S	0	√			
F12	F12_209_1609em2	13	4.94	4	B	2268496.3	6966059.95	20-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze antenna							AL	√	6	2	1	N-S	0	√			
F12	F12_211_1609em2	13	4.9	4	B	2268434.61	6966123.94	20-Jul-06	Jim Thoren																			no contact											
F12	F12_213_1609em2	12	4.82	4	B	2268439.64	6966061.38	20-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze antenna							AL	√	6	2	1	N-S	0	√			
F12	F12_214_1609em2	13	4.8	4	B	2268448.73	6966087.77	20-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap		√	12	6	0.25	N-S	0				
F12	F12_215_1609em2	13	4.74	4	B	2268463.8	6966095.34	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	40mm casing							AL	√	3	2	0.25	N-S	0	√			
F12	F12_224_1609em2	10	4.52	4	C	2268450.12	6966130.72	20-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze bracket							FE	√	6	2	0.25	N-S	0	√			
F12	F12_23_1609em2	13	35.04	4	B	2268465.62	6966053.1	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.5	fuze part							FE	√	6	2	0.5	N-S	0	√			
F12	F12_235_1609em2	13	4.24	4	B	2268513.12	6966068.96	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							FE	√	3	2	0.25	N-S	0	√			
F12	F12_241_1609em2	13	4.11	4	B	2268491.19	6966039.19	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag							FE	√	3	1	0.25	N-S	0	√			
F12	F12_243_1609em2	12	4.08	4	B	2268482.84	6966087.64	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	5.56 blank							OTHER	√	3	0.5	0.25	N-S	0	√			
F12	F12_247_1609em2	10	4.03	4	C	2268493.95	6966071.79	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna							AL		6	2	1	N-S	0	√			
F12	F12_249_1609em2	10	4.02	4	C	2268450.15	6966134.55	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.5	burster tube							FE	√	9	0.5	0.25	N-S	0	√			
F12	F12_250_1609em2	11	4.01	4	B	2268509.41	6966038.87	20-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
F12	F12_253_1609em2	12	3.97	4	B	2268456.34	6966103.33	20-Jul-06	Jim Thoren																			no contact											
F12	F12_255_1609em2	13	3.89	4	B	2268430.05	6966052.6	20-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	fence part	FE	√	6	4	0.25	N-S	0	√			
F12	F12_256_1609em2	16	3.88	4	A	2268516.86	6966075.98	20-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			
F12	F12_26_1609em2	14	34.3	4	A	2268455.49	6966045.63	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.5	fuze bracket							FE	√	6	2	0.25	N-S	0	√			
F12	F12_273_1609em2	12	3.67	4	B	2268489.45	6966058.13	20-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze antenna							AL	√	6	2	0.5	N-S	0	√			
F12	F12_278_1609em2	11	3.58	3	B	2268455.1	6966072.9	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							FE	√	9	2	0.25	N-S	0	√			
F12	F12_279_1609em2	11	3.58	3	B	2268498.73	6966126.42	20-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap		√	3	2	0.25	N-S	0				
F12	F12_283_1609em2	11	3.57	3	B	2268476.59	6966115.2	20-Jul-06	Jim Thoren	√													√	MIL	3	2	0.25	scrap	FE	√	3	1	0.25	N-S	0	√			
F12	F12_285_1609em2	11	3.54	3	B	2268456.88	6966125.45	20-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap		√	3	1	0.25	N-S	0				
F12	F12_286_1609em2	12	3.52	3	B	2268418.37	6966042.18	20-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence part	FE	√	6	2	0.25	N-S	0	√			
F12	F12_289_1609em2	12	3.43	3	B	2268478.09	6966066.76	20-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap		√	3	0.5	0.25	N-S	0				
F12	F12_290_1609em2	12	3.42	3	B	2268497.62	6966082.27	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm body							OTHER	√	3	1	0.25	N-S	0				
F12	F12_3_1609em2	15	94.02	4	A	2268420.46	6966123.84	20-Jul-06	Jim Thoren	√													√	CIV	6	1	0.5	scrap	AL	√	9	6	0.25	N-S	0	√			
F12	F12_303_1609em2	14	3.2	3	A	2268455.29	6966038.04	20-Jul-06	Jim Thoren	√													√	CIV	12	2	0.25	scrap	FE	√						√			
F12	F12_315_1609em2	10	3.07	3	C	2268440.13	6966085.98	20-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
F12	F12_33_1609em2	13	25.33	4	B	2268451.22	6966046.05	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							FE	√	6	2	0.25	N-S	0	√			
F12	F12_350_1609em2	11	2.71	3	B	2268484.69	6966072.26	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	40mm ogive							AL	√	3	2	0.25	N-S	0	√			
F12	F12_357_1609em2	12	2.6	3	B	2268460.38	6966089.5	20-Jul-06	Jim Thoren																			no find, too small											
F12	F12_362_1609em2	11	2.57	3	B	2268511.69	6966132.48	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna							AL	√	6	2	0.25	N-S	0				
F12	F12_38_1609em2	15	20.98	4	A	2268418.46	6966091.3	20-Jul-06	Jim Thoren	√													√	CIV	18	1	0.25	scrap	AL	√	6	4	0.25			√			
F12	F12_4_1609em2	14	74.6	4	A	2268468.09	6966120.36	20-Jul-06	Jim Thoren	√													√	CIV	0	1	1	rod	FE	√	> 24	0.5	0.25	N-S	0	√			
F12	F12_45_1609em2	10	18.89	4	C	2268467.64	6966049.31	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							FE	√	6	2	0.25	N-S	0	√			
F12	F12_48_1609em2	11	18.07	4	B	2268476.28	6966059.77	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.5	fuze bracket							OTHER	√	6	2	0.25	N-S	0	√			
F12	F12_50_1609em2	10	16.83	4	C	2268469.44	6966052.85	20-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap metal	FE	√	6	0.5	0.25	N-S	0	√			
F12	F12_52_1609em2	14	16.69	4	A	2268515.73	6966085.43	16-Aug-06	Jim Thoren	√							√	ORD MD	0	1	0.25	flare part	√	MIL	12	1	0.25	ac part	AL	√	6	2	0.25	N-S	0	√			
F12	F12_55_1609em2	14	16.27	4	A	2268460.48	6966099.92	20-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	flare							AL	√	12	2	0.25	N-S	0	√			
F12	F12_57_1609em2	15	15.58	4	A	2268494.36	6966043.62	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							FE	√	6	2	0.25	N-S	0	√			
F12	F12_62_1609em2	15	14.26	4	A	2268459.91	6966119.84	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							FE	√	6	2	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																		
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
F12	F12_63_1609em2	13	14.19	4	B	2268488.82	6966081.51	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag, vt fuze part							FE	√	3	1	0.25	N-S	0	√			
F12	F12_69_1609em2	14	13.43	4	A	2268436.38	6966088.83	20-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	ac scrap	FE	√	6	6	0.25	N-S	0	√			
F12	F12_7_1609em2	16	61.01	4	A	2268451.99	6966037.98	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	4	fuze fired							FE	√	3	4	2	N-S	0	√			
F12	F12_73_1609em2	13	13.09	4	B	2268448.29	6966065.92	20-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							OTHER	√	6	2	0.25	N-S	0	√			
F12	F12_77_1609em2	10	12.85	4	C	2268513.09	6966082.98	20-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	6	2	0.25	N-S	0	√			
F12	F12_78_1609em2	14	12.82	4	A	2268504.49	6966039.12	20-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			
F12	F12_79_1609em2	15	12.66	4	A	2268498.34	6966136.3	20-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze part							FE	√	6	2	0.25	N-S	0	√			
F12	F12_80_1609em2	13	12.56	4	B	2268467.66	6966108.2	20-Jul-06	Jim Thoren	√													√	MIL	6	1	0.5	scrap	FE	√	6	4	0.25	N-S	0	√			
F12	F12_83_1609em2	14	12.14	4	A	2268453.62	6966131.48	20-Jul-06	Jim Thoren																			no contact											
F12	F12_85_1609em2	15	12.05	4	A	2268421.8	6966040.45	20-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze bracket							FE	√	9	2	0.25	N-S	0	√			
F12	F12_86_1609em2	14	11.99	4	A	2268454.6	6966109.38	20-Jul-06	Jim Thoren	√													√	MIL	6	1	0.25	scrap		√	6	0.5	0.25	N-S	0				
F12	F12_88_1609em2	13	11.91	4	B	2268479.21	6966048.45	20-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	2	0.25	N-S	0				
F12	F12_89_1609em2	13	11.89	4	B	2268452.39	6966080.78	20-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	CU	√	6	4	0.25	N-S	0	√			
F12	F12_97_1609em2	13	11.19	4	B	2268461.97	6966045.77	20-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	40mm body							AL	√	3	2	0.25	N-S	0	√			
F12	QAdig_F12_311		8.2		QA	2268458.31	6966082.56	15-Aug-06	Alan Merriman																			no contact											
F13	F13_102_1609em2	16	10.95	4	A	2268524.81	6966082.22	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap		√						√			
F13	F13_103_1609em2	13	10.92	4	B	2268583.62	6966076.28	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze part								√	3	2				√			
F13	F13_105_1609em2	14	10.43	4	A	2268552.67	6966079.81	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket								√	6	2	0.25			√			
F13	F13_106_1609em2	14	10.36	4	A	2268564.29	6966070.84	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna								√	6	2	1			√			
F13	F13_109_1609em2	13	10.08	4	B	2268554.38	6966093.37	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.5	aluminum scrap		√	6	4	0.25			√			
F13	F13_111_1609em2	13	10.01	4	B	2268593.7	6966068.61	21-Jun-06	Jim Thoren																			no find											
F13	F13_116_1609em2	13	9.48	4	B	2268574.8	6966091.92	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	vt fuze bracket								√	6	2	0.25			√			
F13	F13_117_1609em2	11	9.4	4	B	2268565.45	6966101.42	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	6	1	0.25			√			
F13	F13_119_1609em2	10	9.26	4	C	2268552.96	6966119.24	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bar, vt							FE	√	3	1	0.25	N-S	0	√			
F13	F13_120_1609em2	12	9.19	4	B	2268539.59	6966046.17	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	2	1			√			
F13	F13_122_1609em2	14	9.07	4	A	2268525.92	6966112.55	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.5	steel scrap		√	9	6	0.25			√			
F13	F13_126_1609em2	9	8.71	4	C	2268573.53	6966104.36	11-Jul-06	Alan Merriman	√													√	MIL	3	1	0.5	scrap	FE	√	3	2	2	N-S	0	√			
F13	F13_13_1609em2	16	52.11	4	A	2268557.01	6966112.79	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	≥8	fuze								√	6	4	0.25			√			
F13	F13_132_1609em2	13	8.19	4	B	2268529.62	6966128.13	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna								√	6	2	1			√			
F13	F13_141_1609em2	13	7.64	4	B	2268612.49	6966106.9	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna								√	6	2	1			√			
F13	F13_148_1609em2	10	7.38	4	C	2268569.99	6966109.38	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bracket, vt							FE	√	6	1	0.25	N-S	0	√			
F13	F13_154_1609em2	12	7.07	4	B	2268580.13	6966092.21	21-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	steel scrap		√	3	2	0.25			√			
F13	F13_156_1609em2	13	7	4	B	2268587.54	6966095.25	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.5	mech scrap steel								√	3	0.5	0.25			√			
F13	F13_161_1609em2	11	6.83	4	B	2268600.44	6966076.98	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	2	vt fuze part								√	3	2	0.25			√			
F13	F13_167_1609em2	13	6.37	4	B	2268601.7	6966115.72	21-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	ejection seat part		√	3	1				√			
F13	F13_169_1609em2	13	6.21	4	B	2268527.39	6966079.95	21-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	steel frag & ejection seat parts								√	3	1	0.25			√			
F13	F13_178_1609em2	13	5.81	4	B	2268551.12	6966042.97	21-Jun-06	Jim Thoren	√													√	CIV	3	1	1	steel scrap		√	3	2	0.5			√			
F13	F13_179_1609em2	13	5.81	4	B	2268588.42	6966098.52	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3		0.25			√			
F13	F13_18_1609em2	11	39.25	4	B	2268582.87	6966087.07	21-Jun-06	Jim Thoren	√							√	EMAT MD	12	1	4	vt fuze, too small to find								√	6	4	0.25			√			
F13	F13_185_1609em2	15	5.65	4	A	2268529.52	6966113.77	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	40mm body								√	3	2	0.25			√			
F13	F13_187_1609em2	14	5.62	4	A	2268540.07	6966081.59	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna								√	6	2	0.5			√			
F13	F13_189_1609em2	12	5.54	4	B	2268605.91	6966111.92	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze part								√	3		0.25			√			
F13	F13_191_1609em2	13	5.46	4	B	2268604.59	6966104.06	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket								√	6	2	0.25			√			
F13	F13_192_1609em2	11	5.46	4	B	2268565.92	6966078.69	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna								√	6	2	1			√			
F13	F13_198_1214em2	13	6.35	4	B	2268585.73	6966094.62	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3		0.25			√			
F13	F13_198_1609em2	12	5.28	4	B	2268528.35	6966044.12	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket								√	6	2	0.25			√			
F13	F13_212_1609em2	10	4.88	4	C	2268546.93	6966110.36	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bar, vt							FE	√	3	1	0.25	N-S	0	√			
F13	F13_216_1609em2	13	4.73	4	B	2268527.43	6966076.23	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	2	1			√			
F13	F13_219_1609em2	9	4.72	4	C	2268595.07	6966091.58	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25	N-S	0	√			
F13	F13_22_1609em2	10	35.09	4	C	2268610.84	6966065.77	11-Jul-06	Alan Merriman	√							√	ORD MD	6	1	2	fuze mt, vt	√	MIL	0	2	0.25	rust small debris	FE	√	3	4	4	N-S	0	√			
F13	F13_223_1609em2	11	4.52	4	B	2268559.52	6966093.51	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap		√	3	2	0.25			√			
F13	F13_225_1609em2	13	4.49	4	B	2268571.56	6966076.47	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna								√	6	2	1			√			
F13	F13_228_1609em2	13	4.38	4	B	2268556.17	6966123.45	21-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	frag								√	3	1	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
F13	F13_229_1609em2	12	4.35	4	B	2268560.68	6966113.65	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap		√	3	1	0.25			√			
F13	F13_232_1609em2	10	4.28	4	C	2268595.33	6966077.49	11-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	scrap	FE	√	3	2	2	N-S	0	√			
F13	F13_233_1609em2	12	4.25	4	B	2268593.22	6966047.66	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	3	1	0.5			√			
F13	F13_234_1609em2	10	4.24	4	C	2268521.16	6966066.45	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	20 penny nail	FE	√	6	0.5	0.25	N-S	90	√			
F13	F13_238_1609em2	12	4.17	4	B	2268534.27	6966087.62	21-Jun-06	Jim Thoren	√													√	CIV	12	1	0.25	rebar		√	6	0.5	0.25			√			
F13	F13_239_1609em2	12	4.16	4	B	2268544.38	6966127.51	21-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	aluminum scrap		√	3	2	0.25			√			
F13	F13_240_1609em2	12	4.16	4	B	2268551.04	6966067.99	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	aluminum scrap		√	3	1	1			√			
F13	F13_242_1609em2	11	4.1	4	B	2268600.1	6966062.57	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	aluminum scrap		√	6	2	0.25			√			
F13	F13_245_1609em2	8	4.04	4	D	2268599.59	6966056.64	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal brass							OTHER	√	3	0.5	0.25	N-S	0	√			
F13	F13_248_1609em2	11	4.02	4	B	2268566.09	6966090.18	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	50 cal								√	3	1	0.5			√			
F13	F13_251_1609em2	11	3.99	4	B	2268601.12	6966103.7	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap		√	3	1	0.25			√			
F13	F13_257_1609em2	11	3.82	4	B	2268614.4	6966079.91	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal projo								√	3	0.5	0.5			√			
F13	F13_263_1609em2	11	3.74	4	B	2268521.69	6966133.88	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	2	0.25			√			
F13	F13_264_1609em2	12	3.74	4	B	2268577.34	6966086.34	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	nail		√	3		0.25			√			
F13	F13_265_1609em2	13	3.73	4	B	2268587.43	6966089.08	21-Jun-06	Jim Thoren	√													√	MIL	6	2	0.25	ejection seat parts		√	3	1	2			√			
F13	F13_267_1609em2	13	3.71	4	B	2268522.79	6966069.34	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	hinge		√	3	2	0.25			√			
F13	F13_277_1214em2	12	4.04	4	B	2268594.19	6966077.32	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	barb wire		√	3		0.25			√			
F13	F13_277_1609em2	12	3.58	3	B	2268608.12	6966098.03	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	6	2	0.25			√			
F13	F13_29_1609em2	14	31.3	4	A	2268540.8	6966050.66	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze bracket								√	6	2	0.25			√			
F13	F13_30_1609em2	13	29.61	4	B	2268545.92	6966051.45	21-Jun-06	Jim Thoren	√													√	CIV	3	1	1	aluminum scrap		√	6	1	0.25			√			
F13	F13_306_1609em2	11	3.13	3	B	2268523.16	6966045.74	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket								√	3	2	0.25			√			
F13	F13_307_1609em2	12	3.12	3	B	2268553.51	6966133.31	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze part								√	6	0.5	0.25			√			
F13	F13_312_1609em2	12	3.1	3	B	2268588.38	6966103.98	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap		√	3	0.5	0.5			√			
F13	F13_322_1609em2	11	2.97	3	B	2268522.36	6966086.38	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3		0.25			√			
F13	F13_327_1609em2	11	2.93	3	B	2268536.25	6966049.63	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal								√	3	0.5				√			
F13	F13_338_1609em2	11	2.82	3	B	2268615.8	6966053.77	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	40mm cart case								√	3	2	0.25			√			
F13	F13_34_1609em2	14	25.19	4	A	2268536.48	6966081.7	16-Aug-06	Jim Thoren	√							√	ORD MD	6	1	4	vt fuze part, aircraft part								√	6		0.25			√			
F13	F13_353_1609em2	11	2.65	3	B	2268613.36	6966134.69	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	aluminum scrap		√	3	2				√			
F13	F13_36_1609em2	13	24.03	4	B	2268540.03	6966098.82	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap		√	6	1	0.25			√			
F13	F13_39_1609em2	12	20.61	4	B	2268539.93	6966087.88	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	6	1	0.25			√			
F13	F13_396_1609em2	11	2.22	2	B	2268547.46	6966128.88	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	3	1	0.25			√			
F13	F13_40_1609em2	10	20.39	4	C	2268546.77	6966096.28	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bracket, vt							FE	√	3	1	0.25	NE-SW	45	√			
F13	F13_41_1609em2	14	20.39	4	A	2268550.48	6966135.39	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze bracket								√	6	2	0.25			√			
F13	F13_44_1609em2	10	18.91	4	C	2268614.09	6966058.78	11-Jul-06	Alan Merriman	√													√	MIL	6	1	0.5	scrap	AL	√	6	> 6	0.25	N-S	0	√			
F13	F13_46_1609em2	15	18.74	4	A	2268591.22	6966126.34	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket								√	6	2	0.25			√			
F13	F13_49_1609em2	14	16.98	4	A	2268615.9	6966106.07	21-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	ejection seat part		√	6	1	0.25			√			
F13	F13_5_1609em2	16	73.25	4	A	2268520.84	6966082.39	16-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	airplane part	√	CIV	6	1	≥8	steel scrap		√	12		0.5			√			
F13	F13_51_1609em2	9	16.74	4	C	2268572.83	6966134.6	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part							FE	√	3	0.5	0.25	NE-SW	45	√			
F13	F13_54_1609em2	14	16.53	4	A	2268587.98	6966123.56	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze bracket								√	6	2	0.25			√			
F13	F13_58_1609em2	13	14.8	4	B	2268611.95	6966042.61	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap-hinge		√	3	2	0.25			√			
F13	F13_61_1609em2	13	14.34	4	B	2268577.28	6966130.44	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna								√						√			
F13	F13_64_1609em2	15	14.19	4	A	2268564.66	6966048.5	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	ejection seat part & 7.62 brass								√	3	2	0.25			√			
F13	F13_65_1609em2	14	14.14	4	A	2268588.55	6966112.48	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze part								√	3		0.25			√			
F13	F13_70_1609em2	13	13.42	4	B	2268606.75	6966047.55	21-Jun-06	Jim Thoren	√													√	MIL	12	2	0.5	steel and aluminum scrap		√	6	2	0.25			√			
F13	F13_71_1609em2	14	13.42	4	A	2268597.03	6966069.36	16-Aug-06	Jim Thoren	√							√	ORD MD	6	1	0.5	vt fuze bracket, scrap								√	6	2	0.25			√			
F13	F13_74_1609em2	13	13.06	4	B	2268591.41	6966093.4	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap		√	6	4	0.25			√			
F13	F13_75_1609em2	9	13.06	4	C	2268614.15	6966096.68	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	3	0.5	0.25	N-S	0	√			
F13	F13_76_1609em2	11	12.93	4	B	2268605.02	6966075.12	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3	2	0.5			√			
F13	F13_8_1609em2	15	57.91	4	A	2268580.13	6966096.11	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	4	vt fuze								√	3	2				√			
F13	F13_94_1609em2	13	11.65	4	B	2268562.99	6966088.7	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	2	0.5			√			
F14	F14_101_1609em2	13	11.06	4	B	2268707.25	6966073.75	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap	FE	√	6	4	0.25			√			
F14	F14_104_1609em2	13	10.85	4	B	2268618.32	6966091.4	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.5	scrap	FE	√	6	1	1			√			
F14	F14_113_1609em2	13	9.68	4	B	2268652.89	6966095.93	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part								√	6	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
F14	F14_118_1609em2	10	9.27	4	C	2268710.16	6966123.68	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze bracket							FE	√	6	2	0.25	N-S	0	√			
F14	F14_121_1609em2	12	9.13	4	B	2268715.74	6966068.49	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze brackets								√	6	2	0.25			√			
F14	F14_124_1609em2	14	9	4	A	2268630.12	6966082.11	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze strap, vt m166								√	6	1	0.25	E-W	0	√			
F14	F14_127_1609em2	15	8.68	4	A	2268650.11	6966131.48	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	aluminum ac scrap	AL	√	6	1	0.25	N-S	0	√			
F14	F14_130_1609em2	14	8.4	4	A	2268682.58	6966106.47	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m407a1 body								√	3	2	0.25	N-S	0	√			
F14	F14_133_1609em2	16	8.08	4	A	2268671.61	6966043.76	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	16d nail rusty	OTHER	√	3	0.5	0.25			√			
F14	F14_134_1609em2	10	8.06	4	C	2268668.23	6966088.2	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	20 penny nail	FE	√	6	0.5	0.25	N-S	0	√			
F14	F14_135_1609em2	13	8.05	4	B	2268633.48	6966096.18	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire		√	6	0.5	0.25			√			
F14	F14_137_1609em2	13	7.9	4	B	2268619.23	6966074.06	22-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25			√	6	1	0.25			√			
F14	F14_139_1609em2	13	7.7	4	B	2268699.31	6966073.38	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze bracket								√	6	2	0.25			√			
F14	F14_143_1609em2	11	7.62	4	B	2268698.67	6966050.38	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze bracket								√	6	2	0.25			√			
F14	F14_15_1609em2	16	46.09	4	A	2268675.39	6966042.67	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	t47 boosie kup mt								√	6	4	0.25	N-S	0	√			
F14	F14_150_1609em2	13	7.31	4	B	2268699.58	6966080.57	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.5	scrap	FE	√	3	1	1			√			
F14	F14_152_1609em2	15	7.15	4	A	2268716.46	6966104.14	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	vt fuze component								√	3	2	1	N-S	90	√			
F14	F14_155_1609em2	10	7.02	4	C	2268710.2	6966127.23	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze, vt							FE	√	6	2	0.25	N-S	0	√			
F14	F14_157_1609em2	10	6.99	4	C	2268633.12	6966115.56	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	40mm cad							AL	√	3	1	0.25	N-S	0	√			
F14	F14_159_1609em2	12	6.89	4	B	2268619.94	6966069.55	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20 mm inert								√	6	1	0.25			√			
F14	F14_165_1609em2	15	6.51	4	A	2268692.36	6966118.53	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	fuze component, steel							FE	√	3	2	2	N-S	0	√			
F14	F14_172_1609em2	10	6.13	4	C	2268668.78	6966093.32	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze bracket, vt							FE	√	6	2	0.25	N-S	0	√			
F14	F14_183_1609em2	12	5.72	4	B	2268626.77	6966088.52	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze antenna								√	6	2	0.25			√			
F14	F14_184_1609em2	10	5.66	4	C	2268656.25	6966075.2	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	frag							FE	√	6	2	0.25	N-S	0	√			
F14	F14_19_1609em2	14	43.26	4	A	2268714.5	6966092.55	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	mk 166 fuze part expended								√	6	4	2	N-S	45	√			
F14	F14_193_1609em2	13	5.4	4	B	2268635.68	6966101.62	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	6	2	0.25			√			
F14	F14_201_1609em2	13	5.2	4	B	2268702.77	6966063.05	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze antenna								√	6	2	1			√			
F14	F14_205_1609em2	12	4.99	4	B	2268658.22	6966078.84	22-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	AL	√	3	1	0.25			√			
F14	F14_21_1609em2	16	41.83	4	A	2268625.86	6966104.89	22-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	washer steel 1"	FE	√	3	0.5	0.25			√			
F14	F14_210_1609em2	12	4.91	4	B	2268687.8	6966079.3	22-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	20 mm								√	6	1	0.25			√			
F14	F14_221_1609em2	12	4.69	4	B	2268679.73	6966109.53	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze bracket								√	6	2	0.25			√			
F14	F14_222_1609em2	13	4.6	4	B	2268663.44	6966105.77	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	7.62 casing								√	3	0.5	0.25			√			
F14	F14_226_1609em2	9	4.43	4	C	2268656.6	6966096.86	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part							FE	√	3	4	0.25	N-S	0	√			
F14	F14_231_1609em2	14	4.29	4	A	2268633.38	6966106.15	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	3	1	0.25	N-S	0	√			
F14	F14_236_1609em2	13	4.23	4	B	2268621.59	6966090.27	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	0.5	0.25			√			
F14	F14_237_1609em2	10	4.2	4	C	2268650.9	6966090.59	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal							FE	√	3	0.5	0.25	N-S	0	√			
F14	F14_24_1609em2	15	34.87	4	A	2268659.77	6966106.12	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze strap mk166 vt								√	6	1	0.25	E-W	0	√			
F14	F14_246_1609em2	12	4.04	4	B	2268689.86	6966109.44	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze bracket								√	6	2	0.25			√			
F14	F14_261_1609em2	11	3.79	4	B	2268711.35	6966068.66	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	0.5	0.5			√			
F14	F14_262_1609em2	13	3.76	4	B	2268664.5	6966088.32	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	0.5	0.5			√			
F14	F14_269_1609em2	13	3.7	4	B	2268626.81	6966043.71	22-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	magnet	FE	√	3	1	0.25			√			
F14	F14_27_1609em2	12	32.93	4	B	2268710.12	6966079.87	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	6	2	0.25			√			
F14	F14_271_1609em2	12	3.68	4	B	2268716.1	6966076.43	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	1	0.25			√			
F14	F14_275_1609em2	12	3.62	4	B	2268667.16	6966101.34	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20 mm projectile								√	6	1	0.25			√			
F14	F14_280_1609em2	11	3.57	3	B	2268636.67	6966039.7	22-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	VT fuze bracket								√	6	2	1			√			
F14	F14_304_1609em2	11	3.17	3	B	2268647.16	6966120.39	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	A/C seat part	AL	√	6	2	0.25			√			
F14	F14_309_1609em2	11	3.11	3	B	2268652.23	6966058.91	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	A/C seat part		√	3	0.5	0.5			√			
F14	F14_31_1609em2	11	28.09	4	B	2268622.24	6966044.7	22-Jun-06	Jim Thoren	√													√	CIV	6	1	0.5	rod	FE	√	24	0.5	0.25			√			
F14	F14_32_1609em2	15	25.64	4	A	2268661.44	6966086.65	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	mk166 fuze strap								√	3	1	1	E-W	0	√			
F14	F14_59_1609em2	15	14.63	4	A	2268625.48	6966126.86	22-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ac part aluminum		√	3	1	0.25	NE-SW	45	√			
F14	F14_68_1609em2	15	13.6	4	A	2268644.23	6966096.52	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m166 fuze strap								√	6	1	0.25	N-S	45	√			
F14	F14_87_1609em2	12	11.98	4	B	2268630	6966105.02	22-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap	FE	√	9	4	0.25			√			
F14	F14_9_1609em2	16	56.2	4	A	2268670.91	6966121.86	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze strap, vt m166								√	6	1	0.25	E-W	0	√			
F14	F14_90_1609em2	13	11.79	4	B	2268629.88	6966096.05	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
F14	F14_95_1609em2	13	11.42	4	B	2268654.42	6966085.41	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze bracket							FE	√	6	2	0.25			√			
F14	F14_96_1609em2	13	11.25	4	B	2268626.71	6966082.45	22-Jun-06	Jim Thoren	√													√	MIL	3				AL	√	6	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
F15	F15_10_1610em2	15	83.41	4	A	2268758.47	6966099.13	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.5	bottom half of VT fuze							FE	√	3	4	4	NE-SW	45	√			
F15	F15_100_1610em2	13	7.47	4	B	2268730.8	6966063.82	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	chunk of metal	FE	√	3	0.5	0.5	NE-SW	45	√			
F15	F15_101_1610em2	13	7.39	4	B	2268720.49	6966045.77	06-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	vt fuze antenna							FE	√	3	0.5	0.5	NE-SW	45	√			
F15	F15_109_1610em2	10	6.89	4	C	2268817.68	6966092.16	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part, vt							FE	√	6	1	0.25	N-S	0	√			
F15	F15_111_1610em2	14	6.74	4	A	2268741.53	6966125.65	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	chunk of alum	AL	√	3	0.5	0.5	NE-SW	45	√			
F15	F15_112_1610em2	10	6.66	4	C	2268771.02	6966101.02	11-Jul-06	Alan Merriman	√													√	MIL	0	1	0.5	ac part	FE	√	6	2	0.25	N-S	0	√			
F15	F15_119_1610em2	12	6.2	4	B	2268729.89	6966040.3	06-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	vt fuze piece							FE	√	6	2	0.25	N-S	45	√			
F15	F15_123_1610em2	13	5.99	4	B	2268737.48	6966050.02	06-Jul-06	Alan Merriman	√							√	ED MD	12	2	0.25	vt fuze pieces							FE	√	3	0.5	0.25	N-S	45	√			
F15	F15_132_1610em2	11	5.21	4	B	2268812.9	6966136.33	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm rd empty							FE	√	3	0.5	0.5	NE-SW	0	√			
F15	F15_133_1610em2	12	5.17	4	B	2268787.85	6966070.08	06-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.25	vt fuze							FE	√	6	4	0.25	NE-SW	45	√			
F15	F15_138_1610em2	13	4.82	4	B	2268725.7	6966102.53	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm cart							CU	√	6	2	0.25	N-S	0	√			
F15	F15_139_1610em2	10	4.8	4	C	2268736.32	6966039.91	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
F15	F15_143_1610em2	13	4.57	4	B	2268720.14	6966088.46	06-Jul-06	Alan Merriman	√													√	MIL	6	1	0.25	chunk of alum	AL	√	3	0.5	0.5	N-S	45	√			
F15	F15_144_1610em2	11	4.57	4	B	2268796.42	6966070.15	06-Jul-06	Alan Merriman	√							√	ED MD	12	1	0.25	vt fuze part							FE	√	6	4	0.25	N-S	45	√			
F15	F15_147_1610em2	9	4.46	4	C	2268753.76	6966036.91	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze bracket, vt							FE	√	3	2	0.25	N-S	0	√			
F15	F15_151_1610em2	12	4.32	4	B	2268718.31	6966070.44	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	45	√			
F15	F15_161_1610em2	12	3.71	4	B	2268760.98	6966063.66	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	piece of alum	AL	√	3	0.5	0.25	NE-SW	45	√			
F15	F15_170_1610em2	10	3.38	3	C	2268734.59	6966062.79	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
F15	F15_175_1610em2	12	3.29	3	B	2268757.82	6966051.95	06-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	vt fuze antenna							FE	√	3	0.5	0.5	N-S	45	√			
F15	F15_186_1610em2	11	3.13	3	B	2268733.28	6966050.79	06-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.25	explosive bolt							FE	√	6	0.5	0.5	N-S	45	√			
F15	F15_194_1610em2	11	2.86	3	B	2268747.12	6966073.45	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	piece of alum	AL	√	3	0.5	0.25	NE-SW	45	√			
F15	F15_195_1610em2	10	2.84	3	C	2268779.02	6966092.71	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
F15	F15_204_1610em2	11	2.68	3	B	2268801.27	6966126.83	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	metal washer	FE	√	3	0.5	0.25	NE-SW	45	√			
F15	F15_23_1610em2	12	33.27	4	B	2268756.78	6966041.23	06-Jul-06	Alan Merriman	√													√	MIL	6	1	0.5	machinery part/disk	AL	√	6	4	2	N-S	45	√			
F15	F15_27_1610em2	13	27.18	4	B	2268740.75	6966039.73	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.5	length of rebar	FE	√	9	0.5	0.5	E-W	0	√			
F15	F15_277_1610em2	11	1.63	1	B	2268811.01	6966120.95	06-Jul-06	Alan Merriman	√													√	MIL	6	1	0.25	machinery part	FE	√	3	0.5	0.25	N-S	45	√			
F15	F15_33_1610em2	15	25.75	4	A	2268755.71	6966118.12	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	chunk of alum	AL	√	3	2	0.25	N-S	45	√			
F15	F15_40_1610em2	11	21.46	4	B	2268801.52	6966131.7	06-Jul-06	Alan Merriman	√							√	ED MD	6	1	1	vt fuze upper body							FE	√	6	4	4	NE-SW	45	√			
F15	F15_44_1610em2	16	18.66	4	A	2268807.39	6966120.89	06-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.25	vt fuze part							FE	√	6	2	0.25	N-S	0	√			
F15	F15_47_1610em2	16	17.35	4	A	2268742.05	6966068.75	06-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.25	vt fuze part							FE	√	3	0.5	0.25	NE-SW	45	√			
F15	F15_55_1610em2	15	14.76	4	A	2268730.85	6966108.88	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	chunk of alum	AL	√	6	2	0.25	NE-SW	45	√			
F15	F15_66_1610em2	12	11.34	4	B	2268761.97	6966041.11	06-Jul-06	Alan Merriman	√							√	ORD MD	12	1	0.25	45 cal bullet							OTHER	√	3	0.5	0.25	N-S	0	√			
F15	F15_70_1610em2	13	10.92	4	B	2268732.62	6966057.84	06-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	vt fuze antenna & 50 cal							CU	√	3	0.5	0.5	NE-SW	45	√			
F15	F15_72_1610em2	12	10.73	4	B	2268782.2	6966097.54	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.5	chunk of metal	FE	√	6	4	0.25	NE-SW	45	√			
F15	F15_73_1610em2	13	10.08	4	B	2268724.07	6966049.56	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	chunk of alum	AL	√	3	0.5	0.25	N-S	45	√			
F15	F15_94_1610em2	13	7.72	4	B	2268722.27	6966062.83	06-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	vt fuze antenna							FE	√	3	0.5	0.5	NE-SW	45	√			
F15	QAdig_F15_470		6.1		QA	2268723.6	6966071.77	15-Aug-06	Alan Merriman	√							√	ORD MD	3	2	0.25	CAD, VT fuze bar, aluminum							FE							√			
F16	F16_105_1610em2	15	7.15	4	A	2268838.73	6966102.6	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	scrap, fuze vt antenna							AL	√	6	2	1			√			
F16	F16_11_1610em2	16	83.03	4	A	2268837.3	6966124.25	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze, scrap							FE	√	6	2				√			
F16	F16_114_1610em2	16	6.63	4	A	2268836.11	6966036.77	28-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze, part								√	3	2	0.25			√			
F16	F16_120_1610em2	15	6.18	4	A	2268847.03	6966089.88	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	1	0.25			√			
F16	F16_127_1610em2	13	5.79	4	B	2268818.95	6966097.74	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze ant							AL	√	6	2	0.5			√			
F16	F16_128_1610em2	13	5.66	4	B	2268905.94	6966114.12	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	scrap-frag							FE	√	6	1	0.25			√			
F16	F16_162_1610em2	11	3.6	3	B	2268916.42	6966099.8	07-Jul-06	Jim Thoren																			no contact											
F16	F16_167_1610em2	11	3.43	3	B	2268859.05	6966084.17	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	1	0.25			√			
F16	F16_169_1610em2	11	3.39	3	B	2268885.58	6966054.57	07-Jul-06	Jim Thoren																			no contact											
F16	F16_181_1610em2	14	3.17	3	A	2268826.14	6966079.98	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, part								√	3	0.5	0.25			√			
F16	F16_26_1610em2	16	28.17	4	A	2268874.28	6966077.88	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt bracket								√	6	2	0.25			√			
F16	F16_3_1610em2	15	172.16	4	A	2268889.75	6966105.21	28-Jun-06	Jim Thoren	√													√	MIL	3	1	4	a/ part	AL	√	12	6	0.25			√			
F16	F16_35_1610em2	10	24.27	4	C	2268878.71	6966101.11	11-Jul-06	Alan Merriman	√													√	MIL	> 24	2	0.25	ammo can handle and wire	FE	√	6	0.5	0.5	NE-SW	45	√			
F16	F16_36_1610em2	11	23.05	4	B	2268883.44	6966057.48	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze brkt							FE	√	6	2	0.25			√			
F16	F16_45_1610em2	14	18.05	4	A	2268844.16	6966059.5	28-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	frag							OTHER	√	3	0.5	0.25	N-S	0	√			
F16	F16_50_1610em2	15	17.02	4	A	2268895.72	6966075.36	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	ac flare							AL	√	12	1	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
F16	F16_52_1610em2	14	16.21	4	A	2268845.73	6966056.57	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt bracket								√	6	2	0.25			√			
F16	F16_6_1610em2	16	96.97	4	A	2268822.8	6966043.03	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	≥8	fuze, vt								√	3	4	0.25			√			
F16	F16_61_1610em2	16	13.08	4	A	2268842.59	6966074.41	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	ac flare							AL	√	6	2	0.25			√			
F16	F16_64_1610em2	13	11.84	4	B	2268886.66	6966111.13	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze ant							AL	√	6	2	0.25			√			
F16	F16_67_1610em2	10	11.2	4	C	2268879.52	6966095.92	11-Jul-06	Alan Merriman	√													√	CIV	> 24	1	0.25	wire		√	6	0.5	0.25			√			
F16	F16_99_1610em2	11	7.48	4	B	2268864.49	6966109.4	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	6	1	0.25			√			
F17	F17_102_1610em2	13	7.3	4	B	2268918.7	6966091.58	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.5	scrap	FE	√	6	4	0.25			√			
F17	F17_106_1610em2	15	7.07	4	A	2268995.89	6966073.91	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	> 24	0.5	0.25			√			
F17	F17_115_1610em2	16	6.45	4	A	2268994.76	6966046.98	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap, knife blade	FE	√	6	1	0.25			√			
F17	F17_122_1610em2	12	5.99	4	B	2268938.11	6966085	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze brkt							FE	√	6	2	0.25			√			
F17	F17_137_1610em2	13	4.97	4	B	2268936.8	6966089.67	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	FE	√	6		0.25			√			
F17	F17_14_1610em2	15	61.23	4	A	2268974.11	6966087.5	28-Jun-06	Jim Thoren	√													√	CIV	3	1	2	scrap	AL	√	6	2				√			
F17	F17_142_1610em2	10	4.58	4	C	2268931.11	6966041.31	11-Jul-06	Alan Merriman	√							√	ORD MD				50 bullet, lead							OTHER	√	3	0.5	0.5	N-S	45	√			
F17	F17_145_1610em2	11	4.52	4	B	2268989.3	6966043.45	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	> 24		0.25			√			
F17	F17_152_1610em2	15	4.08	4	A	2269013.74	6966044.04	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25			√			
F17	F17_157_1610em2	13	3.91	4	B	2268957.24	6966072.38	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal projo							CU	√	3	0.5				√			
F17	F17_17_1610em2	13	46.13	4	B	2268920.28	6966111.12	07-Jul-06	Jim Thoren	√							√	ORD MD	6	1	4	vt fuze							FE	√	6	4				√			
F17	F17_173_1610em2	12	3.3	3	B	2268920.41	6966107.27	07-Jul-06	Jim Thoren																			no contact											
F17	F17_176_1610em2	13	3.23	3	B	2268974.55	6966062.48	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3		1			√			
F17	F17_21_1610em2	16	38.1	4	A	2269002.08	6966047.95	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.25	fence pieces	FE	√	6	0.5	0.25			√			
F17	F17_25_1610em2	16	30.5	4	A	2268998.12	6966046.98	28-Jun-06	Jim Thoren	√													√	CIV	6	> 10	0.25	fence pieces	FE	√	6	0.5	0.25			√			
F17	F17_285_1321em2	11	3.9	4	B	2268928.98	6966109.62	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	20mm							FE	√	3	1	0.25						
F17	F17_31_1610em2	16	26.53	4	A	2268956.32	6966037.92	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze, vt bracket							FE	√	6	2	0.25			√			
F17	F17_39_1610em2	14	22.07	4	A	2268953.31	6966045.77	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt bracket							FE	√	6	1	0.25			√			
F17	F17_42_1610em2	14	20.21	4	A	2268995.13	6966058.23	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	rod	FE	√	> 24	0.5	0.25			√			
F17	F17_46_1610em2	11	17.91	4	B	2268928.95	6966051.59	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze brkt								√	6	2	0.25			√			
F17	F17_49_1610em2	11	17.12	4	B	2268928.49	6966047.12	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	FE	√	6	2	0.25			√			
F17	F17_56_1610em2	15	14.76	4	A	2269016.91	6966042.98	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25			√			
F17	F17_60_1610em2	14	13.22	4	A	2268971.25	6966036.76	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, part							FE	√	3	2	0.25			√			
F17	F17_63_1610em2	13	11.91	4	B	2268937.61	6966043.09	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze ant								√	6	2	1			√			
F17	F17_65_1610em2	15	11.64	4	A	2268968.55	6966101.96	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt bracket							FE	√	6	2	1			√			
F17	F17_76_1610em2	16	9.73	4	A	2269005.41	6966050.71	28-Jun-06	Jim Thoren	√													√	CIV	0	4	0.25	fences pieces	FE	√	6	0.5	0.25			√			
F17	F17_81_1610em2	13	9.39	4	B	2268998.71	6966059.68	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	washer		√	3	0.5	0.25	N-S	0	√			
F17	F17_83_1610em2	10	9.16	4	C	2268996.71	6966055.02	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze piece, vt							FE	√	6	4	0.5	NE-SW	45	√			
F17	F17_90_1610em2	14	8.35	4	A	2268962.97	6966051.48	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	0.5	0.25			√			
G01	G01_18_1216em1	11	4.73	4	B	2267415.52	6965991.23	06-Jun-06	Alan Merriman	√							√	ORD MD	12	1	1	bomb, fragment								√	3	1	0.5	NE-SW	0	√			
G01	G01_24_1216em1	11	4.06	4	B	2267407.26	6965995.66	06-Jun-06	Alan Merriman																			no find, maybe soil											
G01	G01_3_1216em1	13	30.03	4	B	2267405.05	6965992.88	06-Jun-06	Alan Merriman																			no find, maybe soil											
G01	G01_4_1216em1	14	20.78	4	A	2267394.81	6965984.39	06-Jun-06	Alan Merriman																			no find, reaquired 7/25/06											
G01	QAdig_G01_345		7.6		QA	2267406.14	6965986.3	15-Aug-06	Alan Merriman	√													√					hot soil											
G02	G02_01_612_mag			99	M	2267461.171	6965982.27	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
G02	G02_02_612_mag			99	M	2267482.128	6965948.192	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
G02	G02_03_612_mag			99	M	2267470.932	6965973.826	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
G02	G02_04_612_mag			99	M	2267471.363	6965971.018	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
G02	G02_24_1527em2	16	13.28	4	A	2267426.23	6965938.9	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire and wire residue		√	9	0.5	0.25	NE-SW	0	√			
G03	G03_25_1527em2	15	10.69	4	A	2267566.05	6965968.06	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	scrap								√	3	2	2	E-W	90	√			
G03	G03_30_1527em2	10	3.16	3	C	2267615.33	6965964.92	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal bullet								√	3	0.5	0.5	E-W	90	√			
G03	G03_39_1527em2	10	2.26	2	C	2267588.84	6966034.71	19-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	50 cal bullet ap								√	3	0.5	0.5	E-W	90				
G04	G04_25_1527em2	16	15.92	4	A	2267709.09	6966005.95	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	2	frag/ fuze								√	3	2	2			√			
G04	G04_30_1527em2	15	10.47	4	A	2267691.11	6966013.45	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	2	2			√			
G04	G04_34_1527em2	12	3.72	4	B	2267674.52	6965999.88	06-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal								√	3	0.5	0.5	E-W	0	√			
G04	G04_37_1527em2	10	3.2	3	C	2267677.27	6966022.62	19-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.25	50 cal bullet								√	3	0.5	0.5	E-W	90	√			
G04	QAdig_G04_469		6.1		QA	2267690.36	6965937.13	15-Aug-06	Alan Merriman	√													√					hot soil											

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G05	G05_23_1527em2	16	69.38	4	A	2267789	6966026.59	06-Jun-06	Alan Merriman	√													√	MIL	6	1	1	scrap, aluminum		√	3	2	2			√			
G05	G05_28_1527em2	14	12.63	4	A	2267760.98	6966005	16-Aug-06	Alan Merriman	√													√	MIL	0	1	1	scrap, aluminum, hot soil		√	6	0.5	0.25	E-W	0	√			
G05	G05_32_1527em2	11	5.57	4	B	2267778.84	6965979.85	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	metal pin		√	3	0.5	0.5	NE-SW	0	√			
G05	G05_42_1527em2	10	2.88	3	C	2267727.61	6965987.32	19-Jun-06	Alan Merriman	√													√	CIV	12	1	0.25	bolt		√	3	0.5	0.5	N-S	45	√			
G05	G05_44_1527em2	11	2.57	3	B	2267725.53	6966013.96	06-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	50 cal								√	3	0.5	0.5	N-S	45	√			
G05	G05_51_1527em2	9	2.23	2	C	2267804	6966013.24	19-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.25	frag piece of 37mm round,cont so								√	3	0.5	0.5	N-S	0	√			
G06	G06_24_1527em2	16	17.73	4	A	2267832.07	6966015.9	06-Jun-06	Alan Merriman	√													√	CIV	3	1	1	can		√	3	2	0.5	N-S		√			
G06	G06_26_1527em2	15	14.7	4	A	2267829.26	6965944	06-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	chaff/expended								√	3	2	2	E-W	0	√			
G06	G06_30_1528em2	4	41.35	4	F	2267887.77	6965992.79	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze adapter							FE	√	6	4	0.5	NE-SW	45	√			
G06	G06_31_1527em2	16	5.89	4	A	2267838.42	6965939.92	06-Jun-06	Alan Merriman	√													√	CIV	0	1	1	fence		√	3	2	0.25		0	√			
G06	G06_35_1527em2	9	3.33	3	C	2267853.73	6965998.89	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	12' piece of barbed wire		√	> 24	0.5	0.25	NE-SW	45	√			
G06	G06_36_1527em2	10	3.21	3	C	2267837.13	6965986.29	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal bullet								√	3	0.5	0.25	NE-SW	45	√			
G06	G06_54_1527em2	9	2.09	2	C	2267854.32	6966002.63	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	12' piece of barbed wire		√	> 24	0.5	0.25	NE-SW	45				
G06	G06_55_1528em2	4	5.98	4	F	2267912.4	6965946.04	06-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	piece of ac flare							FE	√	3	0.5	0.5	E-W	90	√			
G06	G06_56_1528em2	4	5.67	4	F	2267907.35	6965983.17	06-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze part, vt							FE	√	3	0.5	0.5	NE-SW	45	√			
G06	G06_59_1528em2	4	4.5	4	F	2267913.25	6966023.6	06-Jul-06	Alan Merriman	√							√	ORD MD	6	2	0.25	50 cal bullet							FE	√	3	0.5	0.25	N-S	45	√			
G06	G06_92_1528em2	2	2.21	2	F	2267862.56	6966011.37	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
G07	G07_15_1414em2	16	51.16	4	A	2268009.2	6965956.67	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
G07	G07_18_1414em2	15	45.34	4	A	2267973.8	6966017.58	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G07	G07_20_1414em2	13	37.94	4	B	2267982.2	6966035	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	pliers								√			
G07	G07_22_1414em2	13	29.25	4	B	2267981.42	6966031.62	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	pliers								√			
G07	G07_29_1414em2	15	15.52	4	A	2267935.39	6965948.3	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
G07	G07_34_1414em2	13	12.17	4	B	2267983.11	6965965.24	17-Aug-06	Jim Thoren	√													√	CIV	0	1	1	wire, wire								√			
G07	G07_36_1414em2	14	10.84	4	A	2267967.91	6965972.92	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
G07	G07_49_1414em2	13	6.84	4	B	2267981.7	6965961.04	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
G07	G07_55_1414em2	13	6.23	4	B	2267983.69	6965938.19	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
G07	G07_62_1414em2	10	5.49	4	C	2267963.09	6965973.02	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
G07	G07_70_1414em2	10	4.81	4	C	2268016.73	6966000.78	11-Jul-06	Alan Merriman																			no contact, same as G07 #304											
G07	G07_71_1414em2	13	4.71	4	B	2268000.72	6965946.88	13-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	50 cal														√			
G07	G07_75_1414em2	13	4.44	4	B	2267947.54	6966009.49	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal														√			
G07	G07_79_1414em2	12	4.08	4	B	2267942.78	6965945.13	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal														√			
G07	G07_90_1414em2	12	3.72	4	B	2267969.44	6965968.19	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
G08	G08_103_1415em2	13	16.14	4	B	2268103.56	6965972.18	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
G08	G08_107_1415em2	12	15.84	4	B	2268111.05	6965973.67	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	bolt		√	6	0.5	0.5			√			
G08	G08_111_1415em2	11	15.1	4	B	2268115.3	6965973.93	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	bolt		√	6	0.5	0.5			√			
G08	G08_114_1415em2	15	14.79	4	A	2268109.9	6965983.12	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	bolt		√	6	0.5	0.5			√			
G08	G08_127_1415em2	15	13.03	4	A	2268100.13	6965948.64	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_137_1415em2	11	11.82	4	B	2268104.3	6965955.55	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_139_1415em2	15	11.74	4	A	2268103.86	6965999.68	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
G08	G08_14_1415em2	16	116.78	4	A	2268113.74	6965980.24	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
G08	G08_141_1415em2	12	11.2	4	B	2268116.1	6965964.41	13-Jun-06	Jim Thoren	√													√	CIV	12	1	1	magnet								√			
G08	G08_145_1415em2	13	10.74	4	B	2268070.23	6965981.33	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	scrap, scrap								√			
G08	G08_163_1415em2	12	9.07	4	B	2268100.47	6965986.22	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	6	0.5	0.5			√			
G08	G08_176_1415em2	13	8.08	4	B	2268058.34	6966026.86	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_184_1415em2	9	7.6	4	C	2268114.34	6965991.96	11-Jul-06	Alan Merriman	√													√	MIL	> 24	2	0.5	explosive relay device	SS	√	24	0.5	0.5			√			
G08	G08_191_1415em2	11	7.31	4	B	2268111.56	6965946.7	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap, aluminum								√			
G08	G08_192_1415em2	11	7.27	4	B	2268104.84	6965944.05	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	bolt, xpt								√			
G08	G08_199_1415em2	13	7.01	4	B	2268087.84	6965947.09	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_207_1415em2	9	6.69	4	C	2268104.8	6965968.32	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	50 cal bullet							SS	√	3	0.5	0.25			√			
G08	G08_233_1415em2	10	5.42	4	C	2268103.88	6965948.71	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	10	0.25	small arms	√	CIV	> 24	1	0.25	cable	FE	√	6	0.5	0.5	NE-SW	45	√			
G08	G08_248_1415em2	13	5.02	4	B	2268051.05	6966001.53	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	frag														√			
G08	G08_252_1415em2	12	4.92	4	B	2268093.79	6965957.39	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	a/c ejection tubing w/mdf								√	9	0.5	0.25			√			
G08	G08_254_1415em2	12	4.88	4	B	2268112.35	6965955.82	13-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	50 cal														√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G08	G08_258_1415em2	12	4.73	4	B	2268069.91	6965974.66	13-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	50 cal														√			
G08	G08_26_1415em2	16	55.53	4	A	2268085.14	6966006.3	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	flare														√			
G08	G08_264_1415em2	13	4.54	4	B	2268065.34	6966003.6	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1									√			
G08	G08_271_1415em2	11	4.46	4	B	2268053.93	6965951.9	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
G08	G08_272_1415em2	12	4.4	4	B	2268084.87	6965954.22	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
G08	G08_275_1415em2	12	4.38	4	B	2268026.57	6965960.11	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_277_1415em2	11	4.35	4	B	2268083.16	6965937.62	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
G08	G08_285_1415em2	12	4.15	4	B	2268054.43	6966027.68	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	frag														√			
G08	G08_286_1415em2	12	4.13	4	B	2268097.12	6965946.14	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_287_1415em2	11	4.13	4	B	2268022.23	6966007.88	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
G08	G08_289_1415em2	11	4.12	4	B	2268079.64	6965947.51	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	3		0.25			√			
G08	G08_296_1415em2	12	3.95	4	B	2268053.55	6965964.61	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_304_1415em2	14	3.84	4	A	2268018.48	6966001.03	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_312_1415em2	11	3.77	4	B	2268048.46	6965946.59	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_334_1415em2	12	3.48	3	B	2268037.34	6966001.62	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
G08	G08_341_1415em2	11	3.31	3	B	2268025.66	6965977.12	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
G08	G08_347_1415em2	11	3.17	3	B	2268108.62	6965937.78	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	hinge		√	6	1	0.25			√			
G08	G08_368_1415em2	11	2.76	3	B	2268040.92	6965938.3	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
G08	G08_39_1415em2	14	39.77	4	A	2268117.18	6965989.6	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_55_1415em2	14	31.85	4	A	2268108.75	6965949.88	13-Jun-06	Jim Thoren	√							√	ORD MD	6	1	2	chaff in container								√	6	4	0.25			√			
G08	G08_61_1415em2	10	28.84	4	C	2268118.23	6965996.09	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	1	0.5	explosive relay device	√	CIV	> 24	2	0.5	aluminum ac tubing	FE	√	24	0.5	0.5	NE-SW	45	√			
G08	G08_62_1415em2	16	28.34	4	A	2268026.96	6965936.88	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
G08	G08_66_1415em2	12	26.58	4	B	2268107.05	6965965.91	13-Jun-06	Jim Thoren	√													√	CIV	12	1	1	scrap		√	12	0.5	0.25			√			
G08	G08_67_1415em2	12	26.49	4	B	2268111.98	6965963.41	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	bolt		√	12	0.5	0.5			√			
G08	G08_69_1415em2	13	25.03	4	B	2268108.91	6965958.41	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap		√	6	1				√			
G08	G08_80_1415em2	14	21.83	4	A	2268096.73	6965973.14	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
G08	G08_86_1415em2	15	18.96	4	A	2268043.36	6965955.44	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	flare														√			
G08	G08_9_1415em2	16	165.22	4	A	2268096.63	6965952.56	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap		√	6	2	0.25			√			
G08	G08_90_1415em2	13	18.24	4	B	2268073.86	6965977.23	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
G08	G08_96_1415em2	15	17.8	4	A	2268083.63	6965985.89	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
G09	G09_100_1613em2	14	14.38	4	A	2268154.01	6966022.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_101_1613em2	12	14.01	4	B	2268133.89	6966009.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_103_1613em2	16	13.87	4	A	2268160	6966032.5	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_104_1613em2	12	13.71	4	B	2268170.28	6966012.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_105_1613em2	11	13.42	4	B	2268212.96	6965995.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_106_1613em2	13	13.28	4	B	2268168.61	6965970.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_108_1613em2	13	13.09	4	B	2268195.88	6966012.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_109_1613em2	9	12.73	4	C	2268154.38	6966005.64	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_110_1613em2	10	12.66	4	C	2268165.64	6966013.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_112_1613em2	13	12.52	4	B	2268178.52	6965985.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_114_1613em2	10	12.22	4	C	2268215.77	6966000.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_115_1613em2	13	12	4	B	2268185.27	6966014.33	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_116_1613em2	11	11.9	4	B	2268206.03	6966000.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_117_1613em2	12	11.87	4	B	2268162.54	6965973.35	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_118_1613em2	12	11.78	4	B	2268218.16	6966028.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_12_1613em2	16	94.06	4	A	2268146.33	6965957.88	21-Jul-06	Alan Merriman	√													√	CIV	0	1	0.5	tpost bracket	FE	√	9	4	0.25			√			
G09	G09_121_1613em2	14	11.45	4	A	2268160.55	6965951.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_122_1613em2	10	10.99	4	C	2268169.75	6966035.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_123_1613em2	13	10.98	4	B	2268178.59	6966018.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_124_1613em2	13	10.9	4	B	2268189.93	6966032.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_125_1613em2	10	10.25	4	C	2268212.92	6965991.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_128_1613em2	16	10.19	4	A	2268147.56	6966021.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_13_1613em2	12	88.5	4	B	2268194.66	6966026.13	21-Jul-06	Alan Merriman	√							√	ORD MD	12	5	1	ac seat parts							AL	√	6	2	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G09	G09_132_1613em2	13	9.67	4	B	2268159.14	6965985.5	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_136_1613em2	12	9.14	4	B	2268162.83	6965981.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_140_1613em2	13	9.03	4	B	2268141.34	6966021.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_141_1613em2	13	8.96	4	B	2268174.99	6965999.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_142_1613em2	13	8.94	4	B	2268173.55	6965982.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_143_1613em2	13	8.87	4	B	2268203.53	6966033.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_144_1613em2	15	8.83	4	A	2268135.33	6965965.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_146_1613em2	12	8.71	4	B	2268125.27	6965981.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_147_1613em2	12	8.67	4	B	2268210.9	6965982.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_15_1613em2	10	72.05	4	C	2268144.86	6966002.38	21-Jul-06	Alan Merriman	√							√	ORD MD	6	2	0.25	brass/scrap/50 cal	√	CIV	3	1	0.25	wire	OTHER	√	3	0.5	0.25			√			
G09	G09_150_1613em2	12	8.64	4	B	2268208.15	6965989.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_151_1613em2	12	8.62	4	B	2268210.4	6966024.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_152_1613em2	12	8.59	4	B	2268166.85	6965967.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_155_1613em2	10	8.55	4	C	2268191.46	6966010.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_16_1613em2	13	66.44	4	B	2268198.36	6966029.34	21-Jul-06	Alan Merriman	√							√	ORD MD	12	5	2	ac seat parts							AL	√	6	2	0.5			√			
G09	G09_162_1613em2	9	7.95	4	C	2268126.99	6966004.81	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	1			√			
G09	G09_164_1613em2	13	7.81	4	B	2268195.6	6966017.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_166_1613em2	10	7.73	4	C	2268199.34	6966021.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_168_1613em2	9	7.7	4	C	2268164.96	6965954.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_17_1613em2	13	66.11	4	B	2268182.12	6966002.08	21-Jul-06	Alan Merriman	√							√	ORD MD	12	3	1	ac seat parts							AL	√	6	6	1			√			
G09	G09_172_1613em2	13	7.53	4	B	2268184.37	6966010.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_175_1613em2	12	7.46	4	B	2268203.12	6966028.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_176_1613em2	12	7.24	4	B	2268217.41	6965968.89	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_177_1613em2	14	7.21	4	A	2268134.35	6965957.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_178_1613em2	12	7.18	4	B	2268204.17	6966024.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_18_1613em2	13	64.36	4	B	2268155.62	6966009.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	1			√			
G09	G09_180_1613em2	11	7.06	4	B	2268184.41	6965954.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_184_1613em2	12	6.83	4	B	2268123.55	6965985.82	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_185_1613em2	10	6.77	4	C	2268166.95	6966032.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_187_1613em2	10	6.66	4	C	2268186.62	6965998.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_19_1613em2	13	63.73	4	B	2268163.54	6966035.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_192_1613em2	12	6.54	4	B	2268163.68	6965977.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_193_1613em2	12	6.48	4	B	2268195.14	6965981.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_194_1613em2	12	6.41	4	B	2268191.75	6965956.82	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_195_1613em2	12	6.38	4	B	2268209.36	6965975.19	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_196_1613em2	14	6.16	4	A	2268205.06	6966007.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_197_1613em2	10	6.09	4	C	2268173.43	6965989.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_199_1613em2	10	5.98	4	C	2268163.41	6965991.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_20_1613em2	12	62.24	4	B	2268149.82	6966004.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_201_1613em2	11	5.91	4	B	2268148.87	6966012.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_205_1613em2	12	5.73	4	B	2268212.48	6966032.74	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_206_1613em2	13	5.73	4	B	2268133.98	6965968.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_208_1613em2	12	5.61	4	B	2268173.73	6965977.5	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_209_1613em2	11	5.59	4	B	2268176.82	6966021.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_21_1613em2	12	59.87	4	B	2268185.05	6965948.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_211_1613em2	11	5.56	4	B	2268144.28	6966006.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_212_1613em2	13	5.55	4	B	2268170.42	6965960.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_215_1613em2	10	5.51	4	C	2268215.23	6965982.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_22_1613em2	14	58.97	4	A	2268184.38	6965992.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_220_1613em2	12	5.43	4	B	2268192.27	6965960.64	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_225_1613em2	13	5.24	4	B	2268161.22	6966004.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_227_1613em2	13	5.18	4	B	2268195.41	6965992.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_228_1613em2	9	5.16	4	C	2268145.27	6966012.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G09	G09_230_1613em2	13	5.07	4	B	2268133.29	6965946.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_239_1613em2	11	4.83	4	B	2268207.73	6965993.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_24_1613em2	14	56.72	4	A	2268132.13	6966006.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_242_1613em2	10	4.78	4	C	2268181.37	6966011.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_243_1613em2	10	4.77	4	C	2268209.98	6965979.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_25_1613em2	13	54.65	4	B	2268187.82	6966021.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_251_1613em2	13	4.56	4	B	2268214.5	6966035.4	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_252_1613em2	11	4.55	4	B	2268159.88	6965957.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_254_1613em2	13	4.53	4	B	2268210.27	6966009.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_256_1613em2	10	4.49	4	C	2268215.79	6966012.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_257_1613em2	11	4.48	4	B	2268140.44	6966025.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_26_1613em2	13	53.76	4	B	2268193.48	6966021.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_260_1613em2	13	4.23	4	B	2268201.95	6965996.43	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_263_1613em2	11	4.17	4	B	2268160.39	6965970.86	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_265_1613em2	12	4.16	4	B	2268177.96	6965980.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_269_1613em2	10	4.07	4	C	2268177.48	6966030.29	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_27_1613em2	12	53.29	4	B	2268150	6966000.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_275_1613em2	9	4.01	4	C	2268163.27	6965968.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_276_1613em2	13	4	4	B	2268136.34	6965975.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_280_1613em2	12	3.93	4	B	2268214.41	6966023	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_283_1613em2	11	3.86	4	B	2268125.45	6965994.33	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_285_1613em2	12	3.85	4	B	2268204.9	6965952.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_287_1613em2	12	3.76	4	B	2268130.44	6965939.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_288_1613em2	11	3.72	4	B	2268194.54	6965977.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_29_1613em2	13	51.77	4	B	2268169.77	6966021.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	1			√			
G09	G09_297_1613em2	11	3.42	3	B	2268132.11	6965988.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_298_1613em2	9	3.41	3	C	2268193.17	6966034.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_3_1613em2	16	394.61	4	A	2268158.21	6966028.78	21-Jul-06	Alan Merriman	√							√	ORD MD	12	> 10	≥8	ac seat parts/mk13 mod o flares							OTHER	√	9	4	0.5			√			
G09	G09_302_1613em2	6	3.31	3	D	2268137.32	6966008.35	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_303_1613em2	12	3.3	3	B	2268151.72	6966016.4	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_306_1613em2	10	3.23	3	C	2268210.04	6966019.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_31_1613em2	13	49.18	4	B	2268181.08	6965996.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_314_1613em2	10	3.12	3	C	2268183.41	6965960.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_32_1613em2	10	48.95	4	C	2268140.73	6966000.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_322_1613em2	9	3.05	3	C	2268171.21	6965996.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_33_1613em2	13	47.85	4	B	2268184.2	6966032.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_332_1613em2	8	2.87	3	D	2268174.58	6966026.43	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_339_1613em2	9	2.79	3	C	2268202.02	6966003.63	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_34_1613em2	12	45.75	4	B	2268185.75	6965944.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_340_1613em2	11	2.73	3	B	2268198.27	6966009.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_345_1613em2	11	2.63	3	B	2268118.95	6965999.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_348_1613em2	7	2.6	3	D	2268121.54	6965995.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_352_1613em2	8	2.55	3	D	2268169.34	6966029.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_353_1613em2	10	2.52	3	C	2268194.61	6965974.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_355_1613em2	9	2.49	2	C	2268179.87	6965971.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_356_1613em2	10	2.48	2	C	2268146.93	6965992.29	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_360_1613em2	7	2.48	2	D	2268158.78	6965980.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_363_1613em2	10	2.46	2	C	2268159.37	6965948.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_365_1613em2	10	2.44	2	C	2268216.34	6965989.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_369_1613em2	9	2.38	2	C	2268192.41	6965984.22	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_37_1613em2	12	40.48	4	B	2268184.23	6966018.64	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_370_1613em2	8	2.36	2	D	2268167.89	6965963.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_372_1613em2	7	2.36	2	D	2268181.74	6965982.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G09	G09_374_1613em2	7	2.33	2	D	2268193.47	6965953.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_38_1613em2	13	40.05	4	B	2268185.59	6966007.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_381_1613em2	6	2.25	2	D	2268166.88	6965982.4	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_382_1613em2	7	2.25	2	D	2268203.31	6965939.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_385_1613em2	10	2.23	2	C	2268137.29	6965985.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_388_1613em2	9	2.22	2	C	2268217.03	6965965.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_392_1613em2	10	2.19	2	C	2268185.18	6966036.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_393_1613em2	11	2.17	2	B	2268212.79	6966014.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_394_1613em2	9	2.15	2	C	2268126.6	6966036.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_401_1613em2	10	2.01	2	C	2268198.55	6965999.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_403_1613em2	8	1.99	2	D	2268166.93	6965987.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_404_1613em2	9	1.96	2	C	2268129.48	6965975.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_407_1613em2	8	1.94	2	D	2268186.61	6965940.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_414_1613em2	7	1.88	1	D	2268158.9	6965989.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_415_1613em2	7	1.87	1	D	2268163.38	6965948.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_418_1613em2	7	1.84	1	D	2268150.62	6965948.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_42_1613em2	9	34.74	4	C	2268189.93	6966026.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_421_1613em2	8	1.8	1	D	2268132.22	6966013.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_422_1613em2	6	1.79	1	D	2268168.02	6965977.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_423_1613em2	7	1.78	1	D	2268198.77	6965960.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_43_1613em2	10	32.83	4	C	2268159.66	6966009.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_430_1613em2	7	1.74	1	D	2268133.66	6965973.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_44_1613em2	10	31.86	4	C	2268173.05	6966021.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_445_1613em2	6	1.63	1	D	2268190.18	6965977.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_453_1613em2	8	1.57	1	D	2268172.84	6965974.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_456_1613em2	5	1.56	1	D	2268180.88	6965962.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_458_1613em2	5	1.55	1	D	2268122.63	6965969.94	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_459_1613em2	6	1.55	1	D	2268132.85	6965981.49	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_46_1613em2	12	30.65	4	B	2268164.59	6965994.49	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_460_1613em2	8	1.52	1	D	2268144.33	6966033.42	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_466_1613em2	4	1.5	1	F	2268214.02	6965977.37			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_468_1613em2	7	1.5	1	D	2268135.95	6965961.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_47_1613em2	12	30.43	4	B	2268168.69	6966008.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	1			√			
G09	G09_472_1613em2	7	1.47	1	D	2268133.32	6966025.4	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_473_1613em2	6	1.47	1	D	2268162.14	6965987.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_475_1613em2	7	1.44	1	D	2268136.26	6965953.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_478_1613em2	5	1.42	1	D	2268206.11	6965964.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_481_1613em2	8	1.38	1	D	2268133.21	6965937.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_485_1613em2	6	1.38	1	D	2268189.31	6965954.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_488_1613em2	7	1.34	1	D	2268136.77	6965978.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_489_1613em2	7	1.34	1	D	2268193.32	6966002.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_492_1613em2	4	1.31	1	F	2268182.27	6965950.69			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_495_1613em2	6	1.29	1	D	2268161.18	6965961.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_5_1613em2	16	254.48	4	A	2268146.73	6966024.98	21-Jul-06	Alan Merriman	√													√	MIL	6	1	2	50 cal can lid	FE	√	12	6	1			√			
G09	G09_50_1613em2	12	27.88	4	B	2268171.2	6966024.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_508_1613em2	6	1.21	1	D	2268158.71	6965944.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_513_1613em2	6	1.16	1	D	2268125.63	6966017.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_517_1613em2	8	1.14	1	D	2268187.25	6965980.94	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_518_1613em2	5	1.14	1	D	2268166.23	6965958.33	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_526_1613em2	5	1.09	1	D	2268166.25	6965973.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_529_1613em2	8	1.07	1	D	2268215.08	6965955.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_53_1613em2	10	26.41	4	C	2268178.3	6966007.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_532_1613em2	6	1.07	1	D	2268131.95	6965949.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G09	G09_534_1613em2	5	1.07	1	D	2268118.99	6965957.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_537_1613em2	4	1.05	1	F	2268124.52	6965989.37			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_54_1613em2	11	26.09	4	B	2268179.7	6965990.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_541_1613em2	4	1.04	1	F	2268209.31	6965965.3			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_544_1613em2	5	1.03	1	D	2268184.2	6965985.63	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_548_1613em2	5	1.02	1	D	2268119.26	6965972.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_56_1613em2	12	25.46	4	B	2268210.11	6966000.33	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_57_1613em2	13	24.44	4	B	2268168.21	6966016.83	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_6_1613em2	16	249.16	4	A	2268139.16	6966017.49	21-Jul-06	Alan Merriman	√							√	ORD MD	6	1	2	ac parts							AL	√	6	4	1			√			
G09	G09_61_1613em2	12	22.2	4	B	2268146.43	6966017.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_62_1613em2	11	22.1	4	B	2268151.23	6966030.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_63_1613em2	11	22.07	4	B	2268148.13	6966008.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_66_1613em2	13	20.78	4	B	2268140.09	6965997.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_67_1613em2	13	20.72	4	B	2268165.65	6965998.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_69_1613em2	10	20.27	4	C	2268174.13	6966010.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_7_1613em2	16	202.13	4	A	2268158.09	6966025.08	21-Jul-06	Alan Merriman	√							√	ORD MD	12	> 10	≥8	ac seat parts							AL	√	12	4	0.5			√			
G09	G09_70_1613em2	16	20.24	4	A	2268157.84	6966019.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_71_1613em2	12	19.87	4	B	2268178.09	6966013.42	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_72_1613em2	12	19.81	4	B	2268171.5	6966015.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_73_1613em2	11	19.7	4	B	2268137.22	6965995.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_74_1613em2	12	19.67	4	B	2268175.62	6966003.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_75_1613em2	13	19.58	4	B	2268188.63	6965994.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_76_1613em2	13	19.29	4	B	2268207.78	6966003.78	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_80_1613em2	10	18.19	4	C	2268216.59	6965993.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_81_1613em2	12	17.87	4	B	2268167.77	6965992.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_82_1613em2	13	17.85	4	B	2268207.51	6966028.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_83_1613em2	12	17.8	4	B	2268173.98	6966030.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_84_1613em2	10	17.73	4	C	2268144.85	6965998.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_85_1613em2	13	17.36	4	B	2268159.62	6966013.33	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_86_1613em2	11	17.31	4	B	2268185.46	6965989.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_88_1613em2	9	16.82	4	C	2268181.69	6966007.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_9_1613em2	11	114.11	4	B	2268199.62	6966025.78	21-Jul-06	Alan Merriman	√							√	ORD MD	12	5	2	ac seat parts							AL	√	9	2	0.5			√			
G09	G09_90_1613em2	12	16.52	4	B	2268118.95	6965979.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_91_1613em2	13	16.45	4	B	2268128.71	6966001.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_92_1613em2	13	16.19	4	B	2268187.95	6966011.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_96_1613em2	11	15.45	4	B	2268134.16	6965997.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G09	G09_98_1613em2	10	15	4	C	2268208.78	6965996.75	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1001_1212em2	4	1.2	1	F	2268296.92	6965992.54			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1006_1212em2	4	1.19	1	F	2268317.32	6965963.18			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1007_1212em2	5	1.19	1	D	2268278.7	6965939.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1009_1212em2	5	1.19	1	D	2268273.38	6965938.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1012_1212em2	4	1.17	1	F	2268289.13	6965989.15			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1015_1212em2	5	1.17	1	D	2268316.33	6965938.81	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1023_1212em2	7	1.15	1	D	2268240.27	6966015.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1024_1212em2	4	1.15	1	F	2268248.66	6965949.73			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_103_1212em2	10	23.41	4	C	2268295.97	6966023.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1033_1212em2	5	1.13	1	D	2268297.28	6966014.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1036_1212em2	7	1.13	1	D	2268273.88	6965980.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1045_1212em2	9	1.1	1	C	2268267.16	6965983.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1049_1212em2	4	1.1	1	F	2268316.77	6965972.45			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1050_1212em2	5	1.09	1	D	2268265.68	6966011.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1052_1212em2	4	1.09	1	F	2268282.54	6965967.75			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_106_1212em2	11	22.81	4	B	2268226.09	6965987.72	08-Jun-06	Jim Thoren	√							√	ORD MD	> 24	10	1	30 cal & ac scrap							OTHER	√	3	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G10	G10_1060_1212em2	6	1.07	1	D	2268286.85	6965986.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1061_1212em2	4	1.07	1	F	2268307.05	6965970.67			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1073_1212em2	6	1.05	1	D	2268234.38	6966035.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1074_1212em2	5	1.05	1	D	2268248.67	6965963.06	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1086_1212em2	5	1.03	1	D	2268301.41	6965995.63	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_1089_1212em2	4	1.02	1	F	2268295.05	6965975.45			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_11_1212em2	13	110.55	4	B	2268296.27	6966031.99	08-Jun-06	Jim Thoren	√							√	ORD MD	> 24	> 10	≥8	pts,cads,flares,ordnance							OTHER	√	> 24	6	> 4	N-S		√			
G10	G10_118_1212em2	9	20.2	4	C	2268230.56	6965977.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_129_1212em2	12	18.93	4	B	2268257.05	6966002.34	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_136_1212em2	12	18.06	4	B	2268219.94	6966013.08	08-Jun-06	Jim Thoren	√							√	ORD MD	> 24	3	1	50 cal, ctg case & 9mm								√	3	0.5	0.5			√			
G10	G10_138_1212em2	10	17.82	4	C	2268225.71	6966012.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_139_1212em2	10	17.82	4	C	2268228.2	6966010.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_153_1212em2	10	16.46	4	C	2268219.94	6966027.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_16_1212em2	13	97.4	4	B	2268269.59	6965980.52	08-Jun-06	Jim Thoren	√							√	ORD MD	6	> 10	0.25	sm arms scrap	√	MIL	3	1	2	ac ejection seat part	AL	√	6	6	2	N-S	45	√			
G10	G10_162_1212em2	10	15.64	4	C	2268249.97	6965998.39	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_164_1212em2	10	15.54	4	C	2268308.05	6966034.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_167_1212em2	9	15.33	4	C	2268307.01	6966020.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_175_1212em2	10	14.54	4	C	2268223.94	6966028.29	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_186_1212em2	10	13.29	4	C	2268237.29	6966016.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_188_1212em2	10	12.82	4	C	2268233.55	6965984.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_20_1212em2	11	83	4	B	2268223.97	6966016.87	08-Jun-06	Jim Thoren	√							√	ORD MD	12	3	2	scrap, 50 cal etc, & ac seat par	√	CIV	12				FE	√	9	4	2	E-W	45	√			
G10	G10_200_1212em2	10	12.12	4	C	2268251.52	6966027.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_205_1212em2	11	11.85	4	B	2268221.88	6965985.87	08-Jun-06	Jim Thoren	√							√	ORD MD	6	> 10	1	50 cal, 30 cal, ctg cases	√	CIV	12				AL	√	3	0.5	0.5	N-S	45	√			
G10	G10_218_1212em2	10	11.12	4	C	2268246.83	6966024.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_220_1212em2	11	11.07	4	B	2268270.59	6966014.32	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_221_1212em2	10	11.06	4	C	2268306.44	6966015.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_225_1212em2	10	10.93	4	C	2268292.2	6966023.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_227_1212em2	10	10.79	4	C	2268312.88	6965973.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_242_1212em2	12	10.17	4	B	2268283.26	6965956.08	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_246_1212em2	12	9.77	4	B	2268301.55	6966030.25	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_252_1212em2	9	9.35	4	C	2268303.69	6966035.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_253_1212em2	9	9.34	4	C	2268235.11	6966000.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_257_1212em2	9	9.27	4	C	2268230.87	6966003.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_265_1212em2	9	9.04	4	C	2268225.81	6966006.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_267_1212em2	10	9	4	C	2268316.43	6966017.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_271_1212em2	10	8.83	4	C	2268242.22	6966027.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_272_1212em2	10	8.8	4	C	2268261.28	6966026.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_285_1212em2	10	8.26	4	C	2268307.95	6965963.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_288_1212em2	12	8.17	4	B	2268266.91	6966033.89	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_290_1212em2	10	8	4	C	2268230.91	6966007.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_3_1212em2	13	651.15	4	B	2268291.41	6966033.75	08-Jun-06	Jim Thoren	√							√	ORD MD	> 24	> 10	≥8	ac seat pt, cads, flares, ordnan							OTHER	√	> 24	> 6	> 4	N-S		√			
G10	G10_30_1212em2	11	61.52	4	B	2268270.15	6966035.48	08-Jun-06	Jim Thoren	√													√	CIV	12	1	1	hot wire post	FE	√	> 24	0.5	0.5			√			
G10	G10_301_1212em2	10	7.82	4	C	2268221.92	6965990.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_309_1212em2	10	7.48	4	C	2268228.6	6965982.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_317_1212em2	10	7.28	4	C	2268257.3	6965996.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_319_1212em2	9	7.22	4	C	2268263.8	6966029.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_328_1212em2	9	6.99	4	C	2268250.91	6965942.49	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_343_1212em2	10	6.51	4	C	2268311.45	6966035.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_351_1212em2	9	6.38	4	C	2268311.57	6965946.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_368_1212em2	10	6.04	4	C	2268222.09	6965994.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_378_1212em2	11	5.75	4	B	2268238.71	6965952.82	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_385_1212em2	9	5.6	4	C	2268255.76	6966029.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_389_1212em2	10	5.54	4	C	2268233.26	6966027.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G10	G10_397_1212em2	9	5.35	4	C	2268223.78	6966034.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_398_1212em2	9	5.32	4	C	2268301.58	6966014.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_407_1212em2	9	5	4	C	2268238.63	6965957.74	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_411_1212em2	9	4.9	4	C	2268314.88	6965945.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_440_1212em2	11	4.53	4	B	2268291.66	6965983.66	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_442_1212em2	10	4.52	4	C	2268280.84	6965953.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_443_1212em2	9	4.49	4	C	2268302.95	6966027.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_446_1212em2	11	4.47	4	B	2268243.57	6965989.57	08-Jun-06	Jim Thoren	√							√	ORD MD	12	4	1	50 cal ctg, 45 auto, ac tubing							OTHER	√	6	0.5	0.5	N-S	45	√			
G10	G10_459_1212em2	8	4.32	4	D	2268300.08	6966022.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_46_1212em2	11	46.37	4	B	2268312.19	6966017.65	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_474_1212em2	9	4.13	4	C	2268245.99	6965969.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_475_1212em2	10	4.12	4	C	2268301.87	6965943.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_477_1212em2	8	4.02	4	D	2268238.67	6965967.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_482_1212em2	9	3.97	4	C	2268301.77	6965937.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_484_1212em2	9	3.96	4	C	2268301.23	6965964.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_488_1212em2	8	3.9	4	D	2268258.79	6966017.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_489_1212em2	10	3.89	4	C	2268219.7	6965982.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_492_1212em2	9	3.89	4	C	2268231.17	6965940.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_5_1212em2	10	335.45	4	C	2268287.62	6966033.77	21-Jul-06	Alan Merriman	√	√	ORD		1		20mm HE	√	ORD MD	> 24	> 10	≥8	ac seat pts, cads, flares, ordna	√	CIV				bladed, hand swept, scrap metal	OTHER	√	> 24	> 6	> 4	N-S		√			
G10	G10_508_1212em2	10	3.75	4	C	2268269.5	6965938.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_509_1212em2	10	3.74	4	C	2268248.17	6965994.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_516_1212em2	9	3.61	4	C	2268301.11	6966000.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_524_1212em2	10	3.49	3	C	2268303.91	6965954.63	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_525_1212em2	9	3.49	3	C	2268267.71	6966008.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_528_1212em2	8	3.47	3	D	2268237.34	6966027.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_533_1212em2	7	3.36	3	D	2268238.52	6965989.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_546_1212em2	7	3.27	3	D	2268253.8	6965940.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_550_1212em2	10	3.23	3	C	2268281.6	6966033.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_553_1212em2	8	3.19	3	D	2268224.05	6965976.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_562_1212em2	8	3.13	3	D	2268269.91	6965972.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_563_1212em2	9	3.12	3	C	2268245.95	6965959.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_566_1212em2	8	3.12	3	D	2268265.57	6966020.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_572_1212em2	8	3.08	3	D	2268309.97	6965938.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_579_1212em2	9	3.04	3	C	2268304.31	6965997.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_583_1212em2	8	2.99	3	D	2268303.7	6966002.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_593_1212em2	8	2.92	3	D	2268305.7	6965987.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_596_1212em2	7	2.89	3	D	2268233.38	6965989.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_599_1212em2	8	2.87	3	D	2268263.24	6965948.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_60_1212em2	13	38.89	4	B	2268257.98	6965982.01	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_604_1212em2	8	2.85	3	D	2268262.88	6966022.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_605_1212em2	8	2.84	3	D	2268233.17	6965948.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_606_1212em2	8	2.82	3	D	2268292.19	6966016.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_634_1212em2	8	2.63	3	D	2268270.63	6966003.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_643_1212em2	7	2.57	3	D	2268316.86	6965966.43	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_646_1212em2	6	2.56	3	D	2268230.77	6966032.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_651_1212em2	7	2.49	2	D	2268275.3	6965958.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_659_1212em2	7	2.45	2	D	2268280.27	6966017.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_662_1212em2	7	2.44	2	D	2268228.45	6966026.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_672_1212em2	5	2.41	2	D	2268219.24	6965960.74	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_676_1212em2	7	2.38	2	D	2268268.48	6965949.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_678_1212em2	5	2.37	2	D	2268230.79	6966000.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_691_1212em2	5	2.27	2	D	2268313.2	6965965.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_693_1212em2	7	2.27	2	D	2268219.31	6966034.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G10	G10_697_1212em2	7	2.24	2	D	2268279.98	6966023.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_703_1212em2	8	2.22	2	D	2268291.12	6965939.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_708_1212em2	7	2.17	2	D	2268317.24	6965990.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_711_1212em2	7	2.16	2	D	2268241.31	6965947.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_721_1212em2	6	2.1	2	D	2268290.58	6965963.49	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_727_1212em2	7	2.06	2	D	2268223.66	6965946.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_729_1212em2	7	2.04	2	D	2268275.62	6965993.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_731_1212em2	6	2.04	2	D	2268296.88	6965943.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_739_1212em2	7	2.01	2	D	2268273.76	6965985.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_747_1212em2	9	1.98	2	C	2268243.52	6965956.39	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_757_1212em2	7	1.93	2	D	2268278.51	6965988.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_761_1212em2	7	1.92	2	D	2268245.98	6965946.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_763_1212em2	7	1.91	2	D	2268289.22	6965948.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_765_1212em2	6	1.91	2	D	2268223.96	6965960.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_769_1212em2	5	1.9	1	D	2268253.32	6966024.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_772_1212em2	5	1.88	1	D	2268243.45	6965966.81	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_781_1212em2	6	1.85	1	D	2268238.45	6965982.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_787_1212em2	4	1.84	1	F	2268236.29	6965973.33			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_790_1212em2	6	1.82	1	D	2268242.86	6966012.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_798_1212em2	5	1.79	1	D	2268310.52	6966012.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_812_1212em2	5	1.73	1	D	2268224.09	6965971.29	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_817_1212em2	7	1.72	1	D	2268239.34	6966033.28	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_818_1212em2	5	-0.32	1	D	2268244.94	6965936.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_820_1212em2	4	1.71	1	F	2268313.12	6965988.23			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_829_1212em2	6	1.69	1	D	2268258.6	6965944.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_83_1212em2	12	28.78	4	B	2268276.45	6966035.75	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_838_1212em2	5	1.65	1	D	2268263.5	6965939.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_84_1212em2	9	28.72	4	C	2268310.61	6966022.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_842_1212em2	6	1.63	1	D	2268263.51	6966000.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_844_1212em2	6	1.62	1	D	2268233.5	6965970.42	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_845_1212em2	7	1.62	1	D	2268286.38	6965952.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_848_1212em2	6	1.61	1	D	2268293.31	6966006.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_873_1212em2	5	1.54	1	D	2268305.23	6965937.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_875_1212em2	5	1.54	1	D	2268272.51	6966019.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_880_1212em2	5	1.52	1	D	2268225.69	6965939.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_9_1212em2	12	139.73	4	B	2268273.18	6966034.2	08-Jun-06	Jim Thoren	√													√	CIV	> 24	1	2	pipe	FE	√	> 24	2	1			√			
G10	G10_906_1212em2	4	1.45	1	F	2268297.47	6965982.45			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_91_1212em2	11	26.39	4	B	2268314.7	6966020.42	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_931_1212em2	4	1.37	1	F	2268298.55	6965959.07			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_934_1212em2	5	1.36	1	D	2268228.27	6966020.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_938_1212em2	6	1.36	1	D	2268307.41	6965944.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_943_1212em2	5	1.35	1	D	2268221.66	6965938.63	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_950_1212em2	4	1.33	1	F	2268262.52	6965977.81			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_952_1212em2	4	1.32	1	F	2268287.16	6966023.64			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_977_1212em2	6	1.26	1	D	2268219.59	6965974.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_981_1212em2	5	1.24	1	D	2268228.59	6965952.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G10	G10_984_1212em2	5	1.24	1	D	2268275.62	6965953.42	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_111_1416em2	14	20.44	4	A	2268395.54	6965980.92	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_114_1416em2	13	20.24	4	B	2268340.27	6966008.08	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_119_1416em2	13	19.65	4	B	2268328.77	6965999.83	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_12_1416em2	15	135.16	4	A	2268372.52	6966018.16	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	hot wire post	FE	√	> 24	0.5	0.5			√			
G11	G11_124_1416em2	13	19.2	4	B	2268345.2	6966004.76	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_125_1416em2	13	19.06	4	B	2268332.7	6966009.46	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G11	G11_126_1416em2	12	18.97	4	B	2268348.01	6965982.23	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_129_1416em2	14	18.39	4	A	2268386.72	6965949.61	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_131_1416em2	14	18.11	4	A	2268321.04	6965938.43	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_134_1416em2	16	17.89	4	A	2268406.08	6965988.02	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_135_1416em2	12	17.66	4	B	2268376.99	6965973.96	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_139_1416em2	13	16.92	4	B	2268379.69	6965999.84	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_141_1416em2	11	16.86	4	B	2268331.9	6965998.32	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_143_1416em2	16	16.46	4	A	2268377.05	6965954.83	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_147_1416em2	10	16.38	4	C	2268329.24	6966011.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_153_1416em2	13	15.01	4	B	2268405.48	6965949.51	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_157_1416em2	12	14.77	4	B	2268320.93	6966005.92	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_16_1416em2	15	115.58	4	A	2268381.26	6966009.22	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	hot wire post	FE	√	> 24	0.5	0.5			√			
G11	G11_167_1416em2	12	13.91	4	B	2268390.57	6965998.53	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_174_1416em2	12	13.24	4	B	2268320.56	6966027.65	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_175_1416em2	15	13.11	4	A	2268355.53	6966028.84	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_18_1416em2	16	98.23	4	A	2268410.27	6965966.15	08-Jun-06	Jim Thoren	√													√	CIV	6	1	2	strap hook	FE	√	12	4	2			√			
G11	G11_194_1416em2	13	11.61	4	B	2268342.12	6965980.46	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_197_1416em2	12	11.52	4	B	2268393.53	6965974.71	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_20_1416em2	16	89.09	4	A	2268391.58	6965968.08	08-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	ac parts & str ctg lid								√	9	0.5	0.25			√			
G11	G11_208_1416em2	12	10.82	4	B	2268385.11	6965964.2	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_212_1416em2	13	10.7	4	B	2268408.02	6965953.41	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_215_1416em2	12	10.41	4	B	2268382.3	6965972.97	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_218_1416em2	13	10.34	4	B	2268355.21	6965973.05	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_224_1416em2	8	9.62	4	D	2268347.32	6966024.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_226_1416em2	13	9.56	4	B	2268400.74	6965938.19	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_23_1416em2	15	83.34	4	A	2268379.52	6965941.64	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	slap flare							AL	√	12	2	0.5			√			
G11	G11_232_1416em2	13	9.17	4	B	2268351.99	6965996.05	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_234_1416em2	13	9.13	4	B	2268381.87	6966034.38	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	1			√			
G11	G11_236_1416em2	13	9.05	4	B	2268371.96	6966012.34	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_249_1416em2	12	8.45	4	B	2268371.59	6965990.2	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_250_1416em2	10	8.37	4	C	2268353.95	6965980.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_253_1416em2	10	8.17	4	C	2268349.09	6966006.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_255_1416em2	12	7.99	4	B	2268357.16	6966021.11	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_258_1416em2	13	7.95	4	B	2268332.84	6966031.97	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_260_1416em2	13	7.94	4	B	2268394.34	6965994.78	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_261_1416em2	13	7.85	4	B	2268403.78	6965946.29	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_264_1416em2	8	7.81	4	D	2268342.62	6965996.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_270_1416em2	14	7.5	4	A	2268416.09	6966019.86	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_275_1416em2	13	7.32	4	B	2268395.88	6965991.54	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_277_1416em2	12	7.29	4	B	2268378.23	6965994.13	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_285_1416em2	12	7.12	4	B	2268345.73	6965986.04	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_287_1416em2	9	7.05	4	C	2268358.01	6965970.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_293_1416em2	12	6.83	4	B	2268409.27	6965958.93	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_295_1416em2	12	6.76	4	B	2268356.89	6966011.65	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_297_1416em2	12	6.72	4	B	2268375.41	6965947.05	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_298_1416em2	11	6.71	4	B	2268398.66	6965951.47	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_300_1416em2	12	6.61	4	B	2268402.33	6965943.19	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_304_1416em2	12	6.55	4	B	2268344.45	6966015.41	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_32_1416em2	13	59.91	4	B	2268348.4	6966017.35	08-Jun-06	Jim Thoren	√							√	ORD MD	12	1	4	flare package	√	CIV	12			bladed, hand swept, scrap metal	FE	√	12	> 6	> 4			√			
G11	G11_330_1416em2	12	5.95	4	B	2268360.3	6966004.83	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_331_1416em2	12	5.89	4	B	2268363.42	6965998.24	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_339_1416em2	13	5.77	4	B	2268340.62	6966011.63	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_340_1416em2	9	5.72	4	C	2268391.41	6965960.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G11	G11_35_1416em2	14	55.35	4	A	2268325.51	6966017.89	08-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.5	vt fuze parts							FE	√	6	2	0.5			√			
G11	G11_357_1416em2	10	5.27	4	C	2268377.24	6965965.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_363_1416em2	12	5.07	4	B	2268377.88	6965970.02	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_366_1416em2	10	5.03	4	C	2268356.65	6965976.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_369_1416em2	10	5	4	C	2268406.3	6965939.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_370_1416em2	11	4.98	4	B	2268331.02	6966027.58	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_373_1416em2	9	4.93	4	C	2268381.03	6965964.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_374_1416em2	12	4.9	4	B	2268394.89	6965940.46	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_379_1416em2	10	4.85	4	C	2268324.43	6966021.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_385_1416em2	12	4.76	4	B	2268358.27	6966000.97	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_390_1416em2	10	4.69	4	C	2268383.79	6966006.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_391_1416em2	11	4.65	4	B	2268321.09	6966031.27	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_393_1416em2	10	4.64	4	C	2268412.41	6965960.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_40_1416em2	14	50.82	4	A	2268396.3	6965976.63	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	4	slag							FE	√	12	> 6	1			√			
G11	G11_408_1416em2	12	4.31	4	B	2268352.6	6965991.84	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_410_1416em2	13	4.28	4	B	2268365.82	6965990.19	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_415_1416em2	9	4.25	4	C	2268351.5	6965983.63	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_421_1416em2	12	4.18	4	B	2268340.7	6965989.15	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_422_1416em2	12	4.18	4	B	2268318.63	6966009.98	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_429_1416em2	9	4.02	4	C	2268406.26	6965956.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_430_1416em2	9	4.02	4	C	2268413.59	6965964.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_437_1416em2	12	3.9	4	B	2268327.48	6965968.8	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_439_1416em2	13	3.88	4	B	2268415.88	6965946.02	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_44_1416em2	16	45.71	4	A	2268396.45	6966015.09	08-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	slap flare body							AL	√	12	2	2			√			
G11	G11_445_1416em2	13	3.83	4	B	2268379.73	6966003.3	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_453_1416em2	8	3.75	4	D	2268395.34	6965950.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_460_1416em2	10	3.62	4	C	2268361.13	6965972.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_464_1416em2	10	3.55	3	C	2268415.14	6966004.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_483_1416em2	9	3.27	3	C	2268325	6966001.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_488_1416em2	9	3.22	3	C	2268410.23	6965942.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_490_1416em2	9	3.22	3	C	2268328.41	6966024.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_491_1416em2	10	3.21	3	C	2268350.45	6965979.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_494_1416em2	8	3.19	3	D	2268378.23	6965938.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_495_1416em2	10	3.18	3	C	2268330.96	6966002.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_500_1416em2	11	3.15	3	B	2268415.31	6965981.37	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_51_1416em2	12	41.52	4	B	2268344.49	6965999.73	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_510_1416em2	12	3	3	B	2268364.89	6966019.62	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_511_1416em2	8	2.98	3	D	2268351.66	6966022.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_518_1416em2	12	2.9	3	B	2268354.61	6965936.61	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_53_1416em2	14	41.25	4	A	2268418.32	6965936.58	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_536_1416em2	9	2.69	3	C	2268396.84	6965969.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_540_1416em2	11	2.64	3	B	2268330.51	6965943.88	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_548_1416em2	9	2.6	3	C	2268364.97	6966026.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_552_1416em2	10	2.58	3	C	2268405.33	6966022.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_556_1416em2	9	2.55	3	C	2268354.81	6966018.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_56_1416em2	12	37.77	4	B	2268373.2	6966022.6	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_562_1416em2	8	2.5	2	D	2268414.13	6965998.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_566_1416em2	10	2.47	2	C	2268404.75	6966002.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_567_1416em2	7	2.45	2	D	2268375.23	6965942.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_571_1416em2	10	2.42	2	C	2268388.05	6965946.19	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_578_1416em2	6	2.39	2	D	2268389.89	6965994.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_58_1416em2	13	36.9	4	B	2268361.81	6965968.98	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_582_1416em2	6	2.35	2	D	2268386.52	6965971.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G11	G11_593_1416em2	9	2.28	2	C	2268393.8	6966023.5	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_597_1416em2	8	2.26	2	D	2268392.73	6965990.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_599_1416em2	6	2.26	2	D	2268398.31	6965945.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_600_1416em2	7	2.25	2	D	2268413.18	6966014.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_608_1416em2	8	2.19	2	D	2268349.77	6966009.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_616_1416em2	7	2.15	2	D	2268373.02	6965983.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_620_1416em2	8	2.12	2	D	2268326.75	6965965.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_625_1416em2	8	2.09	2	D	2268405.11	6965964.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_640_1416em2	6	2	2	D	2268335.27	6966001.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_641_1416em2	6	1.99	2	D	2268342.03	6966020.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_648_1416em2	8	1.97	2	D	2268370.42	6966029.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_654_1416em2	9	1.95	2	C	2268399.54	6966010.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_657_1416em2	9	1.93	2	C	2268322.47	6965965.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_67_1416em2	12	33.1	4	B	2268372.31	6965979.11	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_681_1416em2	8	1.8	1	D	2268352.3	6965987.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_686_1416em2	7	1.79	1	D	2268366.7	6966002.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_689_1416em2	7	1.77	1	D	2268409.54	6966028.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_696_1416em2	8	1.71	1	D	2268400.76	6965958.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_698_1416em2	6	1.7	1	D	2268337.9	6965945.43	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_700_1416em2	5	1.69	1	D	2268369.63	6965999.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_72_1416em2	12	31.71	4	B	2268382.47	6965968.05	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_721_1416em2	6	1.61	1	D	2268321.48	6965956.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_726_1416em2	5	1.57	1	D	2268352.72	6965976.83	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_727_1416em2	7	1.56	1	D	2268375.99	6965950.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_728_1416em2	6	1.56	1	D	2268411.45	6966031.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_735_1416em2	7	1.55	1	D	2268409.3	6965962.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_737_1416em2	5	1.53	1	D	2268375.77	6966027.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_749_1416em2	7	1.49	1	D	2268353.48	6965953.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_751_1416em2	7	1.49	1	D	2268369.23	6965962.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_757_1416em2	6	1.47	1	D	2268328.2	6965938.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_762_1416em2	7	1.45	1	D	2268404.28	6966025.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_772_1416em2	5	1.38	1	D	2268338.27	6966032.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_776_1416em2	5	1.37	1	D	2268398.88	6965984.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_779_1416em2	6	1.36	1	D	2268372.48	6965954.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_781_1416em2	7	1.35	1	D	2268399.12	6966035.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_79_1416em2	15	29.53	4	A	2268338.41	6965948.68	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_812_1416em2	8	1.23	1	D	2268410.51	6966012.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_82_1416em2	15	27.95	4	A	2268395.64	6965955.28	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_821_1416em2	8	1.21	1	D	2268382.5	6966012.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_825_1416em2	6	1.2	1	D	2268321.38	6965983.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_826_1416em2	8	1.19	1	D	2268389.73	6965939.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_828_1416em2	6	1.19	1	D	2268345.9	6965970.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_829_1416em2	7	1.19	1	D	2268323.44	6966036.19	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_832_1416em2	7	1.18	1	D	2268340.27	6965992.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_835_1416em2	6	1.15	1	D	2268320.12	6965953.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_837_1416em2	6	1.15	1	D	2268409.82	6965998.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_840_1416em2	7	1.15	1	D	2268336.48	6965994.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_844_1416em2	7	1.12	1	D	2268345.17	6965956.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_846_1416em2	5	1.11	1	D	2268362.63	6965988.64	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_85_1416em2	12	26.97	4	B	2268369.02	6965983.65	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_854_1416em2	5	1.09	1	D	2268379.54	6965945.06	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_864_1416em2	8	1.07	1	D	2268337.9	6965968.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_872_1416em2	4	1.05	1	F	2268374.45	6965987.82			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G11	G11_887_1416em2	4	1.02	1	F	2268417.94	6965971.94			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_89_1416em2	16	25.49	4	A	2268404.92	6966031.63	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_890_1416em2	4	1.02	1	F	2268406.82	6965943.64			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G11	G11_9_1416em2	13	162.32	4	B	2268345.88	6966020.76	08-Jun-06	Jim Thoren	√							√	ORD MD	12	1	4	flare package							AL	√	12	> 6	> 4			√			
G11	G11_97_1416em2	13	24.2	4	B	2268385.51	6965960.36	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
G12	G12_1004_1212em2	5	1.2	1	D	2268436.99	6965950.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1011_1212em2	6	1.18	1	D	2268447.92	6966022.64	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1016_1212em2	4	1.16	1	F	2268514.94	6965964.3	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1021_1212em2	5	1.15	1	D	2268422.09	6966016.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1022_1212em2	5	1.15	1	D	2268434.98	6965961.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1028_1212em2	6	1.14	1	D	2268454.3	6965952.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1042_1212em2	6	1.12	1	D	2268422.31	6966024.82	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1046_1212em2	5	1.1	1	D	2268469.27	6965983.39	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1048_1212em2	6	1.1	1	D	2268479.4	6966011.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1053_1212em2	6	1.09	1	D	2268478.53	6965968.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1057_1212em2	6	1.08	1	D	2268478.02	6965951.29	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1059_1212em2	5	1.08	1	D	2268438.23	6965979.26	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1064_1212em2	6	1.07	1	D	2268453.43	6965982.35	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1076_1212em2	6	1.05	1	D	2268515.01	6965969.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1079_1212em2	5	1.04	1	D	2268436.22	6965996.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1082_1212em2	6	1.04	1	D	2268426.99	6966036.26	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1084_1212em2	5	1.04	1	D	2268507.65	6965972.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_1088_1212em2	4	1.02	1	F	2268499.92	6965941.27	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_111_1212em2	9	21.82	4	C	2268450.32	6966029.93	21-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	scrap	AL	√	6	2	0.25			√			
G12	G12_126_1212em2	11	19.59	4	B	2268488.84	6966002.07	21-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	vt fuze	√	CIV				bladed, hand swept, scrap	FE	√	6	2	0.25			√			
G12	G12_130_1212em2	13	18.82	4	B	2268438.5	6965988.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_131_1212em2	11	18.68	4	B	2268514.81	6965989.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_132_1212em2	10	18.55	4	C	2268440.88	6966033.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_141_1212em2	12	17.7	4	B	2268468.39	6965962.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_145_1212em2	9	17.46	4	C	2268486.88	6966011.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_155_1212em2	10	16.39	4	C	2268498.13	6965998.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_179_1212em2	13	13.92	4	B	2268458.97	6965989.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_181_1212em2	10	13.81	4	C	2268420.8	6965976.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_19_1212em2	13	86.76	4	B	2268431.29	6966014.02	21-Jul-06	Alan Merriman	√													√	CIV	6	1	1	can	FE	√	9	6	0.25			√			
G12	G12_197_1212em2	9	12.18	4	C	2268471.43	6965979.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_211_1212em2	10	11.58	4	C	2268493.04	6965992.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_214_1212em2	9	11.4	4	C	2268434.1	6966019.03	21-Jul-06	Alan Merriman	√													√	CIV	6			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_215_1212em2	10	11.39	4	C	2268506.04	6965982.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_229_1212em2	9	10.76	4	C	2268490.67	6966030.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_235_1212em2	13	10.6	4	B	2268426.11	6966006.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_238_1212em2	10	10.57	4	C	2268503.7	6965985.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_24_1212em2	12	69.89	4	B	2268479.05	6966006.04	21-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	vt fuze		CIV					FE	√	6	2	0.25			√			
G12	G12_240_1212em2	10	10.43	4	C	2268444.03	6966030.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_241_1212em2	10	10.27	4	C	2268436.45	6966006.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_254_1212em2	11	9.34	4	B	2268494.84	6965973.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_255_1212em2	11	9.3	4	B	2268431.51	6965946.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_259_1212em2	10	9.23	4	C	2268452.88	6965942.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_266_1212em2	13	9.01	4	B	2268505.49	6966020.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_268_1212em2	10	8.98	4	C	2268480.8	6965981.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_273_1212em2	10	8.79	4	C	2268443.78	6966036.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_289_1212em2	10	8.11	4	C	2268445.4	6966025.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_312_1212em2	9	7.43	4	C	2268492.99	6965986.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_314_1212em2	11	7.41	4	B	2268511.7	6966026.26	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G12	G12_323_1212em2	10	7.14	4	C	2268485.55	6965980.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_332_1212em2	10	6.75	4	C	2268487.9	6965947.43	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_335_1212em2	10	6.72	4	C	2268512.8	6965994.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_34_1212em2	13	56.86	4	B	2268428.87	6965989.41	21-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	vt fuze							FE	√	3	2	0.25			√			
G12	G12_354_1212em2	10	6.35	4	C	2268422.91	6965971.43	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_359_1212em2	10	6.23	4	C	2268475.36	6965969.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_360_1212em2	13	6.18	4	B	2268436.31	6966016.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_371_1212em2	10	5.98	4	C	2268489.97	6965956.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_376_1212em2	9	5.83	4	C	2268512.43	6965980.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_379_1212em2	9	5.75	4	C	2268430.74	6965985.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_387_1212em2	10	5.59	4	C	2268423.88	6965996.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_390_1212em2	10	5.53	4	C	2268428.51	6965979.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_394_1212em2	10	5.42	4	C	2268462.85	6965949.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_395_1212em2	12	5.36	4	B	2268450.55	6965960.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_399_1212em2	10	5.22	4	C	2268419.59	6965945.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_401_1212em2	10	5.18	4	C	2268513	6965998.75	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_403_1212em2	10	5.16	4	C	2268457.59	6965936.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_405_1212em2	8	5.06	4	D	2268473.27	6965953.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_412_1212em2	10	4.88	4	C	2268457.88	6966025.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_415_1212em2	10	4.86	4	C	2268450.17	6966026.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_424_1212em2	10	4.74	4	C	2268475.86	6965975.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_43_1212em2	11	47.81	4	B	2268502.05	6965992.7	21-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.5	vt fuze part							FE	√	6	2	0.25			√			
G12	G12_433_1212em2	10	4.64	4	C	2268494.34	6966007.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_437_1212em2	10	4.55	4	C	2268436.39	6966032.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_457_1212em2	10	4.33	4	C	2268457.91	6966031.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_458_1212em2	12	4.33	4	B	2268470.7	6966031.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_466_1212em2	10	4.21	4	C	2268430.97	6965995.49	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_471_1212em2	10	4.15	4	C	2268441.36	6966009.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_493_1212em2	9	3.88	4	C	2268483.48	6965983.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_501_1212em2	9	3.81	4	C	2268481.02	6965974.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_502_1212em2	9	3.81	4	C	2268502.87	6965959.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_504_1212em2	9	3.78	4	C	2268467.86	6965950	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_521_1212em2	8	3.53	3	D	2268443.73	6966012.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_544_1212em2	9	3.27	3	C	2268461.29	6965979.82	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_545_1212em2	8	3.27	3	D	2268500.59	6965970.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_549_1212em2	8	3.24	3	D	2268496.18	6965957.89	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_559_1212em2	8	3.14	3	D	2268434.15	6965951.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_561_1212em2	9	3.13	3	C	2268503.02	6965979.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_574_1212em2	7	3.08	3	D	2268489.51	6966007.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_586_1212em2	8	2.98	3	D	2268504.43	6965949.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_587_1212em2	9	2.96	3	C	2268462.85	6965952.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_597_1212em2	8	2.89	3	D	2268488.83	6965988.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_612_1212em2	8	2.76	3	D	2268420.16	6965969.5	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_614_1212em2	8	2.75	3	D	2268457.97	6965978.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_620_1212em2	8	2.74	3	D	2268466.77	6965979.5	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_621_1212em2	8	2.72	3	D	2268486.1	6965990.65	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_622_1212em2	10	2.72	3	C	2268493.06	6966023.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_649_1212em2	7	2.5	2	D	2268496.49	6966035.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_667_1212em2	8	2.42	2	D	2268463.3	6965962.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_673_1212em2	7	2.4	2	D	2268484.65	6965950.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_674_1212em2	7	2.4	2	D	2268473.34	6965961.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_677_1212em2	6	2.38	2	D	2268452.77	6966023.86	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_680_1212em2	6	2.35	2	D	2268505.7	6965966.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G12	G12_681_1212em2	6	2.35	2	D	2268466.84	6965974.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_686_1212em2	9	2.3	2	C	2268484.01	6966005.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_695_1212em2	7	2.26	2	D	2268441.59	6965952.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_707_1212em2	6	2.17	2	D	2268510.25	6965966.74	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_710_1212em2	7	2.16	2	D	2268447.79	6965945.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_712_1212em2	7	2.16	2	D	2268461.62	6965970.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_717_1212em2	7	2.11	2	D	2268516.55	6966035.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_728_1212em2	8	2.06	2	D	2268496.62	6965969.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_730_1212em2	7	2.04	2	D	2268422.48	6966035.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_750_1212em2	7	1.97	2	D	2268492.33	6966015.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_764_1212em2	6	1.91	2	D	2268509.8	6965936.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_771_1212em2	5	1.88	1	D	2268443.56	6965988.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_775_1212em2	6	1.87	1	D	2268444.15	6965958.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_789_1212em2	6	1.82	1	D	2268445.22	6966003.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_794_1212em2	6	1.81	1	D	2268441.54	6965939.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_799_1212em2	6	1.79	1	D	2268492.54	6965977.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_804_1212em2	5	1.77	1	D	2268497.45	6965986.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_831_1212em2	9	1.68	1	C	2268428.61	6966011.89	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_843_1212em2	6	1.62	1	D	2268427.73	6965969.22	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_852_1212em2	6	1.6	1	D	2268425.43	6965976.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_860_1212em2	6	1.57	1	D	2268477.97	6966036.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_861_1212em2	5	1.57	1	D	2268464.12	6965987.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_870_1212em2	4	1.55	1	F	2268420.27	6965962.66	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_876_1212em2	6	1.53	1	D	2268421.48	6965999.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_888_1212em2	6	1.5	1	D	2268502.54	6965999.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_890_1212em2	5	1.49	1	D	2268476.35	6965979.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_893_1212em2	4	1.49	1	F	2268515.29	6965954.6	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_896_1212em2	5	1.48	1	D	2268478.09	6965959.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_909_1212em2	4	1.44	1	F	2268447.72	6966018.96	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_910_1212em2	6	1.43	1	D	2268486.5	6965999.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_912_1212em2	9	1.41	1	C	2268436.35	6966012.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_913_1212em2	4	1.41	1	F	2268441.1	6966026.88	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_915_1212em2	5	1.41	1	D	2268428.05	6965973.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_918_1212em2	5	1.4	1	D	2268476.67	6965984.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_928_1212em2	5	1.37	1	D	2268431.8	6965949.65	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_935_1212em2	4	1.36	1	F	2268433.73	6965992.3	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_947_1212em2	4	1.34	1	F	2268433.18	6965978.6	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	9	0.5	0.5			√			
G12	G12_953_1212em2	6	1.32	1	D	2268514.9	6965947.63	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_959_1212em2	5	1.3	1	D	2268514.77	6965985.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_961_1212em2	4	1.3	1	F	2268518.34	6965953.3	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_965_1212em2	4	1.29	1	F	2268506.55	6965993.3	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_966_1212em2	5	1.29	1	D	2268493.51	6966033.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_989_1212em2	5	1.23	1	D	2268478.49	6965987.49	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_993_1212em2	5	1.22	1	D	2268446.43	6965963.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G12	G12_999_1212em2	4	1.22	1	F	2268494.55	6965964.03	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
G13	G13_102_1613em2	13	13.88	4	B	2268592.6	6965956.3	21-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	vt fuze bracket								√	3	2	0.25			√			
G13	G13_107_1613em2	12	13.21	4	B	2268579.7	6965997.06	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze bracket								√	6	2	0.25			√			
G13	G13_11_1613em2	16	102.25	4	A	2268611.02	6965938.82	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	4	vt fuze							FE	√	6	4	0.25	N-S	0	√			
G13	G13_119_1613em2	13	11.73	4	B	2268564.16	6965953.61	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	magnets		√	3	0.5	0.25			√			
G13	G13_120_1613em2	14	11.57	4	A	2268536.35	6965974.16	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze bracket								√	6	2	0.25			√			
G13	G13_131_1613em2	14	9.74	4	A	2268615.46	6965959.44	21-Jun-06	Jim Thoren	√							√	ORD MD	3		0.5	fuze part								√	3		1			√			
G13	G13_135_1613em2	10	9.25	4	C	2268607.88	6965955.09	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ac flare piece							AL	√	3	0.5	0.5	NE-SW	45	√			
G13	G13_137_1613em2	13	9.1	4	B	2268545.52	6966003.23	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	1	1			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G13	G13_138_1613em2	13	9.06	4	B	2268537.7	6966012.9	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	3	1	0.5			√			
G13	G13_14_1613em2	15	75.02	4	A	2268530.7	6965990.86	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3	1	0.25			√			
G13	G13_145_1613em2	13	8.81	4	B	2268568.95	6965986.12	21-Jun-06	Jim Thoren	√							√	ORD MD	12	1	0.25	vt fuze bracket								√	6	2	0.25			√			
G13	G13_148_1613em2	13	8.66	4	B	2268582.46	6966004.06	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	6	0.5	0.25			√			
G13	G13_154_1613em2	14	8.56	4	A	2268596.18	6965996.76	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap		√	3	1				√			
G13	G13_157_1613em2	13	8.24	4	B	2268536.55	6965998.41	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	2	1			√			
G13	G13_161_1613em2	13	8.09	4	B	2268548.91	6966015.81	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	aluminum scrap		√	3	2	1			√			
G13	G13_163_1613em2	11	7.81	4	B	2268532.73	6965976.33	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm projo								√	3	1	0.25			√			
G13	G13_165_1613em2	13	7.8	4	B	2268554.81	6966019.85	21-Jun-06	Jim Thoren	√													√	CIV	6	4	0.5	slag		√	3	2	0.25			√			
G13	G13_170_1613em2	10	7.56	4	C	2268559.71	6965959.05	11-Jul-06	Alan Merriman	√							√	ORD MD	6	1	1	frag heave							FE	√	6	4	2	NE-SW	45	√			
G13	G13_173_1613em2	12	7.51	4	B	2268530.67	6965968.15	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	1	0.25			√			
G13	G13_174_1613em2	14	7.49	4	A	2268587.69	6966019.75	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna								√	6	2	0.25			√			
G13	G13_179_1613em2	10	7.12	4	C	2268583.38	6965983.91	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	metal piece	FE	√	3	0.5	0.25	E-W	90	√			
G13	G13_181_1613em2	12	7.03	4	B	2268580.62	6966013.7	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna								√	3	1	0.5			√			
G13	G13_182_1613em2	13	6.94	4	B	2268568.27	6966029.7	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket								√	6	2	0.25			√			
G13	G13_186_1613em2	9	6.71	4	C	2268560.7	6965946.34	11-Jul-06	Alan Merriman	√							√	ORD MD	12	1	0.25	vt fuze part							OTHER	√	3	0.5	0.25	NE-SW	45	√			
G13	G13_190_1613em2	11	6.6	4	B	2268550.69	6966028.93	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3	2	0.25			√			
G13	G13_191_1613em2	12	6.54	4	B	2268566.36	6966021.28	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3		0.25			√			
G13	G13_202_1613em2	13	5.82	4	B	2268591.08	6965975.64	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap		√	3	1	0.5			√			
G13	G13_203_1613em2	13	5.81	4	B	2268560.25	6965962.66	21-Jun-06	Jim Thoren	√													√	CIV	3	2	0.25	magnets		√	3	0.5	0.25			√			
G13	G13_204_1613em2	13	5.79	4	B	2268614.93	6966034.69	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	aluminum scrap		√	6	4	0.25			√			
G13	G13_210_1613em2	13	5.58	4	B	2268583.5	6965970.97	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	steel scrap a little fuze								√	3	0.5				√			
G13	G13_213_1613em2	12	5.53	4	B	2268557.48	6965971.34	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel		√	6		0.25			√			
G13	G13_217_1613em2	12	5.48	4	B	2268573.3	6965964.02	21-Jun-06	Jim Thoren	√							√	ORD MD	18	1	0.25	vt fuze bracket	√	MIL	18	2	1		FE	√	12	4	1			√			
G13	G13_218_1613em2	11	5.47	4	B	2268557.84	6966015.98	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna								√	3	0.5	1			√			
G13	G13_222_1613em2	10	5.34	4	C	2268583.72	6965997	11-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	45	√			
G13	G13_224_1613em2	10	5.32	4	C	2268551.82	6966004.88	11-Jul-06	Alan Merriman	√													√	CIV	3	5	0.25	scrap steel	SS	√	3	1	0.25			√			
G13	G13_226_1613em2	9	5.23	4	C	2268543.05	6966014.15	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	frag pieces							FE	√	3	0.5	0.5	NE-SW	45	√			
G13	G13_229_1613em2	11	5.16	4	B	2268603.61	6965944.92	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze part								√	6		0.25			√			
G13	G13_231_1613em2	11	5.04	4	B	2268571.48	6965952.02	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	40mm cart case								√	3	2	0.25			√			
G13	G13_232_1613em2	13	5.03	4	B	2268553.75	6965952.25	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3	0.5	0.25			√			
G13	G13_233_1613em2	13	4.99	4	B	2268614.79	6965938.79	21-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	steel scrap		√	3	0.5				√			
G13	G13_235_1613em2	12	4.97	4	B	2268551.12	6965999.66	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3		0.25			√			
G13	G13_236_1613em2	13	4.93	4	B	2268585.92	6966033.5	21-Jun-06	Jim Thoren	√													√	CIV	12	1	1	steel scrap		√	9	4	0.25			√			
G13	G13_237_1613em2	13	4.85	4	B	2268600.12	6965959.75	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze bracket								√	6	2	0.25			√			
G13	G13_240_1613em2	11	4.83	4	B	2268540.21	6965985.15	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	1	0.25			√			
G13	G13_241_1613em2	13	4.79	4	B	2268523.62	6965980.83	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3	0.5	0.25			√			
G13	G13_244_1613em2	12	4.76	4	B	2268551.07	6965986.65	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap		√	3	2	0.25			√			
G13	G13_245_1613em2	11	4.74	4	B	2268558.18	6965939.73	21-Jun-06	Jim Thoren																			no find											
G13	G13_246_1613em2	12	4.65	4	B	2268545.86	6965999.7	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√		2	0.25			√			
G13	G13_247_1613em2	11	4.65	4	B	2268596.05	6966034.7	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√						√			
G13	G13_248_1613em2	12	4.64	4	B	2268562.52	6965956.92	21-Jun-06	Jim Thoren	√													√	CIV	12	1	0.25	steel scrap		√	6	2	0.25			√			
G13	G13_249_1613em2	11	4.6	4	B	2268542.27	6965990.3	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3	1	0.25			√			
G13	G13_258_1613em2	11	4.47	4	B	2268564.03	6965938.45	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel rod		√	3		0.25			√			
G13	G13_262_1613em2	10	4.2	4	C	2268587.03	6965981.48	11-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	ammo clips	FE	√	3	0.5	0.25	N-S	0	√			
G13	G13_264_1613em2	12	4.16	4	B	2268573.7	6965960.21	21-Jun-06	Jim Thoren	√													√	CIV	12	2	0.25	3"x1/2"rebar-steel scrap 5x3x1/8								√			
G13	G13_267_1613em2	8	4.1	4	D	2268518.41	6966002.45	11-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	metal rod	FE	√	6	0.5	0.5	NE-SW	45	√			
G13	G13_268_1613em2	13	4.09	4	B	2268592.38	6966007.63	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	aluminum		√	6	2	0.25			√			
G13	G13_270_1613em2	13	4.07	4	B	2268587.26	6966023.92	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze aluminum								√	3		0.25			√			
G13	G13_271_1613em2	10	4.07	4	C	2268563.23	6966025.21	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	45	√			
G13	G13_272_1613em2	9	4.06	4	C	2268588.47	6966000.91	11-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	45	√			
G13	G13_273_1613em2	12	4.04	4	B	2268529.81	6965964.88	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag								√	3	0.5	0.25			√			
G13	G13_274_1613em2	12	4.02	4	B	2268535.24	6965960.63	21-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	50 cal								√	3	0.5				√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G13	G13_279_1613em2	11	3.94	4	B	2268530.52	6966003.48	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3		0.25			√			
G13	G13_282_1613em2	13	3.88	4	B	2268579.56	6965987.63	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	aluminum scrap		√	3	2	0.25			√			
G13	G13_284_1613em2	12	3.86	4	B	2268573.99	6965949.82	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	6	2	0.25			√			
G13	G13_286_1613em2	11	3.78	4	B	2268615.65	6965969.85	21-Jun-06	Jim Thoren	√							√	ORD MD	3	3	0.25	50 cart								√	3	0.5	0.25			√			
G13	G13_294_1613em2	12	3.57	3	B	2268615.45	6965973.62	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	vt fuze bracket								√	6	2	0.25			√			
G13	G13_300_1613em2	12	3.36	3	B	2268555.07	6965964.3	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	steel scrap vt fuze antenna								√	3	1	0.25			√			
G13	G13_312_1613em2	11	3.14	3	B	2268588.56	6965964.34	21-Jun-06	Jim Thoren	√							√	ORD MD	12	1	0.25	vt fuze bracket								√	6	2	0.25			√			
G13	G13_315_1613em2	11	3.12	3	B	2268555.07	6965973.74	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap		√						√			
G13	G13_324_1613em2	11	2.99	3	B	2268549.56	6965992.12	21-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	steel scrap		√	6		0.25			√			
G13	G13_333_1613em2	11	2.84	3	B	2268557.01	6965992.09	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3		0.25			√			
G13	G13_341_1613em2	11	2.73	3	B	2268557.82	6965979.98	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	3	1	0.5			√			
G13	G13_351_1613em2	11	2.56	3	B	2268523.14	6966005.85	21-Jun-06	Jim Thoren	√							√	ORD MD	12	1	0.25	vt fuze bracket								√	6	2	0.25			√			
G13	G13_361_1613em2	11	2.47	2	B	2268532.2	6965980.54	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	3	2	0.25			√			
G13	G13_39_1613em2	16	39.39	4	A	2268579.36	6965991.85	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3	0.5	0.25			√			
G13	G13_4_1613em2	15	349.71	4	A	2268530.2	6965987.46	21-Jun-06	Jim Thoren	√													√	CIV	18	1	≥8	steel scrap		√	12	> 6	0.5			√			
G13	G13_45_1613em2	13	31.21	4	B	2268612.06	6965945.85	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.5	cad m/t							OTHER	√	3	0.5	0.25	NE-SW	45	√			
G13	G13_48_1613em2	13	29.74	4	B	2268563.73	6965950.07	21-Jun-06	Jim Thoren	√													√	MIL	12	2	0.25	steel tubing		√	3		0.25			√			
G13	G13_52_1613em2	15	26.79	4	A	2268529.76	6965984.11	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	1	1			√			
G13	G13_55_1613em2	16	25.79	4	A	2268569.23	6966002.23	21-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	aluminum scrap		√	9	1	0.25			√			
G13	G13_59_1613em2	13	22.92	4	B	2268606.75	6965960.17	21-Jun-06	Jim Thoren	√							√	ORD MD	6	3	0.5	fuze parts, steel cable								√						√			
G13	G13_65_1613em2	13	20.99	4	B	2268567.19	6965989.96	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.5	aluminum scrap		√	6	4	0.5			√			
G13	G13_77_1613em2	12	18.89	4	B	2268563.56	6966018.24	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	40mm brass								√	3	2	0.25			√			
G13	G13_78_1613em2	14	18.85	4	A	2268527.2	6965959.3	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	1/2 horseshoe		√	3	0.5	0.5			√			
G13	G13_87_1613em2	15	16.94	4	A	2268611.03	6965942.11	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket								√	6	2	0.25			√			
G13	G13_89_1613em2	15	16.8	4	A	2268576.03	6966033.56	21-Jun-06	Jim Thoren	√													√	MIL	12	1	0.25	a/c part-aluminum		√	9	4	0.25			√			
G13	G13_93_1613em2	11	15.98	4	B	2268580.88	6965981.41	21-Jun-06	Jim Thoren	√													√	MIL	18	1	≥8	steel and aluminum scrap		√	6		2			√			
G13	G13_95_1613em2	13	15.63	4	B	2268556.65	6965944.91	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	nail		√	6		0.25			√			
G13	G13_97_1613em2	13	15.08	4	B	2268605.87	6965949.29	21-Jun-06	Jim Thoren	√													√	MIL	18	1	0.25	gun parts		√	6	2	0.5			√			
G14	G14_108_1213em2	14	15.05	4	A	2268641.55	6965953.42	22-Jun-06	Alan Merriman	√							√	ORD MD	3	3	1	vt fuze part mk166 40mm 50cal	√	MIL	3	2	2	ac part scrap								√			
G14	G14_110_1213em2	13	14.95	4	B	2268700.59	6965948.06	22-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_126_1213em2	13	12.67	4	B	2268673.55	6965973.55	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_130_1213em2	13	12.15	4	B	2268656.02	6966003.2	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_139_1213em2	12	11.24	4	B	2268653.72	6965959.05	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt							FE	√	6	4	0.25	N-S	0	√			
G14	G14_141_1213em2	15	11.01	4	A	2268634.38	6965960.13	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.75	fuze bar mk166								√	3	1	0.5	E-W	0	√			
G14	G14_148_1213em2	13	10.48	4	B	2268656.98	6965977.7	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap	FE	√	3	2	0.25	N-S	0	√			
G14	G14_161_1213em2	14	9.73	4	A	2268641.09	6966009.72	22-Jun-06	Alan Merriman	√							√	ORD MD				mk166 fuze bar	√	CIV	3	2	0.25	nail 16 penny, wire		√	3	1	1	E-W	45	√			
G14	G14_164_1213em2	12	9.46	4	B	2268647.1	6965973.93	22-Jun-06	Jim Thoren	√													√	CIV	3	2	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
G14	G14_169_1213em2	16	9.24	4	A	2268697.98	6966014.65	22-Jun-06	Alan Merriman	√							√	ORD MD	18	1	4	nose cougr jato bottel														√			
G14	G14_170_1213em2	10	9.14	4	C	2268704.44	6965952	11-Jul-06	Alan Merriman	√							√	ORD MD	6	2	1	bomb internal plumbing							FE	√	12	1	1	N-S	0	√			
G14	G14_177_1213em2	13	8.61	4	B	2268670.62	6966010.31	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt antenna							FE	√	6	2	1	N-S	0	√			
G14	G14_178_1213em2	14	8.54	4	A	2268693.02	6965972.73	22-Jun-06	Alan Merriman	√							√	ORD MD	12	2		flair parts	√	CIV	6	1	0.25	al scrap	AL							√			
G14	G14_197_1213em2	13	7.74	4	B	2268631.05	6966000.99	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt bracket							FE	√	6	2	0.25	N-S	0	√			
G14	G14_200_1213em2	14	7.58	4	A	2268639.2	6965961.85	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	fuze part mk166														√			
G14	G14_201_1213em2	12	7.52	4	B	2268659.88	6965983.32	22-Jun-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_210_1416em2	15	10.8	4	A	2268678.27	6966019.41	22-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.5	piece of frag								√	6	0.5	0.5	E-W	90	√			
G14	G14_211_1213em2	12	6.97	4	B	2268664.9	6965980.33	22-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_212_1213em2	12	6.89	4	B	2268666.59	6966027.13	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap	FE	√	3	1	0.25	N-S	0	√			
G14	G14_229_1213em2	12	6.34	4	B	2268619.56	6965937.95	22-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	steel scrap	FE	√	3	0.5	0.25	N-S	0	√			
G14	G14_232_1213em2	12	6.12	4	B	2268622.28	6965951.23	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_235_1213em2	11	6.07	4	B	2268661.08	6965963.94	22-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	explosive transfer block							OTHER	√	3	2	0.5	N-S	0	√			
G14	G14_237_1213em2	13	6.03	4	B	2268660.78	6966000.52	22-Jun-06	Jim Thoren	√													√	CIV	0	5	0.25	aluminum scrap and 4 nails	AL	√	6	0.5	0.25	E-W	0	√			
G14	G14_239_1213em2	12	5.95	4	B	2268667.72	6965983.67	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_245_1416em2	14	8.65	4	A	2268685.48	6966020.41	22-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25									√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G14	G14_251_1213em2	12	5.58	4	B	2268648.7	6966006.26	22-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	aluminum scrap	AL	√	3	0.5	0.25	N-S	0	√			
G14	G14_256_1416em2	13	7.97	4	B	2268676.59	6965969.41	22-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	steel scrap	FE	√	3	2	0.5	N-S	0	√			
G14	G14_269_1213em2	11	4.99	4	B	2268717.32	6965954.76	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_270_1213em2	12	4.98	4	B	2268646.22	6965953.98	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_277_1213em2	12	4.91	4	B	2268648.27	6965963.72	22-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze, vt antenna							FE	√	6	2	0.25	N-S	0	√			
G14	G14_278_1213em2	11	4.9	4	B	2268653.14	6965945.41	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap	FE	√	3	0.5	0.25	N-S	0	√			
G14	G14_280_1213em2	13	4.82	4	B	2268642.35	6965975.05	22-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	aluminum scrap	AL	√	3	2	0.25	N-S	0	√			
G14	G14_282_1213em2	12	4.74	4	B	2268713.41	6965951.21	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	1	0.25	N-S	0	√			
G14	G14_294_1213em2	13	4.43	4	B	2268633.79	6965999.16	22-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	aluminum scrap	AL	√	3	0.5	0.25	N-S	0	√			
G14	G14_30_1213em2	14	67.15	4	A	2268706.74	6965948.86	22-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	wire mess/knot								√			
G14	G14_301_1213em2	13	4.3	4	B	2268674.82	6965991.66	22-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_315_1213em2	12	4.02	4	B	2268644.38	6966026.69	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	40mm ctg case							OTHER	√	3	2	0.25	N-S	0	√			
G14	G14_330_1213em2	12	3.74	4	B	2268666.55	6966018.85	22-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	aluminum scrap	AL	√	3	0.5	0.25	N-S	0	√			
G14	G14_339_1213em2	11	3.61	4	B	2268709.11	6965942.85	22-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_341_1213em2	11	3.54	3	B	2268644.51	6965965.84	22-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	frag							OTHER	√	3	1	0.25	N-S	0	√			
G14	G14_347_1213em2	11	3.46	3	B	2268651.34	6965969.86	22-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	ac seat part	FE	√	3	0.5	0.25	N-S	0	√			
G14	G14_354_1213em2	11	3.3	3	B	2268694.52	6965945.91	22-Jun-06	Jim Thoren	√													√	CIV	3	2	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G14	G14_37_1213em2	16	54.53	4	A	2268623.78	6966006.23	22-Jun-06	Alan Merriman	√							√	ORD MD	18	1	≥8	90mm round							OTHER	√	12	4	4	NE-SW	0	√			
G14	G14_400_1416em2	10	4.43	4	C	2268680.34	6965974.77	11-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	45	√			
G14	G14_403_1213em2	10	2.91	3	C	2268647.54	6965950.23	11-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	chunk of aluminum	AL	√	3	0.5	0.25	N-S	45	√			
G14	G14_405_1213em2	11	2.87	3	B	2268674.63	6966032.84	22-Jun-06	Jim Thoren	√													√	CIV	3	2	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
G14	G14_430_1213em2	11	2.71	3	B	2268678.59	6966035.2	22-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	aluminum scrap	AL	√	3	1	0.25	N-S	0	√			
G14	G14_444_1416em2	12	3.83	4	B	2268687.45	6965960.27	22-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	aluminum scrap	AL	√	3	0.5	0.25	N-S	0	√			
G14	G14_49_1213em2	16	38.66	4	A	2268651.53	6966026.85	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	2	t.46 fuze well adaptor														√			
G14	G14_498_1416em2	13	3.16	3	B	2268675.43	6965990.91	22-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze, vt antenna							FE	√	6	2	1	N-S	0	√			
G14	G14_64_1213em2	16	28.32	4	A	2268656.76	6966018.99	22-Jun-06	Alan Merriman	√							√	ORD MD	6	4	4	fmu 54 ab hex plug,fuze part (3)														√			
G14	G14_73_1213em2	13	22.32	4	B	2268619.03	6965993.2	22-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze, vt							FE	√	6	4	0.25	N-S	0	√			
G14	G14_79_1213em2	15	21.2	4	A	2268673.07	6965963.91	22-Jun-06	Alan Merriman	√							√	ORD MD	3	1	2	vt fuze part mk166														√			
G14	G14_821_1213em2	12	18.06	4	B	2268704.11	6965946.83	22-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	5.56mm brass							OTHER	√	3	0.5	0.25	N-S	0	√			
G14	G14_86_1213em2	13	19.68	4	B	2268664.25	6966021.26	22-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm							OTHER	√	6	1	0.25	N-S	0	√			
G14	G14_87_1213em2	13	19.65	4	B	2268623.92	6965996.12	22-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
G15	G15_107_1213em2	14	15.08	4	A	2268738.63	6965962.59	06-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	4ft of fence wire		√	> 24		0.25			√			
G15	G15_115_1213em2	16	14.2	4	A	2268779.46	6966015.71	06-Jul-06	Jim Thoren	√							√	ORD MD	12	1	0.25	vt fuze bracket							FE	√	6	2	0.25	N-S	0	√			
G15	G15_124_1213em2	14	12.82	4	A	2268768.83	6966027.7	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket							FE	√	6	2	0.25			√			
G15	G15_125_1213em2	11	12.73	4	B	2268726.85	6965942.88	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire		√	9	0.5	0.25			√			
G15	G15_134_1213em2	11	11.76	4	B	2268734.53	6965975.23	17-Aug-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag (2)								√	3	1	0.25			√			
G15	G15_135_1213em2	13	11.74	4	B	2268776.41	6966025.91	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25		AL	√	6	2	0.25			√			
G15	G15_136_1213em2	16	11.7	4	A	2268718.59	6965985.03	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap alum	AL	√	3	1	0.25			√			
G15	G15_137_1213em2	13	11.34	4	B	2268787.07	6966000.56	06-Jul-06	Jim Thoren	√													√	CIV	18	> 10	4	pipe from #152/rust chunkc left	FE	√	> 24	4	0.25	N-S	0	√			
G15	G15_150_1213em2	12	10.37	4	B	2268753.84	6966005.81	06-Jul-06	Jim Thoren																			no contact, reaquired 7/25/06												
G15	G15_152_1213em2	13	10.33	4	B	2268784.29	6965998.46	06-Jul-06	Jim Thoren	√													√	CIV	18	1	4	pipe/rust chunks lft in grnd >18	FE	√	> 24	4	0.25	N-S	0	√			
G15	G15_168_1213em2	13	9.26	4	B	2268755.06	6965959.73	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail								√			
G15	G15_180_1213em2	12	8.48	4	B	2268784.3	6966006.04	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap steel, scrap	FE	√	6	0.5	0.25			√			
G15	G15_188_1213em2	11	8.1	4	B	2268734.55	6965954.77	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, wire	FE	√	3	0.5	0.25			√			
G15	G15_210_1213em2	13	7.12	4	B	2268774.39	6965953.77	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
G15	G15_221_1213em2	13	6.58	4	B	2268771.45	6966033.53	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap steel	FE	√	3	0.5	0.25			√			
G15	G15_228_1213em2	12	6.36	4	B	2268811.79	6965961.38	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part/scrap							FE	√	3	2				√			
G15	G15_234_1213em2	13	6.09	4	B	2268804.78	6965973.09	06-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	frag							FE	√	3	2	0.25			√			
G15	G15_24_1213em2	13	104.34	4	B	2268755.15	6965943.02	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			
G15	G15_243_1213em2	12	5.84	4	B	2268730.03	6965981.89	06-Jul-06	Jim Thoren	√													√	CIV	3		0.25	nails		√	3	0.5				√			
G15	G15_248_1213em2	11	5.75	4	B	2268723.6	6966027.94	06-Jul-06	Jim Thoren	√	√	ORD	6	1	0.25	40mm ctg w/propellent													AL	√	3	2	0.25	N-S	0	√			
G15	G15_249_1213em2	12	5.74	4	B	2268813.48	6965944.57	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail		√	3		0.25			√			
G15	G15_25_1213em2	16	98.77	4	A	2268810.14	6965971.3	06-Jul-06	Jim Thoren	√													√	CIV	12	1	2	scrap	FE	√	24	4	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G15	G15_252_1213em2	11	5.5	4	B	2268732.47	6965978.74	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail								√			
G15	G15_256_1213em2	11	5.4	4	B	2268772.39	6965949	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap steel	FE	√	3	2	0.25	N-S	0	√			
G15	G15_257_1213em2	12	5.37	4	B	2268746.58	6966030.12	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm tp							FE	√	3	0.5	0.25	N-S	0	√			
G15	G15_264_1213em2	10	5.1	4	C	2268736.51	6965978.58	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt bar tuze piece							FE	√	3	0.5	0.5	N-S	0	√			
G15	G15_267_1213em2	11	5.05	4	B	2268758.83	6966022.63	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap steel	FE	√	6	2	0.25	N-S	0	√			
G15	G15_272_1213em2	13	4.96	4	B	2268804.57	6966035.39	06-Jul-06	Jim Thoren	√													√	MIL	6	1	0.25	alum scrap	AL	√	6	4	0.25			√			
G15	G15_276_1213em2	9	4.92	4	C	2268732.73	6965948.96	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	wire and nail	FE	√	3	0.5	0.25	N-S	0	√			
G15	G15_293_1213em2	13	4.43	4	B	2268800.64	6965938.02	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	steel scrap	FE	√	3	0.5	0.25	N-S	0	√			
G15	G15_294_1416em2	11	6.77	4	B	2268726.14	6965968.23	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE							√			
G15	G15_299_1213em2	11	4.35	4	B	2268744.11	6965964.55	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3		0.25			√			
G15	G15_300_1213em2	14	4.31	4	A	2268774.19	6965988.18	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE							√			
G15	G15_302_1213em2	12	4.3	4	B	2268764.05	6966021.2	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze base							FE	√	3		0.25			√			
G15	G15_310_1213em2	11	4.05	4	B	2268806.91	6965941.89	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
G15	G15_312_1213em2	9	4.03	4	C	2268736.38	6965970.48	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
G15	G15_320_1213em2	11	3.89	4	B	2268806.8	6965950.79	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap	FE	√	3	0.5	0.25			√			
G15	G15_323_1213em2	12	3.84	4	B	2268769.59	6965952.44	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
G15	G15_326_1213em2	13	3.81	4	B	2268727.72	6965968.86	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze ant 3x2x1/4	√	CIV	3	1	0.25	nail	FE	√	3	0.5				√			
G15	G15_328_1213em2	12	3.77	4	B	2268809.57	6965945.94	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	tube aluminum	AL	√	9		0.25			√			
G15	G15_35_1213em2	16	58.01	4	A	2268768.02	6965971.88	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	4	fuze							FE	√	3	4	2			√			
G15	G15_367_1213em2	11	3.19	3	B	2268791.66	6965981.92	06-Jul-06	Jim Thoren	√													√	MIL	12	1	0.25	scrap alum	AL							√			
G15	G15_370_1213em2	12	3.18	3	B	2268739.12	6965972.66	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE							√			
G15	G15_404_1213em2	8	2.9	3	D	2268747.09	6965973.82	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
G15	G15_409_1416em2	9	4.28	4	C	2268725.74	6965962.85	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	frag							FE	√	3	0.5	0.25	N-S	0	√			
G15	G15_43_1213em2	15	42.64	4	A	2268749.3	6966003.87	06-Jul-06	Jim Thoren	√													√	MIL	3	1	2	tie down ratchet	FE	√	9	4	4			√			
G15	G15_52_1213em2	13	34.35	4	B	2268799.63	6965960.57	06-Jul-06	Jim Thoren	√							√	ORD MD	6	1	2	fuze							FE	√	6	4				√			
G15	G15_56_1213em2	16	32.62	4	A	2268777.24	6965940.89	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket								√	6	2	0.25			√			
G15	G15_61_1213em2	13	29.93	4	B	2268804.4	6965963.56	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							FE	√	6	2	0.25			√			
G15	G15_70_1213em2	16	23.6	4	A	2268796.75	6966035.76	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	frag							FE	√	3	2	0.25			√			
G15	G15_761_1213em2	5	1.18	1	D	2268736.98	6966025.86	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
G15	G15_77_1213em2	15	21.64	4	A	2268743.92	6965977.66	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag							FE	√	3	2	0.25			√			
G15	G15_84_1213em2	15	20.68	4	A	2268797.32	6965937.83	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze parts							FE	√	6	2	0.25			√			
G15	G15_97_1213em2	14	17.16	4	A	2268779.34	6965959.02	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	bracket fuze							FE	√	6	2	0.25			√			
G16	G16_103_1608em2	16	8.24	4	A	2268895.7	6966005.13	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	AL	√	3	2	0.25			√			
G16	G16_105_1608em2	16	8.09	4	A	2268835.77	6966036.29	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, part								√	3	2	0.25			√			
G16	G16_116_1608em2	15	6.83	4	A	2268828.05	6965984.2	28-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	ejection seat part		√	3	0.5				√			
G16	G16_120_1608em2	16	6.66	4	A	2268864.35	6965985.85	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	6	4	0.25			√			
G16	G16_121_1608em2	16	6.62	4	A	2268882.88	6965997.55	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	frag							FE	√	3	2	1			√			
G16	G16_124_1608em2	13	6.44	4	B	2268893.34	6966001.02	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze ant							AL	√	6	2	0.25			√			
G16	G16_13_1608em2	16	77.7	4	A	2268896.7	6966010.16	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	AL	√	6	4	0.25			√			
G16	G16_144_1608em2	13	5.76	4	B	2268847.21	6965977.39	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze ant							AL	√	6	2	0.25			√			
G16	G16_17_1608em2	16	58.93	4	A	2268857.3	6966001.56	28-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.5	fuze, vt brackets							FE	√	6	2	0.25			√			
G16	G16_174_1608em2	14	4.25	4	A	2268837.8	6966009.95	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	ejection connector	AL	√	3	1				√			
G16	G16_186_1608em2	11	3.9	4	B	2268881.78	6965972.19	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal projo							CU	√	3	0.5				√			
G16	G16_188_1608em2	11	3.76	4	B	2268862.73	6965940.58	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm cart case							AL	√	6	1				√			
G16	G16_192_1608em2	11	3.63	4	B	2268860.66	6965936.68	07-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	0.5	0.25			√			
G16	G16_193_1608em2	11	3.62	4	B	2268823.43	6965949.97	07-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	0.5	0.25			√			
G16	G16_194_1608em2	12	3.61	4	B	2268861.93	6966023.01	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap	FE	√	6	2	0.25			√			
G16	G16_201_1608em2	11	3.54	3	B	2268859.03	6965998.05	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
G16	G16_205_1608em2	11	3.41	3	B	2268872.57	6965985.7	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
G16	G16_213_1608em2	11	3.26	3	B	2268881.87	6965940.68	07-Jul-06	Jim Thoren																			no contact											
G16	G16_231_1608em2	11	2.83	3	B	2268907.54	6966030.89	07-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	1	0.25			√			
G16	G16_24_1608em2	15	48.82	4	A	2268863.09	6965951.11	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	4	fuze, vt								√	6	4	0.25			√			
G16	G16_241_1608em2	11	2.58	3	B	2268843.52	6966017.47	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	6	1	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G16	G16_245_1608em2	11	2.52	3	B	2268912.77	6965949.04	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
G16	G16_37_1608em2	16	30.72	4	A	2268860.76	6965965.07	16-Aug-06	Jim Thoren	√							√	ORD MD	0	1	0.25	50 cal casing	√	MIL	3	1	0.25	scrap	FE	√	6	4	0.25			√			
G16	G16_42_1608em2	16	22.15	4	A	2268899.04	6965938.93	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, part							FE	√	3	0.5				√			
G16	G16_44_1608em2	15	21.23	4	A	2268833.32	6965977.86	28-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	AL	√	6	2	0.25			√			
G16	G16_46_1608em2	16	20.76	4	A	2268872.5	6965936.84	28-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	6	0.5	0.25			√			
G16	G16_49_1608em2	14	18.13	4	A	2268846.52	6966034.26	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt bracket								√	6	2	0.25			√			
G16	G16_59_1608em2	12	15.93	4	B	2268849.33	6966032.48	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	4	0.5			√			
G16	G16_6_1608em2	16	110.98	4	A	2268819.77	6966022.66	28-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	ac part	AL	√	6	> 6	0.25			√			
G16	G16_68_1608em2	16	13.43	4	A	2268845.95	6966003.27	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt part							FE	√	6	0.5	0.25			√			
G16	G16_91_1608em2	14	9.64	4	A	2268829.27	6965948.97	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt antenna							AL	√	6	2	1			√			
G16	G16_92_1608em2	12	9.6	4	B	2268864.64	6965957.2	07-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	0.5				√			
G16	G16_95_1608em2	15	9.2	4	A	2268882.44	6965985.42	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	6	1	0.25			√			
G16	G16_98_1608em2	12	8.86	4	B	2268855.14	6965943.21	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	6	1	0.25			√			
G17	G17_103_1213em2	13	15.89	4	B	2268985.05	6965937.04	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12		0.25			√			
G17	G17_112_1213em2	15	14.65	4	A	2268976.82	6966024.3	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	flare							FE	√	6	1	0.25			√			
G17	G17_117_1213em2	13	13.51	4	B	2268990.77	6966036.5	07-Jul-06	Jim Thoren	√							√	ORD MD	12	1	0.25	fuze brkt								√	6	2	0.25			√			
G17	G17_129_1213em2	16	12.59	4	A	2269010.27	6965988.12	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	scrap	AL	√	6	4	0.25			√			
G17	G17_138_1213em2	9	11.32	4	C	2268996.12	6965944.2	11-Jul-06	Alan Merriman	√													√	CIV	> 24	2	0.5	bolt and wire	FE		9	0.5	0.5	NE-SW	45	√			
G17	G17_144_1213em2	15	10.83	4	A	2268928.98	6965972.88	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	VT fuze part							FE	√	6	1	1			√			
G17	G17_147_1213em2	13	10.54	4	B	2268944.26	6965941.76	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25		AL	√	6	2	0.25			√			
G17	G17_149_1213em2	12	10.38	4	B	2268948.84	6965994.98	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12		0.25			√			
G17	G17_159_1213em2	14	10.03	4	A	2269005.82	6966030.68	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	scrap	FE	√	6	2	0.25			√			
G17	G17_16_1610em2	15	48.2	4	A	2269004.36	6965978.77	28-Jun-06	Alan Merriman	√													√	MIL	0	1	0.5	scrap	FE	√	> 24	0.5	0.25			√			
G17	G17_179_1213em2	15	8.5	4	A	2268964.8	6965983.08	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	chain	FE	√	6	1	0.25			√			
G17	G17_181_1213em2	15	8.36	4	A	2269013.42	6965997.95	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze backet							FE	√	6	2	0.25			√			
G17	G17_192_1213em2	9	7.95	4	C	2268995.84	6965948.26	11-Jul-06	Alan Merriman	√													√	CIV	24	2	0.25	bolt and wire	FE		6	0.5	0.5	NE-SW	45	√			
G17	G17_196_1213em2	13	7.8	4	B	2268967.08	6966031.57	07-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze ant							AL	√	6	2	0.25			√			
G17	G17_207_1213em2	15	7.2	4	A	2268984.19	6965986.88	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	chain	FE	√	6	1	0.5			√			
G17	G17_219_1213em2	16	6.67	4	A	2268960.45	6966007.34	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze antenna							AL	√	6	1	0.25			√			
G17	G17_231_1213em2	13	6.21	4	B	2268981.41	6966002.44	07-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze ant							AL	√	6	2	0.25			√			
G17	G17_241_1213em2	13	5.86	4	B	2268939.49	6965945.12	07-Jul-06	Jim Thoren	√							√	EMAT MD	3	1	0.25	fuze ant								√	6	2	1			√			
G17	G17_288_1213em2	15	4.54	4	A	2268923.44	6966029.51	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	seat parts	FE	√	3	0.5	0.5			√			
G17	G17_292_1213em2	12	4.49	4	B	2268991.08	6966006.78	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1				√			
G17	G17_31_1213em2	13	66.99	4	B	2268973.76	6966008.57	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	4	vt fuze							FE	√	6	4	0.25			√			
G17	G17_350_1213em2	11	3.41	3	B	2268938.96	6966028.59	07-Jul-06	Jim Thoren																			too small to find											
G17	G17_352_1213em2	11	3.38	3	B	2268995.12	6965975.73	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	4	0.25			√			
G17	G17_355_1213em2	11	3.26	3	B	2268946.17	6965992.9	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
G17	G17_358_1213em2	11	3.25	3	B	2269015.41	6965945.7	07-Jul-06	Jim Thoren																			no contact											
G17	G17_42_1213em2	12	47.62	4	B	2268969.63	6966012.52	07-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	AL	√	6	2	1			√			
G17	G17_44_1213em2	14	42.06	4	A	2268946.98	6965945.6	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	scrap	AL	√	3	0.5	0.25			√			
G17	G17_60_1213em2	15	30.95	4	A	2268920.93	6966008.62	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	4	fragment							FE	√	6	4	2			√			
G17	G17_63_1213em2	15	28.74	4	A	2268968.28	6965943.55	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
G17	G17_66_1213em2	14	27.61	4	A	2268923.99	6966007.41	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	4	fragment							FE	√	6	4	2			√			
G17	G17_80_1213em2	13	21.1	4	B	2269015.35	6966019.68	07-Jul-06	Jim Thoren	√													√	CIV	0	5	0.25	fence clips	FE	√	6		0.25			√			
G17	G17_82_1610em2	13	9.36	4	B	2269008.63	6965987.73	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal							FE	√	3	0.5				√			
G17	G17_92_1213em2	15	17.64	4	A	2268946.51	6966018.41	28-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	flare							AL	√	6	1	1			√			
G18	G18_102_1213em2	16	16.24	4	A	2269041.88	6965969.94	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	12 barbed wire	FE							√			
G18	G18_122_1213em2	15	13.01	4	A	2269047.88	6965953.65	07-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	fence clips	FE							√			
G18	G18_131_1213em2	12	11.96	4	B	2269051.23	6965938.47	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	steel rod	FE	√	6		0.25			√			
G18	G18_132_1213em2	10	11.78	4	C	2269025.63	6965948.26	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	screw driver	FE	√	6	0.5	0.25	N-S	0	√			
G18	G18_151_1213em2	9	10.36	4	C	2269033.89	6965993.59	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	chain link fence	OTHER	√	6	0.5	0.25	N-S	45	√			
G18	G18_157_1213em2	14	10.1	4	A	2269044.15	6965953.22	07-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	fence clips								√			
G18	G18_162_1213em2	12	9.67	4	B	2269027.34	6966000.57	07-Jul-06	Jim Thoren	√													√	CIV	0	2		fence clips	FE							√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
G18	G18_176_1213em2	13	8.75	4	B	2269018.55	6965944.73	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	9		0.25			√			
G18	G18_184_1213em2	12	8.24	4	B	2269023.2	6966035.05	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	6		0.25			√			
G18	G18_214_1213em2	9	6.84	4	C	2269055.43	6965938.51	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	fence wire		√	3	0.5	0.25	N-S	45	√			
G18	G18_215_1213em2	10	6.8	4	C	2269036.13	6965948.85	11-Jul-06	Alan Merriman	√													√	CIV	0	5	0.25	nails and small metal pieces	FE		3	0.5	0.25	N-S	45	√			
G18	G18_224_1213em2	11	6.53	4	B	2269040.88	6965951.03	07-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	fence clips	FE							√			
G18	G18_29_1213em2	10	69.38	4	C	2269033.2	6965947.29	11-Jul-06	Alan Merriman																			no find, reacquire 7/25/06											
G18	G18_382_1213em2	12	3.09	3	B	2269020.01	6965985.56	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence clip	FE	√	3		0.25			√			
G18	G18_47_1213em2	14	39.91	4	A	2269031.34	6965989.18	07-Jul-06	Jim Thoren	√													√	CIV	0	10		fence clips	FE	√	3		0.25			√			
G18	G18_48_1213em2	15	39.48	4	A	2269020.12	6966021.25	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence clip	FE	√	3		0.25			√			
G18	G18_65_1213em2	9	27.82	4	C	2269033.23	6965950.72	11-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	many nails	FE	√	3	0.5	0.25	N-S	0	√			
G18	G18_67_1213em2	13	24.31	4	B	2269036.18	6965991.02	07-Jul-06	Jim Thoren	√													√	CIV	0	10		fence clips	FE	√	3		0.25			√			
G18	G18_72_1213em2	12	22.47	4	B	2269023.17	6966022.82	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence clip	FE	√	3		0.25			√			
H01	H01_12_1216em1	14	5.4	4	A	2267366.53	6965898.18	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	bolt								√			
H01	H01_21_1216em1	14	4.44	4	A	2267416.45	6965889.12	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	37mm piece														√			
H01	H01_5_1216em1	14	16.53	4	A	2267366.38	6965903.15	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	horseshoe								√			
H01	H01_6_1216em1	14	8.76	4	A	2267364.86	6965906.39	06-Jun-06	Jim Thoren																			nothing found											
H01	H01_80_1216em1	10	1.71	1	C	2267416.75	6965892.49	19-Jun-06	Alan Merriman																			no find, item too small											
H02	H02_01_612_mag			99	M	2267474.306	6965833.835	12-Jun-06	Alan Merriman	√													√	CIV	0	1	1	fence wire								√			
H02	H02_02_612_mag			99	M	2267486.299	6965837.045	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	steel scrap								√			
H02	H02_03_612_mag			99	M	2267489.343	6965840.531	12-Jun-06	Alan Merriman	√													√	CIV	6	1	1	fence wire								√			
H02	H02_04_612_mag			99	M	2267484.177	6965851.25	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
H02	H02_05_612_mag			99	M	2267492.054	6965859.252	12-Jun-06	Alan Merriman	√													√	CIV	6	1	1	fence wire								√			
H02	H02_06_612_mag			99	M	2267480.363	6965874.228	12-Jun-06	Alan Merriman	√													√	CIV	6	1	1	fence wire								√			
H02	H02_07_612_mag			99	M	2267492.948	6965883.599	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
H02	H02_08_612_mag			99	M	2267486.027	6965894.6	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
H02	H02_09_612_mag			99	M	2267473.542	6965891.928	12-Jun-06	Alan Merriman	√													√	CIV	6	1	1	metal scrap								√			
H02	H02_10_612_mag			99	M	2267481.276	6965917.178	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
H02	H02_11_612_mag			99	M	2267496.968	6965916.544	12-Jun-06	Alan Merriman	√													√	CIV	6	1	1	fence wire								√			
H02	H02_84_1217em1	11	4.79	4	B	2267496.16	6965915.77	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H02	H02_87_1217em1	11	3.64	4	B	2267432.39	6965901.59	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H03	H03_305_1415em2	13	3.82	4	B	2267543.27	6965862.62	06-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	fuze, parts								√	3		0.25			√			
H03	H03_97_1217em1	9	2.07	2	C	2267522.5	6965836.73	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap metal lid								√			
H04	H04_28_1218em1	16	19.37	4	A	2267642.36	6965847.8	06-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	flare, expended								√	3	2				√			
H04	H04_37_1218em1	13	4.99	4	B	2267702.55	6965923.19	06-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrape metal		√	3	1	0.25			√			
H04	H04_40_1218em1	12	4.17	4	B	2267690.42	6965889.34	06-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	frag, 37mm														√			
H04	Qadig_H04_362		7.4		QA	2267630.32	6965865.67	15-Aug-06	Alan Merriman	√													√					hot soil											
H04	QAdig_H04_363		7.4		QA	2267690.08	6965923.03	15-Aug-06	Alan Merriman	√													√					hot soil											
H05	H05_27_1218em1	16	20.97	4	A	2267758.08	6965905.48	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	scrap mech														√			
H05	H05_35_1218em1	15	6.25	4	A	2267746.3	6965892.7	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	scrap mech														√			
H05	H05_50_1218em1	10	2.85	3	C	2267723.73	6965882.62	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal ball														√			
H05	H05_53_1218em1	11	2.68	3	B	2267746.94	6965930.18	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	50 cal														√			
H05	H05_73_1218em1	10	2.13	2	C	2267765.88	6965846.03	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 call ball														√			
H06	H06_115_1221em1	11	3.56	3	B	2267863.55	6965898.98	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	6	0.5	0.25			√			
H06	H06_137_1221em1	10	2.82	3	C	2267909.27	6965936.19	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal ball														√			
H06	H06_138_1221em1	12	2.78	3	B	2267866.19	6965865.36	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1			√	6	0.5	0.25			√			
H06	H06_144_1221em1	9	2.7	3	C	2267833.11	6965928.84	19-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	50 call ball														√			
H06	H06_148_1221em1	9	2.52	3	C	2267904.38	6965855.02	19-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	50 cal ball														√			
H06	H06_16_1221em1	16	37.05	4	A	2267866.06	6965846.8	06-Jun-06	Jim Thoren	√													√	CIV	0	1	2	scrap metal		√	3	2	0.5			√			
H06	H06_30_1221em1	16	15.72	4	A	2267840.25	6965892.24	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1			√	24	0.5	0.25			√			
H06	H06_47_1221em1	13	8.51	4	B	2267913.34	6965911.89	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	24	0.5	0.25			√			
H06	H06_60_1221em1	12	6.53	4	B	2267902.19	6965849.28	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	12	0.5	0.25			√			
H07	H07_1_1414em2	15	484.18	4	A	2268005.07	6965909.1	13-Jun-06	Jim Thoren	√													√	CIV	0	1	8	scrap		√	6	1	0.25			√			
H07	H07_104_1414em2	11	2.81	3	B	2268016.48	6965871.63	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H07	H07_112_1414em2	11	2.62	3	B	2267970.23	6965932.55	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal														√			
H07	H07_13_1414em2	15	64.92	4	A	2267998.91	6965899.73	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H07	H07_14_1414em2	16	57.65	4	A	2267958.94	6965912.26	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H07	H07_16_1414em2	16	51.07	4	A	2267949.2	6965897.66	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	flare														√			
H07	H07_24_1414em2	16	22.13	4	A	2268004.09	6965905.6	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
H07	H07_31_1414em2	13	15.3	4	B	2268005.38	6965931.7	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H07	H07_32_1414em2	15	12.59	4	A	2267979.52	6965879.53	13-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
H07	H07_33_1414em2	16	12.37	4	A	2267974.18	6965895.46	13-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	flare														√			
H07	H07_40_1414em2	13	9.13	4	B	2267977.91	6965865.4	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
H07	H07_42_1414em2	12	7.99	4	B	2268002.52	6965934.99	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H07	H07_46_1414em2	13	7.69	4	B	2268002.07	6965901.87	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H07	H07_51_1414em2	12	6.53	4	B	2268017.38	6965920.58	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
H07	H07_52_1414em2	11	6.48	4	B	2268015.86	6965929.95	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H07	H07_60_1414em2	14	5.73	4	A	2268000.82	6965897.01	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H07	H07_65_1414em2	12	5.17	4	B	2268008.59	6965889.66	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
H07	H07_66_1414em2	13	5.15	4	B	2267979.34	6965862.43	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H07	H07_68_1414em2	12	4.91	4	B	2267992.79	6965861.11	13-Jun-06	Jim Thoren	√													√	CIV	12	1	1	scrap								√			
H07	H07_72_1414em2	14	4.6	4	A	2268003.73	6965880.72	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H07	H07_73_1414em2	13	4.58	4	B	2268006.07	6965898.38	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
H07	H07_74_1414em2	13	4.53	4	B	2268007.6	6965893.74	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H07	H07_77_1414em2	12	4.24	4	B	2267976.9	6965897.3	13-Jun-06	Jim Thoren	√													√	CIV	6	2	1	nails		√	6	0.5				√			
H07	H07_81_1414em2	13	4.02	4	B	2267928	6965902.42	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H07	H07_84_1414em2	11	3.95	4	B	2267986.28	6965867.34	13-Jun-06	Jim Thoren	√													√	CIV	12	1	1	scrap								√			
H07	H07_85_1414em2	13	3.94	4	B	2268005.93	6965928.34	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H08	H08_10_1415em2	16	156.61	4	A	2268074.12	6965841.65	13-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	flare								√	9	2	0.25			√			
H08	H08_100_1415em2	10	16.95	4	C	2268079.07	6965889.84	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	7.62 brass							OTHER	√	3	0.5	0.25	N-S	0	√			
H08	H08_101_1415em2	10	16.61	4	C	2268082.91	6965871.22	11-Jul-06	Alan Merriman	√													√	MIL	> 24	5	0.25	starter cart depris	FE	√	6	0.5	0.5	NE-SW	45	√			
H08	H08_102_1415em2	13	16.26	4	B	2268062.54	6965888.89	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H08	H08_109_1415em2	13	15.42	4	B	2268095.5	6965903.84	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H08	H08_110_1415em2	15	15.17	4	A	2268076.2	6965921.74	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap		√	6	2	0.25			√			
H08	H08_115_1415em2	10	14.78	4	C	2268054.73	6965840.69	11-Jul-06	Alan Merriman	√													√	MIL	> 24	> 10	≥8	starter cart depris	FE	√	6	0.5	0.5	NE-SW	45	√			
H08	H08_117_1415em2	10	14.62	4	C	2268075.5	6965864.4	11-Jul-06	Alan Merriman	√													√	MIL	3	1	0.5	wire	FE	√	3	0.5	0.25	N-S	0	√			
H08	H08_118_1415em2	13	14.51	4	B	2268044.27	6965883.11	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
H08	H08_120_1415em2	13	14.19	4	B	2268062.86	6965848.32	17-Aug-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
H08	H08_122_1415em2	13	13.73	4	B	2268036.77	6965846.91	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
H08	H08_123_1415em2	13	13.68	4	B	2268082.67	6965876.68	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H08	H08_124_1415em2	14	13.5	4	A	2268084.89	6965879.57	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_125_1415em2	10	13.3	4	C	2268084.44	6965898.73	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ac flare scrap							AL	√	6	0.5	0.25	N-S	0	√			
H08	H08_126_1415em2	9	13.14	4	C	2268063.32	6965861.69	11-Jul-06	Alan Merriman	√							√	ORD MD	12	1	2	fuze mt, vt							OTHER	√	3	4	4	N-S	0	√			
H08	H08_129_1415em2	13	13	4	B	2268098.35	6965911.42	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	hinge								√			
H08	H08_13_1415em2	15	125.33	4	A	2268086.22	6965882.64	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
H08	H08_130_1415em2	14	12.85	4	A	2268065.64	6965909.07	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap		√	6	1	0.25			√			
H08	H08_131_1415em2	11	12.82	4	B	2268082.55	6965860.87	13-Jun-06	Jim Thoren	√													√	CIV	12	1	2	scrap								√			
H08	H08_132_1415em2	13	12.66	4	B	2268090.95	6965920.3	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
H08	H08_133_1415em2	13	12.32	4	B	2268104.47	6965928.94	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
H08	H08_136_1415em2	14	11.98	4	A	2268074.75	6965924.72	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	9	0.5	0.25			√			
H08	H08_147_1415em2	9	10.54	4	C	2268089.61	6965853.73	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25		FE	√	6	0.5	0.5	E-W	0	√			
H08	H08_15_1614em2	9	20.21	4	C	2268078.96	6965872.45	11-Jul-06	Alan Merriman	√													√	CIV	3	1	1	steel rod	FE	√	12	2	0.25	NE-SW	0	√			
H08	H08_150_1415em2	11	10.34	4	B	2268099.12	6965917.63	13-Jun-06	Jim Thoren	√													√	MIL	> 24	> 10	≥8	starter cart depris	FE	√	6	0.5	0.5	NE-SW	45	√			
H08	H08_156_1415em2	10	9.7	4	C	2268029.7	6965859.82	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
H08	H08_16_1415em2	14	98.27	4	A	2268074.07	6965890.13	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H08	H08_164_1415em2	13	8.84	4	B	2268056.22	6965836.7	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_165_1415em2	13	8.84	4	B	2268069.26	6965843.71	17-Aug-06	Jim Thoren	√													√	MIL	6	1	1	scrap, t-post clips		√	3					√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H08	H08_166_1415em2	10	8.82	4	C	2268087.72	6965898.84	11-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.5	ac started cart							FE	√	9	0.5	0.25	N-S	45	√			
H08	H08_17_1415em2	14	80.86	4	A	2268087.19	6965886.32	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
H08	H08_171_1415em2	13	8.43	4	B	2268094.31	6965859.22	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
H08	H08_173_1415em2	13	8.41	4	B	2268044.6	6965887.09	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_174_1415em2	12	8.16	4	B	2268087.12	6965892.45	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	12	0.5	0.25			√			
H08	H08_178_1415em2	10	7.88	4	C	2268089.08	6965911.82	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
H08	H08_179_1415em2	13	7.82	4	B	2268036.8	6965855.12	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire, truck part								√			
H08	H08_181_1415em2	12	7.76	4	B	2268084.38	6965852.77	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H08	H08_196_1415em2	13	7.09	4	B	2268079.21	6965852.42	13-Jun-06	Jim Thoren	√													√	CIV	3	1	2	scrap								√			
H08	H08_20_1415em2	14	74.47	4	A	2268098.39	6965838.3	13-Jun-06	Jim Thoren	√													√	CIV	12	1	8	rebar								√			
H08	H08_203_1415em2	13	6.91	4	B	2268072.36	6965879.86	17-Aug-06	Jim Thoren	√							√	ORD MD	6	1	4	starter ctg	√	CIV	3	3	0.25	t-post clips	FE	√	3					√			
H08	H08_204_1415em2	13	6.86	4	B	2268039.28	6965898.19	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire								√			
H08	H08_206_1415em2	13	6.72	4	B	2268041.42	6965864.6	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire								√			
H08	H08_208_1415em2	13	6.67	4	B	2268099.23	6965841.52	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H08	H08_21_1415em2	15	71.59	4	A	2268083.59	6965847.3	13-Jun-06	Jim Thoren	√													√	CIV	3	1	8	slag								√			
H08	H08_215_1415em2	13	6.1	4	B	2268098.31	6965888.4	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
H08	H08_217_1415em2	12	6.05	4	B	2268083.02	6965918.55	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	9	0.5	0.25			√			
H08	H08_218_1415em2	12	6.05	4	B	2268046.4	6965892.77	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_219_1415em2	10	6.02	4	C	2268084.75	6965910.48	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal brass							OTHER	√	3	0.5	0.25	N-S	0	√			
H08	H08_22_1415em2	15	62	4	A	2268057.44	6965861.72	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire								√			
H08	H08_222_1415em2	12	5.99	4	B	2268033.33	6965858.35	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_226_1415em2	11	5.76	4	B	2268080.9	6965892.66	13-Jun-06	Jim Thoren	√													√	MIL	0	1	8	scrap								√			
H08	H08_23_1415em2	15	60.56	4	A	2268041.54	6965876.65	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	piece of starter ctg														√			
H08	H08_230_1415em2	14	5.62	4	A	2268073.02	6965886.72	16-Aug-06	Jim Thoren	√							√	ORD MD	0	1	0.25	small arms casings	√	CIV	6	1	1	scrap		√	12	1	0.25			√			
H08	H08_231_1415em2	10	5.52	4	C	2268091.4	6965847.23	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
H08	H08_236_1415em2	12	5.39	4	B	2268078.84	6965886.49	13-Jun-06	Jim Thoren	√													√	MIL	12	1	1	scrap								√			
H08	H08_239_1415em2	9	5.37	4	C	2268083.57	6965888.75	11-Jul-06	Alan Merriman	√							√	ED MD	0	2	0.5	starter cart piecec							FE		3	0.5	0.25	N-S	0	√			
H08	H08_24_1415em2	13	60.24	4	B	2268064.7	6965855.02	17-Aug-06	Jim Thoren	√													√	MIL	6	1	1	scrap, scrap								√			
H08	H08_244_1415em2	13	5.11	4	B	2268089.52	6965839.29	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_247_1415em2	13	5.03	4	B	2268103.73	6965896.3	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
H08	H08_250_1415em2	13	4.98	4	B	2268028.48	6965849.2	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H08	H08_263_1415em2	13	4.55	4	B	2268068.78	6965912.34	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H08	H08_266_1415em2	10	4.52	4	C	2268083.64	6965929.76	11-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	ac seat parts	AL	√	3	0.5	0.25	N-S	0	√			
H08	H08_267_1415em2	9	4.51	4	C	2268102.77	6965909.66	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal ap							OTHER	√	3	0.5	0.25	N-S	0	√			
H08	H08_269_1415em2	9	4.48	4	C	2268094.89	6965907.74	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	> 10	4	sm arm debr,str ctg emp& sm grren	√	CIV	> 24	> 10	≥8	tposts, wire & scrap	OTHER	√	> 24	> 6	> 4			√			
H08	H08_273_1415em2	10	4.39	4	C	2268102.95	6965936.55	11-Jul-06	Alan Merriman	√							√	ORD MD	3	3	0.25	small arms							OTHER	√	3	0.5	0.25	N-S	0	√			
H08	H08_274_1415em2	11	4.39	4	B	2268071.84	6965905.23	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_279_1415em2	12	4.32	4	B	2268024.09	6965856.43	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap		√	3	1	0.25			√			
H08	H08_28_1415em2	10	52.46	4	C	2268056.12	6965850.16	11-Jul-06	Alan Merriman	√													√	MIL	> 24	10	≥8	starter cart depris	FE	√	6	0.5	0.5	NE-SW	45	√			
H08	H08_280_1415em2	10	4.3	4	C	2268078.77	6965930.12	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	frag							FE	√	6	0.5	0.5	N-S	0	√			
H08	H08_282_1415em2	12	4.28	4	B	2268061.98	6965914.71	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal														√			
H08	H08_284_1415em2	13	4.16	4	B	2268039.28	6965852.06	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H08	H08_288_1415em2	13	4.13	4	B	2268030.81	6965863.12	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_294_1415em2	13	3.98	4	B	2268033.29	6965926.05	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H08	H08_299_1415em2	10	3.9	4	C	2268088.02	6965876.64	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25		FE	√	6	0.5	0.25	N-S	0	√			
H08	H08_300_1415em2	11	3.9	4	B	2268053.16	6965882.71	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H08	H08_301_1415em2	13	3.88	4	B	2268058.73	6965868.51	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
H08	H08_308_1415em2	12	3.8	4	B	2268028.8	6965844.57	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap		√	9	1	0.5			√			
H08	H08_31_1415em2	10	51.45	4	C	2268051.71	6965849.51	11-Jul-06	Alan Merriman	√													√	MIL	> 24	> 10	≥8	starter cart depris	FE	√	6	0.5	0.5	NE-SW	45	√			
H08	H08_316_1415em2	12	3.7	4	B	2268068.87	6965882.71	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
H08	H08_317_1415em2	13	3.67	4	B	2268039.77	6965837.84	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	blank														√			
H08	H08_321_1415em2	12	3.63	4	B	2268073.7	6965902.41	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_324_1415em2	11	3.59	3	B	2268065.88	6965894.96	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H08	H08_33_1415em2	13	44.26	4	B	2268098.3	6965892.08	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
H08	H08_35_1415em2	16	42.9	4	A	2268076.05	6965836.85	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	> 24	0.5	0.25			√			
H08	H08_356_1415em2	12	2.94	3	B	2268069.77	6965858.05	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H08	H08_36_1415em2	13	41.63	4	B	2268049.35	6965858.74	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
H08	H08_360_1415em2	11	2.91	3	B	2268096.41	6965866.77	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
H08	H08_393_1415em2	11	2.5	3	B	2268030.95	6965852.28	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_40_1415em2	10	38.62	4	C	2268082.2	6965864.91	11-Jul-06	Alan Merriman	√													√	MIL	> 24	5	0.25	starter cart depris	FE	√	6	0.5	0.5	NE-SW	45	√			
H08	H08_400_1415em2	11	2.44	2	B	2268030.56	6965935.61	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_402_1415em2	11	2.42	2	B	2268068.74	6965849.31	13-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire								√			
H08	H08_42_1415em2	13	36.79	4	B	2268050.12	6965852.78	13-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	starter ctg														√			
H08	H08_44_1415em2	13	36.69	4	B	2268097.18	6965924.4	13-Jun-06	Jim Thoren	√													√	CIV	12	1	8	scrap		√	24	2	0.25			√			
H08	H08_443_1415em2	11	2.04	2	B	2268037.7	6965859.35	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_45_1415em2	12	36.64	4	B	2268089.99	6965932.95	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap		√	9	1	0.25			√			
H08	H08_46_1415em2	14	36.56	4	A	2268101.52	6965836.89	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	rebar (same as 20)								√			
H08	H08_47_1415em2	13	36.27	4	B	2268089.83	6965860.95	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
H08	H08_48_1415em2	13	35.48	4	B	2268053.21	6965843.89	13-Jun-06	Jim Thoren	√													√	CIV	12	1	1	wire		√	6	0.5				√			
H08	H08_49_1415em2	14	34.35	4	A	2268086.95	6965936.48	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H08	H08_51_1415em2	13	34.09	4	B	2268071.15	6965852.42	17-Aug-06	Jim Thoren	√													√	MIL	3	1	1	scrap, wire								√			
H08	H08_52_1415em2	13	33.9	4	B	2268091.98	6965877.63	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
H08	H08_53_1415em2	14	32.88	4	A	2268101.46	6965913.94	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H08	H08_56_1415em2	16	31.42	4	A	2268048.25	6965911.19	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H08	H08_57_1415em2	14	31.19	4	A	2268020.62	6965900.09	13-Jun-06	Jim Thoren	√													√	CIV	3	1	2	fence post		√	6	2	0.5			√			
H08	H08_58_1415em2	12	30.87	4	B	2268100	6965921.17	13-Jun-06	Jim Thoren	√													√	CIV	3	1	2	fence post (same as 67)		√	6	2	0.5			√			
H08	H08_60_1415em2	13	29.53	4	B	2268055.37	6965855.7	13-Jun-06	Jim Thoren	√							√	ORD MD	12	1	2	starter ctg (rust flakes left)														√			
H08	H08_63_1415em2	13	27.53	4	B	2268081.44	6965868.27	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	bolt		√	12	0.5				√			
H08	H08_68_1415em2	14	25.4	4	A	2268021.73	6965903.45	13-Jun-06	Jim Thoren	√													√	CIV	3	1	2	scrap								√			
H08	H08_72_1415em2	10	23.74	4	C	2268077.88	6965847.72	11-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.25	ac starter cart scrap							FE	√	6	0.5	0.25	N-S	0	√			
H08	H08_74_1415em2	13	23.53	4	B	2268061.46	6965853.33	13-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
H08	H08_77_1415em2	12	22.96	4	B	2268090.45	6965908.68	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	bolt		√	9	0.5	0.5			√			
H08	H08_78_1415em2	13	22.4	4	B	2268093.38	6965897.42	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	banding								√			
H08	H08_8_1415em2	12	177.63	4	B	2268059.04	6965844.11	13-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
H08	H08_82_1415em2	13	20.53	4	B	2268087.79	6965843.1	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_84_1415em2	12	19.71	4	B	2268071.25	6965892.7	17-Aug-06	Jim Thoren	√													√	MIL	0	1	1	scrap, scrap								√			
H08	H08_87_1415em2	13	18.78	4	B	2268098.66	6965882.09	13-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
H08	H08_89_1415em2	9	18.45	4	C	2268086.4	6965858.09	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
H08	H08_9_1614em2	15	55.57	4	A	2268083.82	6965872.73	13-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
H08	H08_93_1415em2	13	18.17	4	B	2268081.77	6965882.64	13-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	starter ctg														√			
H08	H08_95_1415em2	13	17.88	4	B	2268082.91	6965839.59	13-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
H08	H08_97_1415em2	10	17.61	4	C	2268058.27	6965847.32	11-Jul-06	Alan Merriman	√													√	MIL	> 24	> 10	≥8	starter cart depris	FE	√	6	0.5	0.5	NE-SW	45	√			
H08	H08_99_1415em2	13	17.01	4	B	2268096.38	6965900.33	13-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
H09	H09_1_1416em2	12	3581.9	4	B	2268127.26	6965886.02	21-Jul-06	Alan Merriman	√													√	CIV	> 24	1		fence post, left in place	FE										
H09	H09_172_1416em2	13	13.44	4	B	2268217.51	6965852.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_183_1416em2	16	12.61	4	A	2268147.16	6965880.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_269_1416em2	12	7.52	4	B	2268180.2	6965922.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_30_1416em2	15	66.07	4	A	2268129.29	6965905.05	21-Jul-06	Alan Merriman	√													√	CIV	0	1	1	tpost bracket	FE	√	3	0.5	0.25			√			
H09	H09_307_1416em2	12	6.04	4	B	2268213.39	6965864.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_310_1416em2	16	6.37	4	A	2268123.21	6965854.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_319_1416em2	12	6.06	4	B	2268126.69	6965893.86	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_342_1416em2	15	5.66	4	A	2268164.88	6965849.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_4_1416em2	15	1292.58	4	A	2268128	6965890.38	21-Jul-06	Alan Merriman	√													√	CIV	24	1	4	fence post, left in place	FE										
H09	H09_424_1416em2	11	4.09	4	B	2268211.35	6965848.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_425_1416em2	13	4.09	4	B	2268126.05	6965871.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_434_1416em2	11	3.92	4	B	2268181.16	6965926.06	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H09	H09_436_1416em2	11	3.91	4	B	2268127.68	6965908.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_443_1416em2	13	3.84	4	B	2268151.41	6965910.22	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5						
H09	H09_448_1416em2	11	3.78	4	B	2268191.64	6965932.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_452_1416em2	12	3.75	4	B	2268127.66	6965899.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_455_1416em2	11	3.68	4	B	2268197.63	6965853.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_480_1416em2	11	3.34	3	B	2268125.15	6965864.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_487_1416em2	9	3.23	3	C	2268218.1	6965864.28	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_524_1416em2	9	2.79	3	C	2268217.79	6965840.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_544_1416em2	9	2.62	3	C	2268132.15	6965860.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_549_1416em2	11	2.6	3	B	2268178.34	6965845.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_580_1416em2	7	2.36	2	D	2268133.52	6965893.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_586_1416em2	8	2.34	2	D	2268128.86	6965867.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_588_1416em2	10	2.33	2	C	2268126.49	6965875.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_6_1416em2	15	378.55	4	A	2268146.07	6965884.09	21-Jul-06	Alan Merriman	√													√	CIV	0	1	1	pin flag on surface	FE	√	12	0.5	0.25			√			
H09	H09_613_1416em2	9	2.15	2	C	2268191.05	6965841.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_615_1416em2	5	2.15	2	D	2268174.67	6965889.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_631_1416em2	8	2.06	2	D	2268122.68	6965843.75	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_651_1416em2	9	1.97	2	C	2268209.02	6965842	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_656_1416em2	9	1.94	2	C	2268195.6	6965897.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_661_1416em2	7	1.91	2	D	2268173.54	6965892.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_663_1416em2	8	1.9	1	D	2268212.21	6965883.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_699_1416em2	7	1.7	1	D	2268180.06	6965917.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_725_1416em2	5	1.58	1	D	2268190.05	6965908.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_729_1416em2	6	1.56	1	D	2268175.39	6965895.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_730_1416em2	6	1.56	1	D	2268128.83	6965926.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_732_1416em2	5	1.56	1	D	2268177.6	6965902.94	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_734_1416em2	7	1.55	1	D	2268189.86	6965927.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_739_1416em2	6	1.52	1	D	2268191.54	6965861.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_741_1416em2	6	1.51	1	D	2268212.72	6965860.28	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_742_1416em2	8	1.51	1	D	2268129.38	6965929.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_744_1416em2	6	1.51	1	D	2268168.43	6965927.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_747_1416em2	8	1.49	1	D	2268129.52	6965918.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_753_1416em2	7	1.48	1	D	2268134.77	6965876.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_754_1416em2	7	1.48	1	D	2268173.41	6965854.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_760_1416em2	4	1.46	1	F	2268175.7	6965899.72			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_761_1416em2	8	1.46	1	D	2268136.59	6965929.83	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_763_1416em2	6	1.44	1	D	2268193.94	6965847.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_764_1416em2	9	1.44	1	C	2268128.26	6965880.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_765_1416em2	5	1.43	1	D	2268159.79	6965891.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_771_1416em2	6	1.4	1	D	2268200.36	6965861.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_775_1416em2	7	1.37	1	D	2268200	6965857.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_788_1416em2	6	1.32	1	D	2268195.3	6965906.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_799_1416em2	7	1.27	1	D	2268161.88	6965878.22	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal		√	6	0.5	0.5			√			
H09	H09_8_1416em2	12	206.76	4	B	2268131.38	6965887.41	21-Jul-06	Alan Merriman	√													√	CIV	> 24	1		fence post, left in place	FE										
H09	H09_805_1416em2	7	1.25	1	D	2268160.74	6965934.39	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_813_1416em2	5	1.23	1	D	2268164.54	6965892.75	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_814_1416em2	6	1.23	1	D	2268193.35	6965925.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_815_1416em2	7	1.22	1	D	2268199.87	6965865.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_818_1416em2	6	1.21	1	D	2268118.88	6965902.78	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_820_1416em2	7	1.21	1	D	2268154.9	6965927.28	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_834_1416em2	6	1.16	1	D	2268169.73	6965930.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_839_1416em2	8	1.15	1	D	2268187.3	6965918.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_842_1416em2	5	1.13	1	D	2268177.74	6965887.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H09	H09_847_1416em2	6	1.11	1	D	2268202.06	6965898.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_861_1416em2	6	1.08	1	D	2268119.33	6965845.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_862_1416em2	7	1.08	1	D	2268177.54	6965930.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_876_1416em2	6	1.04	1	D	2268123.23	6965910.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_879_1416em2	6	1.04	1	D	2268173.48	6965884.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_885_1416em2	5	1.02	1	D	2268187.56	6965883.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_886_1416em2	5	1.02	1	D	2268216.1	6965867.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_888_1416em2	5	1.02	1	D	2268183.01	6965929.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_891_1416em2	5	1.01	1	D	2268203.4	6965913.74	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H09	H09_894_1416em2	6	1	1	D	2268134.28	6965850.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1008_1212em2	4	1.19	1	F	2268272.47	6965863.73	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1014_1212em2	4	1.17	1	F	2268290.73	6965882.98	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1020_1212em2	4	1.15	1	F	2268295.47	6965893.78	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1037_1212em2	4	1.13	1	F	2268278.88	6965895.26	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1039_1212em2	5	1.12	1	D	2268247.3	6965891.26	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1041_1212em2	5	1.12	1	D	2268234.24	6965935.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1051_1212em2	5	1.09	1	D	2268295.7	6965838.35	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1067_1212em2	4	1.07	1	F	2268238.52	6965868.37	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1069_1212em2	5	1.06	1	D	2268244.78	6965886.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1071_1212em2	4	1.06	1	F	2268231.18	6965867.97	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1072_1212em2	6	1.05	1	D	2268267.17	6965885.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1080_1212em2	4	1.04	1	F	2268255.34	6965909.62	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_1094_1212em2	4	1.01	1	F	2268276.96	6965873.03	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_113_1212em2	10	21.38	4	C	2268257.59	6965931.47	21-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ac seat part							AL	√	9	2	2			√			
H10	H10_130_1416em2	14	18.26	4	A	2268255.01	6965861.6	08-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	20mm							FE	√	6	0.5	0.5			√			
H10	H10_133_1212em2	12	18.5	4	B	2268254.2	6965936.35	08-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	ac seat part							AL	√	6	2	0.5			√			
H10	H10_135_1212em2	10	18.42	4	C	2268257.4	6965926.59	21-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	20mm							FE	√	6	0.5	0.5			√			
H10	H10_146_1212em2	10	17.45	4	C	2268250.36	6965895.59	21-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	20mm							FE	√	6	0.5	0.5			√			
H10	H10_170_1212em2	10	15.12	4	C	2268301.88	6965898.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_196_1212em2	11	12.23	4	B	2268231.63	6965894.44	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_212_1212em2	10	11.53	4	C	2268226.41	6965902.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_213_1212em2	11	11.45	4	B	2268302.71	6965884.14	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_216_1212em2	10	11.32	4	C	2268299.59	6965901.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_223_1212em2	10	10.97	4	C	2268266.58	6965906.74	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_224_1212em2	10	10.95	4	C	2268264.62	6965919.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_230_1212em2	11	10.74	4	B	2268306.9	6965882.55	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_256_1212em2	10	9.29	4	C	2268283.37	6965934.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_260_1212em2	11	9.22	4	B	2268262.1	6965887.92	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_295_1212em2	11	7.95	4	B	2268292.98	6965868.46	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_300_1212em2	10	7.88	4	C	2268228.42	6965895.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_321_1416em2	15	6.04	4	A	2268312.84	6965866.76	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_322_1416em2	10	6.02	4	C	2268263.34	6965876.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_325_1416em2	11	6	4	B	2268219.52	6965878.01	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_339_1212em2	10	6.59	4	C	2268300.76	6965839.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_341_1416em2	13	5.7	4	B	2268258.57	6965859.82	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_357_1212em2	10	6.28	4	C	2268293	6965851.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_360_1416em2	11	5.12	4	B	2268249.63	6965865.63	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_363_1212em2	9	6.09	4	C	2268290.59	6965839.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_366_1212em2	10	6.05	4	C	2268245.2	6965904.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_372_1212em2	10	5.9	4	C	2268306.84	6965898.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_380_1212em2	10	5.75	4	C	2268242.47	6965902.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_381_1212em2	10	5.67	4	C	2268221.02	6965925.19	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_400_1212em2	9	5.21	4	C	2268264.59	6965913.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H10	H10_404_1416em2	12	4.37	4	B	2268251.57	6965862.09	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_418_1212em2	10	4.83	4	C	2268297.26	6965905.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_422_1212em2	9	4.76	4	C	2268250.88	6965919.26	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_423_1212em2	11	4.76	4	B	2268240.31	6965924.94	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_430_1212em2	9	4.68	4	C	2268259.8	6965844.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_432_1416em2	11	3.97	4	B	2268263.55	6965854.95	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_435_1212em2	8	4.61	4	D	2268272.52	6965860.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_452_1212em2	9	4.37	4	C	2268257.02	6965841.33	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_453_1212em2	9	4.36	4	C	2268285.48	6965837.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_454_1212em2	10	4.35	4	C	2268248.02	6965927.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_455_1212em2	8	4.34	4	D	2268226.45	6965927.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_458_1416em2	11	3.64	4	B	2268260.74	6965869.04	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_462_1212em2	9	4.24	4	C	2268226.41	6965878.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_467_1212em2	9	4.2	4	C	2268253.12	6965886.75	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_479_1212em2	10	4	4	C	2268255.08	6965913.78	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_494_1212em2	9	3.87	4	C	2268267.14	6965881.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_496_1212em2	10	3.85	4	C	2268280.02	6965936.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_499_1212em2	10	3.82	4	C	2268271.61	6965927.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_503_1416em2	11	3.06	3	B	2268259.58	6965876.12	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_505_1212em2	9	3.77	4	C	2268274.02	6965843.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_515_1212em2	9	3.63	4	C	2268221.05	6965877.43	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_519_1212em2	8	3.58	3	D	2268311.86	6965899.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_520_1212em2	10	3.57	3	C	2268311.46	6965867.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_522_1212em2	8	3.52	3	D	2268236.59	6965896.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_534_1212em2	8	3.35	3	D	2268282.69	6965839.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_535_1212em2	7	3.35	3	D	2268273.69	6965838.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_539_1212em2	9	3.33	3	C	2268257.88	6965898.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_541_1212em2	8	3.31	3	D	2268280.52	6965919.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_542_1212em2	8	3.3	3	D	2268300.49	6965876.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_548_1212em2	9	3.25	3	C	2268310.48	6965849.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_55_1212em2	12	41.25	4	B	2268289.78	6965902.43	08-Jun-06	Jim Thoren	√													√	CIV	12	5	1	bolts	FE	√	12	0.5	0.5			√			
H10	H10_552_1212em2	7	3.21	3	D	2268280.88	6965845.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_554_1212em2	8	3.19	3	D	2268221.12	6965921.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_558_1212em2	8	3.15	3	D	2268238	6965884.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_572_1416em2	9	2.42	2	C	2268251.18	6965855.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_575_1212em2	8	3.07	3	D	2268280.65	6965929.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_585_1212em2	8	2.98	3	D	2268234.4	6965891.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_595_1212em2	7	2.89	3	D	2268242.65	6965896.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_604_1416em2	7	2.21	2	D	2268313.23	6965840.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_623_1212em2	8	2.71	3	D	2268259.95	6965915.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_636_1212em2	8	2.61	3	D	2268278.37	6965839.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_647_1212em2	8	2.53	3	D	2268314.89	6965902.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_652_1212em2	7	2.49	2	D	2268295.68	6965841.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_657_1212em2	6	2.47	2	D	2268231.73	6965906.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_666_1212em2	8	2.42	2	D	2268262.09	6965925.28	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_677_1416em2	6	1.82	1	D	2268266.84	6965857.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_678_1416em2	6	1.82	1	D	2268218.66	6965874.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_683_1416em2	6	1.8	1	D	2268248.04	6965857.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_687_1212em2	6	2.3	2	D	2268298.95	6965931.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_688_1212em2	7	2.3	2	D	2268248.86	6965936.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_694_1212em2	7	2.27	2	D	2268245.44	6965923.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_699_1212em2	6	2.24	2	D	2268311.98	6965840.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_714_1416em2	6	1.65	1	D	2268218.99	6965887.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																		
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H10	H10_718_1212em2	7	2.11	2	D	2268234.12	6965927.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_718_1416em2	7	1.63	1	D	2268266.01	6965866.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_723_1212em2	7	2.09	2	D	2268274.48	6965891.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_73_1212em2	9	32.66	4	C	2268255.22	6965900.88	21-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal brass	√	CIV	12	1	0.25	bolt	FE	√	9	0.5	0.25			√			
H10	H10_733_1212em2	7	2.04	2	D	2268247.91	6965838.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_741_1212em2	6	2.01	2	D	2268305.35	6965879.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_742_1212em2	6	2	2	D	2268262.34	6965903.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_751_1212em2	7	1.97	2	D	2268276.34	6965923.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_752_1212em2	7	1.96	2	D	2268275.98	6965926.74	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_755_1212em2	5	1.95	2	D	2268228.78	6965899.81	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_759_1212em2	7	1.92	2	D	2268296.03	6965865.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_773_1416em2	4	1.38	1	F	2268267.48	6965861.77	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_779_1212em2	5	1.86	1	D	2268284.98	6965931.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_782_1212em2	5	1.85	1	D	2268234.32	6965883.4	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_791_1212em2	6	1.82	1	D	2268223.97	6965883.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_794_1416em2	5	1.28	1	D	2268219.58	6965860.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_8_1212em2	12	219.13	4	B	2268253.2	6965933.17	08-Jun-06	Jim Thoren	√							√	ORD MD	12	3	0.25	ac seat part & scrap	√	MIL	12	2	4	truck parts	FE	√	24	4	0.5			√			
H10	H10_801_1212em2	6	1.78	1	D	2268311.66	6965910.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_810_1212em2	6	1.74	1	D	2268231.47	6965923.22	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_819_1212em2	5	1.71	1	D	2268238.05	6965891.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_830_1212em2	5	1.68	1	D	2268269.67	6965891.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_832_1212em2	6	1.68	1	D	2268298.36	6965870.33	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_841_1212em2	5	1.64	1	D	2268234.48	6965899.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_849_1416em2	4	1.1	1	F	2268260.48	6965864.73	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_850_1212em2	5	1.61	1	D	2268297.04	6965909.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_851_1212em2	6	1.6	1	D	2268301.82	6965906.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_859_1416em2	6	1.08	1	D	2268255.2	6965870.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_867_1212em2	6	1.55	1	D	2268276.55	6965847.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_879_1212em2	4	1.52	1	F	2268313.55	6965925.8	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_886_1212em2	5	1.5	1	D	2268231.48	6965888.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_899_1212em2	6	1.46	1	D	2268287.61	6965876.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_900_1212em2	4	1.46	1	F	2268295.05	6965902.48	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_903_1212em2	6	1.45	1	D	2268231.07	6965930.81	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_904_1212em2	6	1.45	1	D	2268291.61	6965925.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_916_1212em2	4	1.4	1	F	2268250.81	6965908.07	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_923_1212em2	5	1.38	1	D	2268221.5	6965863.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_948_1212em2	6	1.34	1	D	2268238.17	6965928.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_968_1212em2	6	1.29	1	D	2268259.82	6965883.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_979_1212em2	4	1.26	1	F	2268283.41	6965886.79	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_990_1212em2	4	1.23	1	F	2268247.84	6965931.67	10-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_991_1212em2	5	1.22	1	D	2268221.2	6965889.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H10	H10_992_1212em2	5	1.22	1	D	2268309.08	6965895.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1003_1212em2	4	1.2	1	F	2268402.83	6965876.3			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_101_1212em2	13	23.64	4	B	2268371.83	6965859.12	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1013_1212em2	4	1.17	1	F	2268350.18	6965916.83			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1017_1212em2	6	1.16	1	D	2268398.42	6965858.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1027_1212em2	4	1.14	1	F	2268339.53	6965935.38			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1034_1212em2	5	1.13	1	D	2268325.68	6965844.19	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1035_1212em2	4	1.13	1	F	2268400.38	6965909.2			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1038_1212em2	4	1.12	1	F	2268351.47	6965897.87			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_104_1212em2	11	23.24	4	B	2268341.42	6965850.54	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_104_1416em2	13	21.95	4	B	2268386.58	6965919.72	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1063_1212em2	5	1.07	1	D	2268416.02	6965850.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H11	H11_1066_1212em2	4	1.07	1	F	2268324.61	6965919.04			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1068_1212em2	4	1.06	1	F	2268379.41	6965839.99			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_109_1212em2	10	22.23	4	C	2268366.48	6965846.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1091_1212em2	5	1.02	1	D	2268399.04	6965836.64	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_1096_1212em2	4	1	1	F	2268371.38	6965934.57			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_110_1416em2	9	21.24	4	C	2268391.17	6965877.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_115_1416em2	12	20.19	4	B	2268386.39	6965903.3	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_116_1212em2	9	20.49	4	C	2268339.63	6965880.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_125_1212em2	11	19.61	4	B	2268395.5	6965908.45	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_134_1212em2	10	18.48	4	C	2268397.2	6965840.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_143_1212em2	10	17.57	4	C	2268361.72	6965844.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_149_1212em2	10	17.34	4	C	2268398.23	6965932.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_152_1212em2	10	16.89	4	C	2268402.7	6965882.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_164_1416em2	10	14.24	4	C	2268389.24	6965916.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_166_1212em2	10	15.34	4	C	2268341.86	6965868.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_187_1212em2	10	13.04	4	C	2268382.44	6965936.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_188_1416em2	11	11.96	4	B	2268384.5	6965895.56	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_189_1212em2	11	12.78	4	B	2268354.25	6965900.97	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_199_1416em2	13	11.51	4	B	2268389.59	6965858.04	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_204_1212em2	9	11.86	4	C	2268409.07	6965878.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_209_1212em2	10	11.63	4	C	2268375.74	6965887.35	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_222_1212em2	9	11.01	4	C	2268375.66	6965883.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_232_1212em2	10	10.69	4	C	2268411.22	6965855.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_233_1212em2	11	10.67	4	B	2268365.35	6965875.47	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_239_1212em2	11	10.56	4	B	2268348.95	6965857.78	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_248_1212em2	10	9.65	4	C	2268404.8	6965879.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_250_1212em2	9	9.58	4	C	2268396.71	6965929.78	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_251_1212em2	10	9.46	4	C	2268401.98	6965859.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_251_1416em2	12	8.33	4	B	2268389.51	6965905.53	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.25			√			
H11	H11_258_1212em2	9	9.26	4	C	2268405.01	6965929.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_268_1416em2	10	7.54	4	C	2268390.6	6965911.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_28_1212em2	9	64.48	4	C	2268403.19	6965926	21-Jul-06	Alan Merriman	√													√	CIV	3	1	2	fence post	FE	√	> 24	0.5	0.25			√			
H11	H11_281_1212em2	9	8.41	4	C	2268337.34	6965878.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_282_1212em2	9	8.4	4	C	2268396.15	6965871.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_286_1212em2	9	8.2	4	C	2268402.8	6965919.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_287_1212em2	10	8.18	4	C	2268399.98	6965889.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_296_1212em2	10	7.94	4	C	2268334.71	6965875.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_326_1212em2	10	7.05	4	C	2268416.2	6965860.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_330_1212em2	9	6.94	4	C	2268382.36	6965877.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_331_1212em2	10	6.92	4	C	2268366.48	6965839.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_348_1212em2	9	6.42	4	C	2268368.73	6965857.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_352_1212em2	9	6.36	4	C	2268398.99	6965904.81	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_353_1212em2	9	6.35	4	C	2268333.55	6965841.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_364_1212em2	11	6.08	4	B	2268368.23	6965901.5	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_368_1416em2	9	5	4	C	2268385.45	6965842.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_377_1212em2	10	5.83	4	C	2268327.12	6965881.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_386_1212em2	9	5.6	4	C	2268373.73	6965844.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_391_1212em2	10	5.49	4	C	2268387.26	6965935.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_394_1416em2	10	4.6	4	C	2268390.88	6965886.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_396_1212em2	9	5.36	4	C	2268321.63	6965871.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_397_1416em2	12	4.46	4	B	2268384.49	6965848.8	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_406_1212em2	10	5	4	C	2268399.78	6965868.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_408_1212em2	8	4.97	4	D	2268349.44	6965872.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H11	H11_414_1212em2	10	4.87	4	C	2268338.32	6965840.74	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_416_1212em2	10	4.84	4	C	2268340.12	6965905.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_417_1212em2	10	4.83	4	C	2268329.66	6965912.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_419_1416em2	11	4.19	4	B	2268386.25	6965876.35	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_428_1212em2	10	4.72	4	C	2268361.07	6965906.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_431_1212em2	10	4.65	4	C	2268378.71	6965863.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_434_1212em2	9	4.64	4	C	2268321.63	6965867.82	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_449_1212em2	11	4.41	4	B	2268361.59	6965854.45	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_450_1212em2	10	4.4	4	C	2268324.01	6965883.29	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_460_1212em2	9	4.29	4	C	2268378.91	6965860.06	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_461_1416em2	11	3.58	3	B	2268393.55	6965859.22	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_469_1212em2	9	4.16	4	C	2268359.16	6965841.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_47_1212em2	8	46.33	4	D	2268398.53	6965925.18	21-Jul-06	Alan Merriman	√													√	CIV	3	1	2	fence post	FE	√	> 24	0.5	0.25			√			
H11	H11_470_1212em2	9	4.15	4	C	2268413.88	6965934.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_481_1212em2	9	3.99	4	C	2268340.01	6965885.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_483_1212em2	10	3.97	4	C	2268404.79	6965889.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_485_1212em2	9	3.93	4	C	2268395.42	6965901.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_495_1212em2	10	3.85	4	C	2268345.59	6965844.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_497_1212em2	10	3.84	4	C	2268348.33	6965846.89	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_500_1212em2	9	3.81	4	C	2268411.59	6965880.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_503_1212em2	7	3.8	4	D	2268341.97	6965877.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_506_1212em2	10	3.76	4	C	2268350.02	6965923.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_512_1416em2	9	2.98	3	C	2268383.47	6965931.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_514_1212em2	8	3.64	4	D	2268402.66	6965892.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_514_1416em2	11	2.96	3	B	2268390.11	6965841.35	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_518_1212em2	8	3.6	3	D	2268338.54	6965845.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_52_1212em2	12	43.82	4	B	2268409.82	6965913.18	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	ac part							FE	√	9	2	2			√			
H11	H11_523_1416em2	10	2.8	3	C	2268386.23	6965863.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_526_1212em2	8	3.49	3	D	2268394.69	6965836.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_530_1212em2	8	3.42	3	D	2268399.1	6965883.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_532_1212em2	8	3.39	3	D	2268336.98	6965872.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_535_1416em2	10	2.69	3	C	2268391.45	6965926.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_537_1212em2	8	3.34	3	D	2268365.71	6965881.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_538_1212em2	9	3.33	3	C	2268363.61	6965935.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_542_1416em2	9	2.63	3	C	2268389.46	6965898.35	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_550_1416em2	10	2.59	3	C	2268388.02	6965851.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_551_1212em2	8	3.22	3	D	2268319.56	6965857.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_555_1212em2	8	3.17	3	D	2268407.74	6965924.39	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_565_1212em2	8	3.12	3	D	2268375.86	6965838.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_58_1212em2	10	39.77	4	C	2268403.46	6965934.68	21-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.5	sm arms & ac scrap	√	CIV	3	2	0.5	nails	OTHER	√	6	4	0.25			√			
H11	H11_580_1212em2	7	3.03	3	D	2268379.84	6965894.64	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_582_1212em2	8	3	3	D	2268414.11	6965905.29	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_592_1416em2	8	2.3	2	D	2268389.8	6965863.35	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_598_1212em2	6	2.88	3	D	2268385.52	6965839.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_610_1212em2	8	2.79	3	D	2268416.31	6965925.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_613_1212em2	7	2.76	3	D	2268321.37	6965853.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_615_1212em2	7	2.75	3	D	2268353.54	6965936.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_616_1212em2	8	2.74	3	D	2268376.8	6965872.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_618_1212em2	8	2.74	3	D	2268411.35	6965898.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_625_1212em2	7	2.7	3	D	2268381.8	6965848.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_626_1212em2	8	2.7	3	D	2268399.05	6965873.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_627_1212em2	8	2.7	3	D	2268341.45	6965856.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_629_1212em2	8	2.68	3	D	2268328.72	6965853.26	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H11	H11_630_1212em2	9	2.68	3	C	2268409.27	6965869.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_64_1416em2	13	34.25	4	B	2268394.01	6965879.42	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_647_1416em2	9	1.98	2	C	2268389.52	6965869.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_650_1212em2	8	2.5	2	D	2268335.18	6965920.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_67_1212em2	9	36.84	4	C	2268395.06	6965883.91	21-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	wire coil	√	CIV	6	1	0.25	bolt	FE	√	12	1	0.25			√			
H11	H11_683_1212em2	7	2.33	2	D	2268362.09	6965838.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_70_1212em2	10	35.42	4	C	2268395.98	6965876.35	21-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze							FE	√	6	2	0.25			√			
H11	H11_701_1212em2	5	2.23	2	D	2268404.64	6965900.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_702_1212em2	7	2.23	2	D	2268416.51	6965886.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_71_1212em2	11	34.53	4	B	2268353.05	6965855.8	08-Jun-06	Jim Thoren	√													√	CIV	12	2	0.25	nails	FE	√	3	0.5	0.25			√			
H11	H11_71_1416em2	13	32.22	4	B	2268394.02	6965908.21	08-Jun-06	Jim Thoren	√							√	ORD MD	> 24	10	1	mk13 mod o flare,sm & hand distr	√	CIV	> 24	1	≥8	pipe	OTHER	√	> 24	4	0.5			√			
H11	H11_719_1212em2	6	2.11	2	D	2268395.13	6965860.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_719_1416em2	9	1.63	1	C	2268389.29	6965930.82	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_72_1212em2	11	34.38	4	B	2268347.98	6965842.25	08-Jun-06	Jim Thoren	√							√	ORD MD	12	> 10	1	50 cal bul,bul ctgs, ac seat pcs	√	MIL	3	1	1	wire	OTHER	√	9	0.5	0.5			√			
H11	H11_734_1212em2	7	2.03	2	D	2268336.69	6965855.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_735_1212em2	6	2.02	2	D	2268409.12	6965874.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_740_1212em2	7	2.01	2	D	2268340.21	6965912.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_746_1212em2	7	1.98	2	D	2268329.18	6965873.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_748_1416em2	7	1.49	1	D	2268393.22	6965868.81	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_753_1212em2	7	1.95	2	D	2268353.22	6965867.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_767_1212em2	5	1.91	2	D	2268346.16	6965870.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_776_1212em2	6	1.87	1	D	2268415.75	6965842.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_780_1212em2	4	1.86	1	F	2268338.12	6965908.84			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_793_1212em2	5	1.81	1	D	2268344.12	6965881.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_795_1212em2	5	1.79	1	D	2268368.88	6965863.86	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_808_1212em2	5	1.74	1	D	2268370.11	6965838.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_809_1212em2	4	1.74	1	F	2268365.98	6965906.79			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_811_1212em2	5	1.73	1	D	2268380.45	6965923.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_815_1212em2	5	1.72	1	D	2268356.83	6965926.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_822_1212em2	6	1.7	1	D	2268398.99	6965917.63	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_824_1212em2	5	1.7	1	D	2268344.77	6965913.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_828_1212em2	5	1.69	1	D	2268379.54	6965879.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_830_1416em2	4	1.19	1	F	2268386.03	6965924.05			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_836_1212em2	6	1.66	1	D	2268349.88	6965907.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_84_1416em2	10	27.55	4	C	2268391.1	6965882.42	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_846_1212em2	5	1.61	1	D	2268405.87	6965841.86	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_850_1416em2	6	1.1	1	D	2268387.84	6965848.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_856_1212em2	4	1.58	1	F	2268346.24	6965864.82			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_859_1212em2	6	1.58	1	D	2268372.51	6965886.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_872_1212em2	6	1.54	1	D	2268329.13	6965869.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_874_1212em2	5	1.54	1	D	2268399.98	6965894.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_877_1212em2	4	1.52	1	F	2268355.65	6965889.88			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_88_1212em2	12	27.78	4	B	2268409.63	6965901.55	08-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	frag piece	√	MIL	6	1	1	bolt & frag	FE	√	6	0.5	0.25	N-S	0	√			
H11	H11_881_1212em2	6	1.52	1	D	2268372.99	6965897.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_887_1212em2	5	1.5	1	D	2268413.88	6965875.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_917_1212em2	5	1.4	1	D	2268355.88	6965897.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_922_1212em2	4	1.38	1	F	2268409.12	6965837.09			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_925_1212em2	5	1.38	1	D	2268344.91	6965909.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_936_1212em2	6	1.36	1	D	2268406.4	6965850.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_951_1212em2	6	1.33	1	D	2268332.55	6965879.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_97_1212em2	12	24.69	4	B	2268357.16	6965855.89	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_972_1212em2	6	1.28	1	D	2268401.79	6965844.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_974_1212em2	4	1.27	1	F	2268362.75	6965878.69			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H11	H11_978_1212em2	5	1.26	1	D	2268324.88	6965934.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_982_1212em2	5	1.24	1	D	2268327.16	6965929.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H11	H11_998_1212em2	6	1.22	1	D	2268414.27	6965910.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
H12	H12_122_1416em2	12	19.35	4	B	2268420.69	6965871.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_123_1416em2	11	19.22	4	B	2268501.38	6965851.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_127_1416em2	13	18.73	4	B	2268475.49	6965853.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_132_1416em2	13	18.09	4	B	2268508.48	6965842.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_137_1416em2	13	17.14	4	B	2268483.98	6965919.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_150_1416em2	13	15.77	4	B	2268510.34	6965871.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_151_1416em2	13	15.24	4	B	2268472.69	6965857.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_152_1416em2	13	15.21	4	B	2268456.76	6965842.49	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_154_1416em2	13	14.83	4	B	2268460.05	6965840.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_159_1416em2	14	14.7	4	A	2268441.77	6965842.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_163_1416em2	13	14.4	4	B	2268498.31	6965848.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_166_1416em2	13	13.91	4	B	2268503.16	6965867.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_169_1416em2	13	13.59	4	B	2268481.65	6965844.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_170_1416em2	13	13.55	4	B	2268429.27	6965855.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_177_1416em2	13	12.92	4	B	2268496.91	6965879.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_178_1416em2	15	12.86	4	A	2268432.95	6965923.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_180_1416em2	10	12.8	4	C	2268448.09	6965853.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_185_1416em2	13	12.45	4	B	2268428.81	6965862.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_186_1416em2	13	12.39	4	B	2268502.38	6965837.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_187_1416em2	13	12	4	B	2268445.63	6965851.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_201_1416em2	13	11.34	4	B	2268426.27	6965898.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_202_1416em2	12	11.26	4	B	2268426.66	6965866.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_204_1416em2	12	11.06	4	B	2268470.61	6965848.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_21_1416em2	13	88.56	4	B	2268511.51	6965837.84	21-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	vt fuze							FE	√	6	2	0.25			√			
H12	H12_214_1416em2	10	10.6	4	C	2268514.57	6965860.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_219_1416em2	12	10.08	4	B	2268452.05	6965911.33	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_225_1416em2	13	9.59	4	B	2268432.27	6965934.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_235_1416em2	13	9.06	4	B	2268492.59	6965869.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_237_1416em2	13	8.99	4	B	2268517.65	6965890.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_240_1416em2	14	8.77	4	A	2268420.98	6965836.78	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_241_1416em2	13	8.76	4	B	2268472.22	6965842.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_246_1416em2	12	8.64	4	B	2268497.01	6965871.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_247_1416em2	14	8.59	4	A	2268436.94	6965907.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_254_1416em2	11	8.08	4	B	2268452.17	6965846.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_257_1416em2	13	7.96	4	B	2268430.44	6965877.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_273_1416em2	13	7.43	4	B	2268503.73	6965858.65	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_274_1416em2	13	7.36	4	B	2268504.24	6965862.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_281_1416em2	10	7.19	4	C	2268439.81	6965874.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_282_1416em2	13	7.17	4	B	2268434.75	6965870.22	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_283_1416em2	10	7.15	4	C	2268465.7	6965848.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	9	0.5	0.5			√			
H12	H12_284_1416em2	10	7.14	4	C	2268457.95	6965837.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_291_1416em2	12	6.92	4	B	2268502.23	6965847.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_292_1416em2	10	6.84	4	C	2268516.03	6965857.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_305_1416em2	12	6.46	4	B	2268491.55	6965887.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_313_1416em2	9	6.19	4	C	2268518.2	6965865.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_314_1416em2	12	6.16	4	B	2268517.66	6965928.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_317_1416em2	11	6.12	4	B	2268433.79	6965866.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_318_1416em2	11	6.08	4	B	2268487.51	6965857.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_320_1416em2	10	6.05	4	C	2268432.48	6965898.06	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_324_1416em2	10	6.01	4	C	2268425.86	6965857.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H12	H12_328_1416em2	13	5.98	4	B	2268445.55	6965872.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_329_1416em2	10	5.98	4	C	2268471.26	6965839	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_334_1416em2	13	5.88	4	B	2268455.37	6965903.82	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_335_1416em2	13	5.86	4	B	2268429.12	6965892.39	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_337_1416em2	10	5.81	4	C	2268434.94	6965879.43	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_338_1416em2	12	5.79	4	B	2268518.31	6965838.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_345_1416em2	13	5.52	4	B	2268466.12	6965890.75	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_348_1416em2	13	5.49	4	B	2268510.2	6965857.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_354_1416em2	13	5.37	4	B	2268442.67	6965894.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_359_1416em2	11	5.25	4	B	2268518.04	6965876.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_36_1416em2	16	53.42	4	A	2268516.51	6965868.93	21-Jul-06	Alan Merriman	√							√	ORD MD	6	4	2	vt fuze pts,50 cal,casings & 20m		CIV					FE	√	3	2	0.25			√			
H12	H12_361_1416em2	10	5.11	4	C	2268429.03	6965859.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_362_1416em2	12	5.11	4	B	2268454.74	6965849.86	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_367_1416em2	13	5.02	4	B	2268442.8	6965838.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_371_1416em2	10	4.96	4	C	2268505.48	6965851.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_376_1416em2	13	4.89	4	B	2268480.27	6965866.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_377_1416em2	10	4.88	4	C	2268506.05	6965839.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_38_1416em2	12	52.5	4	B	2268488.05	6965927.3	21-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze part							FE	√	3	2	0.25			√			
H12	H12_381_1416em2	9	4.82	4	C	2268475.78	6965844.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_382_1416em2	10	4.82	4	C	2268450.06	6965917.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_386_1416em2	10	4.74	4	C	2268516.38	6965872.28	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_388_1416em2	10	4.71	4	C	2268499.31	6965886.42	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_392_1416em2	9	4.65	4	C	2268482.1	6965927.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_395_1416em2	12	4.49	4	B	2268509.4	6965846.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_398_1416em2	10	4.45	4	C	2268496.84	6965867.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_399_1416em2	13	4.44	4	B	2268446.23	6965918.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_405_1416em2	11	4.36	4	B	2268455.96	6965922.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_406_1416em2	13	4.35	4	B	2268478.33	6965876.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_411_1416em2	12	4.28	4	B	2268516.59	6965886.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_412_1416em2	11	4.27	4	B	2268508.77	6965864.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	9	0.5	0.5			√			
H12	H12_416_1416em2	12	4.25	4	B	2268485.5	6965895.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_417_1416em2	13	4.2	4	B	2268496.53	6965854.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_418_1416em2	12	4.19	4	B	2268486.66	6965898.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_42_1416em2	13	48.6	4	B	2268482.9	6965931.1	21-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze part							FE	√	3	2	0.25			√			
H12	H12_420_1416em2	9	4.18	4	C	2268435.64	6965873.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_426_1416em2	11	4.04	4	B	2268514.69	6965853.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_433_1416em2	11	3.95	4	B	2268418.79	6965895.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_435_1416em2	12	3.91	4	B	2268442.09	6965930.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_438_1416em2	11	3.88	4	B	2268457.12	6965896.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_440_1416em2	10	3.87	4	C	2268482.24	6965859.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_441_1416em2	10	3.85	4	C	2268433.96	6965894.06	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_446_1416em2	12	3.82	4	B	2268458.17	6965930.64	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_447_1416em2	13	3.79	4	B	2268419.16	6965860.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_449_1416em2	11	3.76	4	B	2268457.74	6965876.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_451_1416em2	11	3.76	4	B	2268485.8	6965902.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_457_1416em2	12	3.64	4	B	2268464.55	6965896.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_459_1416em2	9	3.62	4	C	2268488.26	6965923.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_463_1416em2	11	3.56	3	B	2268462.86	6965920.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_468_1416em2	10	3.49	3	C	2268445.72	6965856.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_471_1416em2	12	3.46	3	B	2268484.28	6965884.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	9	0.5	0.5			√			
H12	H12_476_1416em2	10	3.41	3	C	2268494.53	6965875.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_477_1416em2	11	3.41	3	B	2268488.21	6965850.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_479_1416em2	10	3.39	3	C	2268476	6965900.42	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H12	H12_482_1416em2	10	3.3	3	C	2268433.48	6965927.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_486_1416em2	8	3.26	3	D	2268430.38	6965887.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_489_1416em2	10	3.22	3	C	2268487.5	6965934.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_492_1416em2	10	3.2	3	C	2268430.07	6965930.06	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_496_1416em2	11	3.18	3	B	2268446.52	6965900.49	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_50_1416em2	15	41.98	4	A	2268466.29	6965836.91	21-Jul-06	Alan Merriman	√							√	ORD MD	3	5	0.25	sm arms, 50 cal & 30 cal							FE	√	3	2	0.25			√			
H12	H12_506_1416em2	9	3.03	3	C	2268496.06	6965887.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_507_1416em2	9	3.02	3	C	2268446.95	6965914.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_508_1416em2	9	3.02	3	C	2268463.49	6965883.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_515_1416em2	10	2.92	3	C	2268491.71	6965838.63	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_516_1416em2	9	2.91	3	C	2268425.24	6965853.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_520_1416em2	10	2.89	3	C	2268455.46	6965868.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_521_1416em2	9	2.88	3	C	2268487.05	6965915.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_522_1416em2	7	2.86	3	D	2268468.61	6965883.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_528_1416em2	11	2.74	3	B	2268435.38	6965851.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_529_1416em2	9	2.73	3	C	2268479.17	6965898.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_531_1416em2	10	2.72	3	C	2268439.11	6965885.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_533_1416em2	9	2.7	3	C	2268423.31	6965921.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_539_1416em2	10	2.66	3	C	2268436.42	6965911.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_541_1416em2	9	2.63	3	C	2268438.07	6965903.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_543_1416em2	6	2.63	3	D	2268458.61	6965851.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_545_1416em2	8	2.62	3	D	2268425.95	6965925.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_547_1416em2	8	2.6	3	D	2268451.48	6965836.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_553_1416em2	8	2.58	3	D	2268437.3	6965862.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_554_1416em2	10	2.58	3	C	2268484.03	6965907.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_559_1416em2	8	2.51	3	D	2268429.97	6965903.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_560_1416em2	9	2.5	3	C	2268466.69	6965844.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_563_1416em2	8	2.48	2	D	2268457.64	6965846.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_564_1416em2	11	2.48	2	B	2268439.77	6965846.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_565_1416em2	9	2.48	2	C	2268463.39	6965913.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_568_1416em2	6	2.45	2	D	2268487.11	6965861.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_570_1416em2	7	2.43	2	D	2268469.89	6965872.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_574_1416em2	9	2.41	2	C	2268514.19	6965877.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_575_1416em2	7	2.4	2	D	2268430.95	6965881.64	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_576_1416em2	6	2.4	2	D	2268504.23	6965886.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_579_1416em2	9	2.39	2	C	2268423.3	6965927.83	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	9	0.5	0.5			√			
H12	H12_581_1416em2	10	2.35	2	C	2268508.46	6965881.26	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_584_1416em2	9	2.35	2	C	2268421.93	6965931.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_587_1416em2	9	2.34	2	C	2268477.05	6965904.33	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_589_1416em2	10	2.33	2	C	2268496.98	6965863.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_591_1416em2	10	2.32	2	C	2268431.68	6965845.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_594_1416em2	7	2.27	2	D	2268512.62	6965883.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_598_1416em2	9	2.26	2	C	2268419.45	6965840.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_60_1416em2	13	35.66	4	B	2268426.63	6965870.07	21-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.5	vt fuze							FE	√	6	2	0.25			√			
H12	H12_606_1416em2	6	2.21	2	D	2268448.23	6965911.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_607_1416em2	9	2.19	2	C	2268477.68	6965915.22	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_614_1416em2	7	2.15	2	D	2268433.83	6965859.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_619_1416em2	8	2.13	2	D	2268444.34	6965881.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_623_1416em2	8	2.11	2	D	2268473.9	6965887.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_624_1416em2	7	2.1	2	D	2268490.95	6965891.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_626_1416em2	9	2.09	2	C	2268423.27	6965848.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_628_1416em2	9	2.08	2	C	2268484.7	6965878.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_63_1416em2	13	34.96	4	B	2268510.25	6965860.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H12	H12_630_1416em2	6	2.06	2	D	2268464.05	6965840.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_632_1416em2	9	2.05	2	C	2268419.74	6965882.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_634_1416em2	8	2.04	2	D	2268517.6	6965919.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_636_1416em2	9	2.02	2	C	2268432.33	6965840.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_637_1416em2	7	2.01	2	D	2268422.41	6965918.27	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_639_1416em2	9	2	2	C	2268467.16	6965861.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_652_1416em2	7	1.96	2	D	2268474.08	6965874.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_653_1416em2	6	1.95	2	D	2268459.6	6965936.33	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_662_1416em2	9	1.91	2	C	2268455.78	6965892.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_665_1416em2	8	1.88	1	D	2268465.27	6965928.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_667_1416em2	7	1.85	1	D	2268420.13	6965890.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_669_1416em2	8	1.84	1	D	2268424.84	6965843.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_676_1416em2	6	1.82	1	D	2268438.37	6965924.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_682_1416em2	10	1.8	1	C	2268462.02	6965846.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_685_1416em2	5	1.79	1	D	2268435.19	6965886.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_687_1416em2	8	1.79	1	D	2268448.52	6965926.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_688_1416em2	6	1.78	1	D	2268459.57	6965864.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_691_1416em2	6	1.75	1	D	2268434.52	6965902.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_693_1416em2	6	1.73	1	D	2268478.06	6965857.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_701_1416em2	6	1.69	1	D	2268487.36	6965886.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_712_1416em2	5	1.66	1	D	2268476.94	6965866.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_713_1416em2	6	1.65	1	D	2268491.33	6965884.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_715_1416em2	6	1.64	1	D	2268424.52	6965907.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	9	0.5	0.5			√			
H12	H12_716_1416em2	5	1.64	1	D	2268456.04	6965935.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	SS	√	6	0.5	0.5			√			
H12	H12_720_1416em2	8	1.63	1	D	2268468.5	6965924.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_722_1416em2	7	1.6	1	D	2268454.97	6965853.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_723_1416em2	6	1.59	1	D	2268420.75	6965875.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_724_1416em2	5	1.58	1	D	2268436	6965934	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_731_1416em2	5	1.56	1	D	2268472.7	6965902.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_745_1416em2	6	1.5	1	D	2268444.04	6965909.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_759_1416em2	9	1.47	1	C	2268471.7	6965868.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_767_1416em2	5	1.42	1	D	2268466.47	6965880.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_769_1416em2	8	1.41	1	D	2268485.53	6965854.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_778_1416em2	6	1.36	1	D	2268510.34	6965899.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_783_1416em2	6	1.34	1	D	2268516.28	6965933.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_785_1416em2	6	1.33	1	D	2268500.91	6965856.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_787_1416em2	7	1.32	1	D	2268518.16	6965914.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_789_1416em2	6	1.31	1	D	2268511.96	6965849.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_790_1416em2	6	1.3	1	D	2268427.76	6965849.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_792_1416em2	7	1.29	1	D	2268493.89	6965898.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_793_1416em2	6	1.28	1	D	2268463.65	6965887.64	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_800_1416em2	7	1.27	1	D	2268462.53	6965872.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_802_1416em2	7	1.26	1	D	2268496.45	6965896.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_806_1416em2	6	1.24	1	D	2268502.34	6965933.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_808_1416em2	8	1.24	1	D	2268463.6	6965853.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_809_1416em2	6	1.23	1	D	2268497.61	6965859.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_824_1416em2	5	1.2	1	D	2268456.09	6965857.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_827_1416em2	4	1.19	1	F	2268459.23	6965913.12	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_833_1416em2	8	1.17	1	D	2268425.12	6965912.83	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_838_1416em2	8	1.15	1	D	2268491.49	6965843.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_843_1416em2	5	1.13	1	D	2268512.79	6965910.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_848_1416em2	4	1.1	1	F	2268512.38	6965927.95	14-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_853_1416em2	8	1.1	1	D	2268436.75	6965855.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H12	H12_856_1416em2	8	1.08	1	D	2268503.16	6965879.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_857_1416em2	6	1.08	1	D	2268479.76	6965872.89	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_858_1416em2	7	1.08	1	D	2268463.56	6965868.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_866_1416em2	8	1.07	1	D	2268462.59	6965857.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_867_1416em2	6	1.06	1	D	2268456.49	6965862.78	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_874_1416em2	5	1.04	1	D	2268496.4	6965845.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_877_1416em2	4	1.04	1	F	2268484.16	6965891.06	14-Aug-06	A;an Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_880_1416em2	6	1.04	1	D	2268426.97	6965885	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_881_1416em2	5	1.03	1	D	2268507.12	6965933.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_884_1416em2	4	1.03	1	F	2268434.48	6965890.44	09-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_90_1416em2	15	25.36	4	A	2268480.34	6965863.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_93_1416em2	13	24.81	4	B	2268481.36	6965923.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H12	H12_98_1416em2	14	23.98	4	A	2268453.83	6965918.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
H13	H13_10_1416em2	15	161.61	4	A	2268608.27	6965860.21	21-Jun-06	Jim Thoren	√	√	ORD		5		4 20mm HE,3 M103 bomb fuzes	√	ORD MD	> 24	2	≥8	20mm cad & part of 2 750 lb bomb							FE	√	> 24	> 6	> 4			√			
H13	H13_100_1416em2	13	23.69	4	B	2268610.01	6965931.17	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze							FE	√	6	2	0.25			√			
H13	H13_101_1416em2	13	23.44	4	B	2268567.34	6965882.3	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	bolt	FE	√	3	1	0.25			√			
H13	H13_102_1416em2	14	23.01	4	A	2268606.2	6965849.58	21-Jun-06	Jim Thoren	√													√	CIV	12	10	0.25	steel scrap	SS	√	3	0.5	0.25			√			
H13	H13_103_1416em2	11	22.44	4	B	2268574.68	6965851.98	21-Jun-06	Jim Thoren	√													√	MIL	6	5	1	steel & copper scrap	FE	√	3	1	1			√			
H13	H13_106_1416em2	13	21.77	4	B	2268519.55	6965879.91	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap	FE	√	3	2	0.25			√			
H13	H13_107_1416em2	10	21.62	4	C	2268606.6	6965873.08	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm rd.							FE	√	3	1	0.25	N-S	45	√			
H13	H13_108_1416em2	12	21.55	4	B	2268609.73	6965909.53	21-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	steel scrap	FE	√	3	0.5	0.25			√			
H13	H13_109_1416em2	13	21.35	4	B	2268600.91	6965888.56	21-Jun-06	Jim Thoren	√													√	CIV	18	1	1	steel cable	FE	√	3	0.5	0.25			√			
H13	H13_112_1416em2	11	20.4	4	B	2268614.73	6965902.29	21-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	steel scrap	FE	√	3	2	0.25			√			
H13	H13_116_1416em2	10	20.14	4	C	2268570.85	6965901.59	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm rd.							FE	√	3	1	0.25	N-S	45	√			
H13	H13_117_1416em2	10	20.05	4	C	2268524.25	6965874.42	11-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	vt fuze piece							FE	√	6	4	0.25	N-S	45	√			
H13	H13_118_1416em2	13	20.02	4	B	2268523.12	6965860.24	21-Jun-06	Jim Thoren	√													√	MIL	12	1	0.25	steel scrap	FE	√	3	1	0.5			√			
H13	H13_120_1416em2	13	19.58	4	B	2268593.88	6965850.41	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap	FE	√	6	1	0.25			√			
H13	H13_121_1416em2	11	19.58	4	B	2268602.52	6965883.56	21-Jun-06	Jim Thoren	√							√	ORD MD	12	2	0.25	VT fuze piece & nail							FE	√	3	2	0.25			√			
H13	H13_128_1416em2	13	18.65	4	B	2268526.55	6965854.88	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	50 cal							OTHER	√	3	0.5	0.25			√			
H13	H13_13_1416em2	14	129.98	4	A	2268569.5	6965878.95	21-Jun-06	Jim Thoren	√													√	CIV	12	1	0.25	scrap steel	SS	√	3	0.5	0.25			√			
H13	H13_136_1416em2	13	17.64	4	B	2268609.87	6965913.56	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	magnet	FE	√	3	0.5	0.25			√			
H13	H13_138_1416em2	13	17.13	4	B	2268617.55	6965871.09	21-Jun-06	Jim Thoren	√													√	MIL	12	1	0.25	steel scrap	FE	√	6	0.5	0.25			√			
H13	H13_14_1416em2	13	125.53	4	B	2268602.18	6965874.13	21-Jun-06	Jim Thoren	√							√	ORD MD	3	4		VT fuze & parts							FE	√	6	4	0.25			√			
H13	H13_140_1416em2	10	16.88	4	C	2268604.52	6965890.03	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm rd.							FE	√	3	1	0.25	N-S	45	√			
H13	H13_142_1416em2	13	16.58	4	B	2268532.05	6965861.94	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap	FE	√	6	4	0.25			√			
H13	H13_146_1416em2	13	16.41	4	B	2268552.83	6965933.02	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze brkt							FE	√	6	2	0.25			√			
H13	H13_148_1416em2	13	16.33	4	B	2268580.68	6965910.79	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze pt							FE	√	6	1	0.25			√			
H13	H13_149_1416em2	13	16.12	4	B	2268557.55	6965871.3	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	VT fuze brkt							FE	√	6	2	0.25			√			
H13	H13_15_1416em2	14	121.06	4	A	2268576.95	6965843.22	21-Jun-06	Jim Thoren	√													√	CIV	6	2	1	steel scrap	SS	√	> 24	0.5	0.25			√			
H13	H13_155_1416em2	12	14.82	4	B	2268610.66	6965927.73	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap	FE	√	3	1	0.25			√			
H13	H13_156_1416em2	9	14.81	4	C	2268612.89	6965864.04	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze piece							FE	√	6	4	0.25	N-S	45	√			
H13	H13_158_1416em2	13	14.73	4	B	2268573.26	6965906.83	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze brkt							FE	√	6	1	0.25			√			
H13	H13_161_1416em2	12	14.53	4	B	2268534.48	6965891.35	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap	FE	√	3	2	0.25			√			
H13	H13_165_1416em2	13	14.08	4	B	2268522.44	6965888.6	21-Jun-06	Jim Thoren	√							√	ORD MD	6	2	0.5	VT fuze bkts							FE	√	6	2	0.25			√			
H13	H13_176_1416em2	14	13.05	4	A	2268591.26	6965906.58	21-Jun-06	Jim Thoren	√													√	MIL	12	1	0.25	steel scrap-ammo can lid	SS	√	6	4	0.25			√			
H13	H13_179_1416em2	13	12.8	4	B	2268589.51	6965877.61	21-Jun-06	Jim Thoren	√													√	MIL	3	3	1	steel scrap	FE	√	6	4	2			√			
H13	H13_181_1416em2	13	12.79	4	B	2268569.06	6965875.05	21-Jun-06	Jim Thoren	√							√	ORD MD	18	2	0.5	20mm/762projo/50cart	√	MIL	18	3	0.5	aluminum plate	OTHER	√	12	4	0.25			√			
H13	H13_184_1416em2	13	12.58	4	B	2268574.22	6965910.74	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze brkt							FE	√	6	1	0.25			√			
H13	H13_19_1416em2	16	97.05	4	A	2268532.7	6965836.88	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap	SS	√	3	1	0.25			√			
H13	H13_190_1416em2	13	11.81	4	B	2268617.43	6965861.85	21-Jun-06	Jim Thoren	√													√	CIV	6	3	0.25	nails	FE		3	0.5	0.5			√			
H13	H13_191_1416em2	13	11.76	4	B	2268595.02	6965870.13	21-Jun-06	Jim Thoren	√							√	ORD MD	18	2	0.5	VT fuze brkt							FE	√	9	2	0.25			√			
H13	H13_192_1416em2	11	11.72	4	B	2268606.92	6965925.7	21-Jun-06	Jim Thoren	√							√	ORD MD	12	1	0.25	20mm projo								√	6	1	0.25			√			
H13	H13_195_1416em2	11	11.54	4	B	2268614.49	6965844.4	21-Jun-06	Jim Thoren	√													√	CIV	12	1	0.25	magnet	FE	√	3	1	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H13	H13_196_1416em2	13	11.54	4	B	2268548.4	6965847.64	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze brkt							FE	√	6	2	0.25			√			
H13	H13_198_1416em2	13	11.51	4	B	2268591.67	6965873.69	21-Jun-06	Jim Thoren	√							√	ORD MD	12	1	0.25	VT fuze brkt							FE	√	6	2	0.25			√			
H13	H13_2_1416em2	15	2486	4	A	2268559.74	6965862.62	21-Jun-06	Jim Thoren	√													√	MIL	18	> 10	≥8	marston mating	FE	√	> 24	> 6	0.25			√			
H13	H13_200_1416em2	13	11.43	4	B	2268525.56	6965897.16	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	VT fuze pt							FE	√	9	2	0.25			√			
H13	H13_203_1416em2	13	11.1	4	B	2268592.09	6965890.32	21-Jun-06	Jim Thoren	√													√	CIV	6	2	0.25	nail	FE	√	3	0.5	0.25			√			
H13	H13_205_1416em2	13	10.91	4	B	2268601.3	6965925.45	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.5	fuze pt							FE	√	6	2	0.25			√			
H13	H13_206_1416em2	12	10.91	4	B	2268603.91	6965931.35	21-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap aluminum	AL	√	3	2	2			√			
H13	H13_209_1416em2	12	10.8	4	B	2268609.38	6965917.05	21-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	steel scrap	FE	√	3	2	0.25			√			
H13	H13_211_1416em2	10	10.76	4	C	2268572.35	6965872.96	11-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.25	tubing for ejection seat							FE	√	9	0.5	0.25	N-S	45	√			
H13	H13_217_1416em2	14	10.35	4	A	2268613.3	6965919.3	21-Jun-06	Jim Thoren	√													√	MIL	12	1	0.25	steel scrap	SS	√	3	1	0.25			√			
H13	H13_22_1416em2	13	83.66	4	B	2268606.59	6965868.68	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.5	Vt fuze pt							FE	√	9	4	0.25			√			
H13	H13_220_1416em2	13	10.05	4	B	2268518.76	6965883.55	21-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	VT fuze pts							FE	√	3	0.5	0.25			√			
H13	H13_221_1416em2	10	9.87	4	C	2268576.77	6965913.55	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	CAD							AL	√	3	0.5	0.25	N-S	45	√			
H13	H13_222_1416em2	12	9.75	4	B	2268555.59	6965889.46	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm piece							OTHER	√	3	1	0.25			√			
H13	H13_227_1416em2	10	9.4	4	C	2268559.88	6965931.59	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	CAD							AL	√	3	2	0.25	N-S	45	√			
H13	H13_229_1416em2	13	9.29	4	B	2268523.77	6965838.82	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap	FE	√	3	2	0.25			√			
H13	H13_230_1416em2	10	9.2	4	C	2268563.95	6965891.09	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	CAD							AL	√	3	2	0.25	NE-SW	45	√			
H13	H13_231_1416em2	12	9.2	4	B	2268539.17	6965867.01	21-Jun-06	Jim Thoren	√													√	MIL	6	3	1	steel scrap	FE	√	3	2	0.25			√			
H13	H13_238_1416em2	11	8.99	4	B	2268592.95	6965877.75	21-Jun-06	Jim Thoren	√							√	ORD MD	18	1	0.25	VT fuze brkt							FE	√	6	2	0.25			√			
H13	H13_239_1416em2	13	8.9	4	B	2268616.81	6965888.86	21-Jun-06	Jim Thoren	√													√	MIL	12	10	1	steel & aluminum scrap	AL	√	3	2	0.5			√			
H13	H13_243_1416em2	11	8.72	4	B	2268580.58	6965855.95	21-Jun-06	Jim Thoren	√													√	MIL	18	2	0.25	eject seat pts	AL	√	3	1	0.5			√			
H13	H13_244_1416em2	11	8.7	4	B	2268609.65	6965847.38	21-Jun-06	Jim Thoren	√													√	MIL	> 24		≥8	part of (2) 750 lb bomb	FE		24	> 6	> 4			√			
H13	H13_25_1416em2	15	76.49	4	A	2268607.86	6965905.34	21-Jun-06	Jim Thoren	√													√	MIL	18	10	4	frag	FE	√	3	1	0.25			√			
H13	H13_252_1416em2	10	8.33	4	C	2268539.92	6965891.46	11-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze piece, vt							FE	√	6	4	0.25	N-S	45	√			
H13	H13_26_1416em2	12	75.91	4	B	2268615.73	6965874.41	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
H13	H13_262_1416em2	10	7.84	4	C	2268548.46	6965913.12	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze piece							FE	√	6	4	0.25	N-S	45	√			
H13	H13_263_1416em2	13	7.82	4	B	2268562.37	6965874.94	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap	FE	√	3	0.5	0.25			√			
H13	H13_265_1416em2	10	7.76	4	C	2268569.96	6965849.87	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze piece							FE	√	6	4	0.25	N-S	45	√			
H13	H13_266_1416em2	13	7.69	4	B	2268588.61	6965917.8	21-Jun-06	Jim Thoren	√													√	CIV	3	2	0.5	alum scrap	AL	√	3	2	0.25			√			
H13	H13_267_1416em2	11	7.59	4	B	2268552.13	6965936.54	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap	FE	√	3	0.5	0.25			√			
H13	H13_27_1416em2	12	74.12	4	B	2268554.33	6965857.45	21-Jun-06	Jim Thoren	√													√	MIL	18	> 10	≥8	marston mating	FE	√	> 24	> 6	0.25			√			
H13	H13_272_1416em2	11	7.46	4	B	2268553.87	6965896.34	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze pt							FE	√	6	0.5	0.25			√			
H13	H13_278_1416em2	12	7.22	4	B	2268548.77	6965880.32	21-Jun-06	Jim Thoren	√													√	CIV	6	2	0.25	rust	FE	√	3	0.5	0.25			√			
H13	H13_279_1416em2	13	7.22	4	B	2268590.8	6965883.14	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	rust flakes & magnets	FE	√	3	0.5	0.25			√			
H13	H13_28_1416em2	14	71.66	4	A	2268609.05	6965901.22	21-Jun-06	Jim Thoren	√													√	CIV	3	1	1	steel scrap	SS	√	12	> 6	0.25			√			
H13	H13_289_1416em2	13	7.01	4	B	2268545.16	6965905.05	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap	FE	√	3	1	0.25			√			
H13	H13_290_1416em2	13	6.94	4	B	2268595.63	6965863.22	21-Jun-06	Jim Thoren	√							√	ORD MD	> 24	2	0.5	vt fuze part							FE	√	6	2	0.25			√			
H13	H13_296_1416em2	13	6.72	4	B	2268527.39	6965870.56	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	VT fuze pt							FE	√	3	2	0.25			√			
H13	H13_299_1416em2	12	6.62	4	B	2268542.38	6965874.77	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap	FE	√	3	0.5	0.25			√			
H13	H13_3_1416em2	12	1751.6	4	B	2268555.38	6965860.88	21-Jun-06	Jim Thoren	√													√	MIL	18	> 10	≥8	marston mating	FE	√	> 24	> 6	0.25			√			
H13	H13_301_1416em2	12	6.61	4	B	2268522.86	6965864.67	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	VT fuze brkt							FE	√	6	2	0.25			√			
H13	H13_302_1416em2	10	6.59	4	C	2268543.41	6965867.09	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze antenna							FE	√	6	2	0.25	N-S	45	√			
H13	H13_303_1416em2	10	6.58	4	C	2268567.25	6965891.14	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze antenna							FE	√	3	2	0.25	N-S	45	√			
H13	H13_31_1416em2	13	65.75	4	B	2268551.75	6965903.75	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm							FE	√	6	1	0.25			√			
H13	H13_311_1416em2	13	6.26	4	B	2268585.62	6965897.52	21-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	VT fuze ant							FE	√	6	1	0.25			√			
H13	H13_315_1416em2	10	6.16	4	C	2268573.44	6965848.23	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze antenna							FE	√	6	2	0.25	N-S	45	√			
H13	H13_326_1416em2	13	6	4	B	2268556.59	6965882.09	21-Jun-06	Jim Thoren	√													√	CIV	6	2	0.25	steel scrap	FE	√	6	4	0.25			√			
H13	H13_327_1416em2	11	5.98	4	B	2268604.7	6965915.51	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	20mm							FE	√	3	1	0.25			√			
H13	H13_33_1416em2	15	58.99	4	A	2268559.64	6965865.98	21-Jun-06	Jim Thoren	√													√	MIL	18	> 10	≥8	marston mating	FE	√	24	> 6	0.25			√			
H13	H13_34_1416em2	13	56.7	4	B	2268568.57	6965867.82	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	piece of 20mm							FE	√	3	1	0.25			√			
H13	H13_343_1416em2	13	5.66	4	B	2268520.65	6965842.29	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze ant							FE	√	6	2	1			√			
H13	H13_346_1416em2	10	5.5	4	C	2268528.52	6965850.87	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze antenna							FE	√	3	2	0.25	N-S	45	√			
H13	H13_347_1416em2	9	5.49	4	C	2268525.13	6965847.23	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	50 cal ctg, brass							OTHER	√	3	0.5	0.5	NE-SW	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H13	H13_350_1416em2	10	5.46	4	C	2268583.2	6965845.52	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	metal cap	FE	√	3	0.5	0.25	N-S	45	√			
H13	H13_352_1416em2	13	5.42	4	B	2268581.12	6965921.28	21-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	alum fuze pt							AL	√	3	2	1			√			
H13	H13_353_1416em2	12	5.41	4	B	2268595.96	6965932.99	21-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	aluminum scrap	AL	√	3	2	0.25			√			
H13	H13_358_1416em2	13	5.26	4	B	2268548.91	6965851.41	21-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	scrap	FE	√	3	2	0.25			√			
H13	H13_365_1416em2	13	5.05	4	B	2268544.14	6965840.13	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze ant							FE	√	6	2	1			√			
H13	H13_37_1416em2	14	52.71	4	A	2268610.66	6965879.68	21-Jun-06	Jim Thoren	√													√	CIV	3	3	1	steel scrap & nail	SS	√	3	0.5	0.25			√			
H13	H13_372_1416em2	12	4.96	4	B	2268578.94	6965906.91	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap	FE	√	3	0.5	0.5			√			
H13	H13_378_1416em2	12	4.85	4	B	2268528.25	6965881.43	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze ant							FE	√	6	1	1			√			
H13	H13_380_1416em2	11	4.84	4	B	2268594.1	6965927.02	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	rebar	FE	√	6	0.5	0.25			√			
H13	H13_383_1416em2	13	4.8	4	B	2268535.34	6965855.05	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	VT fuze brkt							FE	√	6	2	0.25			√			
H13	H13_384_1416em2	14	4.78	4	A	2268554.91	6965853.12	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	VT fuze pt							FE	√	6	0.5	0.25			√			
H13	H13_39_1416em2	13	51.24	4	B	2268600.53	6965891.87	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap	FE	√		1	0.5			√			
H13	H13_396_1416em2	9	4.47	4	C	2268532.68	6965850.99	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50 cal cart, brass							OTHER	√	6	1	0.25	N-S	45	√			
H13	H13_407_1416em2	10	4.32	4	C	2268613.96	6965840.83	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal cart, brass							OTHER	√	3	1	0.25	NE-SW	45	√			
H13	H13_41_1416em2	13	50.58	4	B	2268602.03	6965879.34	21-Jun-06	Jim Thoren	√							√	ORD MD	0	2		VT fuze brkts							FE	√	6	2	0.25			√			
H13	H13_414_1416em2	11	4.26	4	B	2268580.41	6965914.89	21-Jun-06	Jim Thoren	√													√	CIV	0	4	0.25	steel scrap	FE	√	3	0.5	0.25			√			
H13	H13_427_1416em2	10	4.04	4	C	2268555.55	6965926.59	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50 cal carts, brass							OTHER	√	3	1	0.25	N-S	45	√			
H13	H13_43_1416em2	13	46.27	4	B	2268573.06	6965864.44	21-Jun-06	Jim Thoren	√													√	CIV	3	1	1	steel scrap	FE	√	12	6	0.25			√			
H13	H13_45_1416em2	13	44.89	4	B	2268610.93	6965867.07	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	VT fuze brkt							FE	√	6	2	0.25			√			
H13	H13_454_1416em2	12	3.74	4	B	2268548.22	6965901.34	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm piece							FE	√	3	1	0.25			√			
H13	H13_46_1416em2	13	44.47	4	B	2268576.45	6965869.54	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm piece							FE	√	3	0.5	0.25			√			
H13	H13_466_1416em2	11	3.5	3	B	2268539.36	6965870.94	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	VT fuze brkt							FE	√	6	1	0.25			√			
H13	H13_47_1416em2	12	44.38	4	B	2268612.03	6965898.25	21-Jun-06	Jim Thoren	√													√	MIL	12	2	0.5	steel scrap	FE	√	6	2	0.25			√			
H13	H13_478_1416em2	11	3.41	3	B	2268599.29	6965846.54	21-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap	FE	√	6	2	0.25			√			
H13	H13_48_1416em2	13	44.07	4	B	2268566.41	6965886.29	21-Jun-06	Jim Thoren	√							√	ORD MD	18	1	4	VT fuze							FE	√	6	4	0.25			√			
H13	H13_5_1416em2	15	795.64	4	A	2268605.01	6965855.46	21-Jun-06	Jim Thoren	√													√	MIL	> 24		≥8	part of (2) 750 lb bomb	FE	√	> 24	> 6	> 4			√			
H13	H13_504_1416em2	11	3.06	3	B	2268592.24	6965886.91	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap	FE	√	3	0.5	0.25			√			
H13	H13_52_1416em2	13	41.34	4	B	2268546.11	6965865.2	21-Jun-06	Jim Thoren	√							√	ORD MD	6	2	2	VT fuze pts							FE	√	3	2	0.25			√			
H13	H13_54_1416em2	16	38.87	4	A	2268531.63	6965840.32	21-Jun-06	Jim Thoren	√							√	ORD MD	18	> 10	0.75	50 projo, 50 cal casing & vt fuz	√	CIV	6	1	0.5	scrap metal	FE	√	6	6	0.25			√			
H13	H13_55_1416em2	16	37.91	4	A	2268548	6965844.16	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	2	VT fuze							FE	√	6	2	0.25			√			
H13	H13_57_1416em2	12	37.41	4	B	2268568.9	6965871.14	21-Jun-06	Jim Thoren	√													√	MIL	3	1	1	eject. seat pt	SS	√	6	4	1			√			
H13	H13_59_1416em2	14	36.4	4	A	2268579.56	6965852.09	21-Jun-06	Jim Thoren	√													√	MIL	18	10	1	steel scrap	FE	√	6	2	0.5			√			
H13	H13_605_1416em2	11	2.21	2	B	2268549.37	6965872.88	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	steel frag							FE	√	3	1	0.5			√			
H13	H13_61_1416em2	14	35.59	4	A	2268594.66	6965866.74	21-Jun-06	Jim Thoren	√							√	ORD MD	18	1	0.25	50 cal projo							OTHER	√	3	0.5	0.25			√			
H13	H13_62_1416em2	13	35.34	4	B	2268594.56	6965893.49	21-Jun-06	Jim Thoren	√													√	CIV	12	2	0.25	aluminum scrap and magnet	AL	√	3	2	0.25			√			
H13	H13_66_1416em2	14	33.65	4	A	2268610.25	6965883.53	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap	SS	√	3	2	0.25			√			
H13	H13_68_1416em2	11	32.95	4	B	2268615.09	6965881.77	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	magnet	FE	√	3	0.5	0.25			√			
H13	H13_69_1416em2	14	32.61	4	A	2268574.57	6965855.9	21-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.5	vt fuze bracket							FE	√	6	2	0.25			√			
H13	H13_70_1416em2	14	32.54	4	A	2268607.96	6965896.07	21-Jun-06	Jim Thoren	√													√	CIV	12	1	0.25	steel scrap	SS	√	3	2	0.5			√			
H13	H13_73_1416em2	12	31.16	4	B	2268594.03	6965897.77	21-Jun-06	Jim Thoren	√													√	CIV	6		0.5	steel scrap	FE	√	3	2	0.5			√			
H13	H13_74_1416em2	15	30.74	4	A	2268612.73	6965923.06	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.5	VT fuze ant							FE	√	6	2	0.5			√			
H13	H13_75_1416em2	11	30.51	4	B	2268613.43	6965877.45	21-Jun-06	Jim Thoren	√													√	CIV	6	4	0.25	nail	FE	√	3	0.5	0.25			√			
H13	H13_77_1416em2	13	30.07	4	B	2268575.52	6965861.09	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze ant							FE	√	6	2	1			√			
H13	H13_78_1416em2	13	29.65	4	B	2268528.95	6965846.98	21-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	steel scrap	FE	√	3	0.5	0.25			√			
H13	H13_80_1416em2	13	29.43	4	B	2268566.72	6965894.8	21-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	fuze pt/steel scrap							FE	√	6	4	0.25			√			
H13	H13_81_1416em2	11	28.98	4	B	2268599.66	6965920.21	21-Jun-06	Jim Thoren	√							√	ORD MD	6	1	2	fuze pt							FE	√	3	2	2			√			
H13	H13_83_1416em2	12	27.87	4	B	2268579.54	6965845.69	21-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	alum can	AL	√	6	4	0.25			√			
H13	H13_87_1416em2	13	26.59	4	B	2268550.55	6965898.36	21-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze brkt							FE	√	6	2	0.25			√			
H13	H13_88_1416em2	10	25.5	4	C	2268563.42	6965894.83	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ac cad/cart/20mm rd.							FE	√	3	1	1	E-W	90	√			
H13	H13_91_1416em2	10	24.91	4	C	2268608.34	6965892.36	11-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	20mm rd.							FE	√	3	1	0.25	N-S	45	√			
H13	H13_94_1416em2	10	24.79	4	C	2268572.14	6965869.45	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm rd.							FE		3	1	0.25	N-S	45	√			
H13	H13_95_1416em2	13	24.7	4	B	2268609.57	6965876.02	21-Jun-06	Jim Thoren	√							√	ORD MD	18		0.25	VT fuze brkt							FE	√	6	2	0.25			√			
H13	H13_99_1416em2	12	23.89	4	B	2268597.09	6965899.07	21-Jun-06	Jim Thoren	√													√	MIL	12	1	2	scrap	FE	√	9	1	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H14	H14_101_1607em2	13	19.98	4	B	2268685.73	6965891.59	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_103_1607em2	13	19.8	4	B	2268642.45	6965917.14	22-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	chunk of aluminum	AL	√	3	0.5	0.25	N-S	0	√			
H14	H14_109_1607em2	13	19.46	4	B	2268710.07	6965928.47	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_11_1607em2	15	90.65	4	A	2268691.59	6965902.48	22-Jun-06	Alan Merriman	√							√	ORD MD	6	2	0.5	vt fuze pts, bracket	√	CIV	6	> 10	2	nails	FE	√	6	2	0.25			√			
H14	H14_115_1607em2	13	19.12	4	B	2268642.16	6965853.14	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_12_1607em2	16	89.05	4	A	2268693.02	6965899.34	22-Jun-06	Alan Merriman	√													√	CIV	6	4	0.75	nail & wire	FE	√	24	0.5	0.25			√			
H14	H14_125_1607em2	11	18.01	4	B	2268646.38	6965881.18	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_134_1607em2	12	16.82	4	B	2268702.75	6965893.74	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_135_1607em2	13	16.76	4	B	2268705.84	6965878.02	22-Jun-06	Alan Merriman	√													√	CIV	24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_136_1607em2	13	16.62	4	B	2268640.92	6965887.91	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_14_1607em2	16	78.61	4	A	2268618.77	6965841.38	22-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	1	vt fuze brkt, antenna & fuze pts							FE	√	6	2	0.25			√			
H14	H14_141_1607em2	13	15.47	4	B	2268707.77	6965919.62	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_142_1607em2	13	15.43	4	B	2268620.99	6965855.48	22-Jun-06	Alan Merriman	√													√	CIV	> 24	10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_146_1607em2	12	14.82	4	B	2268685.48	6965879.08	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_148_1607em2	14	14.57	4	A	2268710.29	6965870.09	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_153_1607em2	13	13.96	4	B	2268649.55	6965884.16	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_154_1607em2	11	13.87	4	B	2268642.28	6965898.07	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_156_1607em2	12	13.83	4	B	2268644.63	6965856.67	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_158_1607em2	14	13.74	4	A	2268619.65	6965858.53	22-Jun-06	Alan Merriman	√													√	CIV	6	2	0.75	wire	FE	√	> 24	0.5	0.25			√			
H14	H14_16_1607em2	13	72.67	4	B	2268637.94	6965910.89	22-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	scrap metal & length of cable	FE	√	24	0.5	0.5			√			
H14	H14_160_1607em2	13	13.6	4	B	2268709.08	6965865.76	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_161_1607em2	11	13.5	4	B	2268629.91	6965862.71	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_165_1607em2	14	13.2	4	A	2268689.39	6965909.7	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_173_1607em2	13	12.66	4	B	2268642.45	6965903.11	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_18_1607em2	16	65.55	4	A	2268692.68	6965895.79	22-Jun-06	Alan Merriman	√													√	CIV	6	3	0.75	nails, wire & metal iron	FE	√	24	0.5	0.25			√			
H14	H14_180_1607em2	12	12.3	4	B	2268624.21	6965930.33	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_187_1607em2	12	12.11	4	B	2268686.51	6965922.41	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_188_1607em2	12	11.85	4	B	2268656.26	6965884.35	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_189_1607em2	11	11.68	4	B	2268623.53	6965852.61	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_190_1607em2	13	11.55	4	B	2268711.62	6965863.6	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_196_1607em2	12	11.21	4	B	2268690.82	6965925.29	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.75	nails	FE	√	6	0.5	0.25			√			
H14	H14_197_1607em2	13	11.18	4	B	2268639.32	6965848.98	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_2_1607em2	12	280.76	4	B	2268659.53	6965896.77	22-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	pt of vt fuze, iron metal	√	CIV	3	1	0.25	magnet	FE	√	3	0.5	0.25			√			
H14	H14_202_1607em2	13	11.03	4	B	2268660.25	6965866.87	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_204_1607em2	13	11	4	B	2268664.06	6965898.16	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10		nails	FE	√	6	0.5	0.25			√			
H14	H14_205_1607em2	12	10.99	4	B	2268618.57	6965907.23	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_207_1607em2	13	10.91	4	B	2268697.77	6965891.39	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_211_1607em2	12	10.76	4	B	2268699.45	6965839.49	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_214_1607em2	13	10.64	4	B	2268708.83	6965923.47	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_220_1607em2	13	10.31	4	B	2268653.26	6965888.12	22-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	piece of aluminum	AL	√	3	0.5	0.25	N-S	0	√			
H14	H14_221_1607em2	12	10.29	4	B	2268680.37	6965874.66	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_226_1607em2	11	9.97	4	B	2268649.27	6965887.63	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_227_1607em2	13	9.85	4	B	2268664.16	6965884.95	22-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	vt antenna							FE	√	3	0.5	0.5	NE-SW	0	√			
H14	H14_229_1607em2	12	9.74	4	B	2268631.04	6965928.42	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_230_1607em2	12	9.66	4	B	2268638.98	6965920.84	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_232_1607em2	12	9.59	4	B	2268715.14	6965856.94	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_238_1607em2	11	9.23	4	B	2268684.54	6965913.07	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_239_1607em2	12	9.19	4	B	2268716.74	6965921.62	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_240_1607em2	11	9.08	4	B	2268699.88	6965853.05	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_241_1607em2	13	9.06	4	B	2268704.57	6965901.41	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_255_1607em2	13	8.57	4	B	2268657.14	6965871.46	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_258_1607em2	12	8.43	4	B	2268686.2	6965901.23	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_26_1607em2	13	53.62	4	B	2268701.37	6965884.59	22-Jun-06	Alan Merriman	√							√	ORD MD	6	2	1	vt fuze part							FE	√	6	2	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H14	H14_261_1607em2	13	8.38	4	B	2268698.86	6965919.82	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_265_1607em2	12	8.28	4	B	2268706.86	6965911.68	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_277_1607em2	13	7.97	4	B	2268715.18	6965931.62	22-Jun-06	Alan Merriman	√													√	MIL	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_279_1607em2	12	7.87	4	B	2268639.93	6965907.02	22-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	length of cable	FE	√	24	0.5	0.5	NE-SW	0	√			
H14	H14_28_1607em2	13	46.22	4	B	2268625.51	6965915.45	22-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	wire & cable, iron/steel	FE	√	12	1	0.25			√			
H14	H14_280_1607em2	13	7.85	4	B	2268622	6965912.6	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_282_1607em2	11	7.81	4	B	2268629.41	6965859.19	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_289_1607em2	12	7.53	4	B	2268664.27	6965889.88	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_290_1607em2	13	7.52	4	B	2268663.53	6965903.03	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_292_1607em2	12	7.48	4	B	2268696.12	6965842.62	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_295_1607em2	13	7.19	4	B	2268670.88	6965871.93	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_30_1607em2	16	42.82	4	A	2268635.79	6965854.95	22-Jun-06	Alan Merriman	√							√	ORD MD	6	> 10	0.25	20mm	√	CIV	3	> 10	≥8	nails	FE	√	3	0.5	0.25	N-S	0	√			
H14	H14_300_1607em2	12	7.1	4	B	2268708.41	6965892.97	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_311_1607em2	13	6.69	4	B	2268640.66	6965894.12	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_328_1607em2	11	5.98	4	B	2268638.62	6965916.98	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_331_1607em2	12	5.95	4	B	2268717.27	6965918.22	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_336_1607em2	12	5.81	4	B	2268688.7	6965894.28	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_341_1607em2	13	5.78	4	B	2268691.23	6965914.88	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_351_1607em2	12	5.49	4	B	2268675.92	6965869.06	22-Jun-06	Alan Merriman	√													√	MIL	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_353_1607em2	12	5.41	4	B	2268647.92	6965903.09	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_354_1607em2	12	5.41	4	B	2268707.83	6965916.11	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_356_1607em2	12	5.39	4	B	2268714.84	6965905.95	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_359_1607em2	11	5.29	4	B	2268700.08	6965858.27	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_361_1607em2	12	5.28	4	B	2268715.52	6965925.02	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_362_1607em2	13	5.28	4	B	2268623.12	6965905.87	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.75	nails	FE	√	6	0.5	0.25			√			
H14	H14_364_1607em2	13	5.25	4	B	2268705.17	6965873.24	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_374_1607em2	13	5.05	4	B	2268658.34	6965863.27	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.75	nails	FE	√	6	0.5	0.25			√			
H14	H14_375_1607em2	11	5.02	4	B	2268665.07	6965874.71	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_378_1607em2	12	4.96	4	B	2268630.21	6965871.26	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_379_1607em2	12	4.92	4	B	2268708.98	6965889.73	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_38_1607em2	13	34.57	4	B	2268620.58	6965851.07	22-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	vt fuze part							FE	√	6	0.5	0.25			√			
H14	H14_380_1607em2	12	4.91	4	B	2268705.93	6965904.45	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_381_1607em2	13	4.91	4	B	2268670.82	6965880.12	22-Jun-06	Alan Merriman	√													√	MIL	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_383_1607em2	11	4.84	4	B	2268701.43	6965930.89	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_384_1607em2	12	4.81	4	B	2268646.41	6965896.3	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_385_1607em2	13	4.78	4	B	2268619.62	6965917.18	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_39_1607em2	13	34.41	4	B	2268686.74	6965888.17	22-Jun-06	Alan Merriman	√													√	CIV	3	3	0.5	wire & nails, iron/metal	FE	√	6	0.5	0.25			√			
H14	H14_392_1607em2	12	4.66	4	B	2268711.12	6965857.57	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_401_1607em2	12	4.55	4	B	2268682.41	6965884.99	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_411_1607em2	13	4.4	4	B	2268666.71	6965878.77	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_418_1607em2	13	4.28	4	B	2268699.62	6965880.28	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_42_1607em2	13	31.6	4	B	2268695.62	6965880.17	22-Jun-06	Alan Merriman	√													√	CIV	6	2	0.5	wire, iron/metal	FE	√	6	0.5	0.5			√			
H14	H14_429_1607em2	12	4.11	4	B	2268675.08	6965923.83	22-Jun-06	Alan Merriman	√													√	CIV	24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_433_1607em2	11	4.05	4	B	2268676.17	6965917.26	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_445_1607em2	13	3.9	4	B	2268654.12	6965853.05	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_453_1607em2	12	3.77	4	B	2268705.35	6965897.62	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE		6	0.5	0.25			√			
H14	H14_456_1607em2	12	3.71	4	B	2268624.6	6965934.91	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_476_1607em2	12	3.44	3	B	2268661.49	6965856.36	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_48_1607em2	14	29.7	4	A	2268644.84	6965873.05	22-Jun-06	Alan Merriman	√							√	ORD MD	> 24	1	≥8	fins							FE	√	> 24	> 6	2			√			
H14	H14_482_1607em2	12	3.39	3	B	2268658.08	6965878.35	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_496_1607em2	11	3.25	3	B	2268668.11	6965907.13	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_499_1607em2	11	3.21	3	B	2268672.88	6965877.33	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_50_1607em2	12	29.25	4	B	2268696.41	6965876.36	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H14	H14_504_1607em2	11	3.17	3	B	2268710.73	6965935.23	22-Jun-06	Alan Merriman	√													√	CIV	> 24	10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_507_1607em2	12	3.13	3	B	2268685.41	6965863.79	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_508_1607em2	11	3.12	3	B	2268701.86	6965906.06	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_545_1607em2	11	2.72	3	B	2268635.06	6965886.09	22-Jun-06	Alan Merriman	√													√	CIV	24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_55_1607em2	13	28.88	4	B	2268685.2	6965907.22	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_573_1607em2	11	2.51	3	B	2268628.81	6965896.02	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_6_1607em2	16	135.21	4	A	2268636.01	6965859.15	22-Jun-06	Alan Merriman	√							√	ORD MD	3	3	1	scrap, iron metal	√	CIV	6	10	2	nails	FE	√	3	0.5	0.25			√			
H14	H14_60_1607em2	13	27.22	4	B	2268690.12	6965885.5	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_63_1607em2	13	26.44	4	B	2268702.21	6965889.57	22-Jun-06	Alan Merriman	√													√	MIL	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_66_1607em2	12	25.93	4	B	2268699.59	6965936.41	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_69_1607em2	11	25.4	4	B	2268634.1	6965863.12	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_72_1607em2	12	25.06	4	B	2268664.73	6965870.44	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.5			√			
H14	H14_75_1607em2	12	24.81	4	B	2268641.97	6965860	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_76_1607em2	14	24.65	4	A	2268618.36	6965870.2	22-Jun-06	Alan Merriman	√							√	ORD MD	6	3	1	vt fuze pts, iron metal							FE	√	6	1	0.25			√			
H14	H14_77_1607em2	14	24.54	4	A	2268641.56	6965881.14	22-Jun-06	Alan Merriman	√													√	MIL	12	2	0.25	frag, scrap megnetized iron meta	FE	√	6	0.5	0.25			√			
H14	H14_79_1607em2	13	24.34	4	B	2268655.79	6965856.91	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_82_1607em2	13	23.55	4	B	2268662.27	6965859.84	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_83_1607em2	13	23.25	4	B	2268622.3	6965869.2	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.75	nails	FE	√	6	0.5	0.25			√			
H14	H14_87_1607em2	12	22.63	4	B	2268637.48	6965862.91	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_88_1607em2	13	22.3	4	B	2268672.52	6965910.48	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_9_1607em2	14	96.02	4	A	2268689.25	6965905.84	22-Jun-06	Alan Merriman	√							√	ORD MD	0	2	0.5	vt fuze pts, metal	√	CIV	6	> 10	2	nails	FE	√	6	2	1			√			
H14	H14_93_1607em2	12	21.33	4	B	2268712.05	6965888.37	22-Jun-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	0.5	0.25			√			
H14	H14_95_1607em2	13	21.1	4	B	2268641.68	6965865.92	22-Jun-06	Alan Merriman	√													√	CIV	12	> 10	1	nails, wire, scrap mtl & bolts	FE	√	12	0.5	0.5			√			
H14	H14_98_1607em2	13	20.33	4	B	2268646.66	6965891.01	22-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	explosive bolt							FE	√	6	0.5	0.5	NE-SW	0	√			
H14	H14_99_1607em2	13	20.16	4	B	2268669.77	6965894.36	22-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	bottom of a vt fuze							FE	√	3	1	0.5	NE-SW	45	√			
H15	H15_100_1607em2	13	20.03	4	B	2268735.34	6965885.41	06-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze bar							FE	√	6	1	0.5			√			
H15	H15_104_1607em2	12	19.73	4	B	2268720.2	6965853.62	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_106_1607em2	14	19.6	4	A	2268757.07	6965927.7	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	6	4	0.25			√			
H15	H15_107_1607em2	12	19.53	4	B	2268756.08	6965891.12	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	rod	FE	√	24	0.5	0.25			√			
H15	H15_108_1607em2	13	19.51	4	B	2268809.28	6965878.18	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25			√			
H15	H15_110_1607em2	13	19.46	4	B	2268745.73	6965862.37	06-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze part							FE	√	6	1	0.25			√			
H15	H15_111_1607em2	15	19.44	4	A	2268730.99	6965837.74	06-Jul-06	Jim Thoren	√													√	CIV	6	4	0.25	nails	FE	√	6		0.25			√			
H15	H15_112_1607em2	13	19.31	4	B	2268799.99	6965848.13	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_117_1607em2	14	18.86	4	A	2268741.54	6965909.15	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	aluminum scrap							AL	√	3	4	0.25			√			
H15	H15_119_1607em2	11	18.42	4	B	2268722.88	6965892.2	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	steel scrap	FE	√	3	0.5	0.25			√			
H15	H15_120_1607em2	12	18.36	4	B	2268721.26	6965902.7	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
H15	H15_121_1607em2	12	18.29	4	B	2268729.43	6965862.77	06-Jul-06	Jim Thoren	√													√	CIV	6	4	0.25	nails	FE	√	3	0.5	0.25			√			
H15	H15_123_1607em2	12	18.21	4	B	2268733.82	6965869.02	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_124_1607em2	13	18.14	4	B	2268777.22	6965909.75	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	AL	√	3	2	0.25			√			
H15	H15_126_1607em2	15	17.94	4	A	2268718.62	6965894.45	06-Jul-06	Jim Thoren	√													√	CIV	12	2	0.25	wire	FE	√	9	0.5	0.25			√			
H15	H15_127_1607em2	12	17.88	4	B	2268724.34	6965900.71	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze part							FE	√	6	2	0.25			√			
H15	H15_128_1607em2	12	17.19	4	B	2268789.17	6965869.35	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	3	0.5	0.25			√			
H15	H15_130_1607em2	13	17.07	4	B	2268768.18	6965876.49	06-Jul-06	Jim Thoren	√													√	CIV	6	3	0.25	nails	FE	√	6	0.5	0.25			√			
H15	H15_131_1607em2	13	17.07	4	B	2268727.97	6965857.2	06-Jul-06	Jim Thoren	√													√	CIV	12	5	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_133_1607em2	12	16.89	4	B	2268733.53	6965859.17	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire		√	3	0.5	0.25						
H15	H15_138_1607em2	12	16.26	4	B	2268755.34	6965876.07	06-Jul-06	Jim Thoren	√													√	MIL	6	1	0.25	scrap	FE	√	3	1	0.25			√			
H15	H15_140_1607em2	10	15.58	4	C	2268782.79	6965842.48	11-Jul-06	Alan Merriman	√													√	CIV	24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_144_1607em2	10	14.99	4	C	2268787.46	6965847.38	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_147_1607em2	12	14.67	4	B	2268760.07	6965838.29	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	rod	FE	√	9	0.5	0.25	N-S	0	√			
H15	H15_149_1607em2	10	14.36	4	C	2268766.6	6965888.02	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_155_1607em2	10	13.86	4	C	2268733.84	6965862.55	11-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.25	fuze antenna, vt							FE	√	3	0.5	0.5	N-S	90	√			
H15	H15_157_1607em2	12	13.83	4	B	2268764.14	6965892.47	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	seat pt	AL	√	6	1	0.25			√			
H15	H15_159_1607em2	13	13.69	4	B	2268742.97	6965849.6	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H15	H15_164_1607em2	13	13.21	4	B	2268762.3	6965885.89	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	lag bolt	FE	√	3	0.5	0.25			√			
H15	H15_166_1607em2	12	13.2	4	B	2268725.34	6965910.28	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_168_1607em2	13	13.16	4	B	2268722.12	6965887.71	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_169_1607em2	12	13.04	4	B	2268719	6965865.11	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_171_1607em2	13	12.86	4	B	2268796.56	6965932.65	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	6	6	0.25			√			
H15	H15_172_1607em2	9	12.67	4	C	2268722.91	6965844.62	11-Jul-06	Alan Merriman	√													√	CIV	6	3	0.25	nails			3	0.5	0.25	NE-SW	45	√			
H15	H15_176_1607em2	9	12.38	4	C	2268816.48	6965901.51	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_178_1607em2	13	12.35	4	B	2268739.14	6965878.59	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.5			√			
H15	H15_181_1607em2	9	12.3	4	C	2268761.7	6965882.53	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_183_1607em2	13	12.26	4	B	2268724.33	6965837.81	06-Jul-06	Jim Thoren	√							√	ORD MD	3	2	0.25	556mm blanks							OTHER	√	3	0.5	0.25			√			
H15	H15_184_1607em2	13	12.25	4	B	2268773.95	6965840.62	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE		3	0.5	0.5			√			
H15	H15_185_1607em2	13	12.23	4	B	2268741.93	6965844.91	06-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	6	0.5	0.25			√			
H15	H15_186_1607em2	13	12.17	4	B	2268732.37	6965853.55	06-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	nail	FE	√	6	0.5	0.25			√			
H15	H15_192_1607em2	10	11.34	4	C	2268730.98	6965845.6	11-Jul-06	Alan Merriman	√													√	CIV	6	4	0.25	nails	FE	√	3	0.5	0.25	NE-SW	45	√			
H15	H15_193_1607em2	9	11.31	4	C	2268795.94	6965877.27	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_201_1607em2	15	11.07	4	A	2268777.57	6965934.45	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	2	0.25			√			
H15	H15_203_1607em2	9	11.02	4	C	2268721.89	6965908.9	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_206_1607em2	13	10.94	4	B	2268815.86	6965844.38	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	scrap steel fuze							FE	√	3	4	0.25			√			
H15	H15_209_1607em2	13	10.88	4	B	2268810.87	6965907.18	06-Jul-06	Jim Thoren	√													√	CIV	12	1	4	steel scrap	FE	√	9	2	0.25			√			
H15	H15_213_1607em2	11	10.71	4	B	2268725.62	6965889.67	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_216_1607em2	13	10.49	4	B	2268733.48	6965881.52	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal carts							OTHER	√	3	0.5	0.25			√			
H15	H15_218_1607em2	9	10.41	4	C	2268725.94	6965847.26	11-Jul-06	Alan Merriman	√													√	CIV	6	5	0.25	sm piece of magnet	SS	√	3	0.5	0.25	NE-SW	90	√			
H15	H15_223_1607em2	13	10.22	4	B	2268787.44	6965913.73	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.5	fuze brkt							FE	√	6	4	0.25			√			
H15	H15_225_1607em2	11	10.02	4	B	2268727.39	6965841.22	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	6	0.5	0.25			√			
H15	H15_231_1607em2	12	9.63	4	B	2268780.03	6965839.85	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
H15	H15_236_1607em2	13	9.26	4	B	2268757.31	6965894.68	06-Jul-06	Jim Thoren	√													√	CIV	> 24	10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_237_1607em2	13	9.26	4	B	2268793.38	6965922.98	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	steel frag							FE	√	3	0.5	0.25	N-S	0	√			
H15	H15_242_1607em2	12	9.01	4	B	2268795.82	6965844.18	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	6	0.5	0.25			√			
H15	H15_243_1607em2	12	9.01	4	B	2268753.85	6965853.09	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	AL	√	3	1	0.25			√			
H15	H15_245_1607em2	12	8.94	4	B	2268758.94	6965904.36	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	40mm cart							AL	√	3	2	0.25			√			
H15	H15_249_1607em2	12	8.85	4	B	2268792.89	6965909.95	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap-rod	FE	√	6	0.5	0.25			√			
H15	H15_250_1607em2	13	8.83	4	B	2268740.98	6965869.03	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	4	0.25			√			
H15	H15_251_1607em2	13	8.77	4	B	2268788.66	6965860.84	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_252_1607em2	15	8.76	4	A	2268802.37	6965915	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	SS	√	9	0.5	0.25			√			
H15	H15_256_1607em2	12	8.56	4	B	2268728.64	6965916.62	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_263_1607em2	11	8.33	4	B	2268719.37	6965912.88	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_266_1607em2	12	8.26	4	B	2268789.98	6965842.02	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25			√			
H15	H15_267_1607em2	12	8.19	4	B	2268728.48	6965932.32	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_268_1607em2	12	8.16	4	B	2268751.07	6965931.68	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
H15	H15_270_1607em2	12	8.11	4	B	2268772.52	6965851.2	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_271_1607em2	10	8.11	4	C	2268790.65	6965864.16	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_274_1607em2	10	8.01	4	C	2268808.8	6965864.04	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_276_1607em2	12	7.99	4	B	2268794.89	6965861.22	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	heavy gauge steel wire	FE	√	24	0.5	0.25			√			
H15	H15_281_1607em2	12	7.84	4	B	2268727.72	6965881.34	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_283_1607em2	12	7.81	4	B	2268718.92	6965861.22	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_284_1607em2	10	7.76	4	C	2268744.06	6965859.38	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_288_1607em2	13	7.59	4	B	2268778.65	6965880.32	06-Jul-06	Jim Thoren	√													√	CIV	3	10	0.25	nails	FE	√	6	0.5	0.25			√			
H15	H15_29_1607em2	13	43.14	4	B	2268731.06	6965849.04	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	scrap steel	FE	√	6	2	0.25			√			
H15	H15_291_1607em2	11	7.5	4	B	2268734.32	6965846.14	06-Jul-06	Jim Thoren	√													√	CIV	24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_296_1607em2	13	7.17	4	B	2268739.75	6965889.07	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	nails	FE	√	3	0.5	0.25			√			
H15	H15_297_1607em2	13	7.17	4	B	2268744.16	6965852.71	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_298_1607em2	10	7.16	4	C	2268719.16	6965906	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_301_1607em2	9	7.1	4	C	2268787.32	6965865.9	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H15	H15_303_1607em2	13	7	4	B	2268778.83	6965906.54	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_306_1607em2	11	6.85	4	B	2268800.37	6965843.41	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_309_1607em2	13	6.77	4	B	2268725.79	6965920.14	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_312_1607em2	12	6.59	4	B	2268799.93	6965863.6	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_313_1607em2	13	6.49	4	B	2268794.62	6965916.99	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	6	2	0.25			√			
H15	H15_314_1607em2	12	6.46	4	B	2268752.39	6965934.9	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_316_1607em2	12	6.41	4	B	2268725.83	6965934.26	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	AL	√	3	0.5	0.5			√			
H15	H15_317_1607em2	9	6.4	4	C	2268724.88	6965914.98	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_32_1607em2	13	41.24	4	B	2268771.09	6965883.87	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze brkt							FE	√	6	2	0.25			√			
H15	H15_320_1607em2	9	6.28	4	C	2268793.15	6965874.23	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_324_1607em2	10	6.15	4	C	2268779.52	6965873.97	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_326_1607em2	11	6.06	4	B	2268791.73	6965853.02	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_327_1607em2	12	6	4	B	2268724.42	6965877.35	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_329_1607em2	12	5.96	4	B	2268721.87	6965881.76	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_334_1607em2	12	5.91	4	B	2268799.99	6965897.91	06-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	nail	FE	√	6	0.5	0.25			√			
H15	H15_337_1607em2	11	5.81	4	B	2268724.54	6965859.12	06-Jul-06	Jim Thoren	√							√	ORD MD	6	1	1	vt fuze								√	6	0.5	2			√			
H15	H15_340_1607em2	10	5.78	4	C	2268765.34	6965871.45	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_342_1607em2	13	5.77	4	B	2268742.3	6965872.69	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap	FE	√	3	2	0.25	N-S	0	√			
H15	H15_343_1607em2	9	5.72	4	C	2268723.94	6965851.03	11-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
H15	H15_346_1607em2	11	5.58	4	B	2268741.47	6965898.7	06-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
H15	H15_349_1607em2	12	5.5	4	B	2268774.55	6965900.69	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scat pt	FE	√	6	2	0.25			√			
H15	H15_35_1607em2	11	36.7	4	B	2268770.45	6965894.5	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	1	vt fuze							FE	√	6	4	0.25			√			
H15	H15_350_1607em2	12	5.49	4	B	2268748.91	6965872.71	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_355_1607em2	12	5.4	4	B	2268765.77	6965904.64	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
H15	H15_360_1607em2	13	5.28	4	B	2268765.1	6965868.05	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	6	1	0.25			√			
H15	H15_365_1607em2	9	5.17	4	C	2268793.3	6965857.95	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_368_1607em2	9	5.14	4	C	2268731.2	6965866.33	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
H15	H15_37_1607em2	13	35.86	4	B	2268774.16	6965847.71	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	rod	FE	√	9	0.5	0.25			√			
H15	H15_371_1607em2	13	5.13	4	B	2268767.17	6965840.18	06-Jul-06	Jim Thoren																			no contact											
H15	H15_372_1607em2	13	5.11	4	B	2268768.44	6965859.31	06-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze brkt							FE	√	6	1	0.25			√			
H15	H15_373_1607em2	13	5.08	4	B	2268797.69	6965837.41	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_376_1607em2	12	5.02	4	B	2268797.27	6965867.77	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_382_1607em2	10	4.9	4	C	2268760.89	6965894.72	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_393_1607em2	12	4.65	4	B	2268739.43	6965894.78	06-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	4 nails	FE	√	3	0.5	0.25			√			
H15	H15_394_1607em2	11	4.64	4	B	2268726.99	6965929.18	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_396_1607em2	11	4.59	4	B	2268733.34	6965890.48	06-Jul-06	Jim Thoren	√													√	CIV	0	4	0.25	nails	FE		3	0.5	0.25			√			
H15	H15_398_1607em2	11	4.57	4	B	2268740.85	6965875.66	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
H15	H15_4_1607em2	15	198.5	4	A	2268805.44	6965926.48	06-Jul-06	Jim Thoren	√													√	MIL	6	1	0.25	scrap	AL	√	12	> 6	0.25			√			
H15	H15_407_1607em2	9	4.46	4	C	2268730.33	6965871.18	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.5			√			
H15	H15_408_1607em2	9	4.46	4	C	2268755.8	6965838.44	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_412_1607em2	10	4.4	4	C	2268786.82	6965908.23	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_414_1607em2	9	4.36	4	C	2268736.27	6965872.83	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_415_1607em2	13	4.36	4	B	2268774.41	6965912.31	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25			√			
H15	H15_419_1607em2	12	4.26	4	B	2268748.51	6965868.12	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_420_1607em2	9	4.24	4	C	2268811.06	6965866.66	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_421_1607em2	9	4.23	4	C	2268739.44	6965841.29	11-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	nails	FE	√	3	0.5	0.25	N-S	90	√			
H15	H15_422_1607em2	10	4.19	4	C	2268720.52	6965857.59	11-Jul-06	Alan Merriman	√							√	ORD MD	3	3	0.25	20mm fuze and nails							FE	√	3	0.5	0.25	N-S	45	√			
H15	H15_424_1607em2	12	4.14	4	B	2268744.03	6965865.87	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_43_1607em2	12	31.3	4	B	2268726.33	6965853.94	06-Jul-06	Jim Thoren	√													√	MIL	0	5	1	nails and rod	FE	√	12	1	0.25			√			
H15	H15_431_1607em2	13	4.08	4	B	2268779.44	6965884.77	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_435_1607em2	11	4.03	4	B	2268805.77	6965876.16	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm frag							FE	√	3	0.5	0.25			√			
H15	H15_436_1607em2	11	4.02	4	B	2268794.94	6965896.34	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_446_1607em2	12	3.89	4	B	2268761.26	6965899.02	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H15	H15_45_1607em2	15	30.51	4	A	2268815.14	6965890.12	06-Jul-06	Jim Thoren	√							√	ORD MD	12	1	4	vt fuze							FE	√	6	4	0.25			√			
H15	H15_452_1607em2	12	3.79	4	B	2268763.39	6965848.16	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
H15	H15_454_1607em2	12	3.74	4	B	2268776.59	6965903.54	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_457_1607em2	13	3.7	4	B	2268723.24	6965925.52	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.5	nails & wire	FE	√	6	0.5	0.25			√			
H15	H15_46_1607em2	9	30.23	4	C	2268761.96	6965889.58	11-Jul-06	Alan Merriman	√													√	CIV	6	2	0.5	wire and scrap metal	FE	√	6	1	0.25			√			
H15	H15_462_1607em2	13	3.68	4	B	2268732.32	6965908.81	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	20mm							FE	√	3	0.5	0.25	N-S	0	√			
H15	H15_493_1607em2	11	3.27	3	B	2268802.23	6965860.04	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_494_1607em2	11	3.27	3	B	2268776.59	6965883.09	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	nails	FE	√	6	0.5	0.25			√			
H15	H15_498_1607em2	11	3.22	3	B	2268765.01	6965862.47	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_52_1607em2	12	29.07	4	B	2268756.44	6965869.39	06-Jul-06	Jim Thoren	√													√	CIV	6	1	1	scrap	AL	√	12	1	0.25			√			
H15	H15_521_1607em2	11	3.04	3	B	2268801.74	6965853.2	06-Jul-06	Jim Thoren																			no contact											
H15	H15_56_1607em2	12	28.41	4	B	2268757.03	6965881.18	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	stake	FE	√	9	1	0.25			√			
H15	H15_58_1607em2	15	27.9	4	A	2268786.12	6965854.52	16-Aug-06	Jim Thoren	√													√	CIV	6	5	0.25	nails, area scraped w bulldozer	FE	√	3	0.5	0.25			√			
H15	H15_59_1607em2	15	27.58	4	A	2268787.23	6965857.74	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
H15	H15_594_1607em2	11	2.4	2	B	2268740.34	6965884.06	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	aluminum scrap							AL	√	3	1	0.25			√			
H15	H15_622_1607em2	11	2.15	2	B	2268775.13	6965862.83	06-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze antenna	√	CIV	6	3	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
H15	H15_64_1607em2	9	26.13	4	C	2268747.12	6965857.6	11-Jul-06	Alan Merriman	√													√	CIV	6	5	0.25	nails		√	3	0.5	0.25			√			
H15	H15_65_1607em2	12	26.12	4	B	2268721.88	6965895.91	06-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze bracket							FE	√	6	2	0.25			√			
H15	H15_67_1607em2	12	25.92	4	B	2268795.15	6965864.69	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	steel heavy guage wire	FE	√	> 24	0.5	0.25	N-S	0	√			
H15	H15_70_1607em2	9	25.39	4	C	2268785.33	6965840.3	11-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	vt fuze bracket							FE	√	6	2	0.25			√			
H15	H15_8_1607em2	14	99.13	4	A	2268721.01	6965899.16	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	2	t148 bomb fuze adapter							FE	√	9	6	4	N-S	0	√			
H15	H15_80_1607em2	11	24.31	4	B	2268730.78	6965841.88	06-Jul-06	Jim Thoren	√							√	ORD MD	12	1	0.5	vt fuze							FE	√	6	6	0.25			√			
H15	H15_81_1607em2	12	23.95	4	B	2268801.99	6965926.37	06-Jul-06	Jim Thoren	√							√	EMAT MD	6	1	0.5	fuze pt							FE	√	6	2	0.25			√			
H15	H15_86_1607em2	14	22.64	4	A	2268785.29	6965850.29	16-Aug-06	Jim Thoren	√													√	CIV	6	5	0.25	nails, area scraped w bulldozer	FE	√	3	0.5	0.25			√			
H15	H15_89_1607em2	13	22.26	4	B	2268761.91	6965864.94	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze brkt							FE	√	6	1	0.25			√			
H15	H15_90_1607em2	11	22.01	4	B	2268773.62	6965895.8	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze brkt								√	6	2	0.25			√			
H16	H16_118_1607em2	16	18.83	4	A	2268881.73	6965886.08	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	2	0.25			√			
H16	H16_122_1607em2	13	18.22	4	B	2268911.73	6965847.49	07-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	brkt		√	6	4	0.25			√			
H16	H16_129_1607em2	12	17.17	4	B	2268835.62	6965910.17	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	6	2	0.25			√			
H16	H16_137_1607em2	14	16.52	4	A	2268911.27	6965866.77	28-Jun-06	Jim Thoren	√													√	CIV	0	4	0.25	fence wire	FE	√	6	0.5	0.25			√			
H16	H16_145_1607em2	16	14.89	4	A	2268892.25	6965856.45	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	flare part							AL	√	12	2	2			√			
H16	H16_15_1607em2	15	74.64	4	A	2268863.04	6965922.53	28-Jun-06	Jim Thoren	√													√	MIL	0	1			SS	√	6	2	0.25			√			
H16	H16_151_1607em2	16	14.15	4	A	2268904.7	6965836.91	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt bracket							FE	√	6	2	0.25			√			
H16	H16_170_1607em2	14	13.03	4	A	2268888.59	6965876.19	28-Jun-06	Jim Thoren	√													√	CIV	0	5	0.25	fence wire	FE	√	6	0.5	0.25			√			
H16	H16_179_1607em2	14	12.34	4	A	2268887.99	6965871.74	28-Jun-06	Jim Thoren	√													√	CIV	0	5	0.25	fence wire	FE	√	6	0.5	0.25			√			
H16	H16_184_1608em2	12	3.92	4	B	2268883.67	6965895.1	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	1	0.25			√			
H16	H16_198_1607em2	9	11.17	4	C	2268818.34	6965848.07	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	flare							SS	√	6	2	0.5	N-S	0	√			
H16	H16_212_1607em2	12	10.71	4	B	2268837.66	6965889.71	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze ant							AL	√	6	2	0.25			√			
H16	H16_215_1607em2	14	10.52	4	A	2268844.16	6965875.59	28-Jun-06	Jim Thoren	√													√	MIL	6	2	0.25	ac seat part		√		2	1			√			
H16	H16_234_1607em2	13	9.38	4	B	2268848.65	6965883.77	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze ant							AL	√	6	2	0.25			√			
H16	H16_286_1607em2	11	7.63	4	B	2268823.12	6965861.88	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	2	0.25			√			
H16	H16_287_1607em2	13	7.63	4	B	2268905.04	6965846.1	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	2	2			√			
H16	H16_293_1607em2	12	7.29	4	B	2268841.53	6965883.68	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap	AL	√	3		1			√			
H16	H16_302_1607em2	12	7.08	4	B	2268909.12	6965862.07	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3		0.25			√			
H16	H16_315_1607em2	13	6.44	4	B	2268819.52	6965853.41	07-Jul-06	Jim Thoren	√													√	MIL				rust flakes still in ground											
H16	H16_319_1607em2	15	6.32	4	A	2268873.41	6965933.87	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt bracket								√	6	2	0.25			√			
H16	H16_323_1607em2	9	6.22	4	C	2268822.23	6965879.16	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	20 penny nail	FE	√	6	0.5	0.25	N-S	0	√			
H16	H16_325_1607em2	13	6.11	4	B	2268819.91	6965910.37	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	24		0.25			√			
H16	H16_34_1607em2	11	37.77	4	B	2268821.77	6965856.62	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	6	1	0.25			√			
H16	H16_344_1607em2	13	5.71	4	B	2268821.8	6965844.52	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
H16	H16_347_1607em2	10	5.54	4	C	2268859.28	6965837.16	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	truck part	FE	√	3	1	0.25	N-S	0	√			
H16	H16_363_1607em2	13	5.27	4	B	2268856.84	6965926.88	07-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	frag, aircraft part (AL)							FE	√	3	0.5	0.25			√			
H16	H16_397_1607em2	10	4.57	4	C	2268861.73	6965856.64	11-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	ac part	AL		3	1	1	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H16	H16_402_1607em2	12	4.55	4	B	2268862.28	6965846.26	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze brkt							FE	√	6	2	0.25			√			
H16	H16_417_1607em2	13	4.32	4	B	2268864.45	6965860.1	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze ant							AL	√	6	2	1			√			
H16	H16_423_1607em2	13	4.18	4	B	2268913.21	6965886.88	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	magnet		√	3	0.5	0.5			√			
H16	H16_425_1607em2	12	4.13	4	B	2268861.59	6965888.54	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25		AL	√	3	1	0.25			√			
H16	H16_428_1607em2	13	4.12	4	B	2268849.8	6965879.62	07-Jul-06	Jim Thoren	√													√	MIL	6	1	0.25	scrap		√	3	0.5				√			
H16	H16_450_1607em2	13	3.8	4	B	2268826.13	6965930.55	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	OTHER	√	3	2	0.25			√			
H16	H16_466_1607em2	11	3.6	4	B	2268908.8	6965858.27	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3		0.25			√			
H16	H16_468_1607em2	11	3.59	3	B	2268883.79	6965863.35	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	2	0.25			√			
H16	H16_473_1607em2	14	3.49	3	A	2268863.89	6965926.56	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	magnet	FE	√	3	0.5	0.25	N-S	0	√			
H16	H16_488_1607em2	11	3.33	3	B	2268848.76	6965931.59	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	2	0.25			√			
H16	H16_5_1607em2	16	155.87	4	A	2268831.7	6965876.98	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	6	4	0.25			√			
H16	H16_511_1607em2	11	3.12	3	B	2268891.68	6965860.2	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√						√			
H16	H16_517_1607em2	11	3.06	3	B	2268858.47	6965932.77	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze brkt							FE	√	6	4	0.25			√			
H16	H16_53_1607em2	13	28.96	4	B	2268819.67	6965841.37	07-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze brkt							FE	√	6		0.25			√			
H16	H16_54_1607em2	14	28.88	4	A	2268858.55	6965913.96	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.5	horseshoe	FE	√	6	4	0.5			√			
H16	H16_57_1607em2	12	28.08	4	B	2268820.94	6965903.49	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	6	0.5				√			
H16	H16_574_1607em2	11	2.5	3	B	2268839.18	6965861.26	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	1	0.25	N-S	0	√			
H16	H16_62_1607em2	15	27.06	4	A	2268886.68	6965930.52	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze, vt bracket							FE	√	6	2	0.25			√			
H16	H16_78_1607em2	16	24.41	4	A	2268904.12	6965886.35	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt antenna							AL	√	6	2	0.25			√			
H16	H16_84_1607em2	16	23.01	4	A	2268866.93	6965876.09	28-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze, vt bracket							FE	√	6	2	0.25			√			
H16	H16_91_1607em2	10	21.7	4	C	2268818.37	6965858.73	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	bolt	FE	√	9	0.5	0.25	N-S	0	√			
H17	H17_10_1608em2	15	94.89	4	A	2268963.8	6965927.02	28-Jun-06	Alan Merriman	√							√	ORD MD	0	1	4	VT fuze							FE	√	6	4				√			
H17	H17_101_1608em2	9	8.29	4	C	2269006.29	6965916.18	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
H17	H17_11_1608em2	13	89.63	4	B	2268943.05	6965859.55	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	4	fuze, vt							FE	√	6	4	0.25	N-S	0	√			
H17	H17_118_1608em2	15	6.77	4	A	2268919.47	6965840.16	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	scrap	AL	√	6	1	1			√			
H17	H17_127_1608em2	13	6.28	4	B	2268933.21	6965864.77	07-Jul-06	Jim Thoren																			no contact											
H17	H17_132_1608em2	13	6.07	4	B	2268921.95	6965909.25	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna							AL	√	6	2	0.5	N-S	0	√			
H17	H17_137_1608em2	14	5.92	4	A	2268989.45	6965918.59	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	12	0.5	0.25			√			
H17	H17_143_1608em2	10	5.76	4	C	2268930.45	6965854.55	11-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	chain link fence	FE	√	3	0.5	0.25	NE-SW	45	√			
H17	H17_155_1608em2	12	5.01	4	B	2269010.1	6965891.36	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
H17	H17_16_1608em2	16	60.61	4	A	2268937.7	6965879.55	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	flare part							AL	√	6	4	0.25			√			
H17	H17_166_1608em2	13	4.6	4	B	2268959.5	6965911.51	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	1	1	N-S	0	√			
H17	H17_172_1608em2	12	4.32	4	B	2269010.89	6965894.97	07-Jul-06	Jim Thoren																			no contact											
H17	H17_18_1608em2	12	57.76	4	B	2268935.9	6965854.69	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	> 24	0.5	0.25	N-S	0	√			
H17	H17_187_1608em2	13	3.85	4	B	2268957.95	6965926.8	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna							AL	√	6	2	0.5	N-S	0	√			
H17	H17_20_1608em2	15	56.09	4	A	2268938.3	6965924.34	28-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.5	VT fuze bracket							FE	√	6	2	0.5			√			
H17	H17_23_1608em2	12	49.96	4	B	2268924.34	6965930.55	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.5	scrap	FE	√	6	2	0.25	N-S	0	√			
H17	H17_27_1608em2	13	44.45	4	B	2268933.64	6965932.17	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	scrap	AL	√	6	2	0.25	N-S	0	√			
H17	H17_28_1608em2	16	40.92	4	A	2268971.87	6965915.52	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	VT fuze bracket							FE	√	6	2	0.25			√			
H17	H17_30_1608em2	14	35.62	4	A	2268932.3	6965869.09	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.5	A/C seat part	FE	√	6	2	0.25			√			
H17	H17_33_1608em2	15	34.5	4	A	2268941.8	6965921.31	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze part							FE	√	3	0.5	0.25			√			
H17	H17_34_1608em2	12	33.4	4	B	2268930.08	6965926.06	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.5	scrap	FE	√	12	2	0.25	N-S	0	√			
H17	H17_4_1608em2	15	231.83	4	A	2268926.36	6965848.05	28-Jun-06	Alan Merriman	√													√	MIL	0	1	0.25	A/C part	FE	√	12	6	0.25			√			
H17	H17_40_1608em2	14	23.25	4	A	2268929.7	6965921.02	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze bracket							FE	√	6	2	0.25			√			
H17	H17_48_1608em2	13	18.35	4	B	2268937.77	6965869.19	07-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	6	0.5	2	N-S	0	√			
H17	H17_57_1608em2	14	16.15	4	A	2268934.75	6965935.53	28-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.5	VT fuze bracket							FE	√	6	2	0.25			√			
H17	H17_58_1608em2	13	16.14	4	B	2268939.38	6965844.44	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							FE	√	6	2	0.25	N-S	0	√			
H17	H17_62_1608em2	14	15.42	4	A	2268937.8	6965839.86	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	flare piece							AL	√	3	2	0.25			√			
H17	H17_70_1608em2	15	12.84	4	A	2269001.54	6965889.73	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.5	chain		√	6	1	0.5			√			
H17	H17_73_1608em2	14	12.1	4	A	2268984.59	6965934.59	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
H17	H17_75_1608em2	12	11.65	4	B	2268976.13	6965858.67	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	0.5	0.5	N-S	0	√			
H17	H17_78_1608em2	12	11.05	4	B	2268977.32	6965862.65	07-Jul-06	Jim Thoren																			no contact, reaquired 7/25/06											
H17	H17_86_1608em2	12	10.04	4	B	2268943.88	6965916.42	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	2	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H17	H17_88_1608em2	15	9.96	4	A	2268919.74	6965870.3	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25			√			
H17	H17_94_1608em2	16	9.52	4	A	2268953.01	6965886.76	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze							AL	√	6	2	0.25			√			
H18	H18_106_1611em2	12	14.74	4	B	2269075.06	6965875.23	07-Jul-06	Jim Thoren	√													√	CIV	0	5	0.25	nails	FE							√			
H18	H18_107_1611em2	10	14.55	4	C	2269053.05	6965879.19	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	many nails	FE							√			
H18	H18_114_1611em2	10	13.88	4	C	2269079.7	6965873.6	11-Jul-06	Alan Merriman	√													√	CIV	3	> 10	0.25	many nails	FE	√	3	0.5	0.25	N-S	0	√			
H18	H18_120_1611em2	11	13.24	4	B	2269059.58	6965856.38	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.75	rail road spike	FE							√			
H18	H18_123_1611em2	12	13	4	B	2269068.8	6965932.03	07-Jul-06	Jim Thoren	√													√	CIV	12	1	0.5	steel plate	FE	√	3	4	0.25			√			
H18	H18_130_1611em2	9	12.25	4	C	2269083.86	6965873.9	11-Jul-06	Alan Merriman	√													√	CIV	3	> 10	0.25	many nails		√	3	0.5	0.5	NE-SW	45	√			
H18	H18_134_1610em2	13	5.11	4	B	2269018.25	6965880.44	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	fence wire 6"	FE							√			
H18	H18_135_1610em2	12	5.04	4	B	2269041.18	6965920.63	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	6" fence wire	FE							√			
H18	H18_146_1611em2	11	10.61	4	B	2269069.3	6965922.77	07-Jul-06	Jim Thoren	√													√	CIV	6			fence wire & 4" nail	FE							√			
H18	H18_150_1611em2	10	10.32	4	C	2269069.43	6965926.34	11-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	wire	FE	√	6	0.5	0.25	N-S	45	√			
H18	H18_159_1611em2	11	9.63	4	B	2269077.92	6965855.88	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	4" nail								√			
H18	H18_165_1610em2	10	3.56	3	C	2269022.59	6965926.66	11-Jul-06	Alan Merriman	√													√	CIV	6	5	0.25	many nails	FE	√	3	0.5	0.25	N-S	0	√			
H18	H18_165_1611em2	9	8.98	4	C	2269033.04	6965839.49	11-Jul-06	Alan Merriman	√													√	CIV				need backhoe											
H18	H18_166_1610em2	11	3.5	3	B	2269029.41	6965903.69	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap steel	FE	√	3	1	0.25			√			
H18	H18_168_1611em2	11	8.77	4	B	2269039.59	6965843.04	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	4" nail								√			
H18	H18_170_1611em2	12	8.59	4	B	2269049.58	6965895.76	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	fence scrap within 10' of fence	FE							√			
H18	H18_172_1611em2	12	8.53	4	B	2269037.08	6965845.34	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	8" fence wire	FE							√			
H18	H18_178_1611em2	12	8.07	4	B	2269085.46	6965866.48	07-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	4" nails	FE							√			
H18	H18_181_1611em2	11	7.94	4	B	2269063.28	6965917.54	07-Jul-06	Jim Thoren	√													√	CIV	6	2	0.25	small scrap metal chunks	FE							√			
H18	H18_184_1611em2	14	7.72	4	A	2269058.77	6965914.88	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail 3"								√			
H18	H18_185_1611em2	12	7.64	4	B	2269081.8	6965884.27	07-Jul-06	Jim Thoren	√													√	CIV	0	10	0.25	nails	FE							√			
H18	H18_189_1611em2	10	7.22	4	C	2269066.37	6965915.45	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	nails	FE	√	3	0.5	0.25	NE-SW	45	√			
H18	H18_194_1611em2	12	7.1	4	B	2269049.08	6965883.68	07-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	3" nails	FE										
H18	H18_200_1611em2	12	6.74	4	B	2269078.22	6965836.8	07-Jul-06	Jim Thoren	√													√	CIV	0	4	0.25	4" nails	FE							√			
H18	H18_204_1611em2	11	6.66	4	B	2269075.8	6965843.76	07-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	4" nails	FE							√			
H18	H18_209_1611em2	12	6.38	4	B	2269044.72	6965861.3	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	4" nail											
H18	H18_210_1611em2	9	6.36	4	C	2269058.82	6965897.44	11-Jul-06	Alan Merriman	√													√	CIV	6	> 10	0.25	many nails	FE	√	3	0.5	0.25	N-S	45	√			
H18	H18_214_1611em2	11	6.25	4	B	2269058.11	6965872.09	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	small scrap steel	FE							√			
H18	H18_215_1611em2	10	6.19	4	C	2269075.07	6965879.13	11-Jul-06	Alan Merriman	√													√	CIV	3	> 10	0.25	many nails	FE	√	3	0.5	0.25	N-S	0	√			
H18	H18_227_1611em2	10	5.86	4	C	2269054.48	6965886.59	11-Jul-06	Alan Merriman	√													√	CIV	6	5	0.25	many nails	FE	√	3	0.5	0.25	NE-SW	45	√			
H18	H18_233_1611em2	10	5.6	4	C	2269052.93	6965883.02	11-Jul-06	Alan Merriman	√													√	CIV	6	10	0.25	many nails	FE	√	3	0.5	0.25	NE-SW	45	√			
H18	H18_234_1611em2	13	5.54	4	B	2269080.77	6965840.19	07-Jul-06	Jim Thoren	√													√	CIV	0	4	0.25	4" nails	FE							√			
H18	H18_235_1611em2	10	5.53	4	C	2269061.94	6965903.3	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
H18	H18_240_1611em2	9	5.35	4	C	2269034.45	6965842.67	11-Jul-06	Alan Merriman	√													√	CIV	24	10	0.25	nails and wire	FE	√	6	0.5	0.25	NE-SW	45	√			
H18	H18_241_1611em2	11	5.34	4	B	2269054.8	6965893.77	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire 3x2 bundle	FE	√	3	2	0.25			√			
H18	H18_243_1611em2	11	5.25	4	B	2269072.91	6965862.25	07-Jul-06	Jim Thoren	√													√	CIV	3	10	0.25	nails	FE							√			
H18	H18_254_1611em2	10	5.02	4	C	2269077.63	6965868.41	11-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	many nails	FE							√			
H18	H18_259_1611em2	9	4.88	4	C	2269049.71	6965877.29	11-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	wire in rock	FE							√			
H18	H18_272_1611em2	11	4.56	4	B	2269091.83	6965854.75	07-Jul-06	Jim Thoren	√													√	CIV		2	0.25	4" nails											
H18	H18_273_1611em2	11	4.52	4	B	2269039.73	6965855.62	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	small scrap metal	FE							√			
H18	H18_276_1611em2	11	4.48	4	B	2269065.51	6965905.27	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	3" nail											
H18	H18_278_1611em2	9	4.45	4	C	2269058.11	6965911	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	45	√			
H18	H18_281_1611em2	13	4.35	4	B	2269088.57	6965844.6	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	vt fuze ant							FE	√	6	2	0.25			√			
H18	H18_284_1611em2	10	4.3	4	C	2269050.66	6965888.65	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.5	many nails	FE	√	3	0.5	0.25	N-S	0	√			
H18	H18_289_1611em2	11	4.17	4	B	2269059.55	6965876.16	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	4" bolt											
H18	H18_295_1611em2	11	3.95	4	B	2269068.01	6965838.08	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	4" nail								√			
H18	H18_316_1611em2	11	3.69	4	B	2269037.98	6965866.35	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	fence wire 8'/within 10' of fenc	FE										
H18	H18_338_1611em2	10	3.18	3	C	2269044.58	6965853.98	11-Jul-06	Alan Merriman	√													√	CIV	6	> 10	0.25	many nails	FE	√	3	0.5	0.25	N-S	45	√			
H18	H18_34_1610em2	16	25.6	4	A	2269025.73	6965908.21	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap meta;	FE	√	3	1	0.25			√			
H18	H18_43_1610em2	14	19.73	4	A	2269041.3	6965912.87	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	6" bolt	FE							√			
H18	H18_49_1611em2	12	40.22	4	B	2269057.45	6965852.82	07-Jul-06	Jim Thoren	√													√	CIV	3	4	4	rail road spikes	FE							√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
H18	H18_53_1611em2	9	35.2	4	C	2269064.69	6965858.55	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	rail road spike								√			
H18	H18_57_1611em2	13	32.62	4	B	2269074.29	6965866.02	07-Jul-06	Jim Thoren	√													√	CIV	0	> 10	0.25	nails	FE							√			
H18	H18_58_1610em2	15	14.2	4	A	2269027.9	6965935.18	07-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze part							FE	√	6	2	0.25			√			
H18	H18_66_1611em2	9	25.88	4	C	2269062.91	6965854.98	11-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	many nails								√			
H18	H18_69_1610em2	9	10.95	4	C	2269021.12	6965929.8	11-Jul-06	Alan Merriman	√													√	CIV	3	> 10	0.25	many nails	FE	√	3	0.5	0.25	N-S	0	√			
H18	H18_69_1611em2	13	24.26	4	B	2269079.16	6965877.55	07-Jul-06	Jim Thoren	√													√	CIV	0	> 10	1	nails	FE							√			
H18	H18_78_1611em2	13	20.94	4	B	2269084.84	6965862.89	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	starter cart screen							FE	√	9	2	0.5			√			
H18	H18_79_1611em2	13	20.83	4	B	2269074.13	6965871.66	07-Jul-06	Jim Thoren	√													√	CIV	3	10	0.25	nails	FE							√			
H18	H18_82_1611em2	12	20.48	4	B	2269060.11	6965860.11	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	6" fence wire	FE							√			
H18	H18_83_1611em2	12	20.19	4	B	2269055.4	6965849.26	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail 2"	FE							√			
H18	H18_84_1611em2	9	19.59	4	C	2269063.6	6965851.52	11-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	many nails	FE	√	3	0.5	0.25	N-S	45	√			
H18	H18_87_1610em2	10	8.7	4	C	2269027.37	6965924.83	11-Jul-06	Alan Merriman	√													√	CIV	6	3	0.25	wire pieces	FE	√	3	0.5	0.25	N-S	45	√			
H18	H18_89_1611em2	13	18.25	4	B	2269071.5	6965867.93	07-Jul-06	Jim Thoren	√													√	CIV	0	10	0.25	nails	FE							√			
H18	H18_93_1610em2	12	7.82	4	B	2269019.15	6965897.88	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							FE							√			
H18	QAdig_H18_108		18.9		QA	2269070.39	6965902.17	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
H18	QAdig_H18_281		8.9		QA	2269032.3	6965852.5	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
H18	QAdig_H18_339		7.7		QA	2269034	6965861	15-Aug-06	Alan Merriman	√													√	CIV	0	1	1	bolt	FE	√	6	1	0.25			√			
H18	QAdig_H18_342		7.7		QA	2269065.06	6965917.66	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
J02	J02_01_612_mag			99	M	2267514.512	6965836.659	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
J02	J02_02_612_mag			99	M	2267479.972	6965816.208	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
J02	J02_04_612_mag			99	M	2267481.239	6965809.652	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
J02	J02_05_612_mag			99	M	2267494.033	6965808.194	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
J02	J02_06_612_mag			99	M	2267486.588	6965781.761	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
J02	J02_07_612_mag			99	M	2267468.713	6965745.386	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
J02	J02_08_612_mag			99	M	2267470.72	6965748.827	12-Jun-06	Alan Merriman	√													√	CIV	0	1	1	fence wire								√			
J02	J02_09_612_mag			99	M	2267465.157	6965776.239	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire staple								√			
J02	J02_69_1217em1	12	15.29	4	B	2267493.6	6965792.8	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
J02	J02_73_1217em1	13	8.25	4	B	2267514.94	6965836.34	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
J02	J02_77_1217em1	12	6	4	B	2267494.64	6965806.65	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
J03	J03_64_1217em1	16	83.51	4	A	2267614	6965818.61	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	flare, expended														√			
J04	J04_113_1320em2	9	2.26	2	C	2267692.38	6965822.16	19-Jun-06	Alan Merriman																			no find - item too small											
J04	J04_123_1320em2	9	2.06	2	C	2267689.17	6965821.16	19-Jun-06	Alan Merriman																			no find - item too small											
J04	J04_46_1218em1	11	3.18	3	B	2267686.16	6965806.31	06-Jun-06	Jim Thoren																														
J04	J04_49_1218em1	11	2.86	3	B	2267686.23	6965810.44	06-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	frag, 1 inch round														√			
J04	J04_51_1218em1	10	2.74	3	C	2267687.59	6965813.59	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap <1"								√			
J04	J04_54_1218em1	11	2.62	3	B	2267683.87	6965812.93	06-Jun-06	Jim Thoren																														
J04	J04_55_1218em1	11	2.61	3	B	2267682.64	6965806.3	06-Jun-06	Jim Thoren																														
J04	J04_57_1218em1	10	2.61	3	C	2267682.59	6965797.16	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap <1"								√			
J04	J04_59_1218em1	11	2.55	3	B	2267684.26	6965789.88	06-Jun-06	Jim Thoren																			No Contact											
J04	J04_60_1218em1	11	2.5	3	B	2267684.52	6965793.3	06-Jun-06	Jim Thoren																														
J04	J04_67_1218em1	10	2.23	2	C	2267689.95	6965825.89	19-Jun-06	Alan Merriman																			no find - item too small											
J04	J04_69_1218em1	10	2.21	2	C	2267686.27	6965799.28	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap <1"								√			
J04	J04_70_1218em1	9	2.17	2	C	2267690.41	6965816.3	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap <1"								√			
J04	J04_76_1218em1	9	2.05	2	C	2267691.42	6965830.14	19-Jun-06	Alan Merriman																			no find - item too small											
J04	J04_79_1218em1	9	2	2	C	2267686.41	6965817.32	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap <1"								√			
J04	J04_82_1218em1	10	1.98	2	C	2267685.62	6965786.78	19-Jun-06	Alan Merriman	√													√	CIV	3	1	0.75	scrap <1"								√			
J04	QAdig_J04_511		5.8		QA	2267639.44	6965822.34	15-Aug-06	Alan Merriman	√													√					hot soil											
J05	J05_13_607_mag	13	9.05	0	M			07-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal pipe								√			
J05	J05_31_1218em1	13	9.05	4	B	2267812.3	6965807.41	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal pipe								√			
J05	J05_34_1218em1	12	6.34	4	B	2267807.11	6965811.39	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	bolt								√			
J05	J05_39_1218em1	13	4.42	4	B	2267726.64	6965764.88	06-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	fuze, parts								√	3	1				√			
J05	J05_47_1218em1	10	3	3	C	2267818.34	6965789.66	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	chain link								√			
J05	J05_83_1218em1	9	1.97	2	C	2267764.92	6965762.12	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap metal <1"								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J06	J06_102_1221em1	9	4.12	4	C	2267866.62	6965818.31	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	mech scrap														√			
J06	J06_105_1221em1	11	4.06	4	B	2267867.52	6965813.7	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
J06	J06_111_1221em1	10	3.69	4	C	2267911.41	6965799.74	19-Jun-06	Alan Merriman	√													√	MIL	3	1	1	ammo links								√			
J06	J06_113_1221em1	10	3.63	4	C	2267818.55	6965788.52	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	chain link								√			
J06	J06_128_1221em1	10	3.12	3	C	2267864.27	6965829.1	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire small diameter			3									
J06	J06_129_1221em1	10	3.11	3	C	2267867.79	6965738.26	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire								√			
J06	J06_134_1221em1	11	2.85	3	B	2267844.91	6965794.75	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
J06	J06_140_1221em1	11	2.76	3	B	2267863.83	6965800.38	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
J06	J06_152_1221em1	9	2.46	2	C	2267907.9	6965800.58	19-Jun-06	Alan Merriman	√													√	MIL	0	1	1	ammo link								√			
J06	J06_164_1221em1	9	2.24	2	C	2267863.77	6965789.82	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence clip								√			
J06	J06_67_1221em1	14	6.13	4	A	2267864.1	6965736.77	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
J06	J06_79_1221em1	11	5.3	4	B	2267899.91	6965806.38	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
J06	J06_82_1221em1	13	5.1	4	B	2267914.61	6965768.16	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap metal								√			
J06	J06_85_1221em1	12	4.71	4	B	2267863.88	6965820.62	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
J06	J06_89_1221em1	12	4.44	4	B	2267866.77	6965760.5	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	barb wire								√			
J06	J06_94_1221em1	12	4.33	4	B	2267911.03	6965768.73	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal								√			
J06	J06_95_1221em1	13	4.3	4	B	2267918.05	6965756.11	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal								√			
J07	J07_119_1413em2	15	13.59	4	A	2267926.66	6965738.02	15-Jun-06	Alan Merriman	√													√	CIV	0	1	0.5	3/16 fence wire, pretzel shaped								√			
J07	J07_126_1413em2	13	13.02	4	B	2268018.23	6965820.14	15-Jun-06	Alan Merriman	√													√	MIL	0	5	0.25	147 grn 9mm projo, heavy rusted								√			
J07	J07_14_1413em2	14	106.97	4	A	2268017.8	6965748.77	15-Jun-06	Alan Merriman	√							√	ORD MD	0	2	0.25	b-52 starter cart screen, cad														√			
J07	J07_141_1413em2	16	11.32	4	A	2267985.72	6965760.45	15-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ac flare cannister, aluminum								√	6	0.5	0.25	NE-SW	0	√			
J07	J07_150_1413em2	13	10.08	4	B	2268015.8	6965814.71	15-Jun-06	Alan Merriman	√							√	ORD MD	0	3	0.25	ap,300grn/7.62mm casex2														√			
J07	J07_174_1413em2	7	7.71	4	D	2268012.3	6965752.87	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	small arms pieces														√			
J07	J07_191_1413em2	15	6.82	4	A	2268014.09	6965805.2	16-Aug-06	Alan Merriman	√							√	ORD MD	3	3	0.25	50cal ap bul,38cal bul,7.62 mm c														√			
J07	J07_196_1413em2	7	6.55	4	D	2268013.83	6965755.86	11-Jul-06	Alan Merriman	√													√	MIL	3	4	0.25	small arms casing pieces								√			
J07	J07_200_1413em2	10	6.11	4	C	2268013.04	6965818.12	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	cad/small arms							FE	√	3	1	0.25			√			
J07	J07_207_1413em2	13	5.22	4	B	2268008.48	6965774.53	17-Aug-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50cal ap,300grn copper & steel,b	√	CIV	0	1	0.25	nail		√	3	0.5	0.25	N-S	0	√			
J07	J07_215_1413em2	13	5.09	4	B	2267921.26	6965788.43	15-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	18 ga wire shaped like ducks unl								√			
J07	J07_220_1413em2	12	4.93	4	B	2268012.37	6965824.54	17-Aug-06	Alan Merriman	√							√	ORD MD	0	3	0.25	tractr hth pin,hhn scrp mtl,5.56								√						√			
J07	J07_227_1413em2	9	4.73	4	C	2268017.04	6965823.35	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	small arms							FE							√			
J07	J07_238_1413em2	12	4.24	4	B	2267989.24	6965750.31	15-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ac flare base, aluminum														√			
J07	J07_286_1413em2	12	2.99	3	B	2267998.53	6965773.12	15-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	ctg actuated device, expended														√			
J07	J07_309_1413em2	11	2.61	3	B	2267941.47	6965800.38	15-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	5.56mm,link,m27/12gag fence wire																	
J07	J07_375_1413em2	9	1.89	1	C	2268007.09	6965761.88	11-Jul-06	Alan Merriman	√							√	ORD MD	0	3	0.5	fin parts, scrap (Fe)							AL	√	3		0.25			√			
J07	J07_41_1413em2	15	49.99	4	A	2267956.68	6965806.73	15-Jun-06	Alan Merriman	√													√	CIV	0	1	1	galvanized fence bracket		√	9	1	0.25	N-S	0	√			
J07	J07_42_1413em2	13	47.55	4	B	2268010.38	6965748.94	17-Aug-06	Alan Merriman	√							√	ORD MD	0	1	0.25	b-52 starter cart screen	√	CIV	3	2	0.25	t-post clips	FE	√	3					√			
J07	J07_47_1413em2	15	42.68	4	A	2267955.99	6965809.94	15-Jun-06	Alan Merriman	√													√	CIV	0	1	1	galvanized fence bracket		√	9	1	0.25	N-S	0	√			
J07	J07_51_1413em2	13	41.13	4	B	2268017.41	6965754.67	15-Jun-06	Alan Merriman	√							√	ORD MD	0	3	0.25	b-52 starter ctg screen,cad/alum														√			
J07	J07_69_1413em2	16	26.8	4	A	2267920.06	6965755.38	15-Jun-06	Alan Merriman																			no contact, reaquired 7/25/06											
J07	J07_71_1413em2	16	25.46	4	A	2267986.2	6965780.97	15-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	aluminum flare ctg, expended								√	6	2	0.25	E-W	45	√			
J07	J07_81_1413em2	15	21.63	4	A	2268003.62	6965743.61	16-Aug-06	Alan Merriman	√							√	ORD MD	3	2	0.25	mtu-4a/a ctg,0/6 wire 24" long								√	24	0.5	0.5	N-S	0	√			
J07	J07_82_1413em2	13	21.27	4	B	2268016.91	6965763.52	15-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	ac starter cart screen														√			
J08	J08_1_1413em2	14	259.78	4	A	2268076.09	6965822.2	15-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	starter cart							FE	√	9	0.5	0.25			√			
J08	J08_10_1413em2	16	127.81	4	A	2268022.64	6965774.69	15-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	sm arms scrap	√	CIV	3	2	0.25	rust flakes	OTHER	√	9	0.5	0.25			√			
J08	J08_103_1413em2	15	16.13	4	A	2268089.17	6965792.73	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_106_1413em2	12	15.5	4	B	2268045.77	6965813.37	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_107_1413em2	13	15.46	4	B	2268086.3	6965754.62	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_109_1413em2	13	15.26	4	B	2268042.94	6965801.8	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_11_1413em2	15	125.38	4	A	2268030.98	6965745.35	15-Jun-06	Alan Merriman	√							√	ORD MD	12	2	0.25	sm arms scrap	√	CIV	3	2	0.25	rust flakes, scrap	OTHER	√	3	0.5	0.5			√			
J08	J08_110_1413em2	13	15.07	4	B	2268083.34	6965758.86	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_111_1413em2	15	15.03	4	A	2268096.78	6965807.63	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_112_1413em2	13	14.82	4	B	2268086.02	6965831.79	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_114_1413em2	10	14.36	4	C	2268049.27	6965813.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J08	J08_115_1413em2	11	14.32	4	B	2268073.38	6965788.45	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_116_1413em2	13	14.32	4	B	2268102.83	6965769.58	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_117_1413em2	14	14.22	4	A	2268111.9	6965813.31	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_118_1413em2	10	13.9	4	C	2268082.65	6965754.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_12_1413em2	14	113.22	4	A	2268092.54	6965795.8	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_121_1413em2	13	13.31	4	B	2268108.74	6965820.74	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_124_1413em2	12	13.09	4	B	2268105.59	6965807.37	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_129_1413em2	10	12.54	4	C	2268021.59	6965752.83	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	9	0.5	0.5			√			
J08	J08_13_1413em2	13	112.99	4	B	2268071.72	6965793.36	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_130_1413em2	10	12.26	4	C	2268070.31	6965807.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_131_1413em2	13	12.18	4	B	2268083.87	6965835.55	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_132_1413em2	12	12.12	4	B	2268062.55	6965793.05	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_134_1413em2	14	11.9	4	A	2268078.46	6965739.34	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_135_1413em2	14	11.87	4	A	2268063.6	6965785.7	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_137_1413em2	10	11.74	4	C	2268047.76	6965801.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_140_1413em2	16	11.52	4	A	2268029.66	6965740.89	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_144_1413em2	11	11.24	4	B	2268072.77	6965813.55	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_145_1413em2	13	11.05	4	B	2268105.12	6965741.73	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_146_1413em2	13	11.03	4	B	2268071.95	6965767.48	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_148_1413em2	13	10.45	4	B	2268081	6965797.83	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_149_1413em2	15	10.17	4	A	2268106.95	6965753.79	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_15_1413em2	14	106.6	4	A	2268067.92	6965780.91	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_151_1413em2	10	10.05	4	C	2268069.18	6965784.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_152_1413em2	14	9.95	4	A	2268075.43	6965743.94	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_153_1413em2	7	9.88	4	D	2268053.25	6965779.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_156_1413em2	13	9.48	4	B	2268054.82	6965804.84	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_157_1413em2	14	9.41	4	A	2268101.32	6965835.54	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_158_1413em2	12	8.9	4	B	2268100.91	6965813.38	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_16_1413em2	15	104.54	4	A	2268109.68	6965756.88	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_160_1413em2	11	8.78	4	B	2268114.26	6965764.41	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_161_1413em2	10	8.73	4	C	2268068	6965797.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_162_1413em2	9	8.6	4	C	2268047.12	6965809.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_163_1413em2	10	8.46	4	C	2268076.86	6965788.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_164_1413em2	12	8.35	4	B	2268062.94	6965796.75	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_166_1413em2	15	8.22	4	A	2268054.93	6965834.77	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_169_1413em2	12	8.07	4	B	2268099.32	6965825.89	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_17_1413em2	13	95.35	4	B	2268055.54	6965801.23	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_170_1413em2	12	8.07	4	B	2268056.44	6965830.41	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_171_1413em2	12	8.05	4	B	2268116.62	6965796.4	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_176_1413em2	12	7.62	4	B	2268101.1	6965766.48	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_177_1413em2	13	7.43	4	B	2268050.05	6965793.07	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_178_1413em2	13	7.41	4	B	2268066.05	6965827.4	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_18_1413em2	14	91.42	4	A	2268042.57	6965811.48	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_181_1413em2	9	7.3	4	C	2268063.33	6965818.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_184_1413em2	13	7.13	4	B	2268088.38	6965817.4	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_185_1413em2	13	7.07	4	B	2268108.95	6965777.72	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_186_1413em2	9	7.01	4	C	2268035.62	6965808.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_187_1413em2	15	6.98	4	A	2268032.22	6965780.79	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_188_1413em2	15	6.94	4	A	2268076.05	6965830.66	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_189_1413em2	13	6.88	4	B	2268076.3	6965769.86	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_19_1413em2	13	86.52	4	B	2268029.02	6965754.22	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_190_1413em2	12	6.83	4	B	2268051.5	6965816.16	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_192_1413em2	13	6.81	4	B	2268027.01	6965773.02	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J08	J08_195_1413em2	16	6.61	4	A	2268027.47	6965788.45	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_197_1413em2	10	6.34	4	C	2268109.79	6965795.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_198_1413em2	13	6.33	4	B	2268020.77	6965760.18	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_20_1413em2	13	81.84	4	B	2268078.28	6965791.67	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_202_1413em2	12	5.8	4	B	2268057.53	6965808.38	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_204_1413em2	13	5.57	4	B	2268060.21	6965745.2	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_205_1413em2	15	5.34	4	A	2268113.39	6965753.66	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_206_1413em2	11	5.29	4	B	2268068.17	6965740.6	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_211_1413em2	13	5.14	4	B	2268029.91	6965759	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_213_1413em2	13	5.09	4	B	2268040.24	6965742.57	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_214_1413em2	15	5.09	4	A	2268085.22	6965762.29	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_216_1413em2	10	5.06	4	C	2268071.74	6965746.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_218_1413em2	13	5.02	4	B	2268022.57	6965808.49	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_219_1413em2	12	5	4	B	2268054.34	6965751.98	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_22_1413em2	11	78.15	4	B	2268065.02	6965810.73	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_222_1413em2	9	4.92	4	C	2268077.05	6965760.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_223_1413em2	12	4.78	4	B	2268029.5	6965826.42	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_225_1413em2	12	4.76	4	B	2268097.77	6965745.27	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_226_1413em2	11	4.75	4	B	2268110.5	6965750.3	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_228_1413em2	13	4.72	4	B	2268023.11	6965770.69	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_229_1413em2	12	4.59	4	B	2268024.58	6965827.95	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_23_1413em2	13	73.12	4	B	2268075.56	6965800.2	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_233_1413em2	12	4.35	4	B	2268118.2	6965814.77	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_236_1413em2	13	4.29	4	B	2268097.39	6965818.45	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_237_1413em2	12	4.25	4	B	2268043.38	6965833.12	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_239_1413em2	14	4.2	4	A	2268069.37	6965831.27	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_24_1413em2	10	69.79	4	C	2268073.08	6965781	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_240_1413em2	11	4.19	4	B	2268075.9	6965754.58	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_241_1413em2	10	4.12	4	C	2268031.2	6965831.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_245_1413em2	9	3.93	4	C	2268077.19	6965784.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_252_1413em2	9	3.72	4	C	2268056.29	6965780.35	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_253_1413em2	13	3.68	4	B	2268063.59	6965762.12	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_254_1413em2	9	3.66	4	C	2268023.84	6965782.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_256_1413em2	9	3.53	3	C	2268081.62	6965762.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_26_1413em2	15	67.13	4	A	2268047.38	6965775.09	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_260_1413em2	10	3.41	3	C	2268095.69	6965824.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_261_1413em2	11	3.4	3	B	2268107.2	6965790.54	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_262_1413em2	9	3.36	3	C	2268093.77	6965742.18	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	CU	√	6	0.5	0.5			√			
J08	J08_264_1413em2	10	3.34	3	C	2268104.43	6965831.29	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_268_1413em2	11	3.3	3	B	2268040.1	6965836.51	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_269_1413em2	9	3.28	3	C	2268105.88	6965802.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_27_1413em2	13	66.95	4	B	2268052.73	6965748.93	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_270_1413em2	9	3.25	3	C	2268042.86	6965794.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_272_1413em2	9	3.21	3	C	2268050.18	6965757.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_276_1413em2	9	3.12	3	C	2268034.71	6965834.49	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_277_1413em2	12	3.1	3	B	2268029.67	6965769.22	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_28_1413em2	15	66.87	4	A	2268040.85	6965760.27	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_281_1413em2	11	3.05	3	B	2268045.76	6965828.53	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_282_1413em2	10	3.02	3	C	2268089.44	6965822.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_285_1413em2	12	3	3	B	2268056.17	6965748.61	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_288_1413em2	7	2.97	3	D	2268101	6965822.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_289_1413em2	9	2.96	3	C	2268023.12	6965822	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_29_1413em2	13	66.2	4	B	2268074.3	6965795.59	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J08	J08_290_1413em2	11	2.96	3	B	2268117.01	6965783.97	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_291_1413em2	10	2.94	3	C	2268107.51	6965824.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_292_1413em2	10	2.94	3	C	2268112.86	6965774.24	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_294_1413em2	10	2.89	3	C	2268114.46	6965786.94	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_297_1413em2	10	2.81	3	C	2268115.98	6965780.75	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_298_1413em2	7	2.8	3	D	2268101.66	6965817.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_3_1413em2	13	220.97	4	B	2268062.92	6965807.16	15-Jun-06	Alan Merriman	√													√	CIV	12	3	0.5	barb wire	FE	√	> 24	0.5	0.25			√			
J08	J08_30_1413em2	11	63.25	4	B	2268071.63	6965777.86	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	CU	√	6	0.5	0.5			√			
J08	J08_300_1413em2	11	2.73	3	B	2268066.28	6965758.51	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_303_1413em2	10	2.68	3	C	2268085.11	6965820.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_304_1413em2	10	2.68	3	C	2268068.45	6965791.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	CU	√	6	0.5	0.5			√			
J08	J08_31_1413em2	14	61.78	4	A	2268100.12	6965797.59	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_315_1413em2	7	2.51	3	D	2268024.98	6965750.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_318_1413em2	8	2.49	2	D	2268114.44	6965825.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_32_1413em2	16	59.73	4	A	2268066.15	6965773.01	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	CU	√	6	0.5	0.5			√			
J08	J08_320_1413em2	8	2.46	2	D	2268106.59	6965771.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_322_1413em2	9	2.44	2	C	2268034.01	6965793.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_325_1413em2	9	2.42	2	C	2268075.02	6965748.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_326_1413em2	10	2.39	2	C	2268087.98	6965743.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_327_1413em2	9	2.38	2	C	2268052.08	6965740.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_328_1413em2	9	2.35	2	C	2268092.89	6965820.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_33_1413em2	12	57.81	4	B	2268047.8	6965765.3	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_335_1413em2	7	2.28	2	D	2268094.88	6965827.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_337_1413em2	9	2.27	2	C	2268068.04	6965752.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_339_1413em2	8	2.25	2	D	2268040.62	6965754.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_34_1413em2	13	56.77	4	B	2268046.73	6965754.95	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_349_1413em2	6	2.13	2	D	2268085.73	6965827.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_35_1413em2	11	56.5	4	B	2268048.77	6965778.97	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_355_1413em2	8	2.07	2	D	2268067.21	6965835.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_36_1413em2	13	56.21	4	B	2268067.84	6965800.75	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_367_1413em2	10	1.95	2	C	2268084.84	6965785.81	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_368_1413em2	8	1.95	2	D	2268051.62	6965820.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_37_1413em2	12	54.55	4	B	2268043.12	6965764.94	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	3	0.5	0.5			√			
J08	J08_371_1413em2	10	1.94	2	C	2268113.63	6965808.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_372_1413em2	10	1.93	2	C	2268079.05	6965750.06	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_377_1413em2	6	1.87	1	D	2268020.28	6965826.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_379_1413em2	7	1.87	1	D	2268113.45	6965745.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_38_1413em2	15	52.97	4	A	2268027.12	6965822.17	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	SS	√	6	0.5	0.5			√			
J08	J08_381_1413em2	7	1.84	1	D	2268029.47	6965797.82	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_39_1413em2	12	52.87	4	B	2268100.27	6965750.48	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_390_1413em2	6	1.78	1	D	2268095.23	6965791.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_392_1413em2	7	1.78	1	D	2268084.96	6965745.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_394_1413em2	6	1.78	1	D	2268049.67	6965796.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_395_1413em2	8	1.77	1	D	2268028.88	6965776.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_4_1413em2	14	209.57	4	A	2268032.7	6965748.63	15-Jun-06	Alan Merriman	√							√	ORD MD	12	> 10	0.5	sm arms scrap	√	CIV	12	> 10	0.5	rust flakes and scrap	OTHER	√	3	0.5	0.5			√			
J08	J08_401_1413em2	6	1.73	1	D	2268115.26	6965777.42	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_404_1413em2	6	1.72	1	D	2268082.23	6965781.11	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_405_1413em2	7	1.71	1	D	2268057.66	6965783.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_410_1413em2	10	1.68	1	C	2268023.27	6965778.19	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_415_1413em2	6	1.66	1	D	2268082.92	6965748.65	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_416_1413em2	8	1.65	1	D	2268036.76	6965816.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_418_1413em2	6	1.64	1	D	2268094.17	6965810.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_420_1413em2	6	1.63	1	D	2268048.53	6965739.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J08	J08_429_1413em2	6	1.59	1	D	2268066.41	6965788.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_43_1413em2	10	45.52	4	C	2268066.07	6965804.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_436_1413em2	6	1.56	1	D	2268022.85	6965739.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_437_1413em2	7	1.56	1	D	2268024.59	6965831.65	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_438_1413em2	6	1.54	1	D	2268031.78	6965811.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_44_1413em2	14	43.69	4	A	2268023.63	6965764.84	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_441_1413em2	9	1.53	1	C	2268105.35	6965810.81	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_45_1413em2	10	43.16	4	C	2268106.83	6965750.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_458_1413em2	7	1.39	1	D	2268079.03	6965773.39	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	CU		6	0.5	0.5			√			
J08	J08_463_1413em2	4	1.36	1	F	2268111.39	6965805.82	09-Aug-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_464_1413em2	7	1.36	1	D	2268100.24	6965831.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_466_1413em2	6	1.33	1	D	2268027.43	6965791.74	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_481_1413em2	9	1.22	1	C	2268116.56	6965792.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_49_1413em2	16	42.03	4	A	2268030.52	6965784.09	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_491_1413em2	8	1.16	1	D	2268097.8	6965810.82	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_493_1413em2	7	1.15	1	D	2268104.48	6965834.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_5_1413em2	16	173.66	4	A	2268074.3	6965825.89	15-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	starter cart lids							FE	√	9	0.5	0.25			√			
J08	J08_50_1413em2	13	41.3	4	B	2268086.96	6965810.82	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_514_1413em2	5	1.06	1	D	2268066.81	6965745.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_52_1413em2	12	40.11	4	B	2268061.87	6965803.48	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_53_1413em2	15	38.68	4	A	2268076.73	6965815.03	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_54_1413em2	13	38.65	4	B	2268073.98	6965833.73	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_56_1413em2	12	35.37	4	B	2268085.41	6965804.88	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_57_1413em2	16	34.99	4	A	2268106.91	6965759.48	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_59_1413em2	13	33.58	4	B	2268056.34	6965764.62	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_6_1413em2	16	154.58	4	A	2268076.72	6965818.42	15-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.5	starter cart lids							FE	√	9	0.5	0.5			√			
J08	J08_60_1413em2	13	32.96	4	B	2268068.45	6965814.73	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_61_1413em2	13	32.82	4	B	2268088.27	6965750.7	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_62_1413em2	13	32.56	4	B	2268105.68	6965747.09	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_63_1413em2	13	31.64	4	B	2268108.88	6965768.59	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_65_1413em2	16	29.97	4	A	2268099.4	6965737.98	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_66_1413em2	13	27.33	4	B	2268054.88	6965758.59	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_67_1413em2	13	27.21	4	B	2268051.91	6965808.04	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_68_1413em2	13	26.8	4	B	2268041.69	6965805.15	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_7_1413em2	14	145.51	4	A	2268066.51	6965777.72	15-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	0.5	str cart lids, atu-35 arming van							FE	√	9	0.5	0.5			√			
J08	J08_70_1413em2	13	26.47	4	B	2268072.45	6965801.95	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_74_1413em2	11	24.23	4	B	2268115.48	6965800.14	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_75_1413em2	13	22.3	4	B	2268110.78	6965762.16	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_76_1413em2	10	22.29	4	C	2268068.7	6965818.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_78_1413em2	10	21.83	4	C	2268050.74	6965767.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_79_1413em2	13	21.76	4	B	2268113.88	6965790.8	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_8_1413em2	14	134.66	4	A	2268100.09	6965800.9	15-Jun-06	Alan Merriman	√							√	ORD MD	6	2	0.25	2 cads	√	CIV	12	1	1	bolt	FE	√	12	0.5	0.5			√			
J08	J08_80_1413em2	13	21.67	4	B	2268106.5	6965787.01	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_85_1413em2	11	20.79	4	B	2268044.34	6965769.16	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_86_1413em2	12	20.55	4	B	2268043.44	6965757.5	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_87_1413em2	15	20.44	4	A	2268097.21	6965804.07	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_89_1413em2	14	20.23	4	A	2268034.27	6965800.53	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_9_1413em2	13	128.34	4	B	2268102.05	6965792.84	15-Jun-06	Alan Merriman	√							√	ORD MD	3	2	1	starter cart lids							FE	√	9	0.5	0.25			√			
J08	J08_90_1413em2	12	20.16	4	B	2268081.7	6965823.93	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_91_1413em2	13	19.93	4	B	2268076.48	6965763.74	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_93_1413em2	13	19	4	B	2268081.03	6965815.05	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_94_1413em2	12	18.33	4	B	2268107.62	6965763.45	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_95_1413em2	13	17.85	4	B	2268054.41	6965772.65	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J08	J08_96_1413em2	15	17.52	4	A	2268069.44	6965771.17	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_97_1413em2	13	17.49	4	B	2268092.87	6965799.15	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_98_1413em2	10	16.77	4	C	2268081.42	6965827.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	J08_99_1413em2	13	16.45	4	B	2268106.55	6965782.49	15-Jun-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J08	QAdig_J08_196		12.3		QA	2268022.47	6965835	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wore	FE	√	3	0.5	0.25			√			
J08	QAdig_J08_241		10.4		QA	2268069.69	6965789.14	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
J09	J09_110_1206em2	12	9.75	4	B	2268130.66	6965771.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_113_1206em2	14	9.4	4	A	2268120.45	6965775.69	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_124_1206em2	12	8.68	4	B	2268149.85	6965767.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_135_1206em2	14	7.9	4	A	2268164.96	6965743.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_144_1206em2	11	7.21	4	B	2268150.06	6965760.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_165_1206em2	13	5.94	4	B	2268126.64	6965789.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_166_1206em2	13	5.93	4	B	2268160.75	6965760.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_176_1206em2	14	5.59	4	A	2268121.81	6965834.63	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_18_1206em2	14	45.22	4	A	2268136.49	6965778.1	21-Jul-06	Alan Merriman	√													√	CIV	0	1	0.5	bolt	FE	√	12	0.5	0.5			√			
J09	J09_182_1206em2	12	5.48	4	B	2268138.95	6965791.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_193_1206em2	12	4.91	4	B	2268174.85	6965746.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_195_1206em2	12	4.79	4	B	2268146.73	6965769.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_208_1206em2	12	4.37	4	B	2268132.05	6965761.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_214_1206em2	10	4.22	4	C	2268153.56	6965753.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_231_1206em2	11	3.84	4	B	2268194.25	6965832.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_240_1206em2	10	3.74	4	C	2268120.52	6965761.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_247_1206em2	10	3.63	4	C	2268194.77	6965813.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_257_1206em2	9	3.45	3	C	2268135.84	6965763.94	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_259_1206em2	10	3.42	3	C	2268125.74	6965771.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_260_1206em2	8	3.38	3	D	2268162.97	6965833.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_263_1206em2	10	3.36	3	C	2268157.21	6965772.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_266_1206em2	9	3.31	3	C	2268140.48	6965764.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_270_1206em2	9	3.21	3	C	2268132.32	6965776.29	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_275_1206em2	9	3.15	3	C	2268197.51	6965819.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_283_1206em2	12	3.03	3	B	2268176.76	6965757.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_285_1206em2	10	3.02	3	C	2268161.33	6965775.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_290_1206em2	13	2.91	3	B	2268140.7	6965781.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_292_1206em2	9	2.89	3	C	2268149.68	6965742.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_295_1206em2	13	2.86	3	B	2268121.83	6965825.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_303_1206em2	8	2.74	3	D	2268192.91	6965772.32	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_31_1206em2	14	28.78	4	A	2268123.87	6965775.69	21-Jul-06	Alan Merriman	√							√	ORD MD	12	1	0.5	ac seat part	√	MIL				bladed, hand swept, scrap metal	FE	√	6	2	2			√			
J09	J09_314_1206em2	7	2.55	3	D	2268125.16	6965796.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_316_1206em2	8	2.53	3	D	2268134.7	6965737.19	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_321_1206em2	7	2.45	2	D	2268131.48	6965788.83	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_323_1206em2	8	2.42	2	D	2268122.23	6965791.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_325_1206em2	8	2.39	2	D	2268161.91	6965749.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_333_1206em2	9	2.29	2	C	2268208.48	6965801.51	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_335_1206em2	7	2.29	2	D	2268153.74	6965757.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_339_1206em2	7	2.27	2	D	2268167.64	6965748.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_342_1206em2	9	2.25	2	C	2268196.84	6965777.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_346_1206em2	7	2.24	2	D	2268141.72	6965736.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_383_1206em2	8	1.9	2	D	2268181.02	6965818.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_390_1206em2	8	1.86	1	D	2268118.66	6965765.78	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_391_1206em2	9	1.86	1	C	2268121.09	6965796.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_392_1206em2	7	1.85	1	D	2268129.31	6965739.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_396_1206em2	6	1.84	1	D	2268153.27	6965766.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_397_1206em2	7	1.83	1	D	2268134.43	6965786.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J09	J09_404_1206em2	7	1.8	1	D	2268143.53	6965821.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_407_1206em2	5	1.78	1	D	2268142.02	6965757.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_418_1206em2	7	1.69	1	D	2268145.85	6965761.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_421_1206em2	4	1.65	1	F	2268140.27	6965760.62			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_423_1206em2	7	1.65	1	D	2268206.12	6965823.57	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_424_1206em2	4	1.64	1	F	2268179.95	6965742.1			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_425_1206em2	8	1.64	1	D	2268181.66	6965767.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_433_1206em2	7	1.57	1	D	2268129.37	6965808.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_438_1206em2	5	1.51	1	D	2268146.88	6965834.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_461_1206em2	7	1.39	1	D	2268169.97	6965753.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_473_1206em2	6	1.3	1	D	2268176.02	6965741.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_479_1206em2	6	1.26	1	D	2268169.47	6965745.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_485_1206em2	6	1.2	1	D	2268139.66	6965827.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_489_1206em2	5	1.19	1	D	2268165.38	6965803.19	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_496_1206em2	5	1.14	1	D	2268157.95	6965831.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_503_1206em2	4	1.12	1	F	2268203.77	6965765.62			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_512_1206em2	7	1.09	1	D	2268134.23	6965781.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_516_1206em2	5	1.06	1	D	2268173.41	6965783.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_517_1206em2	4	1.06	1	F	2268190.3	6965765.63			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_522_1206em2	4	1.03	1	F	2268183.75	6965795.38			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_527_1206em2	5	1.02	1	D	2268207.95	6965755.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_529_1206em2	5	1.01	1	D	2268154.77	6965761.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_531_1206em2	5	1.01	1	D	2268170.04	6965790.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_64_1206em2	13	15	4	B	2268120.41	6965754.69	21-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	rebar	FE	√	9	0.5	0.25			√			
J09	J09_77_1206em2	14	13.7	4	A	2268186.48	6965768.43	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_85_1206em2	11	12.67	4	B	2268136.13	6965774.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J09	J09_95_1206em2	13	11.38	4	B	2268182.39	6965737.67	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_114_1206em2	14	9.4	4	A	2268291.05	6965818.23	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_126_1206em2	16	8.54	4	A	2268244.54	6965800.8	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_175_1206em2	15	5.6	4	A	2268248.59	6965826.44	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_189_1206em2	12	5.01	4	B	2268303.64	6965821.74	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_204_1206em2	12	4.5	4	B	2268286.84	6965835.42	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_212_1206em2	11	4.25	4	B	2268276.98	6965796.52	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_219_1206em2	11	4.06	4	B	2268294.05	6965826.94	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_229_1206em2	11	3.86	4	B	2268277.95	6965799.91	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_233_1206em2	11	3.83	4	B	2268227.17	6965833.6	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_235_1206em2	12	3.77	4	B	2268243.92	6965771.47	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_239_1206em2	12	3.74	4	B	2268227.06	6965775.15	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_244_1206em2	12	3.7	4	B	2268241.62	6965822.84	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_281_1206em2	10	3.06	3	C	2268316.76	6965811.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_297_1206em2	9	2.84	3	C	2268318.12	6965829.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_298_1206em2	10	2.8	3	C	2268283.48	6965803.4	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_310_1206em2	10	2.63	3	C	2268292.77	6965771.28	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_313_1206em2	10	2.56	3	C	2268276.46	6965746.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_364_1206em2	8	2.05	2	D	2268266.72	6965832.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_365_1206em2	8	2.05	2	D	2268293.95	6965834.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_369_1206em2	7	2.03	2	D	2268289.28	6965828.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_370_1206em2	8	2.01	2	D	2268298.81	6965788.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_376_1206em2	7	1.96	2	D	2268268.24	6965824.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_380_1206em2	8	1.91	2	D	2268262.2	6965822.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_380_1613em2	12	2.27	2	B	2268246.84	6965736.53	08-Jun-06	Jim Thoren	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_384_1206em2	8	1.9	2	D	2268297.57	6965827.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_386_1206em2	7	1.89	1	D	2268293.46	6965808.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J10	J10_387_1206em2	7	1.89	1	D	2268301.78	6965790.4	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_417_1206em2	6	1.7	1	D	2268284.45	6965833.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_419_1206em2	6	1.69	1	D	2268302.43	6965836.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_431_1206em2	7	1.57	1	D	2268273.34	6965748.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_432_1206em2	8	1.57	1	D	2268270.23	6965819.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_439_1206em2	7	1.5	1	D	2268233	6965830.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_443_1206em2	6	1.47	1	D	2268297.59	6965813.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_444_1206em2	5	1.47	1	D	2268264.23	6965793.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_445_1206em2	6	1.47	1	D	2268280.41	6965826.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_448_1206em2	6	1.44	1	D	2268299.34	6965832.39	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_451_1206em2	6	1.43	1	D	2268285.77	6965788.7	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_455_1206em2	5	1.42	1	D	2268235.16	6965803.89	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_457_1206em2	5	1.41	1	D	2268264.77	6965827.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_460_1206em2	4	1.4	1	F	2268301.99	6965795.97			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_463_1206em2	6	1.39	1	D	2268286.28	6965813.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_472_1206em2	5	1.3	1	D	2268228.95	6965809.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_477_1206em2	7	1.27	1	D	2268310.78	6965813.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_480_1206em2	5	1.23	1	D	2268301.27	6965744.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_481_1206em2	5	1.22	1	D	2268258.12	6965796.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_482_1206em2	7	1.22	1	D	2268244.31	6965832.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_483_1206em2	6	1.21	1	D	2268284.03	6965819.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_508_1206em2	4	1.1	1	F	2268298.82	6965785.46			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_524_1206em2	6	1.03	1	D	2268225.06	6965822.92	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_530_1206em2	5	1.01	1	D	2268296.56	6965739.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_532_1206em2	4	1.01	1	F	2268310.06	6965806.2			√													√	CIV	12			bladed, hand swept, scrap metal	FE	√	6	0.5	0.5			√			
J10	J10_7_1206em2	15	103.72	4	A	2268316.8	6965825.41	08-Jun-06	Jim Thoren	√							√	ORD MD	12	2	0.25	frag							FE	√	12	6	2			√			
J10	J10_86_1206em2	14	12.64	4	A	2268270.38	6965833.05	08-Jun-06	Jim Thoren	√							√	ORD MD	12	2	0.25	small arms	√	CIV	12	> 10	0.5	nails	FE	√	3	0.5	0.5			√			
J10	J10_89_1206em2	15	12.53	4	A	2268313.12	6965825.32	08-Jun-06	Jim Thoren	√							√	ORD MD	12	2	0.25	frag							FE	√	3	0.5	0.5			√			
J10	J10_99_1206em2	12	10.97	4	B	2268230.83	6965832.95	08-Jun-06	Jim Thoren	√													√	CIV	12	1	0.25	bolt	FE	√	6	0.5	0.5			√			
J11	J11_100_1206em2	13	10.96	4	B	2268346.98	6965747.05	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	banding	SS	√	3	0.5	0.25	N-S	45	√			
J11	J11_101_1206em2	16	10.96	4	A	2268375.12	6965748.92	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	aluminum mec scrap							AL	√	3	0.5	0.25	N-S	0	√			
J11	J11_105_1319em2	13	7.98	4	B	2268362.87	6965819.38	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal							OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_106_1206em2	13	10.23	4	B	2268346.55	6965831.72	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_11_1206em2	15	71.29	4	A	2268340.34	6965755.83	08-Jun-06	Jim Thoren	√													√	CIV	3	1	4	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_111_1206em2	12	9.72	4	B	2268397.58	6965818.09	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_114_1319em2	13	7.6	4	B	2268357.88	6965803.91	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_123_1206em2	12	8.71	4	B	2268383.76	6965833.75	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	drift pin	OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_124_1319em2	13	6.77	4	B	2268354.27	6965747.34	08-Jun-06	Jim Thoren	√													√	CIV	3	3	0.25	wires, 6 gage &a piece of steel	FE	√	6	0.5	0.25	E-W	0	√			
J11	J11_125_1206em2	14	8.56	4	A	2268394.24	6965783.07	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_128_1206em2	10	8.41	4	C	2268417.39	6965784.67	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bracket, vt							FE	√	6	2	1	N-S	0	√			
J11	J11_13_1206em2	13	62.81	4	B	2268365.66	6965831.38	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap metal	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_130_1206em2	12	8.34	4	B	2268414.56	6965756.24	08-Jun-06	Jim Thoren	√							√	ORD MD	12	1	1	20mm projectile, target practice							OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_131_1319em2	11	6.29	4	B	2268351.71	6965741.11	08-Jun-06	Jim Thoren	√													√	CIV	0	3	0.5	nail and piece of aluminum	AL	√	3	1	0.5	NE-SW	0	√			
J11	J11_133_1319em2	12	6.28	4	B	2268363.1	6965806.06	08-Jun-06	Jim Thoren	√							√	ORD MD	6		1	40 mm casing							OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_134_1206em2	12	7.92	4	B	2268374.72	6965761.22	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	links	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_141_1319em2	10	5.67	4	C	2268355.88	6965741.52	11-Jul-06	Alan Merriman	√													√	MIL	3	2	0.25	scrap metal	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_142_1206em2	13	7.26	4	B	2268375.05	6965820.43	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	flare							OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_143_1206em2	13	7.25	4	B	2268341.79	6965826.97	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_144_1319em2	13	5.61	4	B	2268361.46	6965816.05	08-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	cartridge case							OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_146_1206em2	9	7.06	4	C	2268394.69	6965803.2	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	20 penny nail	SS		9	0.5	0.25	N-S	0	√			
J11	J11_147_1206em2	10	6.98	4	C	2268357.61	6965830.6	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50 cal ap							FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_151_1206em2	13	6.73	4	B	2268341.17	6965835.21	08-Jun-06	Jim Thoren	√							√	EMAT MD	12	4	1	cartridges							OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_152_1319em2	12	5.26	4	B	2268353.38	6965780.41	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail	FE	√	3	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J11	J11_154_1206em2	13	6.39	4	B	2268336.02	6965751.55	08-Jun-06	Jim Thoren	√							√	ORD MD	3	2	1	blank cad							OTHER	√	3	0.5	0.25	N-S	0				
J11	J11_156_1206em2	13	6.36	4	B	2268349.57	6965740.89	08-Jun-06	Jim Thoren	√							√	ORD MD	0	2	0.25	expended cad	√	CIV				nail	FE	√	3	1	1	N-S	0	√			
J11	J11_16_1319em2	16	46.8	4	A	2268355.81	6965764.57	08-Jun-06	Jim Thoren	√													√	CIV	18	1	2	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_161_1206em2	13	6.03	4	B	2268416.1	6965793.22	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_162_1206em2	12	6.02	4	B	2268416	6965806.15	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_164_1206em2	11	5.97	4	B	2268383	6965829.01	08-Jun-06	Jim Thoren	√													√	CIV	12	1	1	bolt	FE	√	3	0.5	0.25	N-S	45	√			
J11	J11_170_1206em2	12	5.72	4	B	2268371.02	6965808.5	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	45 projo							OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_170_1319em2	10	4.69	4	C	2268362.08	6965783.09	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	sm pieces brass casing							OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_177_1206em2	13	5.59	4	B	2268402.7	6965766.04	08-Jun-06	Jim Thoren	√													√	CIV	6	2	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_183_1206em2	11	5.47	4	B	2268397.52	6965750.1	08-Jun-06	Jim Thoren	√													√	CIV	3	1	2	scrap metal	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_186_1206em2	11	5.31	4	B	2268380.23	6965756.49	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_194_1319em2	13	4.02	4	B	2268359.59	6965754.27	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	nail	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_197_1206em2	12	4.75	4	B	2268403.36	6965814.43	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	fragment							OTHER	√	3	0.5	0.25	N-S	45	√			
J11	J11_199_1206em2	11	4.7	4	B	2268378.4	6965822.77	08-Jun-06	Jim Thoren	√							√	EMAT MD	3	2	1	blanks							OTHER	√	3	0.5	0.25	N-S	45	√			
J11	J11_20_1206em2	15	43.82	4	A	2268336.53	6965780.34	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_200_1206em2	11	4.66	4	B	2268388.02	6965776.62	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail	FE	√	3	0.5	0.25	N-S	45	√			
J11	J11_205_1206em2	11	4.43	4	B	2268415.99	6965826.93	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	linkage	FE	√	3	0.5	0.25	N-S	45	√			
J11	J11_207_1319em2	11	3.6	3	B	2268358.45	6965784.73	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_208_1319em2	13	3.55	3	B	2268356.03	6965755.92	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_21_1206em2	15	41.85	4	A	2268375.1	6965789.72	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	bolt	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_211_1206em2	13	4.28	4	B	2268345.9	6965827.23	08-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	50 cal	√	CIV	3	1	1	(2nd item) aluminum scrap	AL	√	3	0.5	0.25	N-S	0	√			
J11	J11_216_1206em2	11	4.15	4	B	2268390.98	6965805.59	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	brass	OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_22_1206em2	15	35.15	4	A	2268349.04	6965817.46	08-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_220_1206em2	11	4.03	4	B	2268376.74	6965781.57	08-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	scrap							FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_221_1206em2	12	4.01	4	B	2268408.52	6965738.38	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_224_1206em2	9	3.96	4	C	2268408.75	6965816.96	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	20 penny nail	FE	√	9	0.5	0.25	N-S	0	√			
J11	J11_23_1206em2	14	34.59	4	A	2268359.46	6965826.24	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_238_1319em2	11	2.85	3	B	2268363.77	6965796.55	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	spring	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_24_1206em2	16	34.39	4	A	2268385.95	6965772.29	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap metal	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_241_1206em2	11	3.73	4	B	2268331.34	6965749.36	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal							OTHER	√	3	0.5	0.25	N-S	45	√			
J11	J11_245_1206em2	11	3.7	4	B	2268390.14	6965783.62	08-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	50 cal							OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_25_1206em2	13	34.31	4	B	2268350.41	6965830.07	08-Jun-06	Jim Thoren	√							√	ORD MD	12	> 10	2	piece of VT M166 fuze														√			
J11	J11_250_1206em2	11	3.57	3	B	2268391.37	6965790.84	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	link								√			
J11	J11_252_1206em2	12	3.56	3	B	2268409.89	6965822.02	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√						√			
J11	J11_253_1206em2	9	3.5	3	C	2268331.62	6965835.29	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	hinge	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_261_1206em2	11	3.36	3	B	2268391.05	6965811.29	08-Jun-06	Jim Thoren	√													√	CIV	3	2	0.25	nail and scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_27_1206em2	13	32.74	4	B	2268415.14	6965768.19	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	drain								√			
J11	J11_277_1206em2	11	3.11	3	B	2268413.45	6965816.06	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail											
J11	J11_28_1206em2	10	30.92	4	C	2268410.73	6965770.53	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.5	fuze bracket, vt							FE	√	6	1	0.5	E-W	0	√			
J11	J11_29_1206em2	13	30	4	B	2268408.34	6965813.63	08-Jun-06	Jim Thoren	√							√	ORD MD	3	3	1	brass														√			
J11	J11_293_1206em2	11	2.89	3	B	2268368.03	6965813.89	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	tubing	CU	√	6	0.5	0.25	N-S	0	√			
J11	J11_3_1206em2	15	210.32	4	A	2268413.12	6965775.46	08-Jun-06	Jim Thoren	√							√	ORD MD	0	1	8	starter case							OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_3_1319em2	15	291.48	4	A	2268355.23	6965760.67	08-Jun-06	Jim Thoren	√													√	MIL	12	1	1	aluminum sheet	AL	√	3	0.5	0.25	N-S	0	√			
J11	J11_30_1206em2	13	29.42	4	B	2268338.22	6965747.75	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	aluminum slag														√			
J11	J11_302_1206em2	12	2.74	3	B	2268343.3	6965742.04	08-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	flare part														√			
J11	J11_31_1319em2	13	24.15	4	B	2268355.89	6965738.18	08-Jun-06	Jim Thoren	√													√	CIV	6	10	4	misc trash								√			
J11	J11_32_1206em2	14	28.67	4	A	2268406.3	6965820.81	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	scrap metal							FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_34_1206em2	13	28.45	4	B	2268362.31	6965827.88	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	aluminum scrap								√			
J11	J11_37_1206em2	13	27.29	4	B	2268379.71	6965817.26	08-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	flare														√			
J11	J11_38_1319em2	14	21.39	4	A	2268359.66	6965799.98	08-Jun-06	Jim Thoren	√													√	MIL	6	1	1	eject. slag scrap	OTHER	√	3	0.5	0.25	N-S	0	√			
J11	J11_44_1206em2	13	24.68	4	B	2268368.09	6965782.63	08-Jun-06	Jim Thoren	√													√	CIV	6	1	2	large bolt								√			
J11	J11_46_1206em2	11	23.85	4	B	2268367.84	6965825.56	08-Jun-06	Jim Thoren	√							√	ORD MD	3	4	1	sm arms debris and ac scrap							FE	√	3	0.5	0.25			√			
J11	J11_48_1206em2	12	22.72	4	B	2268390.34	6965832.81	08-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J11	J11_49_1206em2	16	20.45	4	A	2268407.9	6965759.01	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_52_1206em2	15	20.1	4	A	2268364.31	6965791.59	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	bolt	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_52_1319em2	13	16.73	4	B	2268357.12	6965776.55	08-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	50 cal														√			
J11	J11_54_1206em2	10	19.69	4	C	2268352.96	6965833.33	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	smdc mt, ac seat part							SS	√	9	0.5	0.25	N-S	0	√			
J11	J11_58_1206em2	13	17.24	4	B	2268403.74	6965740.12	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
J11	J11_59_1206em2	13	16.73	4	B	2268368.92	6965830.08	08-Jun-06	Jim Thoren	√													√	MIL	6	1	2	eject slag scrap								√			
J11	J11_6_1206em2	16	151.4	4	A	2268329.38	6965830.04	08-Jun-06	Jim Thoren	√							√	ORD MD	0	> 10	4	50 cal	√	CIV	3	1	2	hot wire fence post	FE	√	> 24	0.5	0.25	N-S	0	√			
J11	J11_62_1319em2	14	14.54	4	A	2268354.2	6965788.12	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_63_1206em2	16	15.41	4	A	2268404.38	6965759.09	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap	FE	√	3	0.5	0.25	N-S	0	√			
J11	J11_66_1206em2	12	14.81	4	B	2268373.17	6965798.72	08-Jun-06	Jim Thoren	√													√	CIV	12	1	1	bolt		√						√			
J11	J11_67_1206em2	13	14.62	4	B	2268372.59	6965830.22	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
J11	J11_77_1319em2	13	10.85	4	B	2268363.21	6965792.7	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
J11	J11_80_1206em2	12	13.44	4	B	2268332.06	6965831.98	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
J11	J11_81_1206em2	12	13.34	4	B	2268372.17	6965758.34	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	trash								√			
J11	J11_82_1319em2	12	10.18	4	B	2268356.7	6965772.05	08-Jun-06	Jim Thoren	√													√	CIV	> 24	1	0.25	50 cal	OTHER	√	3	0.5	0.25			√			
J11	J11_83_1206em2	12	13.28	4	B	2268395.1	6965825.25	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
J11	J11_92_1206em2	12	11.94	4	B	2268417.36	6965780.56	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	wire								√			
J11	J11_97_1206em2	14	11.02	4	A	2268382.84	6965782.03	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	hinge	FE	√	3	0.5	0.25	N-S	0	√			
J12	J12_10_1206em2	13	89.03	4	B	2268446.24	6965833.63	21-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	slap flare	√	CIV	3	4	0.25	nail & scrap	FE	√	6	0.5	0.5			√			
J12	J12_102_1206em2	10	10.83	4	C	2268442.45	6965817.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_103_1206em2	9	10.5	4	C	2268440.45	6965748.78	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_107_1206em2	12	10.22	4	B	2268433.66	6965831.28	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_115_1206em2	16	9.39	4	A	2268465.25	6965771.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_116_1206em2	14	9.37	4	A	2268452.03	6965792.43	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_119_1206em2	10	9.18	4	C	2268429.3	6965787.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_12_1206em2	15	63.85	4	A	2268432.77	6965812.06	21-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	40mm cad							AL	√	3	6	0.25			√			
J12	J12_120_1206em2	13	9.14	4	B	2268437.89	6965826.04	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_121_1206em2	13	8.88	4	B	2268432.3	6965761.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_127_1206em2	15	8.48	4	A	2268428.23	6965756.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_129_1206em2	13	8.38	4	B	2268424.43	6965737.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_132_1206em2	13	7.95	4	B	2268424.39	6965787.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_133_1206em2	15	7.94	4	A	2268443.84	6965830.39	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_14_1206em2	10	60.75	4	C	2268459.61	6965822.11	21-Jul-06	Alan Merriman	√							√	ORD MD	24	1	0.25	starter carts	√	MIL				bladed, hand swept, scrap	SS	√	12	> 6	0.25			√			
J12	J12_141_1206em2	13	7.28	4	B	2268464.05	6965750.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_145_1206em2	12	7.11	4	B	2268434.07	6965779.02	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_148_1206em2	13	6.96	4	B	2268447.95	6965819.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_149_1206em2	12	6.92	4	B	2268508.23	6965823.9	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_15_1206em2	13	58.05	4	B	2268459.91	6965815.57	21-Jul-06	Alan Merriman	√													√	CIV	12	1	0.25	bolt	SS	√	12	1	0.25			√			
J12	J12_152_1206em2	13	6.56	4	B	2268463.75	6965818.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_155_1206em2	13	6.38	4	B	2268448.05	6965799.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_158_1206em2	12	6.17	4	B	2268473.68	6965823.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_159_1206em2	11	6.13	4	B	2268496.26	6965791.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_16_1206em2	9	50.15	4	C	2268459.34	6965825.43	21-Jul-06	Alan Merriman	√							√	ORD MD	> 24	> 10	2	starter cart lids	√	MIL	12			bladed, hand swept, scrap	SS	√	12	> 6	0.25			√			
J12	J12_160_1206em2	12	6.04	4	B	2268508.14	6965832.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_163_1206em2	12	6.02	4	B	2268422.81	6965764.72	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_168_1206em2	9	5.84	4	C	2268460.94	6965834.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_17_1206em2	13	49.81	4	B	2268437.91	6965745.66	21-Jul-06	Alan Merriman	√							√	ORD MD	6	2	0.5	vt fuze strap & flare fuze time	√	MIL				bladed, hand swept, scrap	OTHER	√	6	2	0.25			√			
J12	J12_173_1206em2	12	5.63	4	B	2268481.77	6965835.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_174_1206em2	13	5.6	4	B	2268425.52	6965821.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_180_1319em2	13	4.22	4	B	2268484.06	6965831.79	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_185_1206em2	13	5.34	4	B	2268510.27	6965810.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_187_1206em2	13	5.19	4	B	2268459.79	6965751.86	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_188_1206em2	12	5.06	4	B	2268503.5	6965785.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J12	J12_19_1206em2	13	44.74	4	B	2268467.94	6965834.19	21-Jul-06	Alan Merriman	√							√	ORD MD	3	5	0.25	50 cal & 30 cal	√	MIL				bladed, hand swept, scrap	FE	√	3	0.5	0.5			√			
J12	J12_191_1206em2	11	4.94	4	B	2268441.93	6965752.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_192_1206em2	12	4.92	4	B	2268449.29	6965747.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_194_1206em2	11	4.8	4	B	2268457.69	6965754.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_198_1206em2	13	4.72	4	B	2268422.97	6965792.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_201_1206em2	10	4.57	4	C	2268418.39	6965796.35	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_202_1206em2	12	4.52	4	B	2268430.08	6965746.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_203_1206em2	11	4.51	4	B	2268463.82	6965741.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_206_1206em2	12	4.41	4	B	2268421.04	6965808.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_213_1206em2	13	4.23	4	B	2268430.52	6965820.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_215_1206em2	13	4.15	4	B	2268516.44	6965814.94	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_217_1206em2	12	4.14	4	B	2268481.45	6965781.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_218_1206em2	10	4.09	4	C	2268436.27	6965775.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_222_1206em2	9	4	4	C	2268500.46	6965738.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_223_1206em2	10	3.98	4	C	2268427.91	6965824.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_225_1206em2	13	3.96	4	B	2268425.15	6965747.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_227_1206em2	12	3.93	4	B	2268446.51	6965741.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_228_1206em2	12	3.9	4	B	2268422.95	6965801.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_232_1206em2	12	3.83	4	B	2268438.86	6965783.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_236_1206em2	10	3.77	4	C	2268497.09	6965779	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_242_1206em2	12	3.71	4	B	2268421.41	6965741.21	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_243_1206em2	9	3.7	4	C	2268514.11	6965819.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_248_1206em2	11	3.62	4	B	2268513.65	6965793.84	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_251_1206em2	11	3.57	3	B	2268422.93	6965819.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_258_1206em2	8	3.44	3	D	2268422.41	6965779.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_265_1206em2	11	3.31	3	B	2268440.23	6965739.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_274_1206em2	10	3.17	3	C	2268451.87	6965777.23	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_276_1206em2	11	3.13	3	B	2268485.14	6965822.42	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_280_1206em2	9	3.08	3	C	2268516.13	6965791.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_282_1206em2	6	3.06	3	D	2268427.02	6965792.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_284_1206em2	11	3.03	3	B	2268516.42	6965826.65	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_288_1206em2	11	2.98	3	B	2268486.01	6965830.45	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_291_1206em2	10	2.9	3	C	2268490.14	6965749.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_307_1206em2	8	2.68	3	D	2268431.8	6965775.37	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_317_1206em2	7	2.47	2	D	2268488.75	6965833.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_320_1206em2	7	2.46	2	D	2268471.91	6965833.52	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_327_1206em2	14	2.38	2	A	2268516.16	6965803.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_328_1206em2	12	2.37	2	B	2268424.88	6965753.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_329_1206em2	9	2.36	2	C	2268486.69	6965792.15	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_33_1206em2	10	28.59	4	C	2268455	6965819.55	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_330_1319em2	4	1.8	1	F	2268483.8	6965826.94		Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_331_1206em2	11	2.35	2	B	2268427.13	6965806.59	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_337_1206em2	7	2.27	2	D	2268420.82	6965803.99	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_338_1206em2	7	2.27	2	D	2268418.62	6965829.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_347_1206em2	9	2.23	2	C	2268458.15	6965764.25	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_348_1206em2	8	2.23	2	D	2268490.8	6965786.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_35_1206em2	14	28.2	4	A	2268424.92	6965814.2	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_350_1206em2	10	2.19	2	C	2268446.67	6965751.06	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_354_1206em2	9	2.12	2	C	2268468.85	6965792.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_355_1206em2	12	2.12	2	B	2268452.09	6965809.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_358_1206em2	7	2.09	2	D	2268432	6965771.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_36_1206em2	12	27.42	4	B	2268500.14	6965832.76	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_361_1206em2	7	2.07	2	D	2268513.52	6965789.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J12	J12_362_1206em2	7	2.06	2	D	2268504.84	6965811.58	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_366_1206em2	8	2.03	2	D	2268472.58	6965748.54	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_374_1206em2	8	1.98	2	D	2268435.59	6965737.29	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_375_1206em2	10	1.96	2	C	2268485.48	6965796.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_378_1319em2	6	1.42	1	D	2268480.2	6965825.65	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_379_1206em2	11	1.92	2	B	2268432.15	6965743.3	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_381_1206em2	5	1.9	2	D	2268436.77	6965834.28	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_385_1206em2	6	1.9	1	D	2268496.34	6965749.6	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_39_1206em2	13	26.3	4	B	2268440.07	6965803.98	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_393_1206em2	6	1.85	1	D	2268486.22	6965753.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_398_1206em2	6	1.82	1	D	2268452.95	6965823.05	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_4_1206em2	15	193.02	4	A	2268432.39	6965754.12	21-Jul-06	Alan Merriman	√													√	MIL	6	1	0.25	ammo can lid 50 cal	SS	√	24	6	0.5			√			
J12	J12_40_1206em2	13	25.25	4	B	2268474.36	6965831.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_400_1206em2	6	1.81	1	D	2268496.09	6965742.46	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_406_1206em2	8	1.78	1	D	2268473.23	6965763.62	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_409_1206em2	7	1.76	1	D	2268448.26	6965795	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_41_1206em2	14	25.04	4	A	2268463.28	6965814.03	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_415_1206em2	6	1.71	1	D	2268418.96	6965821.77	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_418_1319em2	6	1.26	1	D	2268480.43	6965832.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_42_1206em2	13	25.02	4	B	2268455.86	6965828.89	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_422_1206em2	8	1.65	1	D	2268428.14	6965831.89	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_427_1206em2	6	1.61	1	D	2268436.33	6965755.68	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_428_1206em2	5	1.61	1	D	2268508.3	6965814.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_429_1206em2	7	1.59	1	D	2268477.38	6965812.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_43_1206em2	13	24.73	4	B	2268429.52	6965783.22	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_430_1206em2	9	1.59	1	C	2268437.22	6965812.36	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_434_1206em2	6	1.56	1	D	2268491.88	6965800.44	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_436_1206em2	9	1.54	1	C	2268449.12	6965739.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_449_1206em2	7	1.43	1	D	2268422.77	6965771.4	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_45_1206em2	12	24.21	4	B	2268454.48	6965812.56	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	9	0.5	0.5			√			
J12	J12_450_1206em2	7	1.43	1	D	2268447.45	6965810.14	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_452_1206em2	5	1.43	1	D	2268447.28	6965775.73	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_454_1206em2	9	1.42	1	C	2268439.38	6965790.91	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_456_1206em2	7	1.41	1	D	2268492.73	6965779.08	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_458_1319em2	5	1.11	1	D	2268482.04	6965801.8	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_462_1206em2	6	1.39	1	D	2268463.26	6965774.75	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_47_1206em2	14	23.05	4	A	2268442.46	6965820.88	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_475_1206em2	7	1.29	1	D	2268507.52	6965756.48	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_478_1206em2	6	1.26	1	D	2268501.07	6965749.87	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_487_1206em2	7	1.19	1	D	2268475.48	6965753.13	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_488_1206em2	6	1.19	1	D	2268500.02	6965812.66	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_490_1206em2	7	1.18	1	D	2268448.41	6965828.07	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_493_1206em2	9	1.17	1	C	2268429.66	6965796.38	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_51_1206em2	13	20.34	4	B	2268420.5	6965783.17	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_511_1206em2	9	1.09	1	C	2268427.07	6965802.22	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_513_1206em2	6	1.08	1	D	2268456.06	6965833.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_515_1206em2	6	1.06	1	D	2268470.47	6965742.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_520_1206em2	6	1.04	1	D	2268514.03	6965812.1	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_53_1206em2	13	19.72	4	B	2268427.38	6965765.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_55_1206em2	13	18.87	4	B	2268470.01	6965827.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_56_1206em2	13	17.97	4	B	2268424.21	6965782.97	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_57_1206em2	13	17.51	4	B	2268464.63	6965826.19	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_60_1206em2	13	16.62	4	B	2268421.34	6965834.75	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J12	J12_61_1206em2	10	16.36	4	C	2268502.94	6965835.95	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_69_1206em2	13	14.41	4	B	2268420.58	6965758.53	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_70_1206em2	13	14.28	4	B	2268434.14	6965796.61	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_71_1206em2	13	14.03	4	B	2268453.11	6965826.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_72_1206em2	13	13.98	4	B	2268444.05	6965798.34	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_74_1206em2	12	13.78	4	B	2268427.05	6965771.85	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_76_1206em2	14	13.73	4	A	2268509.01	6965743.41	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_79_1206em2	12	13.56	4	B	2268437.88	6965741.96	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_8_1206em2	13	98.59	4	B	2268495.37	6965833.89	21-Jul-06	Alan Merriman	√							√	ORD MD	3	1	1	jbottle lid							FE	√	6	0.5	0.25			√			
J12	J12_82_1206em2	16	13.33	4	A	2268487.25	6965767.01	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_84_1206em2	15	13.03	4	A	2268418.5	6965766.47	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_88_1206em2	14	12.54	4	A	2268508.93	6965798.12	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_90_1206em2	13	12.23	4	B	2268436.31	6965751.19	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_91_1206em2	12	12.2	4	B	2268492.38	6965792.31	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_93_1206em2	13	11.49	4	B	2268430.35	6965803.93	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_94_1206em2	14	11.41	4	A	2268517.52	6965795.09	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_96_1206em2	13	11.17	4	B	2268468.71	6965753.16	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J12	J12_98_1206em2	9	10.99	4	C	2268450.31	6965815.71	21-Jul-06	Alan Merriman	√													√	CIV	12			bladed, hand swept, scrap	FE	√	6	0.5	0.5			√			
J13	J13_108_1209em2	9	5.18	4	C	2268575.63	6965753.09	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	50 cal ap							FE	√	3	0.5	0.25	N-S	0	√			
J13	J13_11_1209em2	15	36.1	4	A	2268564.42	6965813.24	21-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	vt fuze brackets								√	6	2	0.25			√			
J13	J13_116_1209em2	11	4.81	4	B	2268528.62	6965794.4	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal projo								√	3	0.5				√			
J13	J13_124_1209em2	13	4.64	4	B	2268518.5	6965795.54	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	2	1			√			
J13	J13_127_1209em2	14	4.58	4	A	2268554.01	6965756.16	21-Jun-06	Jim Thoren	√							√	ORD MD		2	0.5	50 cal cartridge/mech scrap								√	3	0.5	0.25			√			
J13	J13_138_1209em2	11	3.98	4	B	2268568.87	6965740.61	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	scrap aluminum		√	3	1				√			
J13	J13_144_1209em2	13	3.85	4	B	2268589.27	6965743.69	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	steel scrap		√	3	0.5	0.25			√			
J13	J13_146_1209em2	12	3.84	4	B	2268528.66	6965739.8	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.5	20mm projo and link								√	3	1	0.25			√			
J13	J13_153_1209em2	12	3.62	4	B	2268571.62	6965753.62	21-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	frag								√	3	2	0.25			√			
J13	J13_18_1209em2	13	26.88	4	B	2268534.73	6965825.92	21-Jun-06	Alan Merriman	√													√	CIV	6	1	0.5	steel scrap		√	24	0.5	0.25			√			
J13	J13_185_1209em2	12	2.82	3	B	2268530.62	6965774.59	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	3	2	0.5			√			
J13	J13_19_1209em2	14	26.31	4	A	2268537.23	6965834.83	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap								√			
J13	J13_190_1209em2	11	2.75	3	B	2268518.63	6965747.24	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	7.62 brass & link	√	CIV	3	1	0.25	nail 4"		√	3	0.5	0.25			√			
J13	J13_2_1209em2	16	210.11	4	A	2268520.86	6965805.1	21-Jun-06	Jim Thoren	√													√	MIL	0	1	0.5	a/c part (access panel)		√	9	6	0.25			√			
J13	J13_22_1209em2	15	22.38	4	A	2268574.98	6965746.89	21-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze part									3	4	0.25			√			
J13	J13_26_1209em2	13	18.07	4	B	2268520.88	6965809.96	21-Jun-06	Alan Merriman	√							√	ORD MD	3	3	0.75	20mm frag,eject seat pt,pin flag								√	6		0.25			√			
J13	J13_31_1209em2	16	15.26	4	A	2268566.94	6965787.02	21-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	chain		√	24	1	0.5			√			
J13	J13_34_1209em2	13	13.17	4	B	2268596.06	6965810.8	21-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	vt fuze antenna								√	3	1	0.5			√			
J13	J13_39_1209em2	13	12.13	4	B	2268594.32	6965819.73	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	steel scrap		√	6	2	0.25			√			
J13	J13_40_1209em2	13	11.9	4	B	2268590.89	6965799.42	21-Jun-06	Alan Merriman	√													√	CIV	3	2	0.5	alum scrap & heavy gauge wire		√	12		0.25			√			
J13	J13_50_1209em2	12	10.01	4	B	2268530.08	6965823.27	21-Jun-06	Alan Merriman	√							√	ORD MD	18	4	1	50 cal projo								√	3	0.5				√			
J13	J13_60_1209em2	14	7.98	4	A	2268562.79	6965830.14	21-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	vt fuze antenna								√	6	2	0.5			√			
J13	J13_61_1209em2	10	7.85	4	C	2268598.18	6965817.3	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bar, vt							FE	√	6	1	0.5	N-S	0	√			
J13	J13_65_1209em2	13	7.47	4	B	2268534.71	6965785.94	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50 cal projo, 20mm scrap								√	3	0.5				√			
J13	J13_71_1209em2	14	7.04	4	A	2268583.7	6965749.98	21-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze scrap								√	3	4	0.25			√			
J13	J13_72_1209em2	13	7.02	4	B	2268559.1	6965829.34	21-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	vt fuze antenna								√	6	2	0.25			√			
J13	J13_74_1209em2	12	6.86	4	B	2268589.84	6965817.37	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	steel scrap		√	6	4	0.25			√			
J13	J13_78_1209em2	13	6.64	4	B	2268539.5	6965787.76	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ejection seat part		√	3	1				√			
J13	J13_8_1209em2	11	59.66	4	B	2268532.88	6965836.53	21-Jun-06	Alan Merriman	√													√	CIV	6	1	0.5	steel rod		√						√			
J13	J13_86_1209em2	12	6	4	B	2268566.23	6965752.45	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	nail 4" & aluminum scrap		√	6	0.5	0.25			√			
J14	J14_100_1209em2	11	5.44	4	B	2268714.3	6965835.43	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3		0.25			√			
J14	J14_102_1319em2	15	8.19	4	A	2268639.79	6965776.46	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25		FE	√	3	4	0.25			√			
J14	J14_110_1209em2	10	5.1	4	C	2268706.85	6965816.95	11-Jul-06	Alan Merriman	√							√	ORD MD	0	2	0.25	5.56 brass							OTHER	√	3	0.5	0.25	N-S	0	√			
J14	J14_113_1209em2	12	4.87	4	B	2268699.5	6965768.44	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	sm gage wire	FE	√	9		0.25			√			
J14	J14_123_1209em2	10	4.66	4	C	2268714.73	6965777.94	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	16 penny nail	FE	√	3	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J14	J14_125_1209em2	11	4.61	4	B	2268712.79	6965771.11	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6		0.25			√			
J14	J14_126_1319em2	11	6.72	4	B	2268660.19	6965766.91	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	1	0.25			√			
J14	J14_133_1209em2	11	4.4	4	B	2268694.69	6965825.66	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
J14	J14_134_1209em2	11	4.25	4	B	2268713.36	6965825.62	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
J14	J14_135_1209em2	9	4.16	4	C	2268690.51	6965765.64	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	16 penny nail	FE	√	3	0.5	0.25	N-S	0	√			
J14	J14_136_1209em2	10	4.09	4	C	2268672.61	6965738.64	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	16 penny nail	FE	√	3	0.5	0.25	N-S	0	√			
J14	J14_137_1209em2	12	4.02	4	B	2268683.88	6965742.95	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6		0.25			√			
J14	J14_137_1319em2	11	5.9	4	B	2268662.7	6965764.14	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	bomb frag							FE	√	3	2	2			√			
J14	J14_151_1209em2	12	3.65	4	B	2268647.62	6965753	26-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze pt								√	3	0.5				√			
J14	J14_157_1209em2	11	3.48	3	B	2268653.79	6965829.51	26-Jun-06	Jim Thoren	√													√	CIV		1	0.25	magnet	FE	√	3	0.5	0.25			√			
J14	J14_210_1319em2	11	3.51	3	B	2268651.03	6965810.33	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6		0.25			√			
J14	J14_48_1209em2	16	10.4	4	A	2268640.34	6965826.67	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	AL	√	6	2	0.25			√			
J14	J14_57_1209em2	12	8.71	4	B	2268688.45	6965769.62	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6		0.25			√			
J14	J14_6_1319em2	16	117.46	4	A	2268673.24	6965782.08	26-Jun-06	Jim Thoren	√							√	ORD MD	0	2	0.25	pin flag/556 brass							OTHER	√	24		0.25			√			
J14	J14_92_1209em2	9	5.83	4	C	2268712.29	6965817.72	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	16 penny nail	FE	√	3	0.5	0.25	N-S	0	√			
J14	J14_94_1209em2	11	5.73	4	B	2268711.09	6965804.96	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25		FE	√	6		0.25			√			
J14	J14_95_1209em2	10	5.72	4	C	2268700.7	6965779.93	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	nails	SS	√	3	0.5	0.25	N-S	0	√			
J15	J15_1_1209em2	16	455.45	4	A	2268797.25	6965787.87	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.5	scrap	FE	√	24	> 6	0.25			√			
J15	J15_10_1209em2	14	36.91	4	A	2268787.51	6965826.58	16-Aug-06	Jim Thoren	√													√	CIV	6	> 10	0.5	nails, nails	FE	√	3		0.25			√			
J15	J15_100_1319em2	13	8.34	4	B	2268773.32	6965813.54	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	2	0.25			√			
J15	J15_103_1209em2	11	5.36	4	B	2268789.83	6965754.86	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	6		0.25			√			
J15	J15_105_1209em2	12	5.32	4	B	2268767.37	6965814.82	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
J15	J15_107_1209em2	13	5.25	4	B	2268769.6	6965820.78	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	1	0.25			√			
J15	J15_111_1209em2	11	5.02	4	B	2268748.89	6965771.73	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze pt								√	6	1	0.25			√			
J15	J15_112_1209em2	12	4.87	4	B	2268734.38	6965774.87	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail		√	3		0.25			√			
J15	J15_114_1209em2	13	4.86	4	B	2268810.78	6965743.39	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6		0.25			√			
J15	J15_115_1209em2	10	4.83	4	C	2268758.19	6965832.95	11-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	bolt	FE	√	3	0.5	0.25			√			
J15	J15_119_1209em2	11	4.73	4	B	2268725.66	6965744.91	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail		√	6		0.25			√			
J15	J15_12_1209em2	13	33.84	4	B	2268722.93	6965826.3	06-Jul-06	Jim Thoren	√													√	CIV	3	4	0.25	nail	FE	√	6		0.25			√			
J15	J15_120_1209em2	9	4.7	4	C	2268721.95	6965780.92	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
J15	J15_121_1209em2	10	4.69	4	C	2268762.18	6965830.48	11-Jul-06	Alan Merriman	√													√	CIV	0	4	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
J15	J15_121_1319em2	9	6.87	4	C	2268805.57	6965777.84	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	scrap	AL	√	3	1	0.25	N-S	0	√			
J15	J15_128_1209em2	11	4.56	4	B	2268810.56	6965787.39	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	24		0.25			√			
J15	J15_129_1209em2	12	4.54	4	B	2268812.38	6965822.36	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
J15	J15_13_1209em2	13	33.43	4	B	2268732.41	6965835.63	17-Aug-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze brkt	√	CIV	0	1	0.25	nail		√	6	2	0.25			√			
J15	J15_130_1209em2	10	4.51	4	C	2268733.11	6965793.82	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
J15	J15_131_1209em2	11	4.5	4	B	2268725.88	6965817.8	06-Jul-06	Jim Rossi	√													√	CIV	0	1	0.25	nail		√	6		0.25			√			
J15	J15_132_1209em2	12	4.49	4	B	2268808.31	6965781.25	06-Jul-06	Jim Rossi	√													√	CIV	3	1	0.25	nail		√	6		0.25			√			
J15	J15_139_1209em2	11	3.98	4	B	2268743.07	6965741.95	06-Jul-06	Jim Rossi	√							√	ORD MD	3	1	0.25	37mm piece							FE	√	6	2	0.25			√			
J15	J15_14_1209em2	16	33.4	4	A	2268815.58	6965742.69	06-Jul-06	Jim Rossi	√													√	CIV	0	1	0.25	scrap	AL	√	6	1				√			
J15	J15_140_1209em2	11	3.96	4	B	2268751.61	6965834.47	06-Jul-06	Jim Rossi	√							√	ORD MD	3	1	0.25	fuze pt							FE	√	6		0.25			√			
J15	J15_141_1209em2	11	3.96	4	B	2268811.5	6965813.87	06-Jul-06	Jim Rossi	√							√	ORD MD	3	1	0.25	gernade spoon							FE	√	6	1	0.25			√			
J15	J15_146_1319em2	12	5.57	4	B	2268778.03	6965805.56	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3		0.25			√			
J15	J15_148_1209em2	11	3.78	4	B	2268797.61	6965794.05	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3		0.25			√			
J15	J15_15_1209em2	12	30.07	4	B	2268755.88	6965818.87	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	jato bottle pt							FE	√	6	1	0.5			√			
J15	J15_150_1209em2	11	3.69	4	B	2268719.52	6965753.35	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	AL	√	3	2	0.25			√			
J15	J15_150_1319em2	12	5.45	4	B	2268805.29	6965795.15	17-Aug-06	Alan Merriman	√													√	CIV	3	2	0.25	nail, nail 16D	FE	√	3		0.25			√			
J15	J15_152_1209em2	12	3.64	4	B	2268729.74	6965809.93	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail		√	6		0.25			√			
J15	J15_155_1209em2	12	3.54	3	B	2268775.52	6965823.69	06-Jul-06	Alan Merriman	√													√	CIV	> 24	10	0.5	nails	FE	√	6	0.5	0.25	NE-SW	45	√			
J15	J15_158_1209em2	10	3.46	3	C	2268807.93	6965777.8	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	wire & nail	FE	√	3					√			
J15	J15_159_1209em2	11	3.46	3	B	2268796.25	6965824.52	17-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
J15	J15_16_1209em2	12	28.11	4	B	2268759.49	6965828.38	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	scrap	FE	√	9		0.25			√			
J15	J15_160_1319em2	13	5.11	4	B	2268787.29	6965815.25	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J15	J15_164_1209em2	12	3.36	3	B	2268780.95	6965815.94	06-Jul-06	Alan Merriman	√													√	CIV		1	0.25	scrap	FE	√	3	1	0.25			√			
J15	J15_17_1209em2	13	27.64	4	B	2268806.8	6965751.78	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze brkt							FE	√	6	2	0.25			√			
J15	J15_176_1319em2	9	4.52	4	C	2268784.09	6965813.84	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.5	nails	FE	√	6	1	0.5	NE-SW	45	√			
J15	J15_181_1209em2	9	2.89	3	C	2268747.64	6965752.95	17-Aug-06	Alan Merriman	√													√	CIV	3	2	0.25	nail 16D	FE	√	3					√			
J15	J15_188_1319em2	9	4.11	4	C	2268779.18	6965811.41	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
J15	J15_203_1209em2	14	2.53	3	A	2268798.46	6965773.52	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze pt								√	6		0.25			√			
J15	J15_21_1209em2	13	24.14	4	B	2268741.05	6965832.58	06-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze brkt							FE	√	6	2	0.25			√			
J15	J15_213_1319em2	9	3.49	3	C	2268806.52	6965784.65	17-Aug-06	Alan Merriman	√													√	CIV	3	2	0.25	wire	FE	√	9					√			
J15	J15_23_1209em2	12	22.36	4	B	2268755.76	6965814.14	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire		√	3		0.25			√			
J15	J15_24_1209em2	10	22.23	4	C	2268815.06	6965834.9	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part, vt							SS	√	3	2	0.25	N-S	0	√			
J15	J15_27_1209em2	12	16.89	4	B	2268804.09	6965738.67	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
J15	J15_29_1209em2	13	15.59	4	B	2268791.34	6965826.91	06-Jul-06	Alan Merriman	√													√	CIV	6	3	0.25	nail	FE	√	3		0.25			√			
J15	J15_3_1209em2	14	107.86	4	A	2268802.61	6965768.42	06-Jul-06	Alan Merriman	√													√	MIL	3	1	0.5	a/c pt	AL	√	6	4	1			√			
J15	J15_30_1209em2	10	15.49	4	C	2268726.39	6965836.2	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	frag							FE	√	9	4	0.25	N-S	0	√			
J15	J15_32_1209em2	12	14.82	4	B	2268770.18	6965829.57	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap-rod	FE	√	6		0.25			√			
J15	J15_33_1209em2	12	13.62	4	B	2268726.07	6965832.21	06-Jul-06	Jim Thoren	√													√	CIV	6	2	0.25	nails	FE	√	6		0.25			√			
J15	J15_35_1209em2	10	12.98	4	C	2268731.62	6965832.02	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
J15	J15_37_1209em2	12	12.58	4	B	2268756.01	6965827.27	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
J15	J15_38_1209em2	10	12.57	4	C	2268782.08	6965835.71	11-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	nail	SS	√	3	0.5	0.25	N-S	0	√			
J15	J15_4_1209em2	15	99.42	4	A	2268783.42	6965827.44	06-Jul-06	Jim Thoren	√													√	CIV	6	> 10	0.5	nails	FE	√	3	0.5	0.25	NE-SW	45	√			
J15	J15_41_1209em2	13	11.82	4	B	2268733.8	6965816.29	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze pt							FE	√	6		0.25			√			
J15	J15_43_1209em2	12	11.69	4	B	2268752.72	6965815.38	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.5	scrap	FE	√	9	2	0.25			√			
J15	J15_44_1209em2	11	11.52	4	B	2268762.38	6965834.02	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nail	FE	√	6		0.25						
J15	J15_45_1209em2	13	11.23	4	B	2268799.48	6965740.76	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze ant							AL	√	6	2	1			√			
J15	J15_47_1209em2	12	10.97	4	B	2268814.7	6965819.36	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
J15	J15_49_1209em2	9	10.27	4	C	2268811.16	6965829.47	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
J15	J15_5_1209em2	11	98.84	4	B	2268778.54	6965826.98	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	nails	FE	√	6	1	0.5	NE-SW	45	√			
J15	J15_53_1209em2	14	9.59	4	A	2268738.59	6965785.38	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	cable cutter	AL	√	3	1				√			
J15	J15_54_1209em2	16	9.26	4	A	2268801.73	6965788.62	06-Jul-06	Jim Thoren	√							√	ORD MD	3	2	0.25	7.62 cart	√	MIL	> 24	> 10	0.5	links	FE	√	6	0.5	0.25	N-S	0	√			
J15	J15_56_1209em2	13	8.88	4	B	2268797.64	6965748.35	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3		0.25			√			
J15	J15_58_1209em2	10	8.61	4	C	2268811.01	6965796.42	11-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
J15	J15_59_1209em2	12	8.01	4	B	2268802.58	6965802.97	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
J15	J15_6_1209em2	14	95.07	4	A	2268810.27	6965760.19	06-Jul-06	Jim Thoren	√													√	CIV	> 24	1	0.5	pipe	FE	√	6	1	0.5	NE-SW	45	√			
J15	J15_63_1209em2	13	7.82	4	B	2268807.89	6965819.52	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	6	1	0.25			√			
J15	J15_64_1209em2	10	7.79	4	C	2268796.56	6965835.41	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
J15	J15_66_1209em2	9	7.4	4	C	2268718.46	6965816.52	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
J15	J15_67_1209em2	12	7.33	4	B	2268811.38	6965752.22	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6		0.25			√			
J15	J15_68_1209em2	11	7.17	4	B	2268793.14	6965812.12	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
J15	J15_69_1209em2	13	7.05	4	B	2268745.11	6965832.77	06-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze ant							AL	√	6	2	1			√			
J15	J15_7_1209em2	16	67.21	4	A	2268773.52	6965826.99	06-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	6	0.5	0.5	NE-SW	45	√			
J15	J15_73_1209em2	13	6.92	4	B	2268747.1	6965813.64	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze brkt							FE	√	6	2	0.25			√			
J15	J15_77_1209em2	12	6.66	4	B	2268805.66	6965815.27	17-Aug-06	Jim Thoren	√													√	CIV	3	2	0.25	nails, nails	FE	√	6		0.25			√			
J15	J15_79_1319em2	13	10.32	4	B	2268787.73	6965811.23	17-Aug-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap, scrap	FE	√	3	0.5	0.25			√			
J15	J15_80_1209em2	10	6.62	4	C	2268796.08	6965757.33	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
J15	J15_81_1209em2	12	6.48	4	B	2268802.08	6965750.67	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	2	0.5			√			
J15	J15_82_1209em2	9	6.44	4	C	2268811.61	6965800.2	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
J15	J15_84_1209em2	11	6.4	4	B	2268798.3	6965800.41	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25		FE	√	3		0.25			√			
J15	J15_85_1209em2	13	6.18	4	B	2268738.95	6965741.27	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25			√			
J15	J15_87_1209em2	12	6	4	B	2268805.74	6965804.47	06-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
J15	J15_87_1319em2	9	9.75	4	C	2268804.3	6965780.87	11-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
J15	J15_88_1209em2	10	5.97	4	C	2268791.4	6965744.77	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
J15	J15_9_1209em2	14	52.73	4	A	2268796.66	6965830.95	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.5	a/c part	AL	√	6	4	0.5			√			
J15	J15_93_1209em2	15	5.75	4	A	2268803.43	6965781.35	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J15	J15_94_1319em2	12	8.94	4	B	2268785.43	6965808.23	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25						
J15	J15_96_1209em2	12	5.7	4	B	2268802.58	6965763.56	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3		0.25			√			
J15	QAdig_J15_102		19.8		QA	2268783.75	6965820.39	15-Aug-06	Alan Merriman	√													√	CIV	3	3	0.25	nails	FE	√	3					√			
J15	QAdig_J15_343		7.6		QA	2268780.89	6965737.42	15-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3					√			
J16	J16_104_1608em2	12	8.17	4	B	2268910.03	6965806.73	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire 18"	FE	√	24	0.5	0.25	N-S	0	√			
J16	J16_106_1608em2	13	8.07	4	B	2268868.95	6965816.66	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	alum scrap	AL	√	3	4	0.25	N-S	0	√			
J16	J16_107_1608em2	10	7.83	4	C	2268900.77	6965803.27	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	frag							FE	√	6	1	0.25	N-S	0	√			
J16	J16_117_1608em2	9	6.83	4	C	2268893.25	6965814.05	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	hook	FE	√	6	1	0.25	N-S	45	√			
J16	J16_12_1608em2	16	84.33	4	A	2268901.06	6965771.65	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.5	scrap	SS	√	9	6	0.25			√			
J16	J16_126_1608em2	10	6.39	4	C	2268880.47	6965740.84	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part, vt							CU	√	6	1	0.25	N-S	0	√			
J16	J16_128_1608em2	13	6.22	4	B	2268906.2	6965812.91	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap steel	FE	√	3	0.5	0.25	N-S	0	√			
J16	J16_129_1608em2	12	6.17	4	B	2268911.52	6965776.7	07-Jul-06	Jim Thoren	√													√	MIL	6	1	0.25	scrap	AL	√	3	1	0.25	N-S	0	√			
J16	J16_131_1608em2	14	6.12	4	A	2268888.55	6965817.79	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
J16	J16_140_1608em2	12	5.84	4	B	2268888.33	6965781.03	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barbed wire	FE	√	6	0.5	0.25	N-S	0	√			
J16	J16_141_1608em2	13	5.8	4	B	2268829.73	6965777.6	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze ant							FE	√	6	2	0.25	N-S	0	√			
J16	J16_142_1608em2	13	5.76	4	B	2268832.73	6965743.53	07-Jul-06	Jim Thoren	√							√	ORD MD	3	> 10	0.25	7.62 links							FE	√	3	1	0.25	N-S	0	√			
J16	J16_15_1608em2	13	65.52	4	B	2268837.05	6965831.31	07-Jul-06	Jim Thoren	√							√	ORD MD	6	1	2	vt fuze							FE	√	6	4	0.25	N-S	0	√			
J16	J16_150_1608em2	13	5.23	4	B	2268886.52	6965820.9	07-Jul-06	Jim Thoren	√													√	CIV	3		0.25	rust chunks	FE										
J16	J16_154_1608em2	11	5.06	4	B	2268882.25	6965805.43	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal							OTHER	√	3	0.5	0.25	N-S	0	√			
J16	J16_158_1608em2	12	4.93	4	B	2268864.29	6965737.42	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barbed wire	FE	√	12	0.5	0.25	N-S	0	√			
J16	J16_159_1608em2	13	4.92	4	B	2268849.48	6965780.73	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze ant							FE	√	6	2	0.25	N-S	0	√			
J16	J16_160_1608em2	13	4.89	4	B	2268832.45	6965804.05	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	7.62 link							FE	√	3	0.5	0.25	N-S	0	√			
J16	J16_162_1608em2	12	4.8	4	B	2268917.9	6965813.12	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence parts	FE	√	3	0.5	0.25	N-S	0	√			
J16	J16_163_1608em2	10	4.77	4	C	2268867.9	6965804.25	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	scrap	AL	√	3	0.5	0.25	N-S	0	√			
J16	J16_164_1608em2	10	4.76	4	C	2268872.69	6965800.34	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	c02 cartridge	FE	√	3	1	0.5	N-S	0	√			
J16	J16_167_1608em2	15	4.6	4	A	2268867.98	6965824.63	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	wire		√	24	0.5	0.25			√			
J16	J16_176_1608em2	11	4.14	4	B	2268898.16	6965811.08	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap steel	FE	√	3	0.5	0.25	N-S	0	√			
J16	J16_180_1608em2	11	3.99	4	B	2268884.06	6965773.92	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	metal scrap	FE	√	6	1	0.25			√			
J16	J16_181_1608em2	12	3.99	4	B	2268838.23	6965739.6	07-Jul-06	Jim Thoren	√													√	MIL	3	2	0.25	scrap aluminum	AL							√			
J16	J16_19_1608em2	12	56.94	4	B	2268850.19	6965807.41	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	2	vt fuze	√	MIL	0	1	0.25	scrap (Al)	FE	√	6	4	0.25	N-S	0	√			
J16	J16_195_1608em2	13	3.6	4	B	2268867.57	6965787.85	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							AL	√	3	2				√			
J16	J16_197_1608em2	11	3.58	3	B	2268840.06	6965756.91	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
J16	J16_2_1608em2	15	257.74	4	A	2268863.41	6965829.2	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	AL	√	12	> 6	0.25			√			
J16	J16_203_1608em2	11	3.51	3	B	2268856.16	6965757.02	07-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	7.62 link							FE	√	3		1			√			
J16	J16_207_1608em2	11	3.33	3	B	2268819.23	6965821.1	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
J16	J16_21_1608em2	14	55.18	4	A	2268903.12	6965807.01	28-Jun-06	Alan Merriman	√													√	MIL	0	1	0.25	A/C seat parts	AL	√	9	2	0.25			√			
J16	J16_214_1608em2	11	3.26	3	B	2268833.16	6965813.21	07-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze ant							FE	√	3	2	0.25			√			
J16	J16_22_1608em2	13	53.51	4	B	2268854.7	6965812.04	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	2	vt fuze							FE	√	6	4	0.25	N-S	0	√			
J16	J16_221_1608em2	10	3.08	3	C	2268859.15	6965739.74	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	banding	FE	√	6	0.5	0.25			√			
J16	J16_26_1608em2	15	47.28	4	A	2268917.12	6965787.12	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze bracket							FE	√	6	2	0.25			√			
J16	J16_29_1608em2	13	38.65	4	B	2268888.81	6965813.64	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	horseshoe	FE							√			
J16	J16_3_1608em2	16	244.13	4	A	2268876.35	6965737.45	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	≥8	75 mm projectile							FE	√	9	2	2			√			
J16	J16_36_1608em2	16	32.65	4	A	2268821.07	6965763.8	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	scrap	AL	√	6	4	0.25			√			
J16	J16_43_1608em2	15	21.91	4	A	2268839.41	6965809.82	28-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.25	VT fuze bracket							FE	√	6	2	0.25			√			
J16	J16_5_1608em2	15	147.83	4	A	2268836.64	6965790.9	28-Jun-06	Alan Merriman	√													√	CIV	12	1	4	pipe	FE	√	> 24	1	0.25			√			
J16	J16_50_1608em2	13	17.81	4	B	2268912.33	6965809.99	07-Jul-06	Jim Thoren	√													√	CIV	3	4	0.25	fence parts	FE	√	3	0.5	0.25	N-S	0	√			
J16	J16_51_1608em2	13	17.77	4	B	2268841.96	6965796.91	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket							FE	√	6	2	0.25	N-S	0	√			
J16	J16_54_1608em2	15	16.7	4	A	2268876.27	6965740.88	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	AL	√	3	2	0.25			√			
J16	J16_55_1608em2	15	16.38	4	A	2268897.06	6965790.23	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	rod	FE	√	> 24	0.5	0.25			√			
J16	J16_61_1608em2	14	15.6	4	A	2268828.48	6965809.72	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	can	AL	√	6	4	0.25			√			
J16	J16_69_1608em2	13	13.01	4	B	2268917.28	6965780.98	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	beer can	AL	√	6	4	0.25	N-S	0	√			
J16	J16_7_1608em2	13	104.8	4	B	2268855.97	6965753.73	07-Jul-06	Jim Thoren	√													√	CIV	6	1	2	pipe	FE	√	24	0.5	0.25	N-S	0	√			
J16	J16_71_1608em2	13	12.51	4	B	2268882.95	6965745.41	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	vt fuze ant							FE	√	6	2	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J16	J16_77_1608em2	10	11.34	4	C	2268847.99	6965801.4	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
J16	J16_80_1608em2	13	10.86	4	B	2268877.24	6965769.23	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt & nut	FE	√	6	0.5	0.25	N-S	0	√			
J16	J16_81_1608em2	15	10.84	4	A	2268904.73	6965835.68	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze bracket							FE	√	6	2	0.25			√			
J16	J16_83_1608em2	12	10.3	4	B	2268848.42	6965814.51	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze pt							AL	√	3	0.5	0.25	N-S	0	√			
J16	J16_84_1608em2	16	10.11	4	A	2268855.17	6965815.42	28-Jun-06	Alan Merriman	√							√	ORD MD	12	1	0.25	VT fuze antenna							AL	√	6	2	0.25			√			
J16	J16_85_1608em2	14	10.07	4	A	2268896.02	6965752.47	28-Jun-06	Alan Merriman	√	√	ORD	3	1	0.25	20mm projo he													FE	√	6	1	0.25			√	√	27-Jul-06	Kelly Hickman
J16	J16_87_1608em2	12	10.04	4	B	2268864.99	6965743.95	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze ant							FE	√	6	2	0.25	N-S	0	√			
J16	J16_9_1608em2	13	97.82	4	B	2268833.44	6965827.38	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	flare body							AL	√	12	1	0.25	N-S	0	√			
J16	J16_97_1608em2	12	8.87	4	B	2268893.23	6965817.72	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail, rust flakes left in grnd	FE	√	3	0.5	0.25	N-S	0	√			
J16	J16_99_1608em2	13	8.68	4	B	2268836.59	6965819.48	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap	FE	√	3	1	0.25	N-S	0	√			
J17	J17_1_1608em2	15	586.86	4	A	2268980.34	6965808.56	28-Jun-06	Alan Merriman	√													√	CIV	3	1	4	fence post	FE		24	2	0.25			√			
J17	J17_108_1608em2	13	7.82	4	B	2268942.78	6965801.95	07-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	scrap	FE	√	6	4	0.25			√			
J17	J17_110_1608em2	12	7.78	4	B	2268922.23	6965815.51	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	2	0.25			√			
J17	J17_112_1608em2	15	7.67	4	A	2268979.74	6965804.85	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	fence parts	FE	√	3	0.5	0.25			√			
J17	J17_114_1608em2	13	7.43	4	B	2268962.02	6965806.83	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze ant							AL	√	6	2	0.5			√			
J17	J17_118_1611em2	14	13.54	4	A	2269012.69	6965806.65	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
J17	J17_119_1608em2	13	6.69	4	B	2268975.45	6965767.49	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9		0.25			√			
J17	J17_119_1611em2	9	13.51	4	C	2268989.11	6965739.49	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25			√			
J17	J17_122_1608em2	11	6.6	4	B	2268980.12	6965813.68	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	5.56 blank							OTHER	√	3		0.25			√			
J17	J17_122_1611em2	13	13.09	4	B	2269014.07	6965792.38	07-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	scrap	FE	√	9	4	0.25			√			
J17	J17_125_1608em2	12	6.4	4	B	2268971.71	6965823.77	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
J17	J17_133_1608em2	13	6.07	4	B	2268947.59	6965743.66	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire		√	6		0.25			√			
J17	J17_134_1608em2	11	6.02	4	B	2268998.84	6965822.01	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
J17	J17_135_1611em2	9	11.51	4	C	2269010.74	6965803.8	11-Jul-06	Alan Merriman	√													√	CIV	24	> 10	0.25	wire	FE	√	9	0.5	0.25	NE-SW	45	√			
J17	J17_136_1611em2	10	11.46	4	C	2269001.71	6965769.59	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail		√	3					√			
J17	J17_138_1608em2	16	5.9	4	A	2268977.93	6965826.95	28-Jun-06	Alan Merriman	√													√	CIV	0	10	0.25	fence parts	FE	√	3	0.5	0.25			√			
J17	J17_14_1608em2	15	72.28	4	A	2268923.57	6965819.38	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
J17	J17_141_1611em2	9	11.14	4	C	2268996.35	6965757.84	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25			√			
J17	J17_142_1611em2	10	10.83	4	C	2268991.06	6965745.81	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25			√			
J17	J17_146_1608em2	12	5.73	4	B	2268984.11	6965800.56	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
J17	J17_147_1608em2	13	5.72	4	B	2268997.65	6965814.98	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
J17	J17_148_1608em2	13	5.49	4	B	2268918.85	6965830.58	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	6	2	0.25			√			
J17	J17_153_1608em2	13	5.13	4	B	2268976.3	6965818.63	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	nail, wire	FE	√	3	0.5	0.25	N-S	0	√			
J17	J17_153_1611em2	10	10.22	4	C	2269003.73	6965773.12	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3					√			
J17	J17_167_1611em2	12	8.84	4	B	2268997.55	6965751.37	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	wire, chain link	FE	√	6		0.25			√			
J17	J17_171_1608em2	12	4.32	4	B	2268969.79	6965826.84	07-Jul-06	Jim Thoren																			no contact											
J17	J17_173_1608em2	12	4.31	4	B	2268963.78	6965821.65	07-Jul-06	Jim Thoren																			no contact											
J17	J17_175_1608em2	11	4.16	4	B	2268974.02	6965758.59	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
J17	J17_179_1608em2	13	4.01	4	B	2268980.34	6965777.09	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	0.5	0.5			√			
J17	J17_180_1611em2	10	8.01	4	C	2269011.66	6965800.02	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.25	wire	FE	√	9	0.5	0.25	NE-SW	45	√			
J17	J17_185_1608em2	11	3.92	4	B	2268955.39	6965813.79	07-Jul-06	Jim Thoren																			no contact											
J17	J17_189_1608em2	13	3.75	4	B	2268984.47	6965808.08	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
J17	J17_193_1611em2	12	7.11	4	B	2269007.17	6965795.49	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
J17	J17_204_1608em2	13	3.42	3	B	2268944.07	6965814.76	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire		√	12		0.25			√			
J17	J17_217_1611em2	10	6.07	4	C	2269007.7	6965774.29	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE							√			
J17	J17_223_1611em2	10	5.91	4	C	2268997.74	6965765.01	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3					√			
J17	J17_225_1611em2	12	5.91	4	B	2269014.12	6965795.79	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	3		0.25			√			
J17	J17_228_1611em2	12	5.82	4	B	2269005.54	6965742.39	07-Jul-06	Jim Thoren																			no contact, reaquired 7/25/06											
J17	J17_229_1611em2	9	5.71	4	C	2269017.63	6965800.77	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail								√			
J17	J17_245_1611em2	10	5.23	4	C	2269014.25	6965803.4	11-Jul-06	Alan Merriman	√													√	CIV	> 24	> 10	0.25	wire	FE	√	9	0.5	0.25	NE-SW	45	√			
J17	J17_246_1611em2	12	5.22	4	B	2269009.5	6965740.38	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9		0.25			√			
J17	J17_249_1611em2	10	5.11	4	C	2269008.98	6965789.62	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3					√			
J17	J17_25_1608em2	15	47.93	4	A	2268979.31	6965831.48	28-Jun-06	Alan Merriman	√													√	CIV	0	10	0.25	fence parts	FE	√	3	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J17	J17_266_1611em2	9	4.7	4	C	2269009.9	6965785.8	11-Jul-06	Alan Merriman	√													√	CIV	24	2	0.25	wire and scrap piece	FE	√	9	0.5	0.25	N-S	45	√			
J17	J17_31_1608em2	15	35.57	4	A	2268944.19	6965810.07	28-Jun-06	Alan Merriman	√													√	CIV	0	5	0.25	fence parts	FE	√	3	0.5	0.25			√			
J17	J17_35_1608em2	12	33.18	4	B	2268924.87	6965777.53	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	hook	FE	√	6	2	1			√			
J17	J17_350_1611em2	11	2.98	3	B	2269008.9	6965782.26	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	3		0.25			√			
J17	J17_38_1608em2	15	29.63	4	A	2268980.78	6965834.86	28-Jun-06	Alan Merriman	√													√	CIV	0	5	0.25	fence parts	FE	√	3	0.5	0.25			√			
J17	J17_41_1608em2	15	22.85	4	A	2268945.29	6965806.05	28-Jun-06	Alan Merriman	√													√	CIV	0	5	0.25	fence parts	FE	√	3	0.5	0.25			√			
J17	J17_52_1608em2	16	17.63	4	A	2268976.79	6965814.64	28-Jun-06	Alan Merriman	√													√	CIV	0	3	0.25	fence parts	FE	√	3	0.5	0.25			√			
J17	J17_60_1608em2	12	15.6	4	B	2268944.21	6965792.74	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	rod	FE	√	12		0.25			√			
J17	J17_65_1608em2	13	13.76	4	B	2268955.02	6965819.56	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25			√			
J17	J17_67_1608em2	13	13.57	4	B	2268923.19	6965804.91	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze brkt							FE	√	6	4	0.25			√			
J17	J17_74_1608em2	12	11.98	4	B	2268974.72	6965807.34	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
J17	J17_79_1608em2	12	11	4	B	2268963.18	6965810.98	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
J17	J17_89_1608em2	12	9.86	4	B	2268973.95	6965774.38	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9		0.25			√			
J17	J17_90_1608em2	12	9.81	4	B	2268975.62	6965779.09	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3		0.25			√			
J17	J17_93_1608em2	12	9.59	4	B	2268986.1	6965790.79	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9		0.25			√			
J17	J17_95_1611em2	12	17.32	4	B	2268995.41	6965754.42	17-Aug-06	Jim Thoren	√													√	CIV	6	1	0.25	wire, wire	FE	√	12		0.25			√			
J17	QAdig_J17_267		9.3		QA	2268992.15	6965761.34	15-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	fence pieces	FE							√			
J17	QAdig_J17_304		8.4		QA	2268995.1	6965769.28	15-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	fence pieces	FE							√			
J17	QAdig_J17_415		6.7		QA	2268996.98	6965773.43	15-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	fence pieces	FE							√			
J18	J18_101_1611em2	10	16.07	4	C	2269098.91	6965818.38	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
J18	J18_112_1611em2	10	14.02	4	C	2269071.56	6965834.7	11-Jul-06	Alan Merriman	√													√	CIV	0	2	0.5	rebar, nails	FE	√	6	0.5	0.25	N-S	0	√			
J18	J18_113_1611em2	10	13.97	4	C	2269089.04	6965790.88	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	cable	FE	√	6	0.5	0.25	N-S	0	√			
J18	J18_117_1611em2	12	13.69	4	B	2269023.29	6965751.36	07-Jul-06	Jim Thoren	√													√	CIV	6	1	4	scrap steel	FE	√	12	2	2			√			
J18	J18_124_1611em2	13	12.93	4	B	2269097.93	6965775.77	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12	0.5	0.25			√			
J18	J18_138_1611em2	12	11.4	4	B	2269022.42	6965747.82	07-Jul-06	Jim Thoren	√													√	CIV	6	1	4	scrap steel	FE	√	12	2	2			√			
J18	J18_143_1611em2	11	10.76	4	B	2269067.76	6965832.85	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	square nail	FE	√	3	0.5	0.25			√			
J18	J18_156_1611em2	11	9.74	4	B	2269081.81	6965737	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_157_1611em2	11	9.7	4	B	2269022.48	6965766.74	07-Jul-06	Jim Thoren	√													√	CIV	3	1	4	steel bar	FE	√	24	4	0.5			√			
J18	J18_169_1611em2	10	8.75	4	C	2269086.34	6965793.02	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
J18	J18_171_1611em2	13	8.56	4	B	2269096.15	6965800.38	07-Jul-06	Jim Thoren	√													√	CIV	24	> 10	1	nails	FE	√	6	0.5	0.25	NE-SW	45	√			
J18	J18_174_1611em2	11	8.47	4	B	2269090.15	6965739.92	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_183_1611em2	9	7.79	4	C	2269095.69	6965804.98	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
J18	J18_192_1611em2	13	7.17	4	B	2269091.1	6965748.61	07-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	6	0.5	0.25			√			
J18	J18_195_1611em2	10	7.09	4	C	2269095.65	6965741.48	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
J18	J18_199_1611em2	10	6.94	4	C	2269022.2	6965815.25	11-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	wire, nails	FE	√	6	0.5	0.25	N-S	0	√			
J18	J18_20_1611em2	12	85.18	4	B	2269098.88	6965803.14	07-Jul-06	Jim Thoren	√													√	CIV	24	> 10	1	nails	FE		6	0.5	0.25	NE-SW	45	√			
J18	J18_201_1611em2	11	6.73	4	B	2269033.4	6965829.2	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_202_1611em2	10	6.72	4	C	2269096.51	6965827.16	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
J18	J18_203_1611em2	12	6.68	4	B	2269086.34	6965743.21	07-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	6	0.5	0.25			√			
J18	J18_206_1611em2	10	6.61	4	C	2269038.01	6965831.45	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
J18	J18_21_1611em2	14	83.13	4	A	2269099.08	6965812.02	07-Jul-06	Jim Thoren	√													√	CIV	24	> 10	1	nails	FE		6	0.5	0.25	NE-SW	45	√			
J18	J18_211_1611em2	12	6.36	4	B	2269070.76	6965831.05	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
J18	J18_224_1611em2	11	5.91	4	B	2269030.74	6965834.07	07-Jul-06	Jim Thoren	√													√	CIV	6	2		nails	FE	√	6	0.5	0.25			√			
J18	J18_236_1611em2	13	5.52	4	B	2269076.32	6965813.07	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_250_1611em2	10	5.1	4	C	2269018.25	6965804.62	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
J18	J18_255_1611em2	12	4.98	4	B	2269086.63	6965828.28	07-Jul-06	Jim Thoren	√													√	CIV	3	2		nail & wire	FE	√	6	0.5	0.25			√			
J18	J18_258_1611em2	10	4.93	4	C	2269023.89	6965826.77	11-Jul-06	Alan Merriman	√													√	CIV	18	5	0.25	nails	FE	√	6	0.5	0.25	NE-SW	45	√			
J18	J18_261_1611em2	12	4.84	4	B	2269082.06	6965821.05	07-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_267_1611em2	13	4.7	4	B	2269102.88	6965786.93	07-Jul-06	Jim Thoren	√													√	CIV	24	> 10	1	nails	FE	√	6	0.5	0.25	NE-SW	45	√			
J18	J18_269_1611em2	11	4.67	4	B	2269088.78	6965745.41	07-Jul-06	Jim Thoren	√													√	CIV	0	5	0.25	nails	FE	√	6	0.5	0.25			√			
J18	J18_274_1611em2	12	4.51	4	B	2269037.3	6965836.14	07-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	wire	FE	√	> 24	0.5	0.25			√			
J18	J18_277_1611em2	12	4.46	4	B	2269047.58	6965742.73	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_282_1611em2	12	4.32	4	B	2269100.45	6965798.39	07-Jul-06	Jim Thoren	√													√	CIV	24	> 10	1	nails	FE	√	6	0.5	0.25	NE-SW	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
J18	J18_283_1611em2	12	4.3	4	B	2269063.27	6965772.41	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25			√			
J18	J18_290_1611em2	11	4.12	4	B	2269070.65	6965755.49	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_292_1611em2	11	4	4	B	2269048.35	6965739.34	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25			√			
J18	J18_299_1611em2	11	3.85	4	B	2269091.98	6965737.04	07-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	6	0.5	0.25			√			
J18	J18_302_1611em2	13	3.82	4	B	2269073.78	6965750.24	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_303_1611em2	12	3.81	4	B	2269026.08	6965831.85	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_305_1611em2	12	3.8	4	B	2269079.09	6965833.58	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
J18	J18_311_1611em2	11	3.74	4	B	2269090.37	6965756.2	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_312_1611em2	11	3.73	4	B	2269054.39	6965774.59	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
J18	J18_33_1611em2	13	60.52	4	B	2269093.3	6965794.7	07-Jul-06	Jim Thoren	√													√	CIV	24	> 10	1	nails	FE		6	0.5	0.25	NE-SW	45	√			
J18	J18_340_1611em2	12	3.13	3	B	2269087.18	6965801.38	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap metal	FE	√	3	2	2			√			
J18	J18_343_1611em2	11	3.03	3	B	2269086.48	6965824.8	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25			√			
J18	J18_38_1611em2	13	50.95	4	B	2269026.01	6965768.85	07-Jul-06	Jim Thoren	√													√	CIV	3	1	4	steel bar	FE	√	24	4	0.5			√			
J18	J18_40_1611em2	12	49.89	4	B	2269025.11	6965764.69	07-Jul-06	Jim Thoren	√													√	CIV	12	1	0.75	rebar	FE	√	9	0.5	0.5			√			
J18	J18_41_1611em2	11	49.74	4	B	2269093.94	6965810.21	07-Jul-06	Jim Thoren	√													√	CIV	24	> 10	1	nails	FE		6	0.5	0.25	NE-SW	45	√			
J18	J18_42_1611em2	12	49.55	4	B	2269102.76	6965802.12	07-Jul-06	Jim Thoren	√													√	CIV	24	> 10	1	nails	FE	√	6	0.5	0.25	NE-SW	45	√			
J18	J18_50_1611em2	11	37.78	4	B	2269096.49	6965815.19	07-Jul-06	Jim Thoren	√													√	CIV	3	> 10	0.25	nails	FE	√	3	0.5	0.25			√			
J18	J18_52_1611em2	12	35.33	4	B	2269022.06	6965757.62	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.5	rebar	FE	√	12	0.5	0.5			√			
J18	J18_62_1611em2	13	28.26	4	B	2269100.73	6965807.12	07-Jul-06	Jim Thoren	√													√	CIV	24	10	1	nails	FE		6	0.5	0.25	NE-SW	45	√			
J18	J18_63_1611em2	13	27.95	4	B	2269089.03	6965816.99	07-Jul-06	Jim Thoren	√													√	CIV	3	1		wire & 6 nails	FE	√	24	0.5	0.25			√			
J18	J18_64_1611em2	13	26.48	4	B	2269096.3	6965791.35	07-Jul-06	Jim Thoren	√													√	CIV	24	> 10	1	nails	FE	√	6	0.5	0.25	NE-SW	45	√			
J18	J18_67_1611em2	13	25.53	4	B	2269093.08	6965818.22	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	pipe	FE	√	3	2	2			√			
J18	J18_68_1611em2	12	25.02	4	B	2269019.19	6965749.39	07-Jul-06	Jim Thoren	√													√	CIV	6	1	4	scrap steel		√	12	2	2			√			
J18	J18_85_1611em2	10	19.51	4	C	2269092.59	6965806.35	11-Jul-06	Jim Thoren	√													√	CIV	3	3	0.5	scrap	FE	√	6	1	0.25	N-S	0	√			
J18	J18_86_1611em2	12	18.94	4	B	2269099.84	6965790.19	07-Jul-06	Jim Thoren	√													√	CIV	24	> 10	1	nails	FE	√	6	0.5	0.25	NE-SW	45	√			
J18	J18_88_1611em2	11	18.72	4	B	2269085.29	6965737.05	07-Jul-06	Jim Thoren	√													√	CIV	0	3	0.5	scrap metal	FE	√	9	0.5				√			
J18	J18_92_1611em2	10	17.76	4	C	2269092.56	6965789.7	11-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	nail, wire	FE	√	6	0.5	0.25	N-S	0	√			
J18	J18_93_1611em2	13	17.61	4	B	2269093.78	6965823.57	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	wire	FE	√	24	0.5	0.25			√			
J18	J18_94_1611em2	9	17.33	4	C	2269088.66	6965809.86	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	chain 3 link	FE	√	6	0.5	0.25	N-S	0	√			
J18	QAdig_J18_132		17.3		QA	2269085.36	6965811.9	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
J18	QAdig_J18_375		7.2		QA	2269063.55	6965835.48	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
K01	QAdig_K01_354		7.5		QA	2267354.64	6965680.37	15-Aug-06	Alan Merriman																			no contact											
K02	K02_01_612_mag			99	M	2267481.25	6965640.675	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
K02	K02_02_612_mag			99	M	2267468.679	6965657.763	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
K02	K02_03_612_mag			99	M	2267482.278	6965681.416	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
K02	K02_04_612_mag			99	M	2267479.343	6965688.378	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
K02	K02_05_612_mag			99	M	2267467.714	6965693.402	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
K02	K02_06_612_mag			99	M	2267478.119	6965705.951	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
K02	K02_07_612_mag			99	M	2267476.039	6965636.906	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
K02	K02_08_612_mag			99	M	2267481.248	6965640.543	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
K02	K02_09_612_mag			99	M	2267481.86	6965731.802	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	steel scrap								√			
K02	K02_15_1320em2	12	92.62	4	B	2267490.11	6965717	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap metal		√	9	1				√			
K02	K02_40_1320em2	13	15.19	4	B	2267515.48	6965717.4	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
K02	K02_47_1320em2	13	9.57	4	B	2267516.9	6965636.02	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	9	0.5				√			
K02	K02_51_1320em2	12	8.36	4	B	2267495.99	6965649.6	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	9	0.5				√			
K02	K02_71_1320em2	11	4.12	4	B	2267501.52	6965642.13	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	9	0.5				√			
K03	K03_67_1217em1	14	29.7	4	A	2267604.14	6965675.91	06-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap metal		√	9	4	0.25			√			
K03	K03_82_1217em1	14	5.23	4	A	2267584.09	6965721.93	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	plug		√	3	1				√			
K03	K03_88_1217em1	12	3.6	4	B	2267567.27	6965708.16	06-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap metal		√	6	0.5				√			
K04	K04_25_1218em1	16	36.3	4	A	2267700.12	6965638.41	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	flare, cartridge expened								√	12	2				√			
K04	K04_26_1218em1	15	21.22	4	A	2267660.26	6965656.97	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal		√	6	0.5	0.25			√			
K04	K04_33_1218em1	14	7.19	4	A	2267706.18	6965655.99	16-Aug-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal, no contact								√			
K04	K04_36_1218em1	13	5.92	4	B	2267661.46	6965653.38	06-Jun-06	Jim Thoren																			no contact											

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K04	K04_43_1218em1	12	3.39	3	B	2267628.94	6965662.47	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap metal		√	3	1	0.25			√			
K04	K04_64_1218em1	9	2.32	2	C	2267689.11	6965731.91	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal bullets								√	3	0.5	0.5			√			
K04	QAdig_K04_499		5.9		QA	2267635.31	6965649.28	15-Aug-06	Alan Merriman																			no contact												
K06	K06_106_1221em1	10	3.93	4	C	2267882.18	6965734.46	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	fence staple								√			
K06	K06_114_1221em1	11	3.59	3	B	2267873.11	6965655.73	06-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal								√	3	1				√			
K06	K06_118_1221em1	11	3.43	3	B	2267855.35	6965667.2	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
K06	K06_119_1221em1	9	3.43	3	C	2267820.91	6965640.52	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	37mm frag														√			
K06	K06_121_1221em1	11	3.34	3	B	2267868.23	6965659.09	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
K06	K06_126_1221em1	10	3.15	3	C	2267876.97	6965641.91	19-Jun-06	Alan Merriman																			no find												
K06	K06_141_1221em1	9	2.72	3	C	2267852.88	6965662.5	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	fence staple								√			
K06	K06_143_1221em1	10	2.71	3	C	2267846.88	6965681.91	19-Jun-06	Alan Merriman																			no find												
K06	K06_145_1221em1	10	2.62	3	C	2267866.12	6965638.52	17-Aug-06	Alan Merriman	√													√	CIV	0	3	1	wire, post clip								√			
K06	K06_170_1221em1	9	2.1	2	C	2267886.72	6965652.88	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	0.5	0.25			√			
K06	K06_214_1319em2	9	3.47	3	C	2267901.15	6965704.88	19-Jun-06	Alan Merriman																			no find (6 ft from well)												
K06	K06_221_1319em2	10	3.29	3	C	2267898.55	6965724.26	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	ball of wire		√	24	0.5	0.25			√			
K06	K06_24_1221em1	13	19.59	4	B	2267856.29	6965674.2	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	4	fuze, front part														√			
K06	K06_34_1221em1	16	13.59	4	A	2267851.52	6965673.52	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	fence staple								√			
K06	K06_39_1221em1	13	11.23	4	B	2267842.96	6965675.41	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	Barb wire								√			
K06	K06_4_1221em1	12	215.34	4	B	2267894.28	6965701.74	06-Jun-06	Jim Thoren	√													√	CIV				concrete pad												
K06	K06_44_1221em1	13	9.63	4	B	2267869.99	6965700.75	06-Jun-06	Jim Thoren	√													√	CIV	3	2	2	wire								√			
K06	K06_5_1221em1	13	213.27	4	B	2267895.05	6965695.95	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	barb wire								√			
K06	K06_59_1221em1	15	7.45	4	A	2267885.73	6965637.86	06-Jun-06	Jim Thoren	√	√	ORD	6	1	1	flare														√	3	1	0.5	NE-SW	45	√			
K06	K06_6_1221em1	15	184.21	4	A	2267887.25	6965698.95	16-Aug-06	Jim Thoren	√													√	CIV				concrete pad left in ground												
K06	K06_62_1221em1	13	6.34	4	B	2267870.14	6965693.18	06-Jun-06	Jim Thoren	√													√	CIV	12	1	1	wire								√			
K06	K06_68_1221em1	13	6.05	4	B	2267850.01	6965683.03	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	barb wire								√			
K06	K06_71_1221em1	13	5.87	4	B	2267869.73	6965722.58	06-Jun-06	Jim Thoren	√													√	MIL	3	2	0.25	5.56 blank brass	OTHER	√	3	0.5	0.25			√			
K06	K06_71_1319em2	13	11.98	4	B	2267897.09	6965692.25	06-Jun-06	Jim Thoren	√													√	CIV	0	2	1	wire and can								√			
K06	K06_77_1221em1	15	5.6	4	A	2267894.73	6965678.2	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	2	base														√			
K06	K06_9_1221em1	15	88.18	4	A	2267885.01	6965683.55	16-Aug-06	Jim Thoren	√													√	CIV				survey point left in ground												
K07	K07_142_1305em1	11	3.05	3	B	2267944.35	6965651.3	15-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	brass fitting, wshr shaped (roun								√			
K07	K07_145_1305em1	11	2.9	3	B	2267994.55	6965731.81	15-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire, 10 gage		√	12	0.5	0.25	N-S	0	√			
K07	K07_25_1305em1	15	18.69	4	A	2267979.64	6965695.71	15-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	survey nail,22d, steel w/flaggin		√	6	0.5	0.25	N-S	90	√			
K07	K07_36_1305em1	14	12.69	4	A	2267919.98	6965682.2	15-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	steel pipe, flash tube, ac relat								√	12	0.5	0.5	N-S	0	√			
K07	K07_47_1305em1	14	9.57	4	A	2267969.24	6965640.45	15-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ecpended ac flare ctg, alum1" sq														√			
K07	K07_50_1305em1	16	9.02	4	A	2267950.78	6965709.02	15-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	bent aluminum flare ctg														√			
K07	K07_64_1305em1	11	7.03	4	B	2267982.75	6965706.41	15-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	gate hinge, steel, cylindrical		√	3	0.5	0.5	N-S	0	√			
K07	K07_72_1305em1	15	6.31	4	A	2267954.29	6965685.77	15-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m166 fuze, parts, rd steel disc														√			
K07	K07_73_1305em1	11	6.24	4	B	2267942.72	6965732.16	15-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	3/16 steel wire		√	6	0.5	0.25	N-S	0	√			
K08	K08_10_1305em1	13	40.6	4	B	2268087.98	6965726.43	15-Jun-06	Alan Merriman	√													√	CIV	12	1	1	slag								√			
K08	K08_100_1305em1	14	4.44	4	A	2268110.8	6965715.29	15-Jun-06	Alan Merriman	√													√	CIV	0	5	1	wire								√			
K08	K08_111_1305em1	12	3.87	4	B	2268076.25	6965721.7	15-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap								√			
K08	K08_112_1305em1	13	3.8	4	B	2268020.11	6965725.04	15-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap								√			
K08	K08_12_1305em1	12	28.8	4	B	2268110.59	6965657.86	15-Jun-06	Alan Merriman	√													√	CIV	12	1	1	nail		√	6	0.5	0.25			√			
K08	K08_13_1305em1	15	28.43	4	A	2268086.92	6965707.04	15-Jun-06	Alan Merriman	√													√	CIV	6	1	1	scrap								√			
K08	K08_132_1305em1	8	3.3	3	D	2268110.59	6965653.5	17-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	wire	FE	√	3						√			
K08	K08_133_1305em1	11	3.29	3	B	2268093.16	6965667.28	15-Jun-06	Alan Merriman	√							√	ORD MD	6	2	1	slag and blank ctg														√			
K08	K08_134_1305em1	11	3.28	3	B	2268112.07	6965733.42	15-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire								√			
K08	K08_14_1305em1	15	28.12	4	A	2268097.15	6965673.31	15-Jun-06	Alan Merriman	√													√	CIV	3	1	1	bolt		√	12	0.5	0.5			√			
K08	K08_153_1305em1	11	2.68	3	B	2268118.19	6965675.52	15-Jun-06	Alan Merriman	√													√	CIV	0	1	1	scrap								√			
K08	K08_181_1305em1	12	2.13	2	B	2268084.47	6965726.77	15-Jun-06	Alan Merriman	√													√	CIV	6	1	1	nail		√	6	0.5	0.25			√			
K08	K08_19_1305em1	13	21.86	4	B	2268113.88	6965655.84	15-Jun-06	Alan Merriman	√													√	MIL	12	1	1	scrap								√			
K08	K08_21_1305em1	9	19.73	4	C	2268094.66	6965723.45	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	rebar	FE	√	6	0.5	0.25	N-S	0	√			
K08	K08_22_1305em1	15	19.64	4	A	2268083.55	6965708.34	15-Jun-06	Alan Merriman	√													√	CIV	6	1	1	scrap								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K08	K08_24_1305em1	13	19.26	4	B	2268116.91	6965652.09	15-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap								√			
K08	K08_27_1305em1	16	18.42	4	A	2268063.16	6965685.63	15-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence post		√	24	1	0.25			√			
K08	K08_28_1305em1	16	17.94	4	A	2268055.43	6965657.24	15-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire								√			
K08	K08_29_1305em1	16	17.58	4	A	2268073.6	6965677.52	15-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap								√			
K08	K08_30_1305em1	13	17.26	4	B	2268077.93	6965735.71	15-Jun-06	Alan Merriman	√													√	MIL	6	1	1	scrap								√			
K08	K08_35_1305em1	13	13.58	4	B	2268082.23	6965716.45	15-Jun-06	Alan Merriman	√													√	CIV	3	1	1	slag								√			
K08	K08_37_1305em1	16	12.6	4	A	2268018.47	6965676.59	15-Jun-06	Alan Merriman	√													√	CIV	3	1	1	bolt		√	6	0.5	0.5			√			
K08	K08_44_1305em1	14	10.32	4	A	2268069.33	6965721.89	15-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap								√			
K08	K08_49_1305em1	14	9.03	4	A	2268087.2	6965696.68	15-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal blank														√			
K08	K08_6_1305em1	16	108.41	4	A	2268066.8	6965685.25	15-Jun-06	Alan Merriman	√													√	CIV	0	1	1	fence post		√	24	0.5	0.25			√			
K08	K08_60_1305em1	13	7.27	4	B	2268104.12	6965655.66	15-Jun-06	Alan Merriman	√													√	CIV	3	5	1	wire								√			
K08	K08_65_1305em1	13	7.01	4	B	2268053.12	6965721.28	15-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap								√			
K08	K08_66_1305em1	12	6.69	4	B	2268091.1	6965716.27	15-Jun-06	Alan Merriman	√													√	CIV	6	1	1	scrap								√			
K08	K08_71_1305em1	11	6.33	4	B	2268093.13	6965679.7	15-Jun-06	Alan Merriman	√													√	CIV	0	1	1	nail		√	6	0.5	0.25			√			
K08	K08_76_1305em1	10	5.91	4	C	2268113.51	6965649.52	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part							FE	√	3	0.5	0.25	N-S	0	√			
K08	K08_78_1305em1	10	5.78	4	C	2268092.95	6965674.02	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	spring	FE	√	3	0.5	0.25	N-S	0	√			
K08	K08_85_1305em1	11	5.46	4	B	2268088.11	6965729.89	15-Jun-06	Alan Merriman	√													√	MIL	6	1	1	scrap								√			
K08	K08_90_1305em1	13	5.14	4	B	2268093.11	6965704.16	15-Jun-06	Alan Merriman	√													√	CIV	6	1	1	scrap								√			
K08	K08_93_1305em1	13	4.9	4	B	2268107.77	6965675.62	15-Jun-06	Alan Merriman	√													√	CIV	3	5	1	wire								√			
K08	K08_96_1305em1	13	4.76	4	B	2268074.77	6965734.2	15-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap								√			
K09	K09_10_1319em2	15	91.75	4	A	2268214.15	6965662.39	08-Jun-06	Jim Thoren	√													√	CIV	3	1	≥8	lg length of pipe	FE		> 24	4	0.5	NE-SW	45	√			
K09	K09_103_1308em2	13	18.04	4	B	2268189.06	6965650.25	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K09	K09_113_1308em2	12	16.03	4	B	2268193.96	6965647.82	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	nail		√						√			
K09	K09_114_1308em2	13	16	4	B	2268211.21	6965668.23	08-Jun-06	Jim Thoren	√													√	CIV	> 24	1	≥8	lg length of pipe	FE		> 24	4	0.5	NE-SW	45	√			
K09	K09_136_1308em2	13	12.83	4	B	2268148.39	6965646.61	08-Jun-06	Jim Thoren	√													√	CIV	12	1	1	scrap								√			
K09	K09_137_1308em2	12	12.81	4	B	2268204.98	6965715.55	08-Jun-06	Jim Thoren	√							√	EMAT MD	6	1	1	blank								√						√			
K09	K09_155_1308em2	11	11.49	4	B	2268128.46	6965648.47	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√						√			
K09	K09_157_1308em2	12	11.38	4	B	2268192.52	6965733.39	08-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
K09	K09_158_1308em2	11	11.34	4	B	2268182.01	6965658.97	08-Jun-06	Jim Thoren	√													√	CIV	12	1	1	bolt								√			
K09	K09_159_1308em2	13	11.33	4	B	2268199.64	6965679.8	08-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
K09	K09_164_1308em2	13	11.08	4	B	2268184.58	6965730.62	08-Jun-06	Jim Thoren	√													√	MIL	6	1	1	ammo link								√			
K09	K09_170_1308em2	13	10.57	4	B	2268145.13	6965647.49	08-Jun-06	Jim Thoren	√													√	CIV	12	1	1	scrap								√			
K09	K09_181_1308em2	12	10	4	B	2268197.61	6965723.61	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K09	K09_185_1308em2	12	9.86	4	B	2268188.08	6965728.82	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
K09	K09_206_1308em2	13	8.47	4	B	2268134.45	6965639.44	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
K09	K09_223_1308em2	10	7.48	4	C	2268209.66	6965671.73	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
K09	K09_228_1308em2	13	7.21	4	B	2268202.09	6965706.52	08-Jun-06	Jim Thoren	√													√	MIL	12	1	1	ammo link								√			
K09	K09_237_1308em2	13	6.77	4	B	2268142.85	6965672.41	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K09	K09_242_1308em2	9	6.56	4	C	2268211.48	6965649.36	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	casing 5.56							OTHER	√	3	0.5	0.25	N-S	0	√			
K09	K09_243_1308em2	12	6.53	4	B	2268198.81	6965672.26	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal								√						√			
K09	K09_244_1308em2	13	6.5	4	B	2268165.68	6965640.13	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap		√						√			
K09	K09_246_1308em2	13	6.47	4	B	2268156.16	6965644.03	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	50 cal								√						√			
K09	K09_248_1308em2	9	6.38	4	C	2268210.52	6965663.3	11-Jul-06	Alan Merriman	√																		no find, reacquired 7/31/06											
K09	K09_260_1308em2	12	6.18	4	B	2268138.68	6965728.37	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
K09	K09_267_1308em2	11	5.75	4	B	2268209.77	6965702.61	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	nail		√						√			
K09	K09_269_1308em2	12	5.73	4	B	2268201.12	6965724.27	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K09	K09_283_1308em2	13	5.32	4	B	2268197.84	6965700.91	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
K09	K09_285_1308em2	9	5.3	4	C	2268203.87	6965722.09	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	casing							OTHER	√	3	0.5	0.25	N-S	0	√			
K09	K09_303_1308em2	9	4.89	4	C	2268130.77	6965640.89	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	5.56mm links							FE	√	3	0.5	0.5	N-S	0	√			
K09	K09_306_1308em2	11	4.82	4	B	2268201.05	6965685.55	08-Jun-06	Jim Thoren	√													√	CIV	> 24	2	≥8	scrap & lg length of pipe	FE	√	> 24	4	0.5	NE-SW	45	√			
K09	K09_308_1308em2	11	4.75	4	B	2268174.32	6965689.58	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire		√						√			
K09	K09_326_1308em2	12	4.38	4	B	2268120.84	6965656.81	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	20mm								√						√			
K09	K09_331_1308em2	9	4.27	4	C	2268127.15	6965643.38	17-Aug-06	Alan Merriman	√							√	ORD MD	3	2	0.25	5.56 brass (2)							OTHER	√	3	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K09	K09_333_1308em2	9	4.23	4	C	2268193.68	6965675.9	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	scrap and nail	FE	√	3	0.5	0.25	N-S	0	√			
K09	K09_349_1308em2	12	3.9	4	B	2268199.8	6965656.41	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	556 blank								√						√			
K09	K09_361_1308em2	11	3.72	4	B	2268208.85	6965654.94	08-Jun-06	Jim Thoren	√							√	ORD MD	12	2	1	blanks																	
K09	K09_372_1308em2	11	3.63	4	B	2268207.44	6965705.98	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K09	K09_378_1308em2	9	3.52	3	C	2268191.53	6965653.74	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	5.56mm brass							OTHER	√	3	0.5	0.25	N-S	0	√			
K09	K09_384_1308em2	11	3.48	3	B	2268161.73	6965716.3	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
K09	K09_399_1308em2	11	3.26	3	B	2268154.22	6965723.47	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire											
K09	K09_417_1308em2	11	3.09	3	B	2268145.61	6965639.3	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	nail		√						√			
K09	K09_43_1308em2	16	51.48	4	A	2268171.84	6965705.73	08-Jun-06	Jim Thoren	√													√	CIV	6	1	4	slag								√			
K09	K09_435_1308em2	11	2.91	3	B	2268179.35	6965730.7	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√						√			
K09	K09_454_1308em2	12	2.75	3	B	2268172.72	6965652.74	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
K09	K09_458_1308em2	11	2.71	3	B	2268120.28	6965675.2	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
K09	K09_5_1319em2	15	134.78	4	A	2268214.52	6965667.21	08-Jun-06	Jim Thoren	√													√	CIV	24	1	≥8	lg length of pipe	FE	√	> 24	4	0.5	NE-SW	45	√			
K09	K09_57_1308em2	12	35.4	4	B	2268192.5	6965643.77	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	bolt		√						√			
K09	K09_60_1308em2	13	32.77	4	B	2268201.73	6965717.28	08-Jun-06	Jim Thoren	√													√	CIV	12	1	1	scrap								√			
K09	K09_60_1319em2	15	15.09	4	A	2268215.02	6965670.48	08-Jun-06	Jim Thoren	√													√	CIV	> 24	1	≥8	lg length of pipe	FE	√	> 24	4	0.5	NE-SW	45	√			
K09	K09_64_1308em2	14	30.26	4	A	2268183.62	6965655.34	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
K09	K09_67_1308em2	12	28.4	4	B	2268210.6	6965659.77	08-Jun-06	Jim Thoren	√							√	ORD MD	18	1	1	blanks >18"								√									
K09	K09_68_1308em2	12	28.24	4	B	2268202.09	6965662.89	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	bolt		√						√			
K09	K09_74_1308em2	13	24.33	4	B	2268196.57	6965678.36	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
K09	K09_82_1308em2	16	22.35	4	A	2268187.99	6965670.33	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
K09	K09_866_1308em2	10	4.47	4	C	2268186.29	6965652.98	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	5.56mm brass							OTHER	√	3	0.5	0.25	N-S	0	√			
K09	K09_93_1308em2	9	19.56	4	C	2268161.62	6965644.43	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	banding	FE	√	> 24	0.5	0.25	N-S	0	√			
K09	K09_97_1308em2	13	18.83	4	B	2268196.99	6965685.55	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap		√						√			
K10	K10_107_1308em2	9	16.75	4	C	2268220.09	6965645.95	11-Jul-06	Alan Merriman																			no contact, reacquired 8/1/06											
K10	K10_111_1308em2	14	16.29	4	A	2268231.29	6965703.45	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
K10	K10_116_1308em2	13	15.8	4	B	2268219.66	6965701.91	08-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	blank								√						√			
K10	K10_119_1308em2	13	15.52	4	B	2268305.4	6965640.2	08-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	frag														√			
K10	K10_123_1308em2	14	15.28	4	A	2268231.53	6965643.17	08-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	frag														√			
K10	K10_126_1308em2	12	14.7	4	B	2268305.48	6965660.3	08-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap		√						√			
K10	K10_132_1308em2	9	13.56	4	C	2268284.93	6965679.36	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	5.56 casing							OTHER	√	3	0.5	0.25	N-S	0	√			
K10	K10_135_1308em2	13	12.88	4	B	2268307.26	6965655.37	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	chain								√			
K10	K10_144_1308em2	13	12.02	4	B	2268314.3	6965664.52	08-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
K10	K10_151_1308em2	13	11.65	4	B	2268237.05	6965667.87	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap		√						√			
K10	K10_160_1308em2	13	11.28	4	B	2268227.52	6965708.45	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	slag								√			
K10	K10_177_1308em2	13	10.31	4	B	2268231.15	6965694.31	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	part of fuze														√			
K10	K10_183_1308em2	11	9.94	4	B	2268277.27	6965681.43	08-Jun-06	Jim Thoren	√							√	EMAT MD	3	1	1	blank								√						√			
K10	K10_186_1308em2	12	9.83	4	B	2268227.86	6965642.47	08-Jun-06	Jim Thoren	√													√	MIL				bunker-reinforced concrete								√			
K10	K10_188_1308em2	13	9.59	4	B	2268227.36	6965691.45	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	rod		√						√			
K10	K10_193_1308em2	13	9.16	4	B	2268295.14	6965640.64	08-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
K10	K10_195_1308em2	14	9.13	4	A	2268314.77	6965677.56	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
K10	K10_196_1308em2	13	9.07	4	B	2268298.24	6965658.9	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K10	K10_198_1308em2	13	8.98	4	B	2268223.8	6965692.23	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	link								√			
K10	K10_216_1308em2	10	7.81	4	C	2268291.92	6965652.5	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K10	K10_225_1308em2	12	7.27	4	B	2268312.91	6965656.52	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K10	K10_227_1308em2	12	7.22	4	B	2268280.66	6965681.91	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	pipe end cap								√			
K10	K10_234_1308em2	12	6.86	4	B	2268247.59	6965691.4	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K10	K10_235_1308em2	12	6.86	4	B	2268315.69	6965708.53	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	link								√			
K10	K10_239_1308em2	10	6.64	4	C	2268233.19	6965658.74	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K10	K10_245_1308em2	12	6.47	4	B	2268291.33	6965676.26	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	link								√			
K10	K10_250_1308em2	12	6.32	4	B	2268288.25	6965654.36	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	chain								√			
K10	K10_252_1308em2	13	6.28	4	B	2268230.3	6965726.88	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√						√			
K10	K10_255_1308em2	9	6.26	4	C	2268309.2	6965702.76	11-Jul-06	Alan Merriman	√							√	ORD MD	0	3	0.25	5.56 casing							OTHER	√	3	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K10	K10_277_1308em2	10	5.41	4	C	2268277.61	6965677.26	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	m407a1 body							AL		3	2	0.25	N-S	0	√			
K10	K10_280_1308em2	13	5.38	4	B	2268304.15	6965704.78	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K10	K10_282_1308em2	12	5.33	4	B	2268244.64	6965698.92	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail	FE							√			
K10	K10_284_1308em2	13	5.31	4	B	2268301.63	6965652.95	08-Jun-06	Jim Thoren	√													√	MIL	6	1	1	link								√			
K10	K10_291_1308em2	9	5.15	4	C	2268302.23	6965644.19	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	casing							OTHER	√	3	0.5	0.25	N-S	0	√			
K10	K10_300_1308em2	12	4.9	4	B	2268236.05	6965694.22	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
K10	K10_307_1308em2	11	4.78	4	B	2268234.23	6965652.21	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K10	K10_309_1308em2	10	4.74	4	C	2268294.49	6965680.37	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	5.56 casing							OTHER	√	3	0.5	0.25	N-S	0	√			
K10	K10_310_1308em2	11	4.73	4	B	2268299.11	6965641.51	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	link								√			
K10	K10_328_1308em2	10	4.37	4	C	2268307.91	6965699.41	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	5.56 casing	√	CIV	0	1	0.25	nail	OTHER	√	3	0.5	0.25	N-S	0	√			
K10	K10_334_1308em2	9	4.23	4	C	2268298.49	6965701.05	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
K10	K10_338_1308em2	11	4.16	4	B	2268273.6	6965686.38	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K10	K10_341_1308em2	10	4.04	4	C	2268264.3	6965693.02	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	50 cal							FE	√	3	0.5	0.25	N-S	0	√			
K10	K10_356_1308em2	12	3.8	4	B	2268268.91	6965687.85	08-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire		√						√			
K10	K10_358_1308em2	10	3.77	4	C	2268310.63	6965696.72	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	5.56 casing							OTHER	√	3	0.5	0.5	N-S	0	√			
K10	K10_389_1308em2	11	3.43	3	B	2268298.23	6965684.08	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	tubing		√						√			
K10	K10_397_1308em2	11	3.3	3	B	2268313.72	6965700.52	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	link								√			
K10	K10_405_1308em2	11	3.16	3	B	2268306.48	6965693.75	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	rusted metal								√			
K10	K10_433_1308em2	12	2.92	3	B	2268296.91	6965676.23	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√						√			
K10	K10_444_1308em2	11	2.8	3	B	2268222.48	6965659.8	08-Jun-06	Jim Thoren	√							√	ORD MD	> 24	> 10	1	5.56 brass, carts							OTHER	√	3	0.5	0.5	NE-SW	45	√			
K10	K10_51_1308em2	15	43.37	4	A	2268226.52	6965727.61	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√						√			
K10	K10_58_1308em2	12	33.38	4	B	2268287.32	6965682.21	08-Jun-06	Jim Thoren	√													√	CIV	12	1	1	bolts		√						√			
K10	K10_69_1308em2	13	27.26	4	B	2268244.18	6965641.54	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	cad														√			
K10	K10_75_1308em2	13	24.24	4	B	2268229.89	6965653.05	08-Jun-06	Jim Thoren	√							√	ORD MD	18	1	8	fuze														√			
K10	K10_85_1308em2	12	21.24	4	B	2268218.51	6965665.38	08-Jun-06	Jim Thoren	√													√	CIV	> 24	1	≥8	lg length of pipe	FE	√	> 24	4	0.5	NE-SW	45	√			
K10	K10_86_1308em2	13	20.99	4	B	2268295.3	6965650.2	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap		√						√			
K10	K10_92_1308em2	13	19.78	4	B	2268317.76	6965642.02	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
K11	K11_100_1308em2	12	18.57	4	B	2268358.38	6965726.59	08-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	fuze, bottom 1/2 of m904 nose								√	6	2	2	E-W	45	√			
K11	K11_104_1308em2	14	17.67	4	A	2268361.51	6965661.24	08-Jun-06	Alan Merriman	√													√	CIV	6	1	1	chunk of metal		√	6	0.5	0.25	N-S	0	√			
K11	K11_112_1308em2	15	16.14	4	A	2268395.81	6965695.22	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	mangled metal piece		√	9	0.5	0.25	N-S	0	√			
K11	K11_122_1308em2	16	15.31	4	A	2268380.66	6965697.23	08-Jun-06	Alan Merriman	√													√	CIV	6	1	1	large chunk of aluminum								√			
K11	K11_128_1308em2	13	14.44	4	B	2268344.91	6965720.26	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	ammo clip		√	3	0.5	0.25	N-S	0	√			
K11	K11_131_1308em2	13	13.58	4	B	2268320.47	6965640.08	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	piece of metal & one 7.62 ctg								√	6	0.5	0.25	N-S	45	√			
K11	K11_133_1308em2	12	13.3	4	B	2268325.54	6965671.42	08-Jun-06	Alan Merriman	√													√	CIV	6	1	1	bolt w/ 2 washers		√	6	0.5	0.25	N-S	0	√			
K11	K11_138_1308em2	13	12.67	4	B	2268329.64	6965656.73	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	flat metal piece		√	6	0.5	0.25	NE-SW	45	√			
K11	K11_139_1308em2	13	12.56	4	B	2268320.73	6965653.62	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	chunk of metal		√	6	1	1	NE-SW	90	√			
K11	K11_140_1308em2	13	12.5	4	B	2268368.73	6965674.62	08-Jun-06	Alan Merriman	√							√	ORD MD	3	3	1	fuze,prox anten,metal neck &nail								√	6	0.5	0.25	N-S	0	√			
K11	K11_146_1308em2	12	11.97	4	B	2268362.39	6965697.29	08-Jun-06	Alan Merriman	√							√	ORD MD	6	3	1	(2) piec of alum & 5 cal bullet								√	3	0.5	0.25	N-S	45	√			
K11	K11_147_1308em2	13	11.92	4	B	2268338.4	6965717.67	08-Jun-06	Alan Merriman	√													√	MIL	3	2	1	piece of metal & piece aluminum		√	9	0.5	0.25	N-S	0	√			
K11	K11_148_1308em2	12	11.86	4	B	2268381.83	6965723.58	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1			√	9	0.5	0.25	SE-NW	90	√			
K11	K11_150_1308em2	13	11.68	4	B	2268403.93	6965695.08	08-Jun-06	Alan Merriman	√													√	CIV	3	2	1	round metal top & chunk of metal		√	3	0.5	0.25	NE-SW	90	√			
K11	K11_153_1308em2	9	11.59	4	C	2268360.02	6965732.25	11-Jul-06	Alan Merriman	√													√	MIL	0	1	0.25	truck part	FE	√	3	2	0.25	N-S	0	√			
K11	K11_154_1308em2	14	11.53	4	A	2268350.34	6965667.04	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m54a, piece of a signal flare								√	3	0.5	0.25	NE-SW	45	√			
K11	K11_161_1308em2	10	11.25	4	C	2268355.88	6965699.08	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	slap flare lid							AL	√	3	2	0.25	N-S	0	√			
K11	K11_165_1308em2	15	11.06	4	A	2268401.34	6965657.6	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	metal piece								√			
K11	K11_169_1308em2	13	10.62	4	B	2268346.15	6965736.04	08-Jun-06	Alan Merriman	√													√	MIL	12	1	1	chunk of metal		√	3	2	2	E-W	45	√			
K11	K11_178_1308em2	13	10.22	4	B	2268338.04	6965637.44	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	piece of aluminum		√	3	1	0.5	E-W	45	√			
K11	K11_179_1308em2	14	10.06	4	A	2268374.97	6965666.84	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fuze, proximity antenna piece								√	6	0.5	0.25	N-S	0	√			
K11	K11_180_1308em2	14	10.01	4	A	2268411.2	6965711.02	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	chunk of metal		√	3	1	0.25	N-S	0	√			
K11	K11_184_1308em2	13	9.9	4	B	2268366.82	6965693.72	08-Jun-06	Alan Merriman	√													√	CIV	6	2	1	(2) pieces of aluminum		√	3	1	0.25	E-W	90	√			
K11	K11_190_1308em2	12	9.32	4	B	2268357.65	6965660.8	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	piece of metal		√	6	0.5	0.25	N-S	0	√			
K11	K11_194_1308em2	15	9.15	4	A	2268366.94	6965728.05	08-Jun-06	Alan Merriman	√													√	CIV	0	1	1	4 links of chain		√	6	0.5	0.5	N-S	45	√			
K11	K11_210_1308em2	9	8.15	4	C	2268355.88	6965704.64	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part							FE	√	3	1	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K11	K11_211_1308em2	14	8.1	4	A	2268343.23	6965665.59	08-Jun-06	Alan Merriman	√													√	CIV	6	1	1	chunk of metal		√	6	1	0.5	SE-NW	90	√			
K11	K11_212_1308em2	12	8.09	4	B	2268351.85	6965698.95	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	9	0.5	0.25	E-W	45	√			
K11	K11_220_1308em2	12	7.66	4	B	2268353.64	6965735.02	08-Jun-06	Alan Merriman	√													√	MIL	0	1	1	scrap metal		√	3	2	0.5	N-S	0	√			
K11	K11_222_1308em2	13	7.53	4	B	2268325.47	6965703.33	08-Jun-06	Alan Merriman	√							√	ORD MD	3	2	1	5.56mm,ctg,blnk, m200 (2) unfire								√	3	2	0.25	N-S	45	√			
K11	K11_240_1308em2	12	6.62	4	B	2268335	6965648.82	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	2	0.25	E-W	0	√			
K11	K11_241_1308em2	13	6.56	4	B	2268396.59	6965733.8	08-Jun-06	Alan Merriman	√													√	MIL	3	2	1	(2) scrap		√	3	0.5	0.5		0	√			
K11	K11_251_1308em2	13	6.29	4	B	2268381.77	6965706.72	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	0.5	0.5	NE-SW	0	√			
K11	K11_256_1308em2	12	6.23	4	B	2268386.46	6965731.95	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	penny nail made in1974		√	6	0.5	0.25		90	√			
K11	K11_258_1308em2	12	6.22	4	B	2268348.69	6965694.55	08-Jun-06	Alan Merriman	√													√	MIL	6	3	1									√			
K11	K11_259_1308em2	13	6.2	4	B	2268324.14	6965652.66	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap		√	3	1	0.25		90	√			
K11	K11_262_1308em2	13	6.13	4	B	2268396.82	6965725.59	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	safety pin		√	3	0.5	0.25		0	√			
K11	K11_268_1308em2	12	5.73	4	B	2268319.06	6965661.76	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	1	0.25	E-W	45	√			
K11	K11_27_1308em2	15	91.17	4	A	2268328.88	6965704.15	08-Jun-06	Alan Merriman	√							√	ED MD	3	1	4	cylindrical device/battery								√	9	4	4	E-W	0	√			
K11	K11_273_1308em2	12	5.58	4	B	2268322.11	6965670.77	08-Jun-06	Alan Merriman	√													√	CIV	6	1	1	bolt w/ 2-washers		√	6	0.5	0.25	N-S	0	√			
K11	K11_274_1308em2	13	5.5	4	B	2268351.44	6965730.48	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	starter cart scrap								√	3	4	0.5	N-S	0	√			
K11	K11_275_1308em2	10	5.44	4	C	2268371.04	6965708.27	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	flare scrap							AL	√	3	1	0.25	N-S	0	√			
K11	K11_279_1308em2	12	5.39	4	B	2268370.51	6965658.99	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	#10 spike made 1996		√	6	0.5	0.25		90	√			
K11	K11_286_1308em2	12	5.23	4	B	2268408.03	6965696.16	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap metal		√	3	2	2	N-S	0	√			
K11	K11_287_1308em2	12	5.2	4	B	2268373.74	6965706.4	08-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	frag								√	3	2	0.5		0	√			
K11	K11_296_1308em2	12	5.09	4	B	2268345.54	6965708.69	08-Jun-06	Alan Merriman	√													√	CIV	3	2	1	2-12 penny nail made 1982								√			
K11	K11_312_1308em2	10	4.71	4	C	2268353.98	6965694.23	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	flare part							CU		3	2	0.25	N-S	0	√			
K11	K11_313_1308em2	13	4.65	4	B	2268359.53	6965653.3	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	1	0.25	E-W	0	√			
K11	K11_319_1308em2	10	4.53	4	C	2268352.95	6965719.43	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	5.56 casing							OTHER	√	3	0.5	0.25	N-S	0	√			
K11	K11_322_1308em2	12	4.39	4	B	2268411.1	6965694.54	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	metal		√	3		0.25	E-W	45	√			
K11	K11_327_1308em2	12	4.38	4	B	2268336	6965661.29	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	2	0.5	E-W	0	√			
K11	K11_330_1308em2	11	4.31	4	B	2268369.07	6965703.44	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	base of flare								√	3	2	0.5		0	√			
K11	K11_332_1308em2	12	4.25	4	B	2268363.23	6965652.99	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	2	0.5	E-W	0	√			
K11	K11_336_1308em2	14	4.2	4	A	2268404.84	6965648.95	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	wire		√	9	0.5	0.25	N-S	45	√			
K11	K11_339_1308em2	12	4.1	4	B	2268332.37	6965700.49	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	aluminum can		√	3	0.5	1			√			
K11	K11_342_1308em2	12	4.03	4	B	2268345.34	6965686.67	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	can		√	3	2	1	N-S	0	√			
K11	K11_343_1308em2	12	3.96	4	B	2268366.97	6965713.12	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal ap								√	3	2	0.5	E-W	45	√			
K11	K11_346_1308em2	11	3.92	4	B	2268357.64	6965689.63	08-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	50 cal cart								√	3	2	0.5	N-S	45	√			
K11	K11_351_1308em2	12	3.88	4	B	2268389.81	6965706.64	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap al		√	3	2	0.25	N-S	0	√			
K11	K11_352_1308em2	11	3.84	4	B	2268338.36	6965643.62	08-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	frag								√	3	2	0.5	E-W	0	√			
K11	K11_353_1308em2	11	3.83	4	B	2268341.8	6965736.41	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	4 penny nail 1976		√	3	0.5	0.25	N-S	0	√			
K11	K11_360_1308em2	12	3.73	4	B	2268327.95	6965715.39	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	2 penny nail 1998		√	3	0.5	0.25		0	√			
K11	K11_365_1308em2	13	3.67	4	B	2268404.03	6965686.45	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap		√	3	2	2	N-S	0	√			
K11	K11_371_1308em2	12	3.63	4	B	2268353.3	6965683.06	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	2	0.25	E-W	45	√			
K11	K11_374_1308em2	12	3.62	4	B	2268360.2	6965684.95	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	.223 .556mm blank								√	3	0.5	0.25	E-W	0	√			
K11	K11_376_1308em2	11	3.57	3	B	2268377.05	6965727.02	08-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	50 cal								√	3	2	0.5	N-S	45	√			
K11	K11_38_1308em2	16	55.31	4	A	2268329.17	6965649.69	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	4	75mm projo piece								√	6	4	4	E-W	45	√			
K11	K11_406_1308em2	12	3.15	3	B	2268364.18	6965678.49	08-Jun-06	Alan Merriman	√													√	CIV	6	1	1	gas cap 1956 ford tractor		√	3	4	0.5		0	√			
K11	K11_408_1308em2	11	3.14	3	B	2268363.61	6965671.27	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	metal scrap		√	3	1	0.25	N-S	0	√			
K11	K11_41_1308em2	15	54.18	4	A	2268336.23	6965700.56	08-Jun-06	Alan Merriman	√													√	CIV	0	1	1	length of wire		√	12	0.5	0.25	E-W	45	√			
K11	K11_416_1308em2	11	3.09	3	B	2268339.81	6965666.95	08-Jun-06	Alan Merriman	√													√	CIV	6	1	1	1952 4 penny square nail		√	3	0.5	0.25		90	√			
K11	K11_42_1308em2	16	52.2	4	A	2268415.16	6965711.93	08-Jun-06	Alan Merriman	√													√	CIV	3	3	4	melted chunks of metal		√	6	1	1	NE-SW	45	√			
K11	K11_436_1308em2	11	2.9	3	B	2268411.26	6965667.09	08-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	50 cal								√	3	1	0.5	E-W	90	√			
K11	K11_460_1308em2	11	2.65	3	B	2268355.66	6965643.43	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	cad								√	3	1	1			√			
K11	K11_468_1308em2	11	2.58	3	B	2268374.93	6965645.29	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal								√	3	0.5	0.5	SE-NW	0	√			
K11	K11_488_1308em2	11	2.5	3	B	2268333.41	6965683.08	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	mk13 flare scrap								√	3	1	0.25			√			
K11	K11_53_1308em2	16	39.52	4	A	2268392.91	6965723.16	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	container top		√	9	0.5	0.25	N-S	45	√			
K11	K11_54_1308em2	14	38.88	4	A	2268373.76	6965682.56	08-Jun-06	Alan Merriman	√							√	ORD MD	3	3	1	large metal chunk & (2) 7.62 ctg								√	6	2	0.5	N-S	0	√			
K11	K11_65_1308em2	13	30.01	4	B	2268400.17	6965727.16	08-Jun-06	Alan Merriman	√													√	CIV	3	2	1	flat metal pieces		√	6	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K11	K11_66_1308em2	16	29.22	4	A	2268347.1	6965643.49	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	20mm round and opened up								√	3	1	1	NE-SW	45	√			
K11	K11_80_1308em2	13	23.46	4	B	2268334.91	6965674.03	08-Jun-06	Alan Merriman	√													√	CIV	6	1	1	long piece of metal		√	9	0.5	0.5	N-S	0	√			
K11	K11_84_1308em2	15	21.61	4	A	2268319.34	6965691.38	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	fuze, part of								√	6	4	4	E-W	45	√			
K11	K11_91_1308em2	16	19.86	4	A	2268371.45	6965648.45	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze pieces							FE	√	6	2	2	E-W	90	√			
K11	K11_95_1308em2	13	19.42	4	B	2268383	6965731.23	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	piece of aluminum		√	6	0.5	0.25	N-S	0	√			
K11	K11_96_1308em2	14	19.16	4	A	2268342.82	6965692.95	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	piece of metal			6	0.5	0.25	NE-SW	45	√			
K11	K11_98_1308em2	14	18.67	4	A	2268416.8	6965722.3	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	chunk of metal w/ threads								√	3	4	4	E-W	45	√			
K12	K12_104_1306em2	12	10.79	4	B	2268482.56	6965689.34	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel cable		√	24	0.5				√			
K12	K12_105_1306em2	11	10.6	4	B	2268462.01	6965714.04	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3	0.5	0.25			√			
K12	K12_107_1306em2	10	10.43	4	C	2268470.57	6965639.12	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	fuze bar							FE	√	3	1	0.5	N-S	0	√			
K12	K12_111_1306em2	13	10.27	4	B	2268421.4	6965722.9	20-Jun-06	Jim Thoren	√													√	CIV	3	2	1	steel slag		√	6	2	0.25			√			
K12	K12_112_1306em2	11	10.22	4	B	2268444.71	6965731.96	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze parts								√	6	0.5				√			
K12	K12_120_1306em2	12	9.89	4	B	2268499.54	6965696.77	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire		√	12	0.5	0.25			√			
K12	K12_122_1306em2	14	9.85	4	A	2268447.12	6965664.76	20-Jun-06	Jim Thoren	√													√	MIL	3	1	1	steel slag		√	3	4	0.25			√			
K12	K12_123_1306em2	11	9.67	4	B	2268456.84	6965726.41	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	3	0.5	0.25			√			
K12	K12_131_1306em2	11	9.21	4	B	2268447.52	6965729.54	20-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	mech scrap, steel								√	3	1	0.25			√			
K12	K12_132_1306em2	12	9.18	4	B	2268465.64	6965707.98	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	6	0.5	0.25			√			
K12	K12_135_1306em2	12	9.07	4	B	2268465.79	6965715.49	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	6	2	0.25			√			
K12	K12_136_1306em2	13	9.07	4	B	2268445.85	6965695.05	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze antenna								√	6	2	1			√			
K12	K12_141_1306em2	13	8.89	4	B	2268486.71	6965690.32	20-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap, steel		√	3	0.5	0.25			√			
K12	K12_149_1306em2	15	8.15	4	A	2268439.82	6965704.88	20-Jun-06	Jim Thoren	√													√	CIV	3	1	2	scrap, steel		√	6	4	1			√			
K12	K12_163_1306em2	12	7.66	4	B	2268457.04	6965711.48	20-Jun-06	Jim Thoren	√													√	CIV	3	1		nail		√	3	0.5	0.25			√			
K12	K12_164_1306em2	12	7.55	4	B	2268467.71	6965703.78	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	0.5	0.25			√			
K12	K12_167_1306em2	12	7.44	4	B	2268478.46	6965707.2	20-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.5	vt fuze antenna								√	6	1	0.25						
K12	K12_168_1306em2	13	7.36	4	B	2268469.3	6965646.31	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	0.5	1			√			
K12	K12_17_1306em2	13	64.34	4	B	2268501.64	6965682.64	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	6	0.5	0.25			√			
K12	K12_172_1306em2	11	7.13	4	B	2268447.8	6965733.91	20-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap, steel		√	6	2	1			√			
K12	K12_173_1306em2	12	7.1	4	B	2268446.59	6965720.48	20-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap, steel		√	24	6	0.25			√			
K12	K12_174_1306em2	12	7.07	4	B	2268504.84	6965685.34	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	6	0.5	0.25			√			
K12	K12_175_1306em2	15	7.06	4	A	2268469.65	6965700.38	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	0.5	0.25			√			
K12	K12_176_1306em2	12	6.98	4	B	2268502.84	6965670.97	20-Jun-06	Jim Thoren	√													√	CIV	3	1	1	piece of scrap metal		√	6	0.5	0.25	NE-SW	0	√			
K12	K12_181_1306em2	13	6.62	4	B	2268512.79	6965674.38	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	5.56 blank, brass								√	3	0.5	0.25			√			
K12	K12_185_1306em2	9	6.54	4	C	2268492.79	6965691.28	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			
K12	K12_187_1306em2	11	6.43	4	B	2268478.14	6965696.49	20-Jun-06	Jim Thoren	√													√	CIV	3	2	0.25	nail		√	6	0.5	0.25			√			
K12	K12_191_1306em2	12	6.32	4	B	2268453.12	6965720.19	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	0.5	0.25			√			
K12	K12_203_1306em2	11	5.75	4	B	2268457.77	6965646.25	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze part								√	6	0.5	0.5			√			
K12	K12_21_1306em2	13	55.79	4	B	2268501.64	6965674.99	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	aircraft flare								√	9	2	0.25			√			
K12	K12_211_1306em2	9	5.47	4	C	2268509.72	6965672.36	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
K12	K12_218_1306em2	14	5.28	4	A	2268446.2	6965646.45	20-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap, steel		√	3	0.5	0.25			√			
K12	K12_219_1306em2	15	5.22	4	A	2268436.14	6965692.74	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	5.56 blank								√	3	0.5	0.25			√			
K12	K12_22_1306em2	16	55.51	4	A	2268473.21	6965677.28	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	aluminum scrap		√	6	4	0.25			√			
K12	K12_221_1306em2	12	5.12	4	B	2268476.96	6965720.2	20-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	50 cal projo								√	3	0.5	0.25			√			
K12	K12_23_1306em2	12	53.74	4	B	2268451.06	6965731.05	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	4	vt fuze								√	3	4				√			
K12	K12_233_1306em2	11	4.86	4	B	2268433.22	6965699.1	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze part								√	6	0.5	0.25			√			
K12	K12_234_1306em2	10	4.84	4	C	2268473.67	6965703.63	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	frag							FE	√	3	1	1	N-S	0	√			
K12	K12_237_1306em2	10	4.72	4	C	2268504.68	6965733.89	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
K12	K12_240_1306em2	10	4.59	4	C	2268484.23	6965693.87	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
K12	K12_246_1306em2	10	4.49	4	C	2268452.72	6965716.8	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
K12	K12_255_1306em2	12	4.34	4	B	2268499.34	6965653.7	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire		√	6	2	0.25			√			
K12	K12_260_1306em2	11	4.28	4	B	2268495.48	6965730	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail		√	6	0.5	0.25			√			
K12	K12_261_1306em2	10	4.26	4	C	2268509.8	6965678.8	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
K12	K12_263_1306em2	9	4.25	4	C	2268484.35	6965697.66	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	nail	FE	√	3	0.5	0.25	N-S	0	√			
K12	K12_265_1306em2	12	4.23	4	B	2268495.49	6965697.45	20-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	aluminum scrap		√	3	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K12	K12_273_1306em2	12	4.05	4	B	2268479.55	6965649.9	20-Jun-06	Jim Thoren	√													√	MIL	3	1	0.5	aluminum scrap		√	3	1	0.25			√			
K12	K12_279_1306em2	12	3.98	4	B	2268472.05	6965716.97	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal projo								√	3	0.5	0.25			√			
K12	K12_28_1306em2	16	35.4	4	A	2268450.25	6965645.56	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	fuze bracket								√	6	2	0.25			√			
K12	K12_288_1306em2	11	3.8	4	B	2268486.6	6965686.98	20-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	aluminum scrap		√	3	1	0.25			√			
K12	K12_293_1306em2	12	3.66	4	B	2268454.37	6965732.26	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	1	0.25			√			
K12	K12_295_1306em2	11	3.65	4	B	2268423.02	6965640.56	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	2	0.25			√			
K12	K12_297_1306em2	12	3.62	4	B	2268470.07	6965711.3	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm projo								√	3	1	1			√			
K12	K12_3_1306em2	16	157.88	4	A	2268482.7	6965730.07	20-Jun-06	Jim Thoren	√							√	ORD MD	0	3	1	scrap,steel;50 cal projo,m60 ign								√	6	6	0.25			√			
K12	K12_309_1306em2	12	3.44	3	B	2268509.4	6965730.79	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	1	0.25			√			
K12	K12_32_1306em2	14	32.52	4	A	2268456.37	6965718.19	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze brackets								√	6	2	0.25			√			
K12	K12_320_1306em2	11	3.31	3	B	2268453.53	6965675.05	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap, steel		√	3	1	0.25			√			
K12	K12_33_1306em2	10	32.26	4	C	2268502.97	6965678.16	11-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
K12	K12_332_1306em2	12	3.21	3	B	2268431.91	6965673.12	20-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	aluminum		√	3	0.5	0.25			√			
K12	K12_333_1306em2	10	3.21	3	C	2268508.18	6965663.64	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.5	N-S	0	√			
K12	K12_36_1306em2	13	28.66	4	B	2268421.9	6965680.29	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze brackets								√	6	1	0.25			√			
K12	K12_361_1306em2	12	2.95	3	B	2268506.06	6965669.14	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	5.56 blank brass								√	3	0.5	0.25			√			
K12	K12_38_1306em2	16	27.7	4	A	2268473.41	6965699.91	20-Jun-06	Jim Thoren	√													√	CIV	3	1	1	steel slag		√	6	6	0.25			√			
K12	K12_39_1306em2	15	27.35	4	A	2268426.35	6965688	20-Jun-06	Jim Thoren	√													√	CIV	3	2	0.75	wire		√	24	0.5	0.25			√			
K12	K12_41_1306em2	10	26.64	4	C	2268499.65	6965679.12	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	FE		9	4	0.25	N-S	0	√			
K12	K12_44_1306em2	14	23.56	4	A	2268504.14	6965639.88	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze bracket, steel								√	6	2				√			
K12	K12_46_1306em2	13	21.99	4	B	2268477.16	6965641.09	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	steel fuze bracket								√	6	2	0.25			√			
K12	K12_48_1306em2	13	21.77	4	B	2268465.77	6965712.17	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze bracket								√	6	2	0.25			√			
K12	K12_490_1306em2	11	1.92	2	B	2268484.8	6965726.04	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.5	aluminum scrap		√	3	1	0.25			√			
K12	K12_50_1306em2	13	21.5	4	B	2268496.21	6965668.58	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	steel fuze bracket								√	6	1	0.25			√			
K12	K12_52_1306em2	13	21.36	4	B	2268495.31	6965675.37	20-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	vt fuze bracket								√	6	1	0.25			√			
K12	K12_62_1306em2	14	16.04	4	A	2268419.65	6965641.25	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	scrap, metal wing vt fuze								√	6	2	1			√			
K12	K12_63_1306em2	13	15.96	4	B	2268459.8	6965720.84	20-Jun-06	Jim Thoren	√													√	CIV	3	3	0.25	nail		√	6	0.5	0.25			√			
K12	K12_67_1306em2	15	15.04	4	A	2268441.12	6965693.39	20-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.75	vt fuze parts								√	6	2	0.25			√			
K12	K12_68_1306em2	14	14.95	4	A	2268440.62	6965644.16	20-Jun-06	Jim Thoren	√													√	MIL	3	1	2	scrap, steel	FE	√	6	4	0.25			√			
K12	K12_75_1306em2	10	13.74	4	C	2268492.8	6965687.51	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
K12	K12_77_1306em2	12	13.6	4	B	2268517.8	6965672.9	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	6	0.5	0.25			√			
K12	K12_80_1306em2	13	13.23	4	B	2268480.72	6965694.34	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap, steel		√	3	0.5	0.25			√			
K12	K12_82_1306em2	11	12.88	4	B	2268498.05	6965683.81	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap, steel		√	6	2	0.25			√			
K12	K12_85_1306em2	10	12.74	4	C	2268505.95	6965679.56	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
K12	K12_86_1306em2	14	12.62	4	A	2268489.37	6965702.14	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	aluminum scrap		√	6	1	0.25			√			
K12	K12_96_1306em2	14	11.44	4	A	2268490.38	6965683.91	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	fuze antenna								√	3	1	0.5			√			
K12	K12_99_1306em2	11	11.13	4	B	2268462.43	6965717.85	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	3	1	0.25			√			
K13	K13_100_1306em2	12	11.12	4	B	2268545.09	6965664.12	21-Jun-06	Alan Merriman	√													√	CIV	6	3	0.25	3 nails		√	3	0.5	0.25	NE-SW	45	√			
K13	K13_101_1306em2	14	10.99	4	A	2268540.34	6965666.83	21-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	nails		√	6	0.5	0.25	E-W	90	√			
K13	K13_117_1306em2	11	10	4	B	2268548.41	6965660.96	21-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	nails		√	6	0.5	0.25	E-W	0	√			
K13	K13_13_1306em2	12	73.94	4	B	2268556.38	6965652.81	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	> 4			√			
K13	K13_134_1306em2	10	9.16	4	C	2268573.61	6965656.88	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	6	> 4			√			
K13	K13_143_1306em2	12	8.65	4	B	2268600.42	6965654.73	21-Jun-06	Alan Merriman	√							√	ORD MD	3	3	0.25	frag	√	CIV				nail, link		√	3	0.5	0.25	N-S	0	√			
K13	K13_146_1306em2	12	8.43	4	B	2268592.03	6965654.16	21-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	12 penny nail & 16 penny nail		√	3	0.5	0.25	NE-SW	0	√			
K13	K13_151_1306em2	12	8.11	4	B	2268551.91	6965646.38	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	6	> 4			√			
K13	K13_159_1306em2	10	7.73	4	C	2268586.16	6965656.6	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	> 4			√			
K13	K13_169_1306em2	11	7.31	4	B	2268600.29	6965650.59	21-Jun-06	Alan Merriman	√							√	ORD MD	3	3	0.25	frag steel,alum frag,16penny nai								√	3	0.5	0.25	E-W	0	√			
K13	K13_182_1306em2	14	6.61	4	A	2268577.75	6965655.18	21-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	nail 16penny,electrical charged		√	3	0.5	0.25			√			
K13	K13_19_1306em2	11	61.76	4	B	2268566.09	6965646.22	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	4			√			
K13	K13_193_1306em2	11	6.09	4	B	2268544.65	6965660.48	21-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	nails		√	6	0.5	0.25	N-S	0	√			
K13	K13_196_1306em2	15	5.91	4	A	2268526.38	6965665.73	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50 cal bullet and 2 nails								√	3	0.5	0.25	NE-SW	45	√			
K13	K13_200_1306em2	11	5.83	4	B	2268596.88	6965649.01	21-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	6 penny nails		√	3	0.5	0.25	E-W	0	√			
K13	K13_201_1306em2	12	5.76	4	B	2268562.51	6965642.7	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	4			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K13	K13_207_1306em2	12	5.63	4	B	2268533.02	6965674.53	21-Jun-06	Alan Merriman	√													√	MIL	> 24	> 10	0.5	scrap	FE	√	3	1	1			√			
K13	K13_216_1306em2	12	5.3	4	B	2268551.82	6965663.27	21-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	nails		√	3	0.5	0.25	SE-NW	0	√			
K13	K13_223_1306em2	11	5.09	4	B	2268599.5	6965693.27	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	part vt fuze								√	3	0.5	0.5	NE-SW	0	√			
K13	K13_235_1306em2	13	4.77	4	B	2268551.99	6965651.2	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10		str ctg,cs&smoke grenades, ob/od							OTHER	√	6	> 6	> 4			√			
K13	K13_243_1306em2	10	4.54	4	C	2268589.12	6965649.95	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	> 4			√			
K13	K13_250_1306em2	9	4.46	4	C	2268575.19	6965652.85	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	> 4			√			
K13	K13_253_1306em2	11	4.37	4	B	2268574.91	6965681.31	21-Jun-06	Alan Merriman	√							√	ORD MD	3	5	0.25	(6) 5.56mm blanks expended														√			
K13	K13_26_1306em2	14	44.56	4	A	2268521.7	6965667.41	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze body, m166 vt								√	3	4	4	NE-SW	0	√			
K13	K13_262_1306em2	11	4.26	4	B	2268617.65	6965686.18	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	16 penny nail		√	3	0.5	0.25	NE-SW	0	√			
K13	K13_266_1306em2	11	4.2	4	B	2268574.55	6965697.89	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	nail 16 penny		√	3	0.5	0.25	N-S	0	√			
K13	K13_267_1306em2	11	4.19	4	B	2268533.55	6965665.21	21-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	nails		√	3	0.5	0.25	NE-SW	0	√			
K13	K13_269_1306em2	15	4.15	4	A	2268573.89	6965647.21	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	> 4			√			
K13	K13_27_1306em2	11	40.5	4	B	2268557.82	6965641.27	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	6	> 4			√			
K13	K13_271_1306em2	10	4.14	4	C	2268578.77	6965649.55	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	matal scrap	FE	√	3	2	0.25	N-S	0	√			
K13	K13_272_1306em2	11	4.11	4	B	2268556.07	6965704.46	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	nail 16 penny		√	3	0.5	0.25	N-S	90				
K13	K13_277_1306em2	12	3.99	4	B	2268526.22	6965670.18	21-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	2 nails & aluminum piece		√	6	0.5	0.25	N-S	45	√			
K13	K13_283_1306em2	12	3.89	4	B	2268520.34	6965719.05	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	aircraft scrap metal/steel		√	3	2	0.25	SE-NW	45	√			
K13	K13_296_1306em2	12	3.65	4	B	2268537.07	6965666.21	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	2 nails		√	3	0.5	0.25	NE-SW	0	√			
K13	K13_342_1306em2	11	3.12	3	B	2268537	6965735.8	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm m97 he-I empty								√	3	1	0.25	NE-SW	0	√			
K13	K13_389_1306em2	11	2.65	3	B	2268552.51	6965733.38	21-Jun-06	Alan Merriman	√													√	MIL	0	2	0.25	ac parts/scrap-aluminum		√						√			
K13	K13_4_1306em2	11	135.92	4	B	2268555.78	6965645.57	21-Jun-06	Alan Merriman	√							√	ORD MD	24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	24	> 6	> 4			√			
K13	K13_473_1306em2	11	2	2	B	2268617.59	6965644.62	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	coors can top, old style top		√	3	2	0.25	N-S	0	√			
K13	K13_51_1306em2	14	21.45	4	A	2268544.7	6965732.12	21-Jun-06	Alan Merriman	√							√	ORD MD	0	2	0.25	3"aluminum disk, 5.56mm blank								√	3	4	0.5			√			
K13	K13_6_1306em2	13	132.61	4	B	2268570.27	6965647.06	21-Jun-06	Alan Merriman	√							√	ORD MD	24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	6	> 4			√			
K13	K13_60_1306em2	13	16.23	4	B	2268585.95	6965652.31	21-Jun-06	Alan Merriman	√													√	MIL	0	2	0.5	ac knuter valve fitting, 12 penn		√	3	0.5	0.25	NE-SW	0	√			
K13	K13_7_1306em2	12	131.77	4	B	2268560.16	6965647.12	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	> 4			√			
K13	K13_78_1306em2	10	13.58	4	C	2268564.28	6965639.94	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	> 4			√			
K13	K13_8_1306em2	12	114.55	4	B	2268556.07	6965649.14	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	6	> 4			√			
K13	K13_83_1306em2	10	12.84	4	C	2268568.39	6965640.13	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	3	1	0.25	N-S	0	√			
K13	K13_84_1306em2	14	12.75	4	A	2268596.92	6965654.22	21-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	(2) 8 penny nail&(1)6 penny nail		√	3	0.5	0.25			√			
K13	K13_9_1306em2	12	112.75	4	B	2268563.81	6965648.62	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	> 4			√			
K13	K13_91_1306em2	14	12.01	4	A	2268581.14	6965656.39	21-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	2 nails		√	3	0.5	0.25	NE-SW	45	√			
K13	K13_98_1306em2	11	11.25	4	B	2268570.59	6965655	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	≥8	str ctg,cs&smoke grenades, ob/od							OTHER	√	9	> 6	> 4			√			
K14	K14_101_1305em2	12	12.56	4	B	2268677.09	6965641.45	26-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	scrap-frag							FE	√	3	1				√			
K14	K14_103_1305em2	12	12.3	4	B	2268661.81	6965637.86	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	link	FE	√	3	1	0.25			√			
K14	K14_116_1305em2	13	10.96	4	B	2268702.48	6965713.96	26-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze pt							AL	√	3	1	0.25			√			
K14	K14_120_1305em2	9	10.54	4	C	2268623.69	6965649.84	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.5	aluminum scrap							AL	√	6	2	0.25	N-S	0	√			
K14	K14_124_1305em2	14	10.02	4	A	2268675.3	6965694.61	26-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	AL	√	3	1	0.25			√			
K14	K14_125_1305em2	13	9.93	4	B	2268646.59	6965651.13	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
K14	K14_13_1305em2	16	84.54	4	A	2268706.28	6965695.56	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	flare							AL	√	9	2	0.25			√			
K14	K14_130_1305em2	10	9.66	4	C	2268686.11	6965664.66	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K14	K14_131_1305em2	9	9.61	4	C	2268631.54	6965648.08	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K14	K14_132_1305em2	13	9.55	4	B	2268634.34	6965651.93	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
K14	K14_140_1305em2	14	9.24	4	A	2268689.34	6965663.29	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	4	0.25			√			
K14	K14_15_1305em2	13	82.86	4	B	2268703.66	6965641.81	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	flare	√	CIV	3	1	0.25	scrap	OTHER	√	3	1	0.25	N-S	0	√			
K14	K14_150_1305em2	9	8.22	4	C	2268671.34	6965639.93	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	possibel wp frag							FE	√	6	4	0.25	N-S	0	√			
K14	K14_155_1305em2	9	7.64	4	C	2268658.66	6965653.82	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K14	K14_158_1305em2	9	7.14	4	C	2268631.16	6965653.12	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			
K14	K14_164_1305em2	12	6.93	4	B	2268674.59	6965643.8	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap-rod	FE	√	9		0.25			√			
K14	K14_167_1305em2	10	6.71	4	C	2268629.38	6965644.62	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K14	K14_173_1305em2	9	6.56	4	C	2268640.74	6965653.12	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm piece							FE	√	3	2	0.25	N-S	0	√			
K14	K14_177_1305em2	9	6.36	4	C	2268623.61	6965645.8	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K14	K14_185_1305em2	11	6.04	4	B	2268658.7	6965660.3	26-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3		0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K14	K14_189_1305em2	15	5.9	4	A	2268628.84	6965712.3	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm tp							FE	√	6	1	0.25			√			
K14	K14_190_1305em2	12	5.89	4	B	2268625.95	6965643.1	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25			√	6	0.5	0.25			√			
K14	K14_191_1305em2	12	5.81	4	B	2268714.98	6965676.06	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3		0.25			√			
K14	K14_193_1305em2	13	5.75	4	B	2268708.73	6965647.13	26-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	nail & wire	FE	√	3					√			
K14	K14_199_1305em2	11	5.64	4	B	2268639.18	6965662.14	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
K14	K14_204_1305em2	13	5.39	4	B	2268650.08	6965653.75	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE		6		0.25			√			
K14	K14_205_1305em2	11	5.36	4	B	2268681.99	6965664.95	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
K14	K14_210_1305em2	9	5.3	4	C	2268663.95	6965650.73	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K14	K14_217_1305em2	9	5.12	4	C	2268674.57	6965655.49	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K14	K14_236_1305em2	12	4.8	4	B	2268624.53	6965676.49	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
K14	K14_24_1305em2	15	43.25	4	A	2268686.16	6965660.27	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	fuze pt							FE	√	6	2	0.25			√			
K14	K14_241_1305em2	11	4.69	4	B	2268683.12	6965712.2	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
K14	K14_245_1305em2	11	4.58	4	B	2268714.31	6965729.86	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
K14	K14_252_1305em2	11	4.42	4	B	2268717.93	6965674.2	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
K14	K14_257_1305em2	13	4.32	4	B	2268667.35	6965639.8	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	0.5	0.25			√			
K14	K14_26_1305em2	13	38.66	4	B	2268689.89	6965643.38	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	scrap/VT fuze brkt								√	12	2	0.25			√			
K14	K14_263_1305em2	9	4.23	4	C	2268694.41	6965663.1	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.5	fuze part, vt	√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K14	K14_264_1305em2	11	4.21	4	B	2268668.16	6965702.81	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	6	0.5	0.25			√			
K14	K14_267_1305em2	12	4.15	4	B	2268693.3	6965644.62	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap	FE	√	3	1	1			√			
K14	K14_269_1305em2	11	4.14	4	B	2268627.59	6965653.42	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	magnets	FE	√	3	0.5	0.25			√			
K14	K14_273_1305em2	12	4.09	4	B	2268700.09	6965664.93	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1				√			
K14	K14_274_1305em2	11	4.08	4	B	2268649.93	6965687.95	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
K14	K14_281_1305em2	10	4.01	4	C	2268644.6	6965653.76	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap metal	FE	√	6	4	0.25	N-S	0	√			
K14	K14_285_1305em2	11	3.96	4	B	2268680.26	6965656.66	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25			√			
K14	K14_286_1305em2	11	3.93	4	B	2268641.27	6965709.66	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	1	0.25			√			
K14	K14_292_1305em2	10	3.86	4	C	2268634.38	6965656.09	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	metal scrap	FE	√	3	0.5	0.25	N-S	0	√			
K14	K14_295_1305em2	12	3.83	4	B	2268620.35	6965643.05	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3		0.25			√			
K14	K14_299_1305em2	11	3.79	4	B	2268690.66	6965721.95	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
K14	K14_304_1305em2	10	3.7	4	C	2268681.7	6965638.74	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K14	K14_306_1305em2	12	3.69	4	B	2268698.62	6965677.54	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	2	0.25			√			
K14	K14_318_1305em2	12	3.56	3	B	2268697.55	6965657.75	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5				√			
K14	K14_322_1305em2	11	3.55	3	B	2268697.51	6965716.08	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal							CU	√	3	0.5				√			
K14	K14_345_1305em2	11	3.28	3	B	2268717.66	6965719.39	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
K14	K14_37_1305em2	15	27.76	4	A	2268676.62	6965658.41	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	6	2	0.25			√			
K14	K14_403_1305em2	11	2.68	3	B	2268679.95	6965643.16	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3		0.25			√			
K14	K14_43_1305em2	12	25.35	4	B	2268685.59	6965636.75	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	4	1			√			
K14	K14_45_1305em2	13	23.34	4	B	2268664.01	6965658.78	26-Jun-06	Jim Thoren	√							√	ORD MD	3	4	0.25	762 blank & links								√	3	1	0.25			√			
K14	K14_52_1305em2	12	19.83	4	B	2268688.27	6965639.36	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	rod	FE	√	6	0.5				√			
K14	K14_59_1305em2	12	18.34	4	B	2268658.28	6965637.52	26-Jun-06	Jim Thoren	√													√	MIL	3	5	0.25	links	FE	√	3	1	0.25			√			
K14	K14_60_1305em2	13	18.25	4	B	2268710.56	6965643.7	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap-tubing	FE	√	9		0.25			√			
K14	K14_63_1305em2	10	17.43	4	C	2268702.68	6965638.42	11-Jul-06	Alan Merriman																			no find, reacquired 8/1/06												
K14	K14_65_1305em2	13	17.36	4	B	2268697.27	6965644.11	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	FE	√	3	1	0.25			√			
K14	K14_68_1305em2	13	17.02	4	B	2268683.19	6965647.49	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	FE	√	12	1	0.25			√			
K14	K14_70_1305em2	14	16.95	4	A	2268694.52	6965678.27	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24		0.25			√			
K14	K14_76_1305em2	13	15.42	4	B	2268654.91	6965648.05	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	762 case							OTHER	√	6	0.5	0.25			√			
K14	K14_79_1305em2	13	15.14	4	B	2268672.59	6965718.55	26-Jun-06	Jim Thoren	√													√	MIL		1	0.25	scrap	FE	√	3	4	0.25			√			
K14	K14_86_1305em2	13	14.36	4	B	2268670.61	6965726.12	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	AL	√	3	0.5	0.25			√			
K14	K14_90_1305em2	12	13.77	4	B	2268642.09	6965649.19	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
K14	K14_91_1305em2	13	13.74	4	B	2268714.55	6965644.97	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	12	1	0.25			√			
K14	K14_94_1305em2	14	13.44	4	A	2268636.26	6965667.55	26-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	2	0.25			√			
K14	K14_99_1305em2	13	12.77	4	B	2268686.77	6965647.65	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	FE	√	12	1	0.25			√			
K15	K15_10_1305em2	15	92.44	4	A	2268753.38	6965655.12	06-Jul-06	Jim Thoren	√													√	CIV	3	1	1	rebar	FE	√	24	0.5	0.25			√			
K15	K15_106_1305em2	13	12.1	4	B	2268759.16	6965707.4	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K15	K15_109_1305em2	9	11.3	4	C	2268734.38	6965688.83	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail, wire	FE	√	6	0.5	0.25	N-S	45	√			
K15	K15_110_1305em2	10	11.23	4	C	2268807.72	6965725.76	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	scrap	FE	√	3	1	0.25	N-S	0	√			
K15	K15_113_1305em2	13	11.11	4	B	2268787.97	6965640.16	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	A/C seat part		√	3	1	1			√			
K15	K15_115_1305em2	14	10.97	4	A	2268753.91	6965669.62	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna							AL	√	6	2	1			√			
K15	K15_117_1305em2	13	10.91	4	B	2268798.51	6965716.55	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	2	2			√			
K15	K15_119_1305em2	12	10.66	4	B	2268808.61	6965720.8	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25								AL	√	6	2	0.25			√			
K15	K15_126_1305em2	13	9.92	4	B	2268779.28	6965681.01	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna							AL	√	6	2	0.25			√			
K15	K15_144_1305em2	12	9.07	4	B	2268776.38	6965684.03	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna							AL	√	6	2	0.25			√			
K15	K15_156_1305em2	12	7.62	4	B	2268787.34	6965705.48	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	AL	√	3	1	0.5			√			
K15	K15_169_1305em2	12	6.67	4	B	2268810.25	6965649.12	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
K15	K15_176_1305em2	10	6.36	4	C	2268766.88	6965680.55	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	20mm piece, frag							OTHER	√	3	1	0.25	N-S	0	√			
K15	K15_181_1305em2	13	6.27	4	B	2268727.07	6965729.09	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	1	0.25			√			
K15	K15_182_1305em2	10	6.19	4	C	2268798.19	6965724.91	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail		√	6	0.5	0.25	N-S	0				
K15	K15_187_1305em2	9	6.02	4	C	2268724.82	6965732.72	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part							FE	√	3	2	0.25	N-S	0	√			
K15	K15_201_1305em2	11	5.51	4	B	2268730.44	6965639.77	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
K15	K15_208_1305em2	10	5.32	4	C	2268737.02	6965659.3	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K15	K15_211_1305em2	12	5.25	4	B	2268762.45	6965707.14	06-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	6	0.5	0.25			√			
K15	K15_212_1305em2	13	5.21	4	B	2268745.3	6965664.12	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap, nail	FE	√	3	2	0.25			√			
K15	K15_220_1305em2	12	5.1	4	B	2268727.61	6965651.64	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
K15	K15_221_1305em2	13	5.02	4	B	2268760.09	6965662.32	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.5	fragment							FE	√	3	2	0.5			√			
K15	K15_232_1305em2	10	4.89	4	C	2268768.84	6965726.9	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K15	K15_234_1305em2	10	4.83	4	C	2268754.09	6965677.84	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K15	K15_239_1305em2	9	4.71	4	C	2268754.1	6965674.34	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.5	frag							FE	√	3	2	0.25	N-S	0	√			
K15	K15_240_1305em2	10	4.7	4	C	2268787.56	6965736.62	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K15	K15_247_1305em2	12	4.51	4	B	2268768.85	6965690.05	06-Jul-06	Jim Thoren	√													√	MIL	3	2	0.25		AL	√	3	2	0.25			√			
K15	K15_248_1305em2	11	4.48	4	B	2268768.99	6965713.63	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
K15	K15_249_1305em2	13	4.48	4	B	2268785.63	6965725.41	06-Jul-06	Jim Thoren	√							√	ORD MD	3	10	0.25	7.62 cartridge								√	6	0.5	0.25			√			
K15	K15_258_1305em2	11	4.31	4	B	2268757.16	6965670.93	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	grenade spoon							FE	√	3	1	0.25			√			
K15	K15_266_1305em2	11	4.16	4	B	2268724.71	6965710.63	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
K15	K15_270_1305em2	13	4.14	4	B	2268782.51	6965648.73	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
K15	K15_280_1305em2	12	4.02	4	B	2268755.62	6965709.34	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
K15	K15_284_1305em2	13	3.97	4	B	2268750.36	6965638.3	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
K15	K15_291_1305em2	11	3.88	4	B	2268718.56	6965646.3	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25			√			
K15	K15_301_1305em2	11	3.77	4	B	2268777.51	6965638.68	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
K15	K15_302_1305em2	13	3.73	4	B	2268811.48	6965724.97	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze antenna							AL	√	6	2	0.25			√			
K15	K15_305_1305em2	12	3.69	4	B	2268805.62	6965730.77	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
K15	K15_308_1305em2	13	3.68	4	B	2268731.87	6965731.59	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24	0.5	0.25			√			
K15	K15_310_1305em2	11	3.66	4	B	2268793.52	6965735.98	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	0.5	0.25			√			
K15	K15_311_1305em2	11	3.66	4	B	2268738.82	6965728.68	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	7.62 casing							AL	√	6	0.5	0.25			√			
K15	K15_314_1305em2	11	3.61	4	B	2268740.31	6965700.34	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25			√			
K15	K15_324_1305em2	9	3.53	3	C	2268745.05	6965697.4	17-Aug-06	Alan Merriman	√													√	CIV	3	2	0.25	wire & nail	FE	√	3					√			
K15	K15_328_1305em2	11	3.5	3	B	2268772.94	6965683.24	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20 mm inert							FE	√	6	1	0.25			√			
K15	K15_33_1305em2	13	28.76	4	B	2268763.51	6965685.71	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze bracket								√	6	2	0.25			√			
K15	K15_34_1305em2	15	28.39	4	A	2268756.41	6965689.82	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	6	4	0.25			√			
K15	K15_343_1305em2	11	3.29	3	B	2268742.31	6965671.06	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
K15	K15_35_1305em2	15	28.01	4	A	2268779.96	6965693.18	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze bracket								√	6	2	0.25			√			
K15	K15_55_1305em2	16	19.28	4	A	2268782.12	6965726.39	16-Aug-06	Jim Thoren	√													√	MIL	3	1	0.25	, wire	FE	√	3	1	0.25			√			
K15	K15_58_1305em2	13	18.62	4	B	2268803.52	6965642.95	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							AL	√	6	1	1			√			
K15	K15_67_1305em2	12	17.23	4	B	2268739.71	6965692.19	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	rod	FE	√	24	0.5	0.25			√			
K15	K15_69_1305em2	12	16.98	4	B	2268733.27	6965684.21	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	2	0.5			√			
K15	K15_71_1305em2	14	16.77	4	A	2268738.96	6965666.98	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	chain		√	6	2	0.5			√			
K15	K15_74_1305em2	14	15.6	4	A	2268750.52	6965668.81	16-Aug-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna	√	CIV	0	1	0.25	wire	AL	√	6	2	1			√			
K15	K15_78_1305em2	16	15.19	4	A	2268789.64	6965696.73	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	1	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																		
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K15	K15_88_1305em2	13	14.05	4	B	2268742.09	6965655.98	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							FE	√	6	2	0.25			√			
K15	K15_92_1305em2	14	13.49	4	A	2268746.52	6965637.27	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	slag	FE	√	3	2	0.25			√			
K15	K15_95_1305em2	12	13.21	4	B	2268732.3	6965651.92	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	rod	FE	√	9	0.5	0.25			√			
K15	QAdig_K15_320		8.1		QA	2268734.25	6965669.5	15-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	nail 16D	FE	√	3					√			
K16	K16_102_1304em2	14	11.21	4	A	2268843.1	6965645.67	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	chain link		√	3	1	0.25			√			
K16	K16_105_1304em2	16	10.7	4	A	2268872.49	6965734.38	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze antenna							AL	√	6	2	0.25			√			
K16	K16_111_1304em2	14	9.69	4	A	2268888.18	6965670.12	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25			√			
K16	K16_122_1304em2	13	8.83	4	B	2268899.59	6965722.95	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9		0.25			√			
K16	K16_126_1304em2	13	8.51	4	B	2268895.24	6965713.91	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	bolt	FE	√	6		0.5			√			
K16	K16_143_1304em2	14	6.67	4	A	2268854.84	6965719.7	28-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	VT fuze bracket							FE	√	6	2	0.25			√			
K16	K16_151_1304em2	13	6.16	4	B	2268841.52	6965705.45	07-Jul-06	Jim Thoren																			no contact, reaquired 7/25/06												
K16	K16_156_1304em2	13	5.86	4	B	2268886.94	6965717.41	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	556 blank							OTHER	√	6		0.25			√			
K16	K16_158_1304em2	11	5.7	4	B	2268840.95	6965696.95	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	20mm projo							FE	√	6	1				√			
K16	K16_16_1304em2	14	128.9	4	A	2268846.37	6965644.29	28-Jun-06	Alan Merriman	√													√	CIV	3	1	1	pipe	FE	√	24	1	0.25			√			
K16	K16_164_1304em2	13	5.62	4	B	2268875.68	6965702.66	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze ant							AL	√	6	2	0.5			√			
K16	K16_169_1304em2	13	5.54	4	B	2268879.18	6965702.05	07-Jul-06	Jim Thoren																			no contact												
K16	K16_183_1304em2	12	4.71	4	B	2268890.74	6965697.36	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire		√	6		0.25						
K16	K16_208_1304em2	12	3.99	4	B	2268879.75	6965736.49	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	38 cad brass							CU	√	3	0.5	0.25			√			
K16	K16_212_1304em2	11	3.79	4	B	2268891.47	6965668.81	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9		0.25			√			
K16	K16_43_1304em2	13	40.26	4	B	2268886.99	6965696.46	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
K16	K16_52_1304em2	16	31.4	4	A	2268870.66	6965723.45	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze bracket							FE	√	6	2	0.25			√			
K16	K16_77_1304em2	12	17.09	4	B	2268883.41	6965694.41	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
K16	K16_80_1304em2	14	16.73	4	A	2268844.41	6965703.51	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	VT fuze antenna							AL	√	6	2	0.25			√			
K16	QAdig_K16_268		9.3		QA	2268885.2	6965705.8	15-Aug-06	Alan Merriman																			no contact												
K16	QAdig_K16_318		8.1		QA	2268856.6	6965677.84	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	9					√			
K16	QAdig_K16_431		6.5		QA	2268854.84	6965665.95	15-Aug-06	Alan Merriman	√																		too small to find								√			
K16	QAdig_K16_485		6		QA	2268856.96	6965643.48	15-Aug-06	Alan Merriman	√																		too small to find								√			
K17	K17_109_1221em2	10	8.71	4	C	2268940.92	6965714.7	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	bolt	FE	√	3	1	0.25			√			
K17	K17_110_1221em2	12	8.69	4	B	2268952.56	6965659.77	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3		0.25			√			
K17	K17_118_1221em2	9	7.35	4	C	2268936.77	6965715.38	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25		FE	√	3	1	0.25			√			
K17	K17_120_1221em2	11	7.16	4	B	2268985.73	6965735.33	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9		0.25			√			
K17	K17_127_1319em2	13	6.68	4	B	2268936.78	6965668.01	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
K17	K17_132_1221em2	11	4.18	4	B	2268926.89	6965701.09	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	can	AL	√	3	4	0.25			√			
K17	K17_134_1221em2	12	5.86	4	B	2268940.08	6965639.64	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
K17	K17_175_1221em2	11	3.54	3	B	2268978.02	6965720.02	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
K17	K17_178_1221em2	9	3.49	3	C	2268982.18	6965733.62	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	fence wire	FE							√			
K17	K17_194_1221em2	11	3.15	3	B	2269014.42	6965717.27	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
K17	K17_220_1221em2	9	2.43	2	C	2268969.55	6965693.46	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	fence wire	FE							√			
K17	K17_348_1221em2	5	1.22	1	D	2268921.67	6965637.39	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	fence wire	FE							√			
K17	K17_93_1319em2	13	9.03	4	B	2268965.62	6965680.05	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12		0.25			√			
K17	K17_95_1221em2	15	11.46	4	A	2268991.77	6965717.29	28-Jun-06	Alan Merriman	√													√	CIV	> 24	1	≥8	rod	CU	√	> 24	0.5	0.5			√			
K17	QAdig_K17_148		16.2		QA	2268972.62	6965714.23	15-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	fence wire and wire rod	FE	√	3	0.5	0.25			√			
K17	QAdig_K17_66		30		QA	2268933.42	6965657.23	15-Aug-06	Alan Merriman	√																		too small to find								√			
K18	K18_10_1304em2	16	291.66	4	A	2269106.4	6965694.61	16-Aug-06	Jim Thoren	√													√	CIV	12	> 10	4	nails & wire, scraped bulldozer	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_101_1304em2	13	11.29	4	B	2269111.06	6965730.39	07-Jul-06	Jim Thoren	√													√	CIV	0	5	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_103_1304em2	13	11.11	4	B	2269108.19	6965670.34	07-Jul-06	Jim Thoren	√													√	CIV	0	4	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_110_1304em2	14	9.8	4	A	2269067.53	6965704.46	07-Jul-06	Jim Thoren	√													√	CIV	0	5	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
K18	K18_113_1304em2	11	9.42	4	B	2269067.7	6965686.55	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_127_1304em2	13	8.35	4	B	2269105.15	6965663.7	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_129_1304em2	12	8.03	4	B	2269067.77	6965664.96	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	part of horseshoe	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_13_1304em2	15	189.24	4	A	2269081.45	6965716.49	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_133_1304em2	13	7.24	4	B	2269103.87	6965717.85	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_137_1304em2	12	6.9	4	B	2269075.2	6965676.2	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	small arms blank 556							FE	√	3	0.5	0.25	N-S	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K18	K18_138_1304em2	12	6.87	4	B	2269067.4	6965689.99	07-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_139_1304em2	13	6.79	4	B	2269107.45	6965727.17	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_14_1304em2	12	140.27	4	B	2269091.17	6965708.79	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	3	0.5	0.25	N-S	0	√			
K18	K18_142_1304em2	13	6.69	4	B	2269106.22	6965704.99	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_144_1304em2	13	6.66	4	B	2269100.48	6965663.24	07-Jul-06	Jim Thoren	√													√	CIV	6	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_145_1304em2	10	6.62	4	C	2269080.09	6965636.77	11-Jul-06	Alan Merriman	√													√	CIV	0	4	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
K18	K18_147_1304em2	13	6.46	4	B	2269109.91	6965724.66	07-Jul-06	Jim Thoren	√													√	CIV	0	5	0.25	nail	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_15_1304em2	13	129.28	4	B	2269078.62	6965680.13	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_153_1304em2	12	5.94	4	B	2269111.03	6965717.11	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	steel wire	FE	√	12	0.5	0.25	N-S	45	√			
K18	K18_154_1304em2	12	5.92	4	B	2269023.88	6965655.7	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire, fence	FE	√	6	0.5	0.25	N-S	45	√			
K18	K18_163_1304em2	12	5.62	4	B	2269093.44	6965638.05	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_167_1304em2	13	5.55	4	B	2269085.06	6965690.2	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_177_1304em2	10	5.01	4	C	2269082.23	6965642.06	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part, vt							FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_179_1304em2	10	4.94	4	C	2269102.93	6965703.05	11-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
K18	K18_18_1304em2	14	105.34	4	A	2269092.31	6965689.43	07-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze parts							FE	√	3	1	2	N-S	45	√			
K18	K18_187_1304em2	12	4.61	4	B	2269107.41	6965644.41	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_19_1304em2	14	97.13	4	A	2269085.93	6965715.98	16-Aug-06	Jim Thoren	√													√	CIV	12	> 10	4	nails & wire, scraped bulldozer	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_190_1304em2	11	4.48	4	B	2269108.88	6965639.6	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_194_1304em2	13	4.27	4	B	2269080.84	6965733.23	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	Nail	FE	√	3	0.5	0.25			√			
K18	K18_20_1304em2	15	96.4	4	A	2269094.9	6965708.98	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_202_1304em2	13	4.1	4	B	2269086.93	6965665.44	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_21_1304em2	11	94.25	4	B	2269092.45	6965715.16	07-Jul-06	Jim Thoren	√													√	CIV	0	> 10	0.5	fence wire/nails	FE	√	6	0.5	0.25	N-S	45	√			
K18	K18_22_1304em2	16	90.02	4	A	2269110.48	6965694.23	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_226_1304em2	11	3.48	3	B	2269022.77	6965699.45	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barbed wire	FE	√	9	0.5	0.25	N-S	45	√			
K18	K18_24_1304em2	13	84.6	4	B	2269078.88	6965675.32	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	45	√			
K18	K18_25_1304em2	14	82.6	4	A	2269097.1	6965688.41	07-Jul-06	Jim Thoren	√													√	CIV	12	10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_250_1304em2	11	2.93	3	B	2269083.97	6965647.62	07-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_254_1304em2	12	2.9	3	B	2269111.09	6965645.38	07-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_256_1304em2	11	2.88	3	B	2269091.3	6965646.3	07-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	scrap	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_269_1304em2	11	2.62	3	B	2269099.93	6965690.91	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_28_1304em2	11	67.39	4	B	2269088.55	6965712.13	07-Jul-06	Jim Thoren	√													√	CIV	0	> 10		nails	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_291_1613em2	13	3.65	4	B	2269028.52	6965686.91	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barbed wire	FE	√	9	0.5	0.25	N-S	45	√			
K18	K18_30_1304em2	14	63.46	4	A	2269112.36	6965672.34	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_31_1304em2	14	60.16	4	A	2269074.87	6965706.88	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_32_1304em2	13	59.13	4	B	2269096.95	6965721.78	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_33_1304em2	16	58.97	4	A	2269086.27	6965679.12	16-Aug-06	Jim Thoren	√													√	CIV	0	4	0.25	nails, scraped bulldozer	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_36_1304em2	11	55.35	4	B	2269096.98	6965683.25	07-Jul-06	Jim Thoren	√													√	CIV	0	> 10	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_38_1304em2	15	50.99	4	A	2269114.8	6965690.09	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_40_1304em2	14	49.04	4	A	2269099.77	6965728.07	16-Aug-06	Jim Thoren	√													√	CIV	12	> 10	4	nails & wire, scraped bulldozer	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_41_1304em2	13	47.22	4	B	2269089.93	6965686.34	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_42_1304em2	13	41.66	4	B	2269080.59	6965720.48	07-Jul-06	Jim Thoren	√													√	MIL	12	10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_46_1304em2	12	34.5	4	B	2269078.16	6965712.61	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	SS	√	6	0.5	0.25	N-S	0	√			
K18	K18_47_1304em2	10	34.25	4	C	2269074.82	6965713.73	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
K18	K18_48_1304em2	13	34.03	4	B	2269078.23	6965706.4	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_50_1304em2	13	32.05	4	B	2269071.25	6965706.2	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	≥8	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_503_1304em2	13	123.26	4	B	2269107.62	6965698.4	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_504_1304em2	16	141.11	4	A	2269103.17	6965693.83	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_51_1304em2	16	31.85	4	A	2269075.06	6965680.87	07-Jul-06	Jim Thoren	√													√	CIV	0	10	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_53_1304em2	13	29.9	4	B	2269104.59	6965678.27	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_54_1304em2	13	29.8	4	B	2269085.69	6965729.66	07-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	nail	FE	√	3		0.25			√			
K18	K18_55_1304em2	14	27.86	4	A	2269071	6965679.04	07-Jul-06	Jim Thoren	√													√	CIV	0	> 10	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_58_1304em2	13	27.12	4	B	2269115.02	6965667.47	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_61_1304em2	14	26.36	4	A	2269107.15	6965716.04	07-Jul-06	Jim Thoren	√													√	CIV	6	10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
K18	K18_62_1304em2	13	25.62	4	B	2269103.97	6965729.4	07-Jul-06	Jim Thoren	√													√	MIL	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	45	√			
K18	K18_63_1304em2	12	23.4	4	B	2269070.68	6965702.73	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_64_1304em2	15	22.59	4	A	2269099.34	6965707.69	16-Aug-06	Jim Thoren	√													√	CIV	0	5	0.25	nails, scraped bulldozer	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_65_1304em2	13	22.43	4	B	2269086.19	6965683.06	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_67_1304em2	11	22.01	4	B	2269096.36	6965729.15	07-Jul-06	Jim Thoren	√													√	CIV	0	5	0.25	nail	FE	√	3		0.25			√			
K18	K18_69_1304em2	11	19.52	4	B	2269092.43	6965682.7	07-Jul-06	Jim Thoren	√													√	CIV	12	10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_71_1304em2	12	18.57	4	B	2269100.2	6965680.49	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_73_1304em2	12	18.22	4	B	2269092.59	6965674.27	07-Jul-06	Jim Thoren	√													√	CIV	6	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_75_1304em2	11	18.12	4	B	2269100.12	6965675.05	07-Jul-06	Jim Thoren	√													√	CIV	12	10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_78_1304em2	9	16.98	4	C	2269081.67	6965725.16	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
K18	K18_79_1304em2	13	16.86	4	B	2269071.78	6965686.7	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_8_1304em2	16	322.99	4	A	2269082.25	6965676.96	07-Jul-06	Jim Thoren	√													√	CIV	12	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_84_1304em2	10	15.55	4	C	2269094.52	6965725.68	11-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_86_1304em2	14	14.37	4	A	2269087.88	6965646.96	07-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
K18	K18_9_1304em2	16	293.77	4	A	2269110.22	6965704.39	07-Jul-06	Jim Thoren	√													√	CIV	6	10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_90_1304em2	10	13.06	4	C	2269097.19	6965667.23	11-Jul-06	Alan Merriman	√													√	CIV	3	5	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_92_1304em2	13	12.98	4	B	2269088.59	6965726.66	07-Jul-06	Jim Thoren	√													√	CIV	0	4	0.25	nails	FE	√	3		0.25			√			
K18	K18_94_1304em2	13	12.69	4	B	2269095.62	6965664.09	07-Jul-06	Jim Thoren	√													√	CIV	12	10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_96_1304em2	10	12.33	4	C	2269104.1	6965723.66	11-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
K18	K18_97_1304em2	13	12.09	4	B	2269108.03	6965676.87	07-Jul-06	Jim Thoren	√													√	CIV	12	10	4	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
K18	K18_99_1304em2	14	11.72	4	A	2269084.47	6965709.23	16-Aug-06	Jim Thoren	√													√	CIV	12	> 10	4	nails & wire, scraped bulldozer	FE	√	6	0.5	0.25	N-S	0	√			
K18	QAdig_K18_421		6.6		QA	2269109.22	6965680.9	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
K18	QAdig_K18_443		6.4		QA	2269103	6965714.2	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
K18	QAdig_K18_481		6		QA	2269088.85	6965698	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	1	0.25			√			
L01	L01_100_1318em2	11	3.62	4	B	2267374.55	6965550.04	06-Jun-06	Jim Thoren																			no contact											
L01	L01_109_1318em2	10	3.32	3	C	2267343.93	6965569.91	19-Jun-06	Alan Merriman																			no find											
L01	L01_12_1318em2	15	52.45	4	A	2267352.76	6965572.41	06-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	fuze, parts														√			
L01	L01_175_1318em2	9	1.97	2	C	2267382.69	6965550.62	19-Jun-06	Alan Merriman																			no find											
L02	L02_01_612_mag			99	M	2267482.744	6965628.287	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
L02	L02_02_612_mag			99	M	2267489.35	6965564.569	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
L02	L02_03_612_mag			99	M	2267477.721	6965537.359	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire staple								√			
L02	L02_04_612_mag			99	M	2267477.786	6965573.132	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
L02	L02_05_612_mag			99	M	2267475.006	6965572.628	12-Jun-06	Alan Merriman	√													√	CIV	0	1	1	shotgun shell								√			
L02	L02_06_612_mag			99	M	2267474.006	6965577.795	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
L02	L02_29_1218em1	16	16.02	4	A	2267497.89	6965583.7	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	flare									3	1	0.25			√			
L02	L02_30_1218em1	13	10.15	4	B	2267503.66	6965541.14	06-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire		√	9	0.5				√			
L03	L03_32_1218em1	13	7.92	4	B	2267519.72	6965562	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
L04	L04_34_1304em1	16	16.73	4	A	2267680.07	6965564.3	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	9	0.5	0.25			√			
L04	L04_60_1304em1	12	3.23	3	B	2267681.5	6965541.15	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	6	0.5	0.25			√			
L04	L04_64_1304em1	10	2.91	3	C	2267678.87	6965548.23	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire								√			
L04	L04_75_1304em1	9	2.38	2	C	2267671.45	6965601.46	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	9	0.5	0.25			√			
L05	L05_194_1304em1	9	1.05	1	C	2267786.96	6965574.3	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap								√			
L05	L05_23_1304em1	16	109.88	4	A	2267803.7	6965592.27	06-Jun-06	Jim Thoren	√							√	ORD MD	3	1	4	fuze, scrap								√	6	4	> 4			√			
L05	L05_26_1304em1	14	52.33	4	A	2267788.02	6965577.41	06-Jun-06	Jim Thoren	√							√	ORD MD	3	1	4	fuze, scrap								√	3	4				√			
L05	L05_292_1613em2	13	3.62	4	B	2267724.38	6965627.87	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	flare, ctg empty														√			
L05	L05_50_1304em1	12	5.49	4	B	2267801.05	6965575.7	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
L05	L05_57_1304em1	10	3.72	4	C	2267795.59	6965575.71	19-Jun-06	Alan Merriman																			no find											
L05	L05_58_1304em1	13	3.55	3	B	2267806.47	6965589.19	06-Jun-06	Jim Thoren																			no contact											
L06	L06_10_1221em1	15	82.45	4	A	2267892.73	6965544.58	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	4	unknown														√			
L06	L06_109_1221em1	11	3.83	4	B	2267839.55	6965566.38	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	barb wire, wire	FE	√	9						√			
L06	L06_117_1221em1	11	3.44	3	B	2267868.91	6965550.05	06-Jun-06	Jim Thoren	√													√	CIV	3	2	1	nail and wire								√			
L06	L06_123_1221em1	9	3.3	3	C	2267842.67	6965560.88	19-Jun-06	Alan Merriman	√													√	CIV	3	2	1	banding strap		√	12	0.5	0.25			√			
L06	L06_127_1221em1	11	3.13	3	B	2267870.41	6965596.43	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
L06	L06_13_1221em1	13	53.9	4	B	2267840.76	6965551.88	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	horseshoe nail		√	6	0.5	0.5			√			
L06	L06_147_1221em1	9	2.54	3	C	2267854.88	6965634.2	19-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	blank 5.56								√	3	0.5	0.25			√			
L06	L06_150_1221em1	11	2.51	3	B	2267846.4	6965572.39	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	barb wire								√			
L06	L06_151_1221em1	9	2.51	3	C	2267850.59	6965549.86	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap								√			
L06	L06_156_1221em1	9	2.44	2	C	2267884.35	6965545.55	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal bullet														√			
L06	L06_158_1221em1	10	2.43	2	C	2267833.4	6965544.61	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	9	0.5	0.25			√			
L06	L06_173_1221em1	9	2.09	2	C	2267868.02	6965625.56	19-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	blank 5.56								√	3	0.5	0.25			√			
L06	L06_178_1221em1	10	2.01	2	C	2267892.16	6965541.31	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	6	0.5	0.25			√			
L06	L06_20_1221em1	14	23.2	4	A	2267877.79	6965601.1	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	horseshoe								√			
L06	L06_26_1221em1	15	17.6	4	A	2267882.16	6965568.15	16-Aug-06	Jim Thoren	√													√	CIV	0	1	1	survey nail left in ground											
L06	L06_28_1221em1	14	16.2	4	A	2267847.3	6965565.34	06-Jun-06	Jim Thoren	√							√	ED MD	3	1	1	flare tube														√			
L06	L06_31_1221em1	13	14.9	4	B	2267840.67	6965599.96	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	barb wire								√			
L06	L06_32_1221em1	16	14.38	4	A	2267906.36	6965611.59	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	tin can								√			
L06	L06_33_1221em1	14	13.92	4	A	2267839.35	6965545.98	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	barb wire								√			
L06	L06_38_1221em1	13	11.6	4	B	2267844.11	6965546.35	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	barb wire								√			
L06	L06_50_1221em1	12	8.27	4	B	2267836.93	6965550.51	06-Jun-06	Jim Thoren																			no find, reacquired 8/1/06											
L06	L06_53_1221em1	10	7.92	4	C	2267847.14	6965569.02	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	blank														√			
L06	L06_69_1221em1	16	5.97	4	A	2267896.2	6965544.59	06-Jun-06	Jim Thoren																			no find											
L06	L06_73_1221em1	11	5.83	4	B	2267847.3	6965540.2	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	screw drive								√			
L06	L06_74_1221em1	15	5.79	4	A	2267846.44	6965591.16	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	barb wire								√			
L06	L06_8_1221em1	16	123.38	4	A	2267835.59	6965541.63	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
L06	L06_80_1221em1	13	5.2	4	B	2267850.62	6965539.88	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
L06	L06_81_1221em1	15	5.13	4	A	2267882.44	6965586.77	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	beer can								√			
L06	L06_84_1221em1	10	4.88	4	C	2267843.38	6965541.45	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	6	0.5	0.25			√			
L06	L06_88_1221em1	14	4.46	4	A	2267818.51	6965545.48	06-Jun-06	Jim Thoren																			no find											
L06	L06_91_1221em1	13	4.36	4	B	2267839.4	6965538.96	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
L06	L06_98_1221em1	11	4.25	4	B	2267875.7	6965561	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail								√			
L06	QAdig_L06_256		9.6		QA	2267869	6965620.07	16-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	T-post clip	FE							√			
L06	QAdig_L06_269		9.3		QA	2267868.84	6965631.48	16-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	T-post clip	FE							√			
L07	L07_106_1305em1	9	4.12	4	C	2267994.04	6965572.48	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√						√			
L07	L07_129_1305em1	11	3.32	3	B	2267926.09	6965597.99	15-Jun-06	Alan Merriman	√													√	CIV	0	1	0.5	1/2 hinge, door, steel, 5 inch		√	6	2	0.25	NE-SW	0	√			
L07	L07_138_1305em1	11	3.16	3	B	2267943.34	6965544.14	15-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	wire, 2 pieces, 1 barbed		√	3	0.5	0.25	N-S	0	√			
L07	L07_139_1305em1	11	3.09	3	B	2267926.94	6965544.99	15-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	14 gage wire, bent like a v		√	6	0.5	0.25						
L07	L07_18_1305em1	15	22.52	4	A	2268012.11	6965545.12	15-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	survey nail, 20d,1/4lb, vertical		√	6	0.5	0.25	N-S	90	√			
L07	L07_23_1305em1	15	19.29	4	A	2267922.26	6965597.82	15-Jun-06	Alan Merriman	√													√	CIV	0	1	0.5	1/2 hinge, door, 5 inch, steel		√	6	2	0.25	NE-SW	0	√			
L07	L07_26_1305em1	14	18.63	4	A	2267978.07	6965630.84	16-Aug-06	Alan Merriman	√							√	ORD MD	0	1	0.5	frag,thin wall,steel,rectangular								√	6	4	0.25	SE-NW	0	√			
L07	L07_33_1305em1	15	15.15	4	A	2267965.64	6965565.75	15-Jun-06	Alan Merriman																			no contact, reacquired 8/1/06											
L07	L07_34_1305em1	15	14.11	4	A	2267962.36	6965566.56	15-Jun-06	Alan Merriman																			no contact, reacquired 8/1/06											
L07	L07_39_1305em1	13	11.34	4	B	2268013.92	6965568.92	15-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	barbed wireold school,bowtie con		√	24	0.5	0.25	E-W	0	√			
L07	L07_48_1305em1	14	9.06	4	A	2267982.72	6965560.82	15-Jun-06	Alan Merriman	√													√	CIV	3	1	2	bolt 1", steel, rusted badly		√	3	1	1			√			
L07	L07_53_1305em1	13	8.51	4	B	2268011.67	6965573.82	15-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	1 piec,37mm,m63 mod1,1/4lb,cast								√	3	0.5	0.25			√			
L07	L07_55_1305em1	15	8.16	4	A	2267942.3	6965620.03	15-Jun-06	Alan Merriman	√													√	CIV	0	1	0.5	chain,3/8, 4 links, steel, rusty		√	6	1	0.25	SE-NW	0	√			
L07	L07_67_1305em1	11	6.65	4	B	2267995.88	6965627.3	15-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	frag,steel,threaded rim 4 inches								√	3	0.5	0.5	NE-SW	45	√			
L07	L07_7_1305em1	13	94.61	4	B	2267973.14	6965599.97	15-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	m166 fuze, vt, expended								√	3	4	4			√			
L07	L07_94_1305em1	10	4.83	4	C	2267998.58	6965571.24	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
L08	L08_1_1305em1	14	1708.27	4	A	2268094.1	6965539.14	16-Aug-06	Jim Thoren	√													√	CIV		1		steel post left in ground		√	6	4							
L08	L08_102_1305em1	12	4.3	4	B	2268105.98	6965547.25	15-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap, steel		√	3	1	0.25			√			
L08	L08_104_1305em1	11	4.14	4	B	2268095.4	6965631.16	15-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap		√	3		0.25			√			
L08	L08_108_1305em1	11	3.96	4	B	2268103.7	6965582.84	15-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	steel scrap		√	3		0.5			√			
L08	L08_110_1305em1	11	3.9	4	B	2268089.44	6965609.52	15-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire balled up		√	3		0.25			√			
L08	L08_113_1305em1	12	3.78	4	B	2268100.02	6965636.37	15-Jun-06	Jim Thoren	√													√	CIV	0	5	0.25	chain links		√	3	2	0.25			√			
L08	L08_117_1305em1	13	3.66	4	B	2268046.35	6965546.3	15-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	6	4	0.25			√			
L08	L08_130_1305em1	11	3.31	3	B	2268102.09	6965575.18	15-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm projo								√	6	1	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
L08	L08_140_1305em1	14	3.07	3	A	2268097.65	6965539.81	15-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	bailing wire		√	24		0.25			√			
L08	L08_15_1305em1	14	27.52	4	A	2268103.19	6965610.1	15-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail		√	6		0.25			√			
L08	L08_16_1305em1	15	25.84	4	A	2268101.61	6965593.95	15-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	nails		√	9		0.25			√			
L08	L08_2_1305em1	16	1190.41	4	A	2268055.73	6965598.27	15-Jun-06	Jim Thoren	√													√	CIV	3	1	2	steel scrap		√	24	> 6	1			√			
L08	L08_20_1305em1	15	20.06	4	A	2268093.55	6965567.38	15-Jun-06	Jim Thoren	√													√	CIV	3	2	0.25	chain links & barb wire		√	24		0.25			√			
L08	L08_40_1305em1	12	11.03	4	B	2268090.74	6965539.06	15-Jun-06	Jim Thoren	√													√	CIV		1		steel post(same as 1)		√	6	4				√			
L08	L08_42_1305em1	15	10.72	4	A	2268112.51	6965564.98	15-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	3	1	1			√			
L08	L08_52_1305em1	11	8.59	4	B	2268112.8	6965538.8	15-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	nail		√	6		0.25			√			
L08	L08_54_1305em1	14	8.2	4	A	2268095.66	6965555.94	15-Jun-06	Jim Thoren	√													√	CIV		4	0.25	chain links		√	3	1	0.25			√			
L08	L08_68_1305em1	11	6.61	4	B	2268060.85	6965580.24	15-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail		√	6		0.25			√			
L08	L08_69_1305em1	12	6.56	4	B	2268021.4	6965565.66	15-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	6		0.25			√			
L08	L08_74_1305em1	13	6.09	4	B	2268105.62	6965631.66	15-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3	2	0.25			√			
L08	L08_75_1305em1	12	6.06	4	B	2268024.71	6965567.32	15-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	6		0.25			√			
L08	L08_79_1305em1	14	5.77	4	A	2268098.48	6965595.17	15-Jun-06	Jim Thoren	√													√	CIV	3	10	0.25	fence pieces		√	3		0.25			√			
L08	L08_81_1305em1	13	5.64	4	B	2268099.69	6965606.07	15-Jun-06	Jim Thoren	√													√	CIV	3	5	0.25	chain link fence links		√	3	2	0.25			√			
L08	L08_83_1305em1	15	5.55	4	A	2268097.01	6965566.4	15-Jun-06	Jim Thoren	√													√	CIV	3	10	0.25	chain pieces		√	3	1	0.25			√			
L08	L08_84_1305em1	13	5.47	4	B	2268098.7	6965584.91	15-Jun-06	Jim Thoren	√													√	CIV	3	> 10	0.25	fence pieces		√	3		0.25			√			
L08	L08_87_1305em1	15	5.31	4	A	2268059.19	6965598.25	15-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	12 gauge base		√	3	1	0.25			√			
L08	L08_92_1305em1	14	4.99	4	A	2268051.29	6965578.18	15-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	steel scrap		√	3	1	0.25			√			
L08	L08_99_1305em1	16	4.53	4	A	2268051.78	6965598.86	15-Jun-06	Jim Thoren																			no contact												
L09	L09_108_1308em2	14	16.72	4	A	2268197.31	6965566.27	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
L09	L09_110_1308em2	13	16.48	4	B	2268180.8	6965567.19	12-Jun-06	Jim Thoren	√													√	CIV				bolt								√			
L09	L09_143_1308em2	15	12.18	4	A	2268181.44	6965625.74	12-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	20mm brass														√			
L09	L09_17_1308em2	15	120.42	4	A	2268157.03	6965620.55	12-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
L09	L09_199_1308em2	13	8.94	4	B	2268202.87	6965621.59	12-Jun-06	Jim Thoren	√							√	ORD MD	6	> 10	1	blank														√			
L09	L09_200_1308em2	13	8.93	4	B	2268148.01	6965607.41	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
L09	L09_201_1308em2	12	8.91	4	B	2268191.95	6965625.04	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
L09	L09_214_1308em2	12	7.95	4	B	2268162.66	6965635.52	12-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
L09	L09_215_1308em2	11	7.88	4	B	2268190.05	6965559.09	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail								√			
L09	L09_219_1308em2	12	7.7	4	B	2268164.55	6965620.96	12-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
L09	L09_221_1308em2	13	7.59	4	B	2268159.03	6965563.84	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
L09	L09_254_1308em2	13	6.27	4	B	2268147.98	6965595.67	12-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
L09	L09_257_1308em2	13	6.22	4	B	2268152.53	6965548.76	12-Jun-06	Jim Thoren	√													√	CIV	12	1	1	scrap								√			
L09	L09_270_1308em2	12	5.67	4	B	2268192.97	6965568.38	12-Jun-06	Jim Thoren	√							√	ORD MD	12	1	1	blanks														√			
L09	L09_276_1308em2	14	5.43	4	A	2268126.94	6965598.37	12-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
L09	L09_278_1308em2	11	5.4	4	B	2268206.64	6965620.51	12-Jun-06	Jim Thoren	√							√	ORD MD	3	10	1	blanks														√			
L09	L09_288_1308em2	11	5.19	4	B	2268154.28	6965607.05	12-Jun-06	Jim Thoren	√													√	CIV	0	1	1	nails								√			
L09	L09_289_1308em2	14	5.19	4	A	2268156.34	6965595.04	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail								√			
L09	L09_29_1308em2	13	80.77	4	B	2268195.9	6965558.13	12-Jun-06	Jim Thoren	√													√	CIV	3	2	1	wire and bolt	FE		3	0.5	0.25	N-S	45	√			
L09	L09_293_1308em2	9	5.11	4	C	2268193.57	6965554.14	11-Jul-06	Alan Merriman	√													√	CIV	6	4	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
L09	L09_302_1308em2	11	4.89	4	B	2268149.87	6965538.12	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
L09	L09_311_1308em2	9	4.71	4	C	2268190.2	6965553.66	11-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	nails	FE	√	3	0.5	0.25	NE-SW	45	√			
L09	L09_316_1308em2	13	4.6	4	B	2268214.88	6965597.08	12-Jun-06	Jim Thoren	√													√	CIV	0	1	1	aluminum can								√			
L09	L09_317_1308em2	12	4.59	4	B	2268217.86	6965558.22	12-Jun-06	Jim Thoren	√													√	CIV	0	1	1	nail								√			
L09	L09_329_1308em2	11	4.32	4	B	2268200.64	6965564.8	12-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	blanks														√			
L09	L09_348_1308em2	13	3.91	4	B	2268154.74	6965564.11	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
L09	L09_40_1308em2	15	55.16	4	A	2268198.98	6965556.96	12-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
L09	L09_73_1308em2	15	25.58	4	A	2268210.73	6965564.74	12-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	5.56 blank and flare	√	CIV	3	1	0.25	nail	FE	√	6	2	0.25	N-S	45	√			
L09	L09_79_1308em2	15	23.78	4	A	2268154.05	6965622.88	12-Jun-06	Jim Thoren																			no find												
L09	L09_81_1308em2	14	22.8	4	A	2268151.36	6965608.93	12-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail								√			
L09	QAdig_L09_427		6.6		QA	2268140.2	6965631.09	15-Aug-06	Alan Merriman	√																		too small to find								√			
L10	L10_101_1308em2	12	18.54	4	B	2268249.28	6965539.9	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal			6	2	0.25			√			
L10	L10_109_1308em2	13	16.5	4	B	2268302.11	6965603.76	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal			9	2	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
L10	L10_115_1308em2	13	15.93	4	B	2268302.2	6965630.41	08-Jun-06	Jim Thoren	√													√	CIV		1	1	nail								√			
L10	L10_127_1308em2	16	14.65	4	A	2268318.2	6965608.55	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
L10	L10_134_1308em2	12	13.06	4	B	2268289.59	6965634.89	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal			3	1	0.25			√			
L10	L10_149_1308em2	11	11.68	4	B	2268309.66	6965623.39	08-Jun-06	Jim Thoren	√													√	CIV	6			scrap metal			3	2	0.25			√			
L10	L10_152_1308em2	12	11.64	4	B	2268252.8	6965539.88	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire			3		0.25			√			
L10	L10_166_1308em2	12	10.99	4	B	2268302.03	6965623.6	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	spike								√			
L10	L10_171_1308em2	10	10.54	4	C	2268304.72	6965627.96	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	> 10	0.25	5.56 carts, sm arms debris	√	CIV	> 24	> 10	0.25	nails	FE	√	6	0.5	0.5	NE-SW	45	√			
L10	L10_174_1308em2	13	10.39	4	B	2268299.08	6965601.87	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal			6	0.5				√			
L10	L10_175_1308em2	10	10.33	4	C	2268305.17	6965622.42	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	> 10	0.25	5.56 carts,, sm arms debris	√	CIV	> 24	> 10	0.25	nails	FE	√	6	0.5	0.5	NE-SW	45	√			
L10	L10_196_1318em2	4	1.76	1	F	2268250.78	6965559.68	17-Aug-06	Alan Merriman	√							√	ORD MD	0	2	0.25	small arms (brass)							OTHER							√			
L10	L10_218_1308em2	11	7.71	4	B	2268235.25	6965541.53	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire			6	0.5	0.25			√			
L10	L10_226_1308em2	13	7.26	4	B	2268305.39	6965614.09	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap metal			6	1				√			
L10	L10_230_1308em2	9	6.96	4	C	2268310.1	6965628.12	11-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	20 penny nails	FE	√	6	0.5	0.25	N-S	45	√			
L10	L10_249_1308em2	12	6.37	4	B	2268300.18	6965616.8	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	spike								√			
L10	L10_266_1308em2	12	5.89	4	B	2268317.87	6965628.76	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	blank cartridge														√			
L10	L10_281_1308em2	12	5.34	4	B	2268286.53	6965593.68	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap metal			6	1				√			
L10	L10_318_1308em2	13	4.56	4	B	2268229.77	6965545.41	08-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire			12	0.5				√			
L10	L10_325_1308em2	11	4.38	4	B	2268298.18	6965627.99	08-Jun-06	Jim Thoren	√							√	ORD MD	6	1	1	40mm brass								√	3	2				√			
L10	L10_33_1318em2	13	13.21	4	B	2268273.68	6965566.01	08-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	5.56, 7.62 brass	√	CIV	3	2	0.25	aluminum scrap	OTHER	√	3	0.5	0.25	N-S	45	√			
L10	L10_337_1308em2	9	4.17	4	C	2268293.91	6965601.81	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	> 10	0.25	5.56 carts, sm arms debris	√	MIL	> 24	> 10	0.25	nails and metal frag	FE	√	6	0.5	0.25	NE-SW	45	√			
L10	L10_385_1308em2	10	3.46	3	C	2268231.27	6965542.15	11-Jul-06	Alan Merriman	√													√	CIV	6	4	0.25	nails	FE	√	3	0.5	0.25	E-W	90	√			
L10	L10_391_1308em2	12	3.4	3	B	2268292.38	6965556.29	08-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	frag								√	3	1	0.25			√			
L10	L10_392_1308em2	11	3.38	3	B	2268243.14	6965555.91	08-Jun-06	Jim Thoren	√													√	CIV	6			scrap metal			3	1				√			
L10	L10_558_1308em2	11	2.05	2	B	2268306.88	6965635.05	08-Jun-06	Jim Thoren	√													√	MIL	3	1	1	ammo link								√			
L10	L10_61_1318em2	12	6.63	4	B	2268263.95	6965561.43	08-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail			3		0.25			√			
L10	L10_88_1318em2	10	4.19	4	C	2268268.43	6965562.58	11-Jul-06	Alan Merriman	√							√	ORD MD	6	5	0.25	5.56 carts							OTHER	√	3	0.5	0.25	E-W	45	√			
L10	QAdig_L10_420		6.6		QA	2268245.63	6965565.47	15-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	nail	FE	√	3	0.5	0.25			√			
L10	QAdig_L10_448		6.4		QA	2268286.78	6965603.06	15-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	shell casings, brass	OTHER							√			
L11	L11_105_1308em2	13	17.37	4	B	2268353.77	6965614.41	08-Jun-06	Alan Merriman	√							√	ORD MD	3	2	1	50 cal cartridge/1 scrap														√			
L11	L11_106_1308em2	16	17	4	A	2268416.84	6965560.55	08-Jun-06	Alan Merriman	√													√	MIL	0	1	1	scrap metal		√	3	2	0.25	NE-SW	0	√			
L11	L11_11_1308em2	13	150.25	4	B	2268364.25	6965595.87	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	container top/a few bullets		√	6	0.5	0.5	NE-SW	45	√			
L11	L11_12_1308em2	16	150.14	4	A	2268382.05	6965563.48	08-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	starter cart top								√	6	2	0.25	E-W	0	√			
L11	L11_120_1308em2	13	15.38	4	B	2268408.11	6965541.83	08-Jun-06	Alan Merriman	√							√	ORD MD	3	5	1	50 cal ctg/ (1)762 carts/cad	√	CIV	0	1	1	bolt		√	3	2	0.5	N-S	45	√			
L11	L11_124_1308em2	12	15.25	4	B	2268377.61	6965629.8	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap		√	3	4	0.5	NE-SW	45	√			
L11	L11_125_1308em2	7	14.8	4	D	2268362.35	6965600.28	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	3	0.5	cad & ejector rod & sm arms cart	√	MIL	> 24	> 10	2	starter cart debris & metal scra	FE	√	6	6	0.5	NE-SW	45	√			
L11	L11_13_1308em2	10	135.35	4	C	2268369.98	6965597.24	11-Jul-06	Alan Merriman	√							√	ED MD	3	3	0.5	cad & ejector rod, sm arms cad	√	MIL	> 24	> 10	2	str ctg debris, frag pcs & scrap	FE	√	6	6	0.5	NE-SW	45	√			
L11	L11_130_1308em2	12	13.9	4	B	2268397.61	6965540.61	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	smoke grenade, spcon	√	CIV	3	2	1	wire and staple								√			
L11	L11_14_1308em2	16	132.56	4	A	2268375.39	6965549.41	08-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	starter cart top								√	6	4	0.25	E-W	0	√			
L11	L11_141_1308em2	12	12.41	4	B	2268350.92	6965588.36	08-Jun-06	Alan Merriman	√							√	ORD MD	0	4	1	2-762 cart/2-links								√	3	0.5	0.25			√			
L11	L11_145_1308em2	9	12.01	4	C	2268357.83	6965615.39	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	> 10	0.5	7.62 ctg, ammo clips, cad & ejec	√	MIL	> 24	> 10	2	frag pieces, str ctg debris & sc	FE	√	6	6	0.5	NE-SW	45	√			
L11	L11_15_1308em2	14	122.57	4	A	2268358.81	6965590.31	08-Jun-06	Alan Merriman	√							√	ED MD	3	1	4	battery/interior device								√	9	4	4	SE-NW	45	√			
L11	L11_16_1308em2	13	121.02	4	B	2268369	6965613.43	08-Jun-06	Alan Merriman	√							√	ORD MD	3	3	1	cntr top for starter cart, piece								√	6	6	0.25	E-W	0	√			
L11	L11_162_1308em2	9	11.2	4	C	2268394.1	6965543.81	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	10	0.5	5.56 carts, frag pieces							FE	√	6	2	0.25	N-S	45	√			
L11	L11_168_1308em2	11	10.75	4	B	2268379.52	6965588.77	08-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	3	2	0.25		0	√			
L11	L11_172_1308em2	10	10.5	4	C	2268369.97	6965591.86	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	> 10	2	20mm he empt,cad&ej rod, sm arms							FE	√	6	6	0.5	N-S	45	√			
L11	L11_176_1308em2	9	10.31	4	C	2268367.2	6965633.91	11-Jul-06	Alan Merriman	√							√	ORD MD	6	3	0.25	50 cal bullets							OTHER	√	3	0.5	0.5	E-W	90	√			
L11	L11_189_1308em2	7	9.52	4	D	2268361.8	6965592.01	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	3	0.5	cad & ejector rod, sm arms carts	√	CIV	> 24	> 10	2	shifter screen pcs, str ct debri	FE	√	6	6	0.5	NE-SW	45	√			
L11	L11_197_1308em2	14	9.06	4	A	2268406.43	6965596.87	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	air craft parts		√	3	2	1	N-S	0	√			
L11	L11_20_1308em2	13	110.97	4	B	2268364.7	6965607.16	17-Aug-06	Alan Merriman	√							√	ORD MD	3	1	1	cart part, small arms (brass)							OTHER	√	3	4	4	E-W	0	√			
L11	L11_203_1308em2	10	8.81	4	C	2268404.3	6965543.23	11-Jul-06	Alan Merriman	√							√	ORD MD	> 24	5	0.25	45 cal slugs & 5.56 carts	√	MIL	> 24	4	1	mtl tubing, frag pc & scrap	FE	√	6	0.5	0.5	NE-SW	45	√			
L11	L11_204_1308em2	13	8.81	4	B	2268378.51	6965611.48	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap		√	3	2	0.25		90	√			
L11	L11_205_1308em2	13	8.57	4	B	2268400.62	6965538.59	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	piece of metal		√	6	0.5	0.25	NE-SW	45	√			
L11	L11_208_1308em2	12	8.27	4	B	2268343.54	6965582.58	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	vehicle part		√	6	1	0.5	E-W	90	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
L11	L11_209_1308em2	10	8.27	4	C	2268381.2	6965579.79	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	5	0.5	50 cal bullets, cad&eje rod & sm	√	MIL	24	> 10	2	str ctg pcs, frag & scrap	FE	√	6	6	0.5	NE-SW	45	√			
L11	L11_213_1308em2	13	7.95	4	B	2268360.52	6965623.98	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap		√	3	0.5	0.5	E-W	45	√			
L11	L11_217_1308em2	10	7.76	4	C	2268374.84	6965543.41	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	chunk of aluminum	AL	√	3	0.5	0.25	N-S	45	√			
L11	L11_22_1308em2	13	105.67	4	B	2268360.02	6965608.17	08-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	top starter cart														√			
L11	L11_229_1308em2	11	7.05	4	B	2268363.31	6965578.31	08-Jun-06	Alan Merriman	√							√	ORD MD	3	3	1	scrap metal/2-bullet carts								√	3	0.5	0.25	N-S	0	√			
L11	L11_232_1308em2	12	6.94	4	B	2268328.55	6965572.97	17-Aug-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal, small arms (brass)								√	3	0.5	0.5	N-S	0	√			
L11	L11_233_1308em2	10	6.91	4	C	2268385.14	6965614.77	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50 cal bullets							OTHER	√	3	0.5	0.5	N-S	45	√			
L11	L11_236_1308em2	12	6.78	4	B	2268369.04	6965574.91	08-Jun-06	Alan Merriman	√							√	ORD MD	3	2		starter cart top/50 cal	√	CIV	3	1		bolt		√	6	2	0.25	E-W	0	√			
L11	L11_238_1308em2	12	6.74	4	B	2268356.17	6965577.91	17-Aug-06	Alan Merriman	√													√	MIL	3	1	1	container metal/aluminum piece	AL	√	6	0.5	0.25	E-W	45	√			
L11	L11_24_1308em2	10	92.75	4	C	2268372.27	6965603.45	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	3	0.5	cad & ejector rod, sm arms carts	√	MIL	> 24	> 10	2	str ctg tops,mtl frag & scrap	FE	√	6	6	0.5	N-S	45	√			
L11	L11_261_1308em2	10	6.18	4	C	2268331.92	6965578.84	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	explosive bolt device							FE	√	6	1	0.25	NE-SW	45	√			
L11	L11_263_1308em2	13	6.04	4	B	2268371.69	6965631.59	08-Jun-06	Alan Merriman	√							√	ORD MD	3	2	1	link/50 cal cartridge								√	3	1	1	E-W	45	√			
L11	L11_264_1308em2	12	6	4	B	2268413.08	6965551.29	08-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	50 cal								√	3	0.5	0.5	E-W	0	√			
L11	L11_265_1308em2	13	5.99	4	B	2268322.35	6965557.99	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	12	2	0.25	E-W	0	√			
L11	L11_290_1308em2	13	5.17	4	B	2268325.5	6965617.8	08-Jun-06	Alan Merriman	√													√	MIL	0	1	1	seat part		√	3	1	1		0	√			
L11	L11_292_1308em2	11	5.12	4	B	2268352.7	6965585.45	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal								√	3	2	0.5	N-S	0	√			
L11	L11_294_1308em2	14	5.11	4	A	2268355.64	6965606.72	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap metal		√	6	6	0.25	NE-SW	45	√			
L11	L11_295_1308em2	10	5.11	4	C	2268379.92	6965557.97	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50 cal bullets							OTHER	√	3	0.5	0.5	NE-SW	90	√			
L11	L11_299_1308em2	10	4.95	4	C	2268354.73	6965634.19	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	5	0.25	20mm ctg & 7.62 ctg, sm arms	√	CIV	> 24	2	0.25	metal scrap	FE	√	6	0.5	0.5	NE-SW	45	√			
L11	L11_30_1308em2	10	77.27	4	C	2268362.02	6965611.06	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	3	0.5	cad & ejector rod & sm arms cart	√	MIL	> 24	> 10	2	str ctg debriss, frag & scrap	FE	√	6	6	0.25	N-S	45	√			
L11	L11_301_1308em2	10	4.9	4	C	2268342.34	6965636.06	11-Jul-06	Alan Merriman	√							√	ORD MD	12	5	0.25	5.56 ctg							OTHER	√	3	0.5	0.25	N-S	45	√			
L11	L11_304_1308em2	12	4.83	4	B	2268332.64	6965628.41	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal								√	3	0.5	0.5	N-S	0	√			
L11	L11_305_1308em2	12	4.82	4	B	2268372.68	6965575.23	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal								√	3	2	0.5	N-S	0	√			
L11	L11_314_1308em2	12	4.64	4	B	2268384.87	6965573.41	08-Jun-06	Alan Merriman	√													√	CIV	0	1	1	scrap		√	3	2	0.25	N-S	0	√			
L11	L11_315_1308em2	12	4.62	4	B	2268398.06	6965549.08	08-Jun-06	Alan Merriman	√													√	MIL	0	1	1	scrap		√	3	1	0.25	NE-SW	0	√			
L11	L11_320_1308em2	13	4.53	4	B	2268362.61	6965628.45	08-Jun-06	Alan Merriman	√							√	ED MD	3	2	1	cads								√	3	1	1	E-W	0	√			
L11	L11_323_1308em2	12	4.39	4	B	2268334.95	6965620.09	08-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	50 cal								√	3	2	0.5	SE-NW	0	√			
L11	L11_324_1308em2	12	4.38	4	B	2268373.3	6965586.93	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal								√	3	0.5	0.5	E-W	0	√			
L11	L11_335_1308em2	13	4.2	4	B	2268375.25	6965632.24	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	45								√	3	0.5	0.5	N-S	0	√			
L11	L11_340_1308em2	12	4.08	4	B	2268405.45	6965550.33	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap		√	3	0.5	0.25	N-S	0	√			
L11	L11_36_1308em2	10	63.65	4	C	2268365.11	6965612.81	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	3	0.5	cad & ejector rod & sm arms cart	√	CIV	> 24	> 10	2	str ctg debris, mtl pcs & scrap	FE	√	6	6	0.5	NE-SW	45	√			
L11	L11_363_1308em2	11	3.69	4	B	2268347.27	6965631.48	08-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	30 car bine								√	3	0.5	0.25		0	√			
L11	L11_364_1308em2	13	3.68	4	B	2268389.61	6965549.47	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	6	0.5	0.25	NE-SW	0	√			
L11	L11_368_1308em2	12	3.65	4	B	2268325.67	6965625.52	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	frag								√	3	4	0.25	N-S	0	√			
L11	L11_369_1308em2	11	3.65	4	B	2268334.02	6965584.83	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal								√	3	2	0.5	N-S	0	√			
L11	L11_377_1308em2	11	3.53	3	B	2268412.8	6965586.95	08-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	50 cal								√	3	0.5	0.5	E-W	0	√			
L11	L11_39_1308em2	16	55.3	4	A	2268406	6965574.26	16-Aug-06	Alan Merriman	√							√	ORD MD	3	1	1	clap flare, 762 blanks								√	6	2	2	N-S	0	√			
L11	L11_400_1308em2	8	3.24	3	D	2268334.54	6965602.11	11-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	small arms (brass)							OTHER							√			
L11	L11_412_1308em2	11	3.13	3	B	2268344.46	6965609.48	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal								√	3	2	0.5	N-S	45	√			
L11	L11_431_1308em2	11	2.93	3	B	2268408.69	6965565.56	08-Jun-06	Alan Merriman	√							√	ED MD	0	1	1	cad								√	3	1	1	E-W	0	√			
L11	L11_442_1308em2	11	2.81	3	B	2268347.41	6965561.98	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal								√	3	2	0.5	N-S	0	√			
L11	L11_45_1308em2	13	49.74	4	B	2268368.68	6965603.77	08-Jun-06	Alan Merriman	√							√	ED MD	3	3	2	cad, cartidge top								√	6	4	0.25	E-W	0	√			
L11	L11_451_1308em2	11	2.77	3	B	2268339.48	6965633.66	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	scrap								√	3	2	0.25	N-S	0	√			
L11	L11_456_1308em2	11	2.73	3	B	2268344.48	6965621.62	08-Jun-06	Alan Merriman	√													√	MIL	0	1	1	scrap		√	3	2	0.25	N-S	0	√			
L11	L11_457_1308em2	11	2.72	3	B	2268332.51	6965606.06	08-Jun-06	Alan Merriman	√													√	MIL	6	1	1	scrap		√	3	2	0.5	N-S	0	√			
L11	L11_46_1308em2	16	48.2	4	A	2268401.98	6965552.76	08-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	starter cartridge scrap								√	9	0.5	0.5	N-S	0	√			
L11	L11_462_1308em2	11	2.64	3	B	2268395.05	6965551.77	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	50 cal								√	3	0.5	0.5	N-S	0	√			
L11	L11_47_1308em2	13	48.02	4	B	2268404.04	6965538.63	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	slap flare part	√	CIV	0	1	1	bailing wire		√	6	1	0.25	N-S	0	√			
L11	L11_474_1308em2	11	2.56	3	B	2268332.26	6965592.08	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	ejection seat scrap		√	6		0.25	NE-SW	0	√			
L11	L11_48_1308em2	12	47.74	4	B	2268386.26	6965547.81	08-Jun-06	Alan Merriman	√													√	CIV	0	1	1	rebar		√	9	0.5	0.25	E-W	0	√			
L11	L11_481_1308em2	11	2.53	3	B	2268338.7	6965607.93	08-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	30 cal tracer								√	3	0.5	0.25	N-S	45	√			
L11	L11_483_1308em2	11	2.52	3	B	2268375.88	6965592.08	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	can		√	6	2	0.25	N-S	0	√			
L11	L11_49_1308em2	12	45.61	4	B	2268383.09	6965548.68	08-Jun-06	Alan Merriman	√													√	CIV	0	1	1	rebar		√	9	0.5	0.5	E-W	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
L11	L11_50_1308em2	13	43.93	4	B	2268342.16	6965589.23	08-Jun-06	Alan Merriman	√							√	ED MD	3	1	1	aircraft ejection part								√	6	2	1		0	√			
L11	L11_504_1308em2	11	2.37	2	B	2268369.65	6965584.37	08-Jun-06	Alan Merriman	√													√	CIV	3	1	1	scrap metal		√	3	2	2	E-W	45	√			
L11	L11_55_1308em2	12	38.18	4	B	2268390.15	6965540.41	08-Jun-06	Alan Merriman	√													√	CIV		2	1	wire		√	9	0.5	0.25	NE-SW	45	√			
L11	L11_61_1308em2	13	31.45	4	B	2268338.32	6965592.66	08-Jun-06	Alan Merriman	√							√	ED MD	3	1	1	ejection seat device								√	6	2	1	NE-SW	0	√			
L11	L11_62_1308em2	16	30.5	4	A	2268355.12	6965589.41	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	large can top		√	6	2	1	E-W	45	√			
L11	L11_63_1308em2	10	30.42	4	C	2268359.06	6965595.01	11-Jul-06	Alan Merriman	√							√	ED MD	> 24	3	0.5	cad & ejector rod, sm arms carts	√	MIL	24	> 10	2	str ctg debris, frag & scrap	FE	√	6	6	0.5	N-S	45	√			
L11	L11_70_1308em2	13	26.99	4	B	2268394.01	6965539.13	17-Aug-06	Alan Merriman	√							√	ORD MD	3	2	1	556 cartridge (2)	√	CIV	0	1	1	wire								√			
L11	L11_72_1308em2	14	25.67	4	A	2268318.9	6965559.21	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	ap scrap		√	3	1	0.25	E-W	0	√			
L11	L11_76_1308em2	15	24.05	4	A	2268382.7	6965611.8	08-Jun-06	Alan Merriman	√							√	ORD MD	3	4	1	50 cal/2-50 cal cart/1-scrap								√	3	1	1	NE-SW	45	√			
L11	L11_77_1308em2	12	23.89	4	B	2268381.91	6965591.16	08-Jun-06	Alan Merriman	√							√	ORD MD	3	3	1	2-50 cal/aluminum scrap								√	3	2			0	√			
L11	L11_78_1308em2	12	23.88	4	B	2268338.43	6965582.25	08-Jun-06	Alan Merriman	√													√	MIL	0	1	1	aluminum piece		√	3	6	2	E-W	0	√			
L11	L11_89_1308em2	11	20.4	4	B	2268381	6965583.13	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	ejection seat part		√	3	2	1	E-W	45	√			
L11	L11_9_1308em2	10	156.02	4	C	2268370.15	6965600.8	11-Jul-06	Alan Merriman	√													√	MIL	6	2	0.25	str ctg tops, frag, need backhoe	FE	√	6	6	0.25	N-S	45				
L11	L11_94_1308em2	13	19.47	4	B	2268360.07	6965572.73	08-Jun-06	Alan Merriman	√							√	ORD MD	6	4	1	50 cal	√	CIV	6	1	1	car part		√	3	2	0.5	N-S	45	√			
L11	L11_99_1308em2	13	18.66	4	B	2268322.1	6965628.84	08-Jun-06	Alan Merriman	√													√	MIL	3	1	1	special bolt		√	6	0.5	0.5	SE-NW	0	√			
L11	QAdig_L11_381		7.1		QA	2268381.73	6965539.06	15-Aug-06	Alan Merriman	√							√	ORD MD	0	1	0.25	762 casing							FE							√			
L12	L12_1_1306em2	10	343.79	4	C	2268467.08	6965567.66	11-Jul-06	Alan Merriman	√							√	ED MD	3	> 10	≥8	explosive tubing, 20mm cart,	√	MIL	3	5	2	scrap, frag,		√	9	0.5	0.5	E-W	90	√			
L12	L12_10_1306em2	15	111.21	4	A	2268471.73	6965569.27	20-Jun-06	Jim Thoren	√							√	ORD MD	6	2	≥8	starter cart parts								√	9	4	0.25			√			
L12	L12_103_1306em2	16	10.94	4	A	2268460.6	6965561.27	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	6	0.5	0.25			√			
L12	L12_106_1306em2	13	10.44	4	B	2268454.91	6965565.16	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√						√			
L12	L12_113_1306em2	12	10.21	4	B	2268495.8	6965557.16	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal								√	3	0.5	0.25			√			
L12	L12_114_1306em2	16	10.18	4	A	2268477.64	6965569.35	20-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	vt fuze antenna								√	6	1	1			√			
L12	L12_116_1306em2	10	10.06	4	C	2268439.2	6965589.71	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	chunk of aluminum	AL	√	3	0.5	0.25	N-S	45	√			
L12	L12_119_1306em2	13	9.89	4	B	2268468.85	6965563.35	20-Jun-06	Jim Thoren	√													√	CIV	3	4	4	scrap, steel		√	6	1	0.25			√			
L12	L12_124_1306em2	13	9.53	4	B	2268470.57	6965588.16	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	part of vt fuze								√	6	2	0.25			√			
L12	L12_148_1306em2	15	8.28	4	A	2268431.67	6965586.55	20-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.5	5.56 blank, vt fuze wing								√	6	2	1			√			
L12	L12_153_1306em2	13	7.93	4	B	2268493.6	6965565.75	20-Jun-06	Jim Thoren	√							√	ORD MD	3	10	0.5	small arms brass,7.62mm &5.56								√	6	0.5	0.25			√			
L12	L12_154_1306em2	13	7.92	4	B	2268501.67	6965565.17	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	6	1	0.5			√			
L12	L12_16_1306em2	13	65.91	4	B	2268468.46	6965572.98	17-Aug-06	Jim Thoren	√							√	ORD MD	6	1	0.25	starter cart lid, small arms (br							OTHER	√	6	6	0.25			√			
L12	L12_166_1306em2	10	7.46	4	C	2268510.72	6965568.35	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25	NE-SW	45	√			
L12	L12_170_1306em2	12	7.31	4	B	2268484.68	6965616.98	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	igniter ring								√	3	1	0.25			√			
L12	L12_171_1306em&	14	7.19	4	A	2268418.63	6965552.44	20-Jun-06	Jim Thoren	√							√	ORD MD	3	> 10	≥8	7.62blank&links (76blanks&50link								√	3	0.5	0.25			√			
L12	L12_178_1306em2	12	6.76	4	B	2268475.57	6965590.85	20-Jun-06	Jim Thoren	√							√	ORD MD	3	10	0.25	steel fragments														√			
L12	L12_186_1306em2	12	6.5	4	B	2268442.89	6965585.18	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire		√	6	0.5	0.25			√			
L12	L12_188_1306em2	14	6.4	4	A	2268453.13	6965615.48	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel slag		√	3	1	0.25			√			
L12	L12_189_1306em2	11	6.4	4	B	2268452.76	6965636.62	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap, steel		√	6	1	0.5			√			
L12	L12_190_1306em2	13	6.4	4	B	2268422.36	6965580.63	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	3	2	0.25			√			
L12	L12_2_1306em2	14	237.56	4	A	2268464.47	6965561.71	20-Jun-06	Jim Thoren	√							√	ORD MD	3	3	4	starter ctg parts & pce of alum								√	6					√			
L12	L12_208_1306em2	12	5.56	4	B	2268477.48	6965578.95	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm projo								√	3	1	0.5			√			
L12	L12_210_1306em2	12	5.55	4	B	2268497.87	6965554.05	20-Jun-06	Jim Thoren	√							√	ORD MD	3	3	0.25	7.62mm brass								√	3	0.5	0.25			√			
L12	L12_213_1306em2	13	5.33	4	B	2268453.3	6965576.8	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal projo								√	3	0.5	0.25			√			
L12	L12_220_1306em2	10	5.18	4	C	2268497.75	6965562.83	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	30 cal tracer	√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	45	√			
L12	L12_222_1306em2	13	5.1	4	B	2268478.07	6965561.71	20-Jun-06	Jim Thoren	√							√	ORD MD	3	3	1	imulse cart, 50 brass								√	3	0.5	0.25			√			
L12	L12_224_1306em2	12	5.08	4	B	2268455.45	6965556.04	20-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	impulse cart, 50 cal								√	3	1	0.25			√			
L12	L12_225_1306em2	9	5.07	4	C	2268503.57	6965544.7	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal bullet							FE	√	6	0.5	0.25	N-S	45	√			
L12	L12_228_1306em2	13	4.99	4	B	2268503.71	6965538.55	20-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	cads								√	3	2	0.25			√			
L12	L12_245_1306em2	13	4.52	4	B	2268481.7	6965559.6	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	sluminum scrap		√	3	1	0.25			√			
L12	L12_259_1306em2	13	4.29	4	B	2268486.95	6965544.73	20-Jun-06	Jim Thoren	√							√	ORD MD	0	3	0.25	50 brass								√	6	0.5	0.25			√			
L12	L12_270_1306em2	11	4.15	4	B	2268470.34	6965592.66	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap, steel		√	3	1	0.25			√			
L12	L12_30_1306em2	13	34.11	4	B	2268508.42	6965562.98	20-Jun-06	Jim Thoren	√													√	CIV	3	2	0.25	aluminum scrap		√	3	2	0.25			√			
L12	L12_300_1306em2	11	3.61	4	B	2268457.24	6965577.52	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	3	0.5	0.25			√			
L12	L12_301_1306em2	12	3.61	4	B	2268457.51	6965559.3	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal projo								√	3	0.5	0.25			√			
L12	L12_310_1306em2	12	3.43	3	B	2268482.9	6965545.88	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm								√	3	1				√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
L12	L12_321_1306em2	11	3.3	3	B	2268514.29	6965553.3	20-Jun-06	Jim Thoren	√							√	ORD MD	3	4	0.25	5.56 brass,(1) 7.62 brass								√						√			
L12	L12_37_1306em2	14	28.12	4	A	2268462.62	6965565.66	20-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	mdf tubing	√	MIL	6	2	1	starter cart lid		√	12	2	0.25			√			
L12	L12_382_1306em2	11	2.73	3	B	2268475.12	6965553.82	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal								√	3	0.5				√			
L12	L12_397_1306em2	11	2.58	3	B	2268473.19	6965585.97	20-Jun-06	Jim Thoren	√													√	CIV	3	2	0.25	aluminum scrap		√	3	1	0.25			√			
L12	L12_40_1306em2	15	27.29	4	A	2268436.93	6965583.8	20-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	wire,aluminum ejection connector								√	3	1	0.25			√			
L12	L12_47_1306em2	14	21.85	4	A	2268506.93	6965551.3	20-Jun-06	Jim Thoren	√							√	ORD MD	3	5	0.5	50 cal projo, (3) 5.56 brass								√	3	0.5	0.25			√			
L12	L12_538_1306em2	11	1.68	1	B	2268470.97	6965576.52	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	steel scrap		√	3	1	0.5			√			
L12	L12_61_1306em2	15	16.06	4	A	2268473.65	6965610.54	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	aluminum scrap		√	6	4	0.25			√			
L12	L12_64_1306em2	12	15.13	4	B	2268508.31	6965571.74	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.5	aluminum scrap, scrap	AL	√	6	2	0.5			√			
L12	L12_65_1306em2	13	15.12	4	B	2268501.56	6965548.16	20-Jun-06	Jim Thoren	√							√	ORD MD	3	2	0.25	50 projo and 38 brass								√	3	0.5				√			
L12	L12_66_1306em2	12	15.05	4	B	2268504.75	6965567.96	20-Jun-06	Jim Thoren	√													√	CIV	0	1	≥8	steel slag		√	6	4	1			√			
L12	L12_87_1306em2	12	12.62	4	B	2268499.3	6965567.66	20-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	cad								√	3	1	1			√			
L12	L12_90_1306em2	13	12.11	4	B	2268504.71	6965562.8	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap chunks		√	3	2				√			
L12	L12_94_1306em2	13	11.62	4	B	2268487.19	6965559.61	20-Jun-06	Jim Thoren	√							√	ORD MD	0	> 10	0.25	7.62 blank and links								√	3	0.5				√			
L12	QAdig_L12_239		10.5		QA	2268429.44	6965575.98	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
L13	L13_110_1306em2	14	10.31	4	A	2268531.8	6965548.27	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	pieces of metal		√	6	0.5	0.25	NE-SW	0	√			
L13	L13_121_1306em2	16	9.88	4	A	2268595.87	6965580.12	16-Aug-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal bullets, 50 cal							OTHER	√	3	0.5	0.5	E-W	90	√			
L13	L13_137_1306em2	13	9.03	4	B	2268617.69	6965620.59	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	horn frm vt fuze,grenade spoon,w								√	3	0.5	0.25	NE-SW	0	√			
L13	L13_145_1306em2	13	8.53	4	B	2268546.74	6965575.55	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of a base plate								√	6	0.5	0.5	E-W	90	√			
L13	L13_180_1306em2	12	6.64	4	B	2268552.29	6965570.63	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	piece of metal flag		√	3	0.5	0.25	NE-SW	0	√			
L13	L13_183_1306em2	12	6.61	4	B	2268577.39	6965539.1	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	piece wire/balled up		√	6	0.5	0.25	NE-SW	0	√			
L13	L13_209_1306em2	11	5.55	4	B	2268574.99	6965635.95	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	wire		√	6	0.5	0.25	NE-SW	45	√			
L13	L13_215_1306em2	13	5.31	4	B	2268603.77	6965571.38	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	0.25	5.56 cart & piece of aluminum								√	3	0.5	0.5	N-S	0	√			
L13	L13_232_1306em2	10	4.91	4	C	2268613.9	6965628.62	11-Jul-06	Alan Merriman	√	√	ORD	3	1	0.25	20mm live HE													FE	√	3	1	0.25	N-S	0	√			
L13	L13_236_1306em2	13	4.76	4	B	2268560.7	6965574.17	21-Jun-06	Alan Merriman	√							√	ORD MD	3	3	0.25	(2) 7.62 carts and nail								√	6	0.5	0.25	N-S	0	√			
L13	L13_238_1306em2	12	4.71	4	B	2268541.57	6965537.34	21-Jun-06	Alan Merriman	√							√	ORD MD	3	4	0.25	(3)7.62 carts & balled up wire								√	3	0.5	0.25	N-S	0	√			
L13	L13_24_1306em2	16	48.99	4	A	2268582.83	6965559.53	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of a slap flag								√	6	0.5	0.25	N-S	0	√			
L13	L13_247_1306em2	12	4.47	4	B	2268618.07	6965634.64	21-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	(2) 50 penny nails		√	6	0.5	0.25	NE-SW	45	√			
L13	L13_257_1306em2	10	4.31	4	C	2268553.57	6965574.38	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
L13	L13_289_1306em2	11	3.78	4	B	2268557.31	6965573.8	21-Jun-06	Alan Merriman	√							√	ORD MD	3	5	0.25	7.62 carts(many items,hard to ge								√	3	0.5	0.25	NE-SW	0	√			
L13	L13_291_1306em2	11	3.73	4	B	2268559.91	6965582.58	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	7.62 cart								√	3	0.5	0.25	N-S	0	√			
L13	L13_299_1306em2	11	3.61	4	B	2268528.86	6965608.83	21-Jun-06	Alan Merriman	√							√	ED MD	3	1	0.25	cad device								√	3	1	0.25	NE-SW		√			
L13	L13_304_1306em2	11	3.55	3	B	2268536.33	6965575.11	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal bullet								√	3	0.5	0.5	N-S	45	√			
L13	L13_315_1306em2	10	3.35	3	C	2268544.34	6965593.91	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
L13	L13_374_1306em2	11	2.79	3	B	2268596.58	6965592.68	21-Jun-06	Alan Merriman	√													√	MIL	0	1	0.25	aircraft seat part		√	3	1	1	E-W	0	√			
L13	L13_410_1306em2	11	2.5	2	B	2268532.22	6965595.62	21-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	10 penny nail, bolt & washer		√	6	0.5	0.25	NE-SW	0	√			
L13	QAdig_L13_489		6		QA	2268590.06	6965585.83	15-Aug-06	Alan Merriman																			no contact											
L14	L14_128_1305em2	12	9.78	4	B	2268620.37	6965613.25	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	1	0.25			√			
L14	L14_137_1305em2	14	9.4	4	A	2268629.82	6965549.62	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	4	0.25			√			
L14	L14_138_1305em2	15	9.36	4	A	2268703.63	6965554.82	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna							FE	√	6	2	0.5			√			
L14	L14_141_1305em2	11	9.2	4	B	2268624.6	6965607.64	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	1	0.5			√			
L14	L14_148_1305em2	11	8.63	4	B	2268620.31	6965618.16	26-Jun-06	Jim Thoren	√													√	MIL	12	10	0.25	scrap	FE	√	6	0.5	0.25			√			
L14	L14_161_1305em2	13	7.01	4	B	2268708.66	6965603.41	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna							FE	√	6	1	0.5			√			
L14	L14_170_1305em2	12	6.66	4	B	2268642.26	6965550	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	scrap, 7.62 blank brass							OTHER	√	3	0.5	0.25			√			
L14	L14_171_1305em2	12	6.63	4	B	2268671.07	6965574.7	26-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap	AL	√	3	1	0.25			√			
L14	L14_172_1305em2	12	6.6	4	B	2268695.59	6965573.3	17-Aug-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap, scrap	AL	√	3	1	0.25			√			
L14	L14_178_1305em2	10	6.31	4	C	2268626.69	6965554.48	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part							AL		3	2	0.25	N-S	0	√			
L14	L14_198_1305em2	11	5.65	4	B	2268633.25	6965608.01	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	2	0.25			√			
L14	L14_203_1305em2	12	5.43	4	B	2268695.09	6965540.8	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna							AL	√	6	2	0.25			√			
L14	L14_213_1305em2	11	5.21	4	B	2268702.89	6965596.05	26-Jun-06	Jim Thoren	√													√	CIV	6	3	0.25	scrap	AL	√	3	0.5	0.25			√			
L14	L14_214_1305em2	14	5.17	4	A	2268693.8	6965625.6	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	2	0.25			√			
L14	L14_219_1305em2	12	5.12	4	B	2268626.73	6965613.38	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal								√	6	0.5	0.25			√			
L14	L14_224_1305em2	12	5	4	B	2268634.81	6965604.88	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna							AL	√	6	2	1			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
L14	L14_227_1305em2	12	4.94	4	B	2268619.21	6965634.16	26-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	3	0.5	0.25			√			
L14	L14_231_1305em2	12	4.9	4	B	2268654.73	6965634.31	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	9	0.5	0.25			√			
L14	L14_233_1305em2	13	4.88	4	B	2268687.15	6965589.18	26-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap	AL	√	3	0.5	0.25			√			
L14	L14_25_1305em2	15	43.13	4	A	2268625.11	6965550.09	26-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	vt fuze bracket							FE	√	6	2	0.25			√			
L14	L14_254_1305em2	11	4.38	4	B	2268645.58	6965550.52	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	7.62 blank								√	3	0.5	0.25			√			
L14	L14_268_1305em2	11	4.15	4	B	2268628.57	6965599.8	26-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	20mm tp							FE	√	3	1				√			
L14	L14_277_1305em2	12	4.07	4	B	2268691.72	6965539.12	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12	0.5	0.25			√			
L14	L14_282_1305em2	14	3.99	4	A	2268626.02	6965581.07	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna							AL	√	6	2	1			√			
L14	L14_294_1305em2	11	3.83	4	B	2268638.63	6965597.59	26-Jun-06	Jim Thoren	√													√	MIL	3	2	0.25	scrap	AL	√	3	1				√			
L14	L14_296_1305em2	12	3.83	4	B	2268696.68	6965622.95	26-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap	AL	√	3	1	0.25			√			
L14	L14_298_1305em2	11	3.81	4	B	2268675.05	6965538.25	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25			√			
L14	L14_31_1305em2	15	30.29	4	A	2268695.7	6965595.47	26-Jun-06	Jim Thoren	√													√	CIV	12	1	1	rebar (same as 49)	FE	√	> 24	0.5				√			
L14	L14_316_1305em2	13	3.59	3	B	2268630.41	6965613.2	26-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	AL	√	9	2	0.25			√			
L14	L14_326_1305em2	11	3.53	3	B	2268671.6	6965556.91	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	1	0.25			√			
L14	L14_330_1305em2	12	3.48	3	B	2268672.17	6965635.12	26-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25			√			
L14	L14_395_1305em2	10	2.8	3	C	2268680.02	6965562.09	17-Aug-06	Alan Merriman	√													√	CIV	3	2	0.25	tin can	OTHER							√			
L14	L14_396_1305em2	11	2.77	3	B	2268698.47	6965539	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12	0.5	0.25			√			
L14	L14_40_1305em2	13	25.99	4	B	2268659.18	6965631.66	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket							FE	√	6	4	2			√			
L14	L14_414_1305em2	11	2.59	3	B	2268701.8	6965542.59	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25			√			
L14	L14_49_1305em2	13	21.91	4	B	2268699.55	6965594.82	26-Jun-06	Jim Thoren	√													√	CIV	12	1	1	rebar	FE	√	> 24	0.5				√			
L14	L14_62_1305em2	16	17.76	4	A	2268711.86	6965595.02	26-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze part							FE	√	3	2	0.5			√			
L14	L14_72_1305em2	13	16.36	4	B	2268703.02	6965588.49	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25			√			
L14	L14_83_1305em2	9	14.67	4	C	2268620.23	6965623.05	11-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze bracket, vt							FE	√	6	2	0.25	N-S	0	√			
L14	L14_89_1305em2	13	13.84	4	B	2268624.29	6965615.98	26-Jun-06	Jim Thoren	√							√	ORD MD	24	1			√	CIV	3	1	0.25	metal screw	FE	√	3	0.5	0.25	N-S	0	√			
L14	QAdig_L14_463		6.2		QA	2268677.4	6965560.08	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nails	FE	√	3	0.5	0.25			√			
L15	L15_ 10_1318em2	15	72.11	4	A	2268760.05	6965609.77	06-Jul-06	Jim Thoren	√													√	CIV	0	1		survey bench mark		√									
L15	L15_111_1305em2	11	11.12	4	B	2268788.4	6965614.51	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6		0.25			√			
L15	L15_112_1305em2	15	11.11	4	A	2268803.21	6965551.16	16-Aug-06	Jim Thoren	√													√	CIV		1		fence post left in ground											
L15	L15_133_1305em2	14	9.55	4	A	2268738.25	6965553.14	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24		0.25			√			
L15	L15_142_1305em2	13	9.13	4	B	2268773.72	6965627.59	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	2	0.25			√			
L15	L15_157_1305em2	13	7.37	4	B	2268779.93	6965562.05	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	> 24		0.25			√			
L15	L15_163_1305em2	13	6.94	4	B	2268735.11	6965621.63	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	chain		√	6	1	0.5			√			
L15	L15_166_1305em2	13	6.72	4	B	2268782.29	6965617.68	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	2	0.25			√			
L15	L15_17_1305em2	13	76.18	4	B	2268800.87	6965626.09	06-Jul-06	Jim Thoren	√													√	CIV	3	1	1	rebar		√	24		0.5			√			
L15	L15_188_1305em2	13	5.92	4	B	2268778.76	6965620.3	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze pt							AL	√	3		0.25			√			
L15	L15_197_1305em2	13	5.66	4	B	2268783.7	6965562.01	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	> 24		0.25			√			
L15	L15_228_1305em2	10	4.93	4	C	2268772.23	6965538.5	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	SS	√	9	0.5	0.25	N-S	0	√			
L15	L15_229_1305em2	10	4.93	4	C	2268737.59	6965562.16	11-Jul-06	Alan Merriman	√	√	EMAT	3	1	0.25	20mm live HE													FE	√	3	1	0.5	N-S	0	√	√	27-Jul-06	Kelly Hickman
L15	L15_230_1305em2	11	4.91	4	B	2268807.59	6965629.19	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9		0.25			√			
L15	L15_238_1305em2	12	4.77	4	B	2268770.27	6965626.85	06-Jul-06	Jim Thoren																			no find, reacquired 8/7/06											
L15	L15_262_1305em2	13	4.25	4	B	2268781.41	6965635.66	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	a/c pts	AL	√	3	1	0.25			√			
L15	L15_289_1305em2	12	3.93	4	B	2268746.58	6965633.77	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	1	0.25			√			
L15	L15_340_1305em2	12	3.37	3	B	2268765.13	6965630.88	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3		0.25			√			
L15	L15_360_1305em2	9	3.1	3	C	2268814.64	6965635.16	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			
L15	L15_375_1305em2	11	2.92	3	B	2268738.62	6965635.27	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12		0.25			√			
L15	L15_4_1305em2	15	603.66	4	A	2268798.93	6965551.01	06-Jul-06	Jim Thoren	√													√	CIV		1		fence post	FE										
L15	L15_50_1305em2	13	21.18	4	B	2268773.62	6965542.99	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze brkt								√	6	2	0.25			√			
L15	L15_51_1305em2	13	20.12	4	B	2268795.48	6965625.95	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze brkt								√	6	2	0.25			√			
L15	L15_53_1305em2	14	19.8	4	A	2268734.77	6965552.84	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24	6	0.25			√			
L15	L15_56_1305em2	12	19.02	4	B	2268801.64	6965635.55	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3		0.25			√			
L15	L15_57_1305em2	14	18.95	4	A	2268735.72	6965630.48	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	12	4	0.25			√			
L15	L15_64_1305em2	16	17.39	4	A	2268811.04	6965595.39	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	2	0.25			√			
L15	L15_75_1318em2	10	5.15	4	C	2268787.89	6965613.44	11-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	frag scrap							FE	√	3	1	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
L15	L15_82_1305em2	16	14.79	4	A	2268748.95	6965625.52	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze brkt							FE	√	6	2	0.25			√			
L15	L15_87_1305em2	15	14.28	4	A	2268812.17	6965552.73	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3		0.25			√			
L15	L15_90_1318em2	14	4.18	4	A	2268760.02	6965613.1	06-Jul-06	Jim Thoren	√													√	CIV	0	1		surveyor's monuments											
L15	L15_96_1305em2	15	13.19	4	A	2268794.86	6965549.2	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	9		0.25			√			
L15	L15_98_1305em2	14	12.96	4	A	2268741.95	6965537.21	16-Aug-06	Jim Thoren	√							√	ORD MD	3	2	0.25	small arms blanks	√	CIV	3	1	0.25	link, coke can	FE	√	3	1	0.25			√			
L15	QAdig_L15_309		8.3		QA	2268784.14	6965623.14	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25			√			
L16	L16_103_1221em2	15	9.64	4	A	2268820.2	6965557.42	28-Jun-06	Alan Merriman	√													√	CIV	6	1	0.5	chain	FE	√	9	1	0.5	N-S	0	√			
L16	L16_107_1221em2	9	9.43	4	C	2268857.12	6965583.75	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
L16	L16_108_1221em2	13	9.35	4	B	2268862.4	6965586.82	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
L16	L16_122_1221em2	12	7.09	4	B	2268884.77	6965608.32	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	nail, nail	FE	√	6					√			
L16	L16_123_1221em2	14	7.09	4	A	2268838.7	6965575.37	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	chain	FE	√	6	1	0.5	N-S	0	√			
L16	L16_126_1221em2	9	6.49	4	C	2268858.09	6965579.57	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	SS	√	6	0.5	0.25	N-S	0	√			
L16	L16_129_1221em2	13	6.27	4	B	2268886.68	6965600.28	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3		0.25			√			
L16	L16_137_1221em2	12	5.62	4	B	2268888.92	6965610.27	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9		0.25			√			
L16	L16_139_1221em2	12	5.38	4	B	2268867.52	6965572.34	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	AL	√	3	1	0.25			√			
L16	L16_140_1221em2	11	5.35	4	B	2268877.88	6965606.2	07-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	fence clips		√	3					√			
L16	L16_141_1221em2	12	5.33	4	B	2268853.23	6965559	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
L16	L16_146_1221em2	13	5.13	4	B	2268824.41	6965576.28	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24		0.25			√			
L16	L16_154_1221em2	11	4.81	4	B	2268863.34	6965554.71	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3		0.25			√			
L16	L16_159_1221em2	14	4.53	4	A	2268860.15	6965601.34	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
L16	L16_160_1221em2	9	4.42	4	C	2268866.87	6965563.23	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
L16	L16_167_1221em2	11	3.91	4	B	2268858.13	6965562.94	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
L16	L16_169_1221em2	11	3.82	4	B	2268904.48	6965622.12	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence clips		√	3		0.25			√			
L16	L16_180_1221em2	11	3.47	3	B	2268844.59	6965593.77	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24		0.25			√			
L16	L16_193_1221em2	11	3.18	3	B	2268827.98	6965576.17	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3		0.25			√			
L16	L16_200_1221em2	10	2.96	3	C	2268881.54	6965635.19	17-Aug-06	Alan Merriman	√													√	CIV	0	3	0.25	nails	FE							√			
L16	L16_210_1221em2	14	2.62	3	A	2268917.64	6965588.07	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
L16	L16_91_1221em2	15	12.35	4	A	2268900.56	6965624.57	28-Jun-06	Alan Merriman	√													√	CIV	0	5	0.25	wire	FE	√	3	0.5	0.25			√			
L16	L16_94_1221em2	13	11.75	4	B	2268853.34	6965585.27	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	> 24		0.25			√			
L16	L16_99_1221em2	14	10.33	4	A	2268876.34	6965611.74	28-Jun-06	Alan Merriman	√													√	CIV	0	2	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
L16	QAdig_L16_389		7		QA	2268903.21	6965548.49	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
L16	QAdig_L16_432		6.5		QA	2268841.8	6965606.8	15-Aug-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part							FE							√			
L17	L17_117_1221em2	13	7.43	4	B	2268991.23	6965552.98	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze antenna, vt							FE	√	6	2	0.25	N-S	0	√			
L17	L17_121_1221em2	12	7.15	4	B	2268968.46	6965571.3	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
L17	L17_133_1221em2	12	5.91	4	B	2268924.65	6965578.66	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
L17	L17_135_1221em2	11	5.79	4	B	2268995.28	6965548.63	07-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails 4"	FE	√	3	0.5	0.25	N-S	0	√			
L17	L17_142_1221em2	12	5.3	4	B	2268943.62	6965578.26	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	steel scrap	FE	√	6	0.5	0.25	N-S	0	√			
L17	L17_145_1221em2	11	5.14	4	B	2269010.52	6965629.95	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	steel scrap	FE	√	6	0.5	0.25	N-S	0	√			
L17	L17_152_1221em2	12	4.88	4	B	2268940.96	6965628.62	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	small steel scrap	FE	√	3	0.5	0.25	N-S	0	√			
L17	L17_162_1221em2	13	4.17	4	B	2268970.82	6965607.93	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	copper wire	CU	√	9	0.5	0.25	N-S	0	√			
L17	L17_163_1221em2	11	4.11	4	B	2268983.86	6965569.56	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
L17	L17_170_1221em2	13	3.67	4	B	2268989.2	6965538.37	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	miller lite can	AL	√	3	0.5	0.25	N-S	0	√			
L17	L17_172_1221em2	12	3.64	4	B	2268977.66	6965632.71	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	5.56 blank ctg	√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
L17	L17_174_1221em2	12	3.59	3	B	2268953.26	6965556.52	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barbed wire	FE	√	6	0.5	0.25	N-S	0	√			
L17	L17_188_1221em2	11	3.29	3	B	2268992	6965542.7	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	can top half	AL	√	3	0.5	0.25	N-S	0	√			
L17	L17_69_1221em2	13	50.22	4	B	2268934.78	6965558.18	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	rebar	FE	√	6	0.5	0.25	N-S	0	√			
L17	L17_72_1221em2	12	32.48	4	B	2268931.87	6965556.62	07-Jul-06	Jim Thoren																			no contact, reaquired 7/25/06											
L17	L17_86_1221em2	12	15.24	4	B	2268979.8	6965627.03	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	bolt	FE	√	6	0.5	0.25	N-S	0	√			
L17	L17_87_1221em2	14	14.21	4	A	2268947.22	6965613.02	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	9	0.5	0.25	N-S	0	√			
L17	L17_89_1221em2	14	13.17	4	A	2268950.45	6965611.34	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	9	0.5	0.25	N-S	0	√			
L17	L17_90_1221em2	13	12.47	4	B	2268996.03	6965575.63	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	steel screw	FE	√	9	0.5	0.5	N-S	0	√			
L17	L17_97_1221em2	13	10.92	4	B	2269005.66	6965622.91	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	Screw	FE	√	9	0.5	0.5	N-S	0	√			
L18	L18_100_1304em2	9	11.57	4	C	2269103.9	6965626.28	11-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	Wire	FE	√	6	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
L18	L18_104_1304em2	15	10.92	4	A	2269079.84	6965577.91	07-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	3		0.25			√			
L18	L18_106_1304em2	15	10.62	4	A	2269108.41	6965566.93	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	6		0.5			√			
L18	L18_107_1304em2	12	10.37	4	B	2269100.61	6965626.7	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
L18	L18_108_1304em2	13	10.07	4	B	2269116.65	6965622.7	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	wire, wire	FE	√	12		0.25			√			
L18	L18_109_1304em2	12	9.88	4	B	2269097.62	6965574.27	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap	FE	√	12		0.25			√			
L18	L18_112_1304em2	11	9.55	4	B	2269107.77	6965629.46	07-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	3		0.25			√			
L18	L18_116_1304em2	9	9.1	4	C	2269066.62	6965633.07	11-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
L18	L18_117_1304em2	14	9.09	4	A	2269058.91	6965576.49	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
L18	L18_118_1304em2	9	9.05	4	C	2269052.26	6965608.8	11-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	bolt	FE	√	6	1	0.25	N-S	0	√			
L18	L18_120_1304em2	11	8.87	4	B	2269025.38	6965614.15	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
L18	L18_121_1304em2	11	8.87	4	B	2269100.69	6965634.11	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
L18	L18_123_1304em2	12	8.74	4	B	2269094.16	6965573.91	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	7/16 socket	FE	√	3	0.5	0.25	N-S	0	√			
L18	L18_132_1304em2	13	7.39	4	B	2269101.39	6965573.27	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	24		0.25			√			
L18	L18_141_1304em2	15	6.7	4	A	2269072.55	6965560.39	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	2	0.25			√			
L18	L18_142_1319em2	14	5.65	4	A	2269034.44	6965597.54	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12		0.25			√			
L18	L18_148_1304em2	12	6.29	4	B	2269089.85	6965620.61	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	2	0.25			√			
L18	L18_150_1304em2	11	6.16	4	B	2269086.2	6965633.48	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	1	0.25			√			
L18	L18_152_1304em2	13	6.13	4	B	2269047.02	6965626.41	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	FE	√	6	2	0.25			√			
L18	L18_155_1304em2	12	5.86	4	B	2269114.99	6965633.52	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt (2)	FE	√	3	0.5				√			
L18	L18_157_1304em2	13	5.81	4	B	2269050.84	6965634.66	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
L18	L18_168_1304em2	13	5.54	4	B	2269097.11	6965634.78	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
L18	L18_174_1304em2	12	5.21	4	B	2269111.36	6965625.1	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
L18	L18_176_1304em2	12	5.04	4	B	2269079.05	6965600.28	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	24		0.25			√			
L18	L18_182_1304em2	13	4.73	4	B	2269061.95	6965563.62	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6					√			
L18	L18_189_1319em2	12	4.11	4	B	2269033.96	6965593.27	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
L18	L18_191_1304em2	12	4.48	4	B	2269058.61	6965635.32	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
L18	L18_200_1319em2	12	3.89	4	B	2269042.81	6965604.35	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	6		0.25			√			
L18	L18_203_1304em2	12	4.1	4	B	2269089.21	6965594.6	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
L18	L18_206_1304em2	13	4.01	4	B	2269045.49	6965543.34	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag							FE	√	3	2	0.25			√			
L18	L18_207_1304em2	11	4.01	4	B	2269075.01	6965600.8	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9		0.25			√			
L18	L18_211_1304em2	12	3.81	4	B	2269038.96	6965615.67	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
L18	L18_213_1304em2	11	3.77	4	B	2269031.68	6965612.14	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
L18	L18_214_1304em2	12	3.72	4	B	2269089.95	6965572.62	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
L18	L18_219_1304em2	11	3.66	4	B	2269092.87	6965625.38	07-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze ant							AL	√	6	2	0.5			√			
L18	L18_245_1304em2	11	3.09	3	B	2269054.73	6965616.46	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9		0.25			√			
L18	L18_265_1304em2	11	2.7	3	B	2269069.36	6965561.7	07-Jul-06	Jim Thoren																			no contact											
L18	L18_283_1304em2	11	2.47	2	B	2269018.27	6965577.21	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
L18	L18_45_1304em2	13	36.84	4	B	2269050.38	6965621.09	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	rebar	FE	√	6		0.5			√			
L18	L18_59_1304em2	13	26.98	4	B	2269089.76	6965628.29	17-Aug-06	Jim Thoren	√													√	CIV	3	3	0.25	nail, nail	FE	√	6		0.25			√			
L18	L18_76_1304em2	12	17.96	4	B	2269062.63	6965634.29	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	FE	√	9		0.25			√			
L18	L18_82_1304em2	12	15.98	4	B	2269052.55	6965603.54	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
L18	L18_83_1304em2	12	15.8	4	B	2269114.09	6965605.8	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	rebar		√	6	0.5							
L18	L18_85_1304em2	12	15.22	4	B	2269074.08	6965622.76	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	9		0.25			√			
L18	L18_89_1304em2	13	13.44	4	B	2269092.74	6965596.03	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25			√			
L18	L18_91_1304em2	10	13.04	4	C	2269103.85	6965630.19	11-Jul-06	Alan Merriman	√													√	CIV				nails	FE	√	6	0.5	0.25	N-S	0	√			
L18	L18_98_1304em2	11	12.04	4	B	2269082.78	6965579.81	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	6		0.5			√			
L18	QAdig_L18_190		12.8		QA	2269059.92	6965593.42	15-Aug-06	Alan Merriman	√													√	CIV	0	1	1	bolt	FE	√	6	1	0.25			√			
M01	M01_11_1215em1	15	26.33	4	A	2267341.62	6965497.89	06-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire			3	0.5	0.25			√			
M01	M01_14_1215em1	14	13.58	4	A	2267338.52	6965487.99	06-Jun-06	Jim Thoren	√													√	CIV	0	1	2	cable			24	0.5	0.25			√			
M01	M01_17_1215em1	15	12.09	4	A	2267399.98	6965498.17	06-Jun-06	Jim Thoren	√													√	CIV	3	1	16	metal fence post			24	2	0.25			√			
M01	M01_19_1215em1	13	11.94	4	B	2267413.94	6965443.93	06-Jun-06	Jim Thoren																			unknown											
M01	M01_2_1215em1	13	133.67	4	B	2267414.77	6965513.77	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	metal scrap			12	0.5	0.25			√			
M01	M01_20_1215em1	14	11.7	4	A	2267385.36	6965504.23	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	metal scrap			6	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M01	M01_26_1215em1	13	7.52	4	B	2267331.44	6965498.57	06-Jun-06	Jim Thoren	√													√	CIV	3	3	1	wire			3		0.25			√			
M01	M01_27_1215em1	12	7.18	4	B	2267380.8	6965497.11	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire			6	0.5	0.25			√			
M01	M01_30_1215em1	8	6.71	4	D	2267382.3	6965510.49	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	piece of barbed wire	FE	√	3	0.5	0.25	NE-SW	45	√			
M01	M01_31_1215em1	10	6.22	4	C	2267360.47	6965498.2	19-Jun-06	Alan Merriman	√													√	MIL	0	5	1	wire		√	3	0.5	0.25			√			
M01	M01_32_1215em1	15	6.11	4	A	2267402.67	6965536.38	06-Jun-06	Jim Thoren																			no find, reaquired 7/25/06											
M01	M01_33_1215em1	12	5.48	4	B	2267351.96	6965496.77	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire			6	0.5	0.25			√			
M01	M01_34_1215em1	12	5.02	4	B	2267346.83	6965531.41	06-Jun-06	Jim Thoren																			unknown											
M01	M01_37_1215em1	11	4.38	4	B	2267390.59	6965500.04	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire			3	0.5	0.25			√			
M01	M01_38_1215em1	10	4.08	4	C	2267325.8	6965525.45	19-Jun-06	Alan Merriman																			no find											
M01	M01_4_1215em1	13	102.88	4	B	2267411.47	6965514.06	06-Jun-06	Jim Thoren	√													√	CIV	3	1	2	metal scrap			12	1	0.25			√			
M01	M01_41_1215em1	11	3.71	4	B	2267397.38	6965523.39	06-Jun-06	Jim Thoren	√													√	CIV	3	1	2	metal scrap			9	1	0.25			√			
M01	M01_42_1215em1	11	3.63	4	B	2267407.56	6965467.36	06-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire			9	0.5	0.25			√			
M01	M01_44_1215em1	11	3.5	3	B	2267409.6	6965498.46	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	3	0.5	0.25			√			
M01	M01_55_1215em1	10	2.69	3	C	2267346.39	6965506.49	19-Jun-06	Alan Merriman	√													√	MIL	3	2	1	nail		√	3	0.5	0.25			√			
M01	M01_56_1215em1	9	2.67	3	C	2267332.91	6965529.63	19-Jun-06	Alan Merriman																			no find											
M01	M01_6_1215em1	15	50.73	4	A	2267381.84	6965503.14	06-Jun-06	Jim Thoren	√													√	CIV	0	1	2	metal scrap			6	0.5	0.25			√			
M01	M01_66_1215em1	9	2.24	2	C	2267392.43	6965497.16	19-Jun-06	Alan Merriman	√													√	MIL	0	1	1	wire		√	3	0.5	0.25			√			
M01	M01_72_1215em1	9	2.12	2	C	2267334.62	6965496.73	19-Jun-06	Alan Merriman	√													√	MIL	3	1	1	wire		√	3	0.5	0.25			√			
M02	M02_01_612_mag			99	M	2267493.707	6965520.211	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
M02	M02_02_612_mag			99	M	2267491.489	6965517.006	12-Jun-06	Alan Merriman	√													√	CIV	0	1	1	shotgun shell								√			
M02	M02_03_.612_mag			99	M	2267470.131	6965499.364	12-Jun-06	Alan Merriman	√													√	CIV	0	1	1	fence wire								√			
M02	M02_04_612_mag			99	M	2267483.851	6965505.693	12-Jun-06	Alan Merriman	√													√	CIV	0	1	1	fence staple								√			
M02	M02_05_612_mag			99	M	2267478.851	6965529.39	12-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence wire								√			
M02	M02_101_1219em1	11	3.55	3	B	2267464.95	6965490.75	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M02	M02_103_1219em1	10	3.5	3	C	2267432.27	6965497.41	19-Jun-06	Alan Merriman	√													√	MIL	3	2	1	wire		√	6	0.5	0.25			√			
M02	M02_110_1219em1	10	3.06	3	C	2267457.77	6965492.49	19-Jun-06	Alan Merriman	√													√	MIL	3	1	1	wire		√	6	0.5	0.25			√			
M02	M02_120_1318em2	9	3.11	3	C	2267432.12	6965510.49	19-Jun-06	Alan Merriman	√													√	MIL	3	1	1	scrap metal		√	3	0.5	0.25			√			
M02	M02_122_1318em2	10	3.09	3	C	2267518.18	6965496.75	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	banding strap		√	9	0.5	0.25			√			
M02	M02_18_1318em2	10	30.05	4	C	2267439.16	6965513.85	19-Jun-06	Alan Merriman																			no find, reacquired 8/1/06											
M02	M02_29_1318em2	15	14.83	4	A	2267460.62	6965514.46	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M02	M02_32_1318em2	12	13.71	4	B	2267431.3	6965517.08	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M02	M02_41_1219em1	12	22.49	4	B	2267441.91	6965497	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	nail								√			
M02	M02_45_1219em1	12	15.8	4	B	2267454.02	6965493.8	06-Jun-06	Jim Thoren	√													√	CIV	3	2	1	wire								√			
M02	M02_53_1318em2	13	7.68	4	B	2267441.8	6965510.85	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M02	M02_57_1219em1	12	10.68	4	B	2267450.13	6965506.12	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	nail								√			
M02	M02_61_1219em1	10	10.13	4	C	2267454.56	6965497.82	19-Jun-06	Alan Merriman	√													√	MIL	3	1	1	wire		√	3	0.5	0.25			√			
M02	M02_64_1219em1	13	9.41	4	B	2267459.59	6965498.97	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M02	M02_66_1219em1	13	9.34	4	B	2267438.72	6965469.85	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M02	M02_72_1219em1	9	7.02	4	C	2267478.18	6965493.73	19-Jun-06	Alan Merriman	√							√	ORD MD	6	1	1	shotgun shell								√	3	1	1			√			
M02	M02_73_1219em1	11	6.94	4	B	2267433.35	6965507.19	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M02	M02_77_1219em1	12	5.94	4	B	2267511.27	6965536.54	06-Jun-06	Jim Thoren																			no find											
M02	M02_78_1219em1	10	5.93	4	C	2267438.67	6965500.82	19-Jun-06	Alan Merriman	√													√	MIL	3	1	1	barbed wire		√	9	0.5	0.25			√			
M02	M02_82_1219em1	11	5.27	4	B	2267470.77	6965497.21	06-Jun-06	Jim Thoren	√													√	CIV	3	2	1	banding								√			
M02	M02_86_1219em1	12	4.84	4	B	2267498.73	6965498.32	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire											
M02	M02_94_1219em1	11	3.81	4	B	2267420.77	6965498.12	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M02	M02_99_1219em1	9	3.58	3	C	2267508.89	6965496.92	19-Jun-06	Alan Merriman	√													√	CIV	0	2	1	wire		√	3	0.5	0.25			√			
M02	QAdig_M02_377		7.2		QA	2267496.38	6965481.59	15-Aug-06	Alan Merriman	√																		too small to find								√			
M03	M03_108_1318em2	11	3.38	3	B	2267554.88	6965489.13	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M03	M03_112_1318em2	10	3.25	3	C	2267553.84	6965517.12	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	barbed wire		√	9	0.5	0.25			√			
M03	M03_121_1219em1	10	2.7	3	C	2267595.91	6965495.95	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	shotgun shell								√			
M03	M03_130_1318em2	11	2.78	3	B	2267573.51	6965513.88	06-Jun-06	Jim Thoren																			no find											
M03	M03_133_1318em2	10	2.73	3	C	2267560.26	6965499.7	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	barb wire		√	9	0.5	0.25			√			
M03	M03_136_1219em1	9	2.17	2	C	2267520.08	6965503.62	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	scrap								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M03	M03_143_1318em2	10	2.52	3	C	2267559.01	6965516.93	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	barbed wire		√	24	0.5	0.25			√			
M03	M03_147_1318em2	9	2.49	2	C	2267571.81	6965468.94	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	40mm frag														√			
M03	M03_174_1318em2	11	2.01	2	B	2267560.33	6965520.21	06-Jun-06	Jim Thoren																			no find											
M03	M03_34_1219em1	16	48	4	A	2267523.31	6965520.25	06-Jun-06	Jim Thoren	√													√	CIV	3	1	2	scrap								√			
M03	M03_44_1219em1	16	17.73	4	A	2267519.43	6965462.13	06-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	frag														√			
M03	M03_5_1318em2	13	7.47	4	B	2267549.63	6965499.89	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M03	M03_6_1219em1	16	214.12	4	A	2267578.5	6965516.38	06-Jun-06	Jim Thoren	√													√	CIV	3	1	2	wire								√			
M03	M03_60_1318em2	13	6.64	4	B	2267539.48	6965498.18	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M03	M03_65_1318em2	13	6.05	4	B	2267558.16	6965493.72	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M03	M03_67_1219em1	13	8.91	4	B	2267609.55	6965497.81	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M03	M03_67_1318em2	12	5.72	4	B	2267571.66	6965502.05	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	staple								√			
M03	M03_68_1318em2	14	5.69	4	A	2267555.7	6965512.89	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M03	M03_71_1219em1	12	7.6	4	B	2267577.69	6965498.71	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M03	M03_79_1219em1	14	5.69	4	A	2267599.69	6965496.97	06-Jun-06	Jim Thoren	√													√	CIV	0	2	1	wire								√			
M03	M03_8_1318em2	16	176.94	4	A	2267565.96	6965520.37	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	8	frag														√			
M03	M03_80_1219em1	12	5.65	4	B	2267549.27	6965448.55	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M03	M03_83_1219em1	12	5.19	4	B	2267521.49	6965498.36	06-Jun-06	Jim Thoren																			no find											
M03	M03_83_1318em2	13	4.77	4	B	2267555.78	6965485.93	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M03	M03_85_1219em1	13	4.98	4	B	2267530.92	6965497.48	06-Jun-06	Jim Thoren	√													√	CIV	3	2	1	wire								√			
M03	M03_88_1219em1	12	4.51	4	B	2267585.15	6965511.09	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail								√			
M03	M03_91_1219em1	12	4.4	4	B	2267552.81	6965446.86	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M03	M03_97_1219em1	10	3.66	4	C	2267615.98	6965495.44	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	wire								√			
M03	M03_99_1318em2	10	3.64	4	C	2267549.33	6965496.54	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	barbed wire		√	6	0.5	0.25			√			
M03	QAdig_M03_15		139		QA	2267614.56	6965481.94	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
M04	M04_120_1304em1	9	1.37	1	C	2267714.02	6965510.91	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	3	0.5	0.25			√			
M04	M04_24_1304em1	16	91.82	4	A	2267717.09	6965516.07	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	2	fuze part														√			
M04	M04_32_1304em1	16	27.79	4	A	2267717.68	6965512.74	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	banding								√			
M04	M04_35_1304em1	15	12.59	4	A	2267650.48	6965508.09	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail								√			
M04	M04_52_1304em1	12	5.16	4	B	2267716.73	6965498.43	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M04	M04_53_1304em1	13	4.66	4	B	2267650.95	6965518.16	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	barb wire								√			
M04	M04_66_1304em1	12	2.77	3	B	2267710.38	6965494.71	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M04	M04_68_1304em1	10	2.63	3	C	2267673.1	6965506.14	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	barb wire		√	3	0.5	0.25			√			
M04	M04_69_1304em1	10	2.62	3	C	2267660.23	6965515.34	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	barb wire		√	12	0.5	0.25			√			
M04	M04_73_1304em1	9	2.43	2	C	2267675.64	6965514.05	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	wire		√	3	0.5	0.25			√			
M04	M04_77_1304em1	9	2.27	2	C	2267636.19	6965515.31	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	barb wire		√	9	0.5	0.25			√			
M04	M04_78_1304em1	9	2.25	2	C	2267644.18	6965464.63	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	9	0.5	0.25			√			
M04	M04_79_1304em1	9	2.23	2	C	2267688.17	6965516.26	19-Jun-06	Alan Merriman	√													√	CIV	3	2	1	wire		√	3	0.5	0.25			√			
M05	M05_101_1304em1	9	1.64	1	C	2267778.67	6965525.71	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	wire		√	3	0.5	0.25			√			
M05	M05_28_1304em1	16	40.64	4	A	2267729.3	6965460.71	06-Jun-06	Jim Thoren	√							√	ED MD	0	1	4	fuze well														√			
M05	M05_29_1304em1	13	31.75	4	B	2267745.54	6965534.55	06-Jun-06	Jim Thoren	√													√	CIV	3	1	4	metal scrap								√			
M05	M05_31_1304em1	16	28.81	4	A	2267772.99	6965515.6	06-Jun-06	Jim Thoren	√													√	CIV	0	1	2	wire		√	9	4	0.25			√			
M05	M05_33_1304em1	16	24.1	4	A	2267817.93	6965505.84	06-Jun-06	Jim Thoren	√													√	CIV	0	1	4	wire, 6 ft		√	> 24	0.5				√			
M05	M05_36_1304em1	15	12.26	4	A	2267750.84	6965508.36	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail, big		√	6	0.5				√			
M05	M05_39_1304em1	13	10.75	4	B	2267764.91	6965516.37	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	scrap, oe								√	3	4	0.5			√			
M05	M05_41_1304em1	13	9.4	4	B	2267743.12	6965532.27	06-Jun-06	Jim Thoren																			no find											
M05	M05_43_1304em1	14	8.67	4	A	2267803.1	6965515.47	06-Jun-06	Jim Thoren	√													√	CIV	3	2	1	wire		√	6	0.5	0.25			√			
M05	M05_47_1304em1	14	6.21	4	A	2267728.63	6965464.12	06-Jun-06	Jim Thoren																			no find											
M05	M05_49_1304em1	14	5.97	4	A	2267744.06	6965512.53	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	can		√	6	4				√			
M05	M05_51_1304em1	13	5.18	4	B	2267802.55	6965518.83	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	6	0.5	0.25			√			
M05	M05_61_1304em1	11	3.21	3	B	2267809.76	6965527.72	06-Jun-06	Jim Thoren	√													√	CIV	3	2	1	wire		√	6	0.5	0.25			√			
M05	QAdig_M05_145		16.4		QA	2267715.55	6965507.29	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	shotgun shell	OTHER	√	3	1	0.25			√			
M05	QAdig_M05_371		7.3		QA	2267729.52	6965469.32	15-Aug-06	Alan Merriman																			no contact											
M06	M06_1_1221em1	15	1439.35	4	A	2267859.98	6965501.14	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	fence post											

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M06	M06_100_1221em1	15	4.19	4	A	2267917.42	6965471.8	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	fence post, t-piece								√			
M06	M06_101_1221em1	11	4.13	4	B	2267907.81	6965520.51	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	24	0.5	0.25			√			
M06	M06_103_1221em1	13	4.09	4	B	2267879.42	6965475.34	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M06	M06_104_1221em1	12	4.07	4	B	2267890.78	6965436.67	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1			√	3	0.5	0.25	N-S		√			
M06	M06_107_1221em1	12	3.85	4	B	2267874.58	6965501.98	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	barb wire		√	9	0.5	0.25			√			
M06	M06_11_1221em1	13	75.87	4	B	2267866.98	6965513.87	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	fence											
M06	M06_110_1221em1	10	3.78	4	C	2267899.35	6965518.19	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	24	0.5	0.25			√			
M06	M06_111_1318em2	11	3.31	3	B	2267849.38	6965489.68	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M06	M06_112_1221em1	10	3.65	4	C	2267871.53	6965512.74	19-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	blank 5.56								√	3	0.5	0.25			√			
M06	M06_12_1221em1	14	57.34	4	A	2267860.85	6965510.45	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	fence											
M06	M06_122_1221em1	10	3.33	3	C	2267897.82	6965526.23	19-Jun-06	Alan Merriman	√													√	CIV	3	2	1	barb wire		√	6	0.5	0.25			√			
M06	M06_124_1221em1	9	3.29	3	C	2267882.08	6965453.62	19-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	3	0.5	0.25			√			
M06	M06_125_1221em1	12	3.28	3	B	2267870.62	6965516.36	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	fence staple								√			
M06	M06_131_1221em1	10	2.96	3	C	2267895.7	6965518.48	19-Jun-06	Alan Merriman	√													√	CIV	6	1	1	barb wire		√	6	0.5	0.25			√			
M06	M06_132_1221em1	9	2.93	3	C	2267841.68	6965497.77	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	6	0.5	0.25			√			
M06	M06_133_1221em1	10	2.93	3	C	2267883.26	6965509.11	19-Jun-06	Alan Merriman	√													√	CIV	0	2	1	wire								√			
M06	M06_139_1221em1	10	2.78	3	C	2267886.09	6965523.96	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire ring		√	12	0.5	0.25			√			
M06	M06_14_1221em1	15	47.46	4	A	2267885.27	6965445.89	06-Jun-06	Jim Thoren	√													√	CIV	6	1	1	fence post parts								√			
M06	M06_149_1221em1	11	2.52	3	B	2267855.53	6965491.49	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	barb wire								√			
M06	M06_155_1221em1	10	2.45	2	C	2267855	6965528.25	19-Jun-06	Alan Merriman	√							√	ORD MD	0	> 10	1	rust flakes/ 5.56 blank ctg									3	0.5	0.25	N-S	0	√			
M06	M06_162_1221em1	10	2.38	2	C	2267891.04	6965487.1	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire ball		√	> 24	0.5	0.25			√			
M06	M06_168_1221em1	9	2.13	2	C	2267847.78	6965511.11	19-Jun-06	Alan Merriman	√													√	CIV	6	2	1	fence staple		√	3	0.5	0.25			√			
M06	M06_17_1221em1	16	37.05	4	A	2267879.72	6965496.5	06-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	flare								√	12	2	0.25			√			
M06	M06_18_1221em1	13	31.44	4	B	2267889.13	6965490.44	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	> 24	0.5	0.25			√			
M06	M06_19_1221em1	15	31.34	4	A	2267881.63	6965446.87	16-Aug-06	Jim Thoren	√													√	CIV	0	1	1	wire, fence clips		√	3	0.5	0.25			√			
M06	M06_2_1221em1	12	648.04	4	B	2267852.99	6965499.45	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire											
M06	M06_21_1221em1	13	22.68	4	B	2267859.84	6965521.78	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire											
M06	M06_22_1221em1	14	20.99	4	A	2267871.3	6965481.32	06-Jun-06	Jim Thoren	√													√	CIV	0	2	1	wire								√			
M06	M06_23_1221em1	14	20.12	4	A	2267868.54	6965527.14	16-Aug-06	Jim Thoren	√													√	CIV	0	1	1	wire, fence clip								√			
M06	M06_25_1221em1	12	18.8	4	B	2267839.39	6965511.23	06-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire		√	6	0.5				√			
M06	M06_253_1221em1	5	1.38	1	D	2267871.05	6965464.93	17-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	nails	FE	√	3					√			
M06	M06_27_1221em1	13	16.28	4	B	2267842.25	6965507.71	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	> 24	0.5	0.25			√			
M06	M06_3_1221em1	14	458.58	4	A	2267867.54	6965493.53	16-Aug-06	Jim Thoren	√													√	CIV	0	1	1	corner post fence, T-post clips											
M06	M06_35_1221em1	16	13.41	4	A	2267849.62	6965458.48	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	> 24	0.5	0.25			√			
M06	M06_36_1221em1	15	12.93	4	A	2267839.85	6965515.02	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	> 24	0.5				√			
M06	M06_37_1221em1	14	12.54	4	A	2267878.19	6965436.91	06-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	fuze								√	3	1	0.25			√			
M06	M06_40_1221em1	12	10.86	4	B	2267869.14	6965486.22	06-Jun-06	Jim Thoren	√													√	CIV	3	1	2	horseshoe								√			
M06	M06_42_1221em1	11	10.56	4	B	2267855.45	6965522.91	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M06	M06_43_1221em1	13	10.2	4	B	2267827.12	6965513.19	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	barb wire								√			
M06	M06_45_1221em1	13	9.29	4	B	2267847.3	6965496.29	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	barb wire								√			
M06	M06_46_1221em1	14	8.79	4	A	2267888.55	6965445.52	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	fence wire		√	3	0.5	0.25			√			
M06	M06_48_1221em1	10	8.51	4	C	2267833.1	6965530.17	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	3	0.5	0.25			√			
M06	M06_49_1221em1	13	8.41	4	B	2267843.39	6965530.2	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M06	M06_51_1221em1	14	8.07	4	A	2267832.91	6965506.04	06-Jun-06	Jim Thoren	√													√	CIV	6	1	1	fence wire		√	> 24								
M06	M06_52_1221em1	16	8.01	4	A	2267819.25	6965480.65	16-Aug-06	Jim Thoren	√													√	CIV	3	1	1	wire, wire								√			
M06	M06_55_1221em1	13	7.62	4	B	2267874.65	6965476.07	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M06	M06_56_1221em1	13	7.53	4	B	2267860.03	6965478.64	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	barb wire								√			
M06	M06_58_1221em1	12	7.49	4	B	2267851.54	6965507.9	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	fence											
M06	M06_61_1221em1	11	6.35	4	B	2267836.02	6965532.69	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	barb wire								√			
M06	M06_63_1221em1	13	6.29	4	B	2267908.84	6965502.68	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	24	0.5	0.25			√			
M06	M06_64_1221em1	12	6.24	4	B	2267874.73	6965441.15	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap		√	6	2	0.25			√			
M06	M06_65_1221em1	13	6.2	4	B	2267821.98	6965520.16	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire, fence		√	9	0.5							
M06	M06_66_1221em1	14	6.18	4	A	2267878.59	6965463.77	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	fence wire		√	3	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M06	M06_7_1221em1	12	135.45	4	B	2267861.95	6965494.73	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	12 gauge shotgun shell								√			
M06	M06_72_1221em1	13	5.86	4	B	2267916.4	6965518.63	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	12	0.5	0.25			√			
M06	M06_75_1221em1	13	5.78	4	B	2267854.3	6965518.61	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M06	M06_76_1221em1	11	5.67	4	B	2267874.84	6965513.85	06-Jun-06	Jim Thoren	√													√	CIV	3	2	2	wire								√			
M06	M06_78_1221em1	13	5.59	4	B	2267836.43	6965529.2	06-Jun-06	Jim Thoren	√													√	CIV	3	1	2	barb wire								√			
M06	M06_83_1221em1	11	4.89	4	B	2267904.95	6965502.89	06-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	3	0.5	0.25			√			
M06	M06_86_1221em1	13	4.6	4	B	2267824.63	6965511	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	shotgun shell		√	3	1				√			
M06	M06_87_1221em1	12	4.53	4	B	2267869.04	6965531.09	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail								√			
M06	M06_90_1221em1	12	4.42	4	B	2267826.59	6965494.81	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M06	M06_92_1221em1	10	4.35	4	C	2267873.84	6965518.04	19-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	6	0.5	0.25			√			
M06	M06_96_1221em1	11	4.26	4	B	2267904.91	6965499.48	06-Jun-06	Jim Thoren	√													√	CIV	3	1	1	fence								√			
M06	QAdig_M06_346		7.6		QA	2267888.75	6965484.1	15-Aug-06	Alan Merriman																			no contact											
M07	M07_103_1305em1	12	4.27	4	B	2267962.9	6965450.32	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M07	M07_105_1305em1	13	4.12	4	B	2267959.89	6965496.91	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire								√			
M07	M07_107_1305em1	11	4.06	4	B	2267990.97	6965497.8	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	12	0.5	0.25			√			
M07	M07_109_1305em1	11	3.92	4	B	2268007.62	6965531.16	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	3	0.5	0.25			√			
M07	M07_115_1305em1	12	3.73	4	B	2268011.41	6965485.88	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	6	0.5	0.25			√			
M07	M07_116_1305em1	13	3.7	4	B	2267928.11	6965511.19	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M07	M07_118_1305em1	12	3.59	3	B	2267925.44	6965472.12	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M07	M07_120_1305em1	11	3.57	3	B	2267944.87	6965524.42	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	6	0.5	0.25			√			
M07	M07_123_1305em1	12	3.44	3	B	2267931.41	6965510.95	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M07	M07_125_1305em1	11	3.41	3	B	2267927.52	6965526.38	15-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire		√	9	1	0.25			√			
M07	M07_131_1305em1	12	3.3	3	B	2267954.4	6965457.49	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M07	M07_141_1305em1	11	3.05	3	B	2268004.36	6965524.08	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	12	0.5	0.25			√			
M07	M07_32_1305em1	13	15.63	4	B	2267939.73	6965523.55	15-Jun-06	Jim Thoren	√													√	CIV	6	2	1	nail		√	6	0.5	0.25			√			
M07	M07_38_1305em1	13	11.52	4	B	2267936.55	6965521.28	17-Aug-06	Jim Thoren	√													√	CIV	0	1	1	wire, wire	FE	√	24	0.5	0.25			√			
M07	M07_43_1305em1	14	10.67	4	A	2267950.19	6965509.5	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M07	M07_45_1305em1	12	9.9	4	B	2267934.26	6965524.83	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	24	0.5	0.25			√			
M07	M07_46_1305em1	14	9.8	4	A	2267936.46	6965486.92	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap		√	9	1	0.25			√			
M07	M07_51_1305em1	14	8.72	4	A	2267939.93	6965486.78	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1			√	9	1	0.25			√			
M07	M07_70_1305em1	14	6.5	4	A	2267978.69	6965535.66	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M07	M07_80_1305em1	12	5.69	4	B	2267946.13	6965460.55	15-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
M07	M07_88_1305em1	13	5.3	4	B	2267960.19	6965527.46	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap		√	6	0.5	0.25			√			
M07	M07_97_1305em1	12	4.64	4	B	2267999.38	6965440.01	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M07	M07_98_1305em1	11	4.55	4	B	2267966.03	6965498.87	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M07	QAdig_M07_454		6.3		QA	2268013.59	6965466.96	15-Aug-06	Alan Merriman																			no contact											
M07	QAdig_M07_93		21.9		QA	2268012.03	6965508.93	15-Aug-06	Alan Merriman	√													√	CIV	0	1	1	fence post pieces	FE	√	9	1	0.25			√			
M08	M08_1_1307em2	15	4044.11	4	A	2268091.1	6965494.32	21-Jun-06	Alan Merriman	√													√	CIV	0	1	≥8	3" steel pipe fence post			24	4	0.25	N-S	90	√			
M08	M08_103_1307em2	15	28.23	4	A	2268057.59	6965464.33	21-Jun-06	Alan Merriman	√													√	CIV	3	3	1	nails, hinge, bailing wire		√	3	2	0.25	NE-SW	45	√			
M08	M08_114_1307em2	13	25.41	4	B	2268079.05	6965463.68	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	14 gauge fence wire uhf antenna		√	12	0.5	0.25	N-S	0	√			
M08	M08_13_1307em2	13	204.28	4	B	2268095.93	6965526.69	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	10 gauge baling wire		√	12	0.5	0.25	E-W	0	√			
M08	M08_140_1307em2	13	19.18	4	B	2268035.73	6965454.53	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	hinge, 7.62 case								√	12	2	0.25	N-S	0	√			
M08	M08_150_1307em2	10	17.87	4	C	2268096.95	6965502.2	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
M08	M08_174_1307em2	14	14.85	4	A	2268100.95	6965502.82	21-Jun-06	Alan Merriman	√													√	CIV	3	1	1	12 penny finishing nail		√	3	0.5	0.25	E-W	0	√			
M08	M08_175_1307em2	12	14.67	4	B	2268085.43	6965504.72	17-Aug-06	Alan Merriman	√													√	CIV	0	2	1	nails 12 & 16 penny, t-post clip	FE	√	3	0.5	0.25	NE-SW	0	√			
M08	M08_19_1307em2	12	162.04	4	B	2268087.41	6965501.27	21-Jun-06	Alan Merriman	√													√	CIV	3	1	1	fence post cap		√	3	4	0.25	N-S	0	√			
M08	M08_2_1307em2	12	1697.76	4	B	2268091.07	6965528.01	21-Jun-06	Alan Merriman	√													√	CIV	0	1	≥8	3" steel pipe, fence post		√	> 24	4	0.25	N-S	0	√			
M08	M08_208_1307em2	14	11.82	4	A	2268112.16	6965500.62	21-Jun-06	Alan Merriman	√													√	CIV	3	1	1	8 penny nail		√	3	0.5	0.25	NE-SW	0	√			
M08	M08_21_1307em2	15	144.6	4	A	2268024.7	6965526	21-Jun-06	Alan Merriman	√													√	CIV	3	1	≥8	1/2" chain		√	> 24	0.5	0.5	NE-SW	45	√			
M08	M08_221_1307em2	15	10.54	4	A	2268104.76	6965501.56	21-Jun-06	Alan Merriman	√													√	CIV	3	2	1	12 penny nail, 4 penny nail		√	3	0.5	0.25	SE-NW	0	√			
M08	M08_225_1307em2	13	10.35	4	B	2268075.41	6965507.07	21-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	nails various penny, 14 ga wire		√	9	0.5	0.25	N-S	0	√			
M08	M08_269_1307em2	15	8.63	4	A	2268108.3	6965500.61	21-Jun-06	Alan Merriman	√													√	CIV	3	3	1	roofing nails, 16 penny nails		√	3	0.5	0.25	N-S	0	√			
M08	M08_283_1307em2	14	8.14	4	A	2268046.88	6965474.32	21-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	scrap aluminum		√	3	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M08	M08_287_1307em2	13	8.02	4	B	2268053.73	6965464.88	21-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	nails various penny		√	9	0.5	0.25	N-S	0	√			
M08	M08_288_1307em2	12	7.97	4	B	2268071.71	6965507.52	21-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	14 gauge wire		√	3	0.5	0.25	N-S	0	√			
M08	M08_3_1307em2	12	1256.98	4	B	2268091.28	6965532.33	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	steel fence post 3" pipe		√	> 24	4	0.25	N-S	0	√			
M08	M08_308_1307em2	13	7.13	4	B	2268084.59	6965440.54	21-Jun-06	Alan Merriman	√							√	ORD MD	0	3	0.25	t post clips, 7.62 brass								√	6	1	0.25	N-S	0	√			
M08	M08_31_1307em2	16	92.24	4	A	2268027.28	6965505.72	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	5.56mm case								√	3	0.5	0.25			√			
M08	M08_316_1307em2	12	6.89	4	B	2268095.01	6965470.38	17-Aug-06	Alan Merriman	√													√	MIL	3	1	0.25	scrap aluminum, t-post clips	AL	√	3	0.5	0.25	N-S	0	√			
M08	M08_331_1307em2	11	6.48	4	B	2268067.39	6965472.02	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	37mm frag								√	3	0.5	0.25	NE-SW	45	√			
M08	M08_334_1307em2	10	6.45	4	C	2268063.55	6965466.92	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
M08	M08_341_1307em2	10	6.35	4	C	2268043.58	6965514.04	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.5	N-S	0	√			
M08	M08_346_1307em2	12	6.19	4	B	2268102.8	6965470.32	21-Jun-06	Alan Merriman	√													√	CIV	3	2	1	10-12 penny nail & 10 gauge wire		√	12	0.5	0.25	N-S	45	√			
M08	M08_364_1307em2	13	5.69	4	B	2268116.04	6965500.14	21-Jun-06	Alan Merriman	√							√	ORD MD	0	1	1	smoke grenade spone								√	6	0.5	0.5	E-W	0	√			
M08	M08_366_1307em2	11	5.65	4	B	2268061.27	6965462.9	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	6 penny concrete nail 45% oxidat		√	3	0.5	0.25	N-S	0	√			
M08	M08_367_1307em2	13	5.6	4	B	2268099.13	6965525.74	21-Jun-06	Alan Merriman	√							√	ORD MD	3	2	1	4uk and 5.56								√	3	1	0.5	E-W	45	√			
M08	M08_371_1307em2	11	5.47	4	B	2268033.34	6965522.27	21-Jun-06	Alan Merriman	√													√	CIV	6	1	1	16 penny nail		√	3	0.5	0.25	N-S	0	√			
M08	M08_393_1307em2	11	5.04	4	B	2268072.24	6965464.39	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	half of a hasp		√	3	0.5	0.25	N-S	0	√			
M08	M08_4_1307em2	9	1196.37	4	C	2268094.87	6965534.15	11-Jul-06	Jim Thoren	√													√	CIV		1		fence post, left in ground	FE	√	6	2							
M08	M08_409_1307em2	12	4.72	4	B	2268081.12	6965505.65	21-Jun-06	Alan Merriman	√													√	CIV	3	2	1	16 penny nail		√	3	0.5	0.25	E-W	0	√			
M08	M08_425_1307em2	13	4.32	4	B	2268031.03	6965504.69	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	5.56mm case								√	3	0.5	0.25			√			
M08	M08_428_1307em2	12	4.3	4	B	2268039.02	6965515.15	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	t-post bracket/ steel		√	3	0.5	0.25	N-S	0	√			
M08	M08_432_1307em2	10	4.26	4	C	2268108.47	6965464.59	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
M08	M08_442_1307em2	11	4.05	4	B	2268116.42	6965473.07	21-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	nails various penny		√	3	0.5	0.25	E-W	90	√			
M08	M08_443_1307em2	12	4.05	4	B	2268033.59	6965491.16	21-Jun-06	Alan Merriman	√													√	CIV	0	1	1	barbed wire 10 gauge		√	12	0.5	0.25	N-S	0	√			
M08	M08_465_1307em2	13	3.72	4	B	2268085.27	6965461.39	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	t-post clip		√	3	0.5	0.25	N-S	0	√			
M08	M08_478_1307em2	11	3.49	3	B	2268039.94	6965440.75	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	t-post bracket		√	3	0.5	0.25	N-S	0	√			
M08	M08_491_1307em2	9	3.36	3	C	2268052.17	6965507.91	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6					√			
M08	M08_5_1307em2	15	1074.89	4	A	2268088.57	6965507.57	21-Jun-06	Alan Merriman	√													√	CIV	0	1	≥8	scrap metal steel		√	> 24	4	0.25	N-S	90	√			
M08	M08_539_1307em2	11	2.85	3	B	2268055.5	6965509.55	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	14 gauge wire		√	12	0.5	0.25	N-S	0	√			
M08	M08_544_1307em2	11	2.83	3	B	2268035.3	6965497.5	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	t-post bracket		√	3	0.5	0.25	N-S	0	√			
M08	M08_553_1307em2	11	2.7	3	B	2268091.52	6965471.07	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	16 penny nail		√	3	0.5	0.25	N-S	0	√			
M08	M08_558_1307em2	12	2.67	3	B	2268086.98	6965482.14	21-Jun-06	Alan Merriman	√													√	CIV	0	4	0.25	t-post clips			3	0.5	0.25	N-S	0	√			
M08	M08_56_1307em2	16	50.62	4	A	2268039.59	6965454.66	21-Jun-06	Alan Merriman	√													√	CIV	3	1	1			√	12	2	0.25	NE-SW	45	√			
M08	M08_561_1307em2	11	2.66	3	B	2268098.96	6965507.62	21-Jun-06	Alan Merriman	√													√	CIV	3	1	1	16 penny nail		√	3	0.5	0.25	NE-SW	0	√			
M08	M08_6_1307em2	12	954.45	4	B	2268092.98	6965501.14	21-Jun-06	Alan Merriman	√													√	CIV	0	1	≥8	3" steel pipe fence post		√	> 24	4	0.25	N-S	90	√			
M08	M08_70_1307em2	16	45.32	4	A	2268068.51	6965510.59	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	flare casing/ aluminum								√	6	1	0.25	N-S	0	√			
M08	M08_75_1307em2	15	38.74	4	A	2268028.05	6965525.74	21-Jun-06	Alan Merriman	√													√	CIV	3	1	≥8	1/2" chain		√	> 24	0.5	0.5	N-S	0	√			
M08	M08_8_1307em2	13	850.15	4	B	2268093.59	6965506.96	21-Jun-06	Alan Merriman	√													√	CIV	0	1	≥8	steel fence post, 3" steel pipe		√	> 24	4	0.25	N-S	0	√			
M08	M08_85_1307em2	10	34.09	4	C	2268094.81	6965498.36	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	dog chain (duke's)	FE	√	> 24	0.5	0.25	N-S	0	√			
M08	M08_86_1307em2	12	34	4	B	2268086.92	6965494.62	21-Jun-06	Alan Merriman	√							√	ORD MD	6	3	≥8	(2)5.56 blank,(1)bin fence post								√	24	4	0.5	N-S	0	√			
M08	QAdig_M08_456		6.3		QA	2268091.15	6965477.62	15-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25			√			
M09	M09_100_1307em2	11	28.92	4	B	2268159.64	6965493.57	14-Jun-06	Alan Merriman	√													√	CIV	6	5	1	nails		√	3	0.5	0.25	NE-SW	90	√			
M09	M09_102_1307em2	13	28.3	4	B	2268135.06	6965497.77	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	t-post		√	> 24	2	2	N-S	0	√			
M09	M09_104_1307em2	12	28.22	4	B	2268190.07	6965514.22	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	large carridge bolt		√	9	0.5	0.5	NE-SW	45	√			
M09	M09_106_1307em2	13	28.17	4	B	2268168.31	6965483.95	14-Jun-06	Alan Merriman	√													√	CIV	6	5	1	nails		√	6	0.5	0.25	N-S	0	√			
M09	M09_107_1307em2	12	27.54	4	B	2268179.66	6965489.24	14-Jun-06	Alan Merriman	√													√	CIV	6	1	1	large bolt		√	6	0.5	0.5	E-W	90	√			
M09	M09_109_1307em2	9	27.03	4	C	2268195.87	6965505.61	11-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
M09	M09_111_1307em2	13	26.74	4	B	2268179.12	6965470.57	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	16 penny nail		√	3	0.5	0.25	N-S	0	√			
M09	M09_113_1307em2	14	25.79	4	A	2268192.18	6965504.95	17-Aug-06	Alan Merriman	√													√	CIV	3	4	1	nails, nails	FE	√	3	0.5	0.25	E-W	90	√			
M09	M09_121_1307em2	10	23.7	4	C	2268172.83	6965483.85	11-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_124_1307em2	12	21.39	4	B	2268185.57	6965489.43	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	carridge bolt		√	9	0.5	0.5	NE-SW	45	√			
M09	M09_137_1307em2	12	19.6	4	B	2268198.42	6965530.14	14-Jun-06	Alan Merriman	√													√	CIV	6	5	1	nails		√	3	0.5	0.25	N-S	0	√			
M09	M09_138_1307em2	11	19.5	4	B	2268195.98	6965509.45	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	clip metal		√	3	0.5	0.25	N-S	45	√			
M09	M09_14_1307em2	13	199.59	4	B	2268191.99	6965468.33	14-Jun-06	Alan Merriman	√													√	CIV	6	10	1	nails		√	3	0.5	0.25	N-S	0	√			
M09	M09_142_1307em2	11	18.94	4	B	2268159.03	6965469.93	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	16 penny nail		√	3	0.5	0.25	NE-SW	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M09	M09_143_1307em2	12	18.89	4	B	2268168.01	6965455.64	14-Jun-06	Alan Merriman	√													√	CIV	3	5	1	nails		√	3	0.5	0.25	NE-SW	45	√			
M09	M09_144_1307em2	13	18.66	4	B	2268123.38	6965491.89	14-Jun-06	Alan Merriman	√													√	CIV	3	1	0.75	ball of wire		√	3	0.5	0.25	NE-SW	45	√			
M09	M09_146_1307em2	9	18.48	4	C	2268195.08	6965479.37	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_147_1307em2	13	18.45	4	B	2268130.19	6965500.17	14-Jun-06	Alan Merriman	√													√	CIV	6	4	1	8 penny nails ventage 1965		√	3	1	0.25	E-W	45	√			
M09	M09_153_1307em2	11	17.57	4	B	2268186.28	6965508.94	17-Aug-06	Alan Merriman	√													√	CIV	3	1	1	large clip, scrap		√	3	0.5	0.25	N-S	0	√			
M09	M09_156_1307em2	12	17.4	4	B	2268214.49	6965484.93	17-Aug-06	Alan Merriman	√													√	CIV	3	1	1	spike ventage 1994, wire		√	6	0.5	0.25	NE-SW	0	√			
M09	M09_157_1307em2	15	17.32	4	A	2268139.62	6965524.54	14-Jun-06	Alan Merriman	√							√	ED MD	3	1	1	piece of slap flare								√	6	2	0.25	N-S	0	√			
M09	M09_158_1307em2	16	17.18	4	A	2268202.04	6965437.28	14-Jun-06	Alan Merriman	√							√	ORD MD	3	1	2	proximity fuze piece								√	3	2	1	NE-SW	45	√			
M09	M09_159_1307em2	13	16.96	4	B	2268203.27	6965485.36	14-Jun-06	Alan Merriman	√													√	CIV	3	3	1	spike/12 penny nail/6 penny nail		√	6		0.25	E-W	0	√			
M09	M09_161_1307em2	12	16.72	4	B	2268165.63	6965473.53	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	16 penny nail		√	3	0.5	0.25	NE-SW	0	√			
M09	M09_163_1307em2	13	16.43	4	B	2268171.61	6965455.79	14-Jun-06	Alan Merriman	√													√	CIV	3	10	1	nails		√	3	0.5	0.25	E-W	0	√			
M09	M09_176_1307em2	12	14.51	4	B	2268156.31	6965466.94	14-Jun-06	Alan Merriman	√													√	CIV	3	3		2-1 penny nails/wire		√	3	0.5	0.25	SE-NW	45	√			
M09	M09_177_1307em2	11	14.48	4	B	2268156.73	6965489.9	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	soda can		√	3	1	1	NE-SW	45	√			
M09	M09_179_1307em2	13	14.27	4	B	2268201.83	6965529.56	14-Jun-06	Alan Merriman	√													√	CIV	6	1	1	bailing wire		√	6	1	0.5	E-W	90	√			
M09	M09_185_1307em2	10	13.81	4	C	2268187.94	6965473.31	11-Jul-06	Jim Thoren	√													√	CIV	3	4	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
M09	M09_187_1307em2	12	13.61	4	B	2268194.56	6965458.06	14-Jun-06	Alan Merriman	√													√	CIV	3	5	1	nails		√	6	0.5	0.25	NE-SW	45	√			
M09	M09_188_1307em2	10	13.59	4	C	2268161.78	6965459.56	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	45	√			
M09	M09_19_1318em2	13	26.66	4	B	2268141.71	6965467.59	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	large bolt		√	9	0.5	0.5	NE-SW	45	√			
M09	M09_191_1307em2	11	13.46	4	B	2268148.75	6965495.71	14-Jun-06	Alan Merriman	√													√	CIV	3	4	1	nails		√	3	0.5	0.25	N-S	0	√			
M09	M09_196_1307em2	12	13.01	4	B	2268210.05	6965536.09	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	barn spike made 1994		√	6	0.5	0.5	SE-NW	45	√			
M09	M09_197_1307em2	13	12.95	4	B	2268207.12	6965477.57	17-Aug-06	Alan Merriman	√													√	CIV	3	1	1	nail, nail	FE	√	3		0.25	NE-SW	0	√			
M09	M09_20_1307em2	14	145.79	4	A	2268188.08	6965466.2	14-Jun-06	Alan Merriman	√													√	CIV	6	10	1	nails (many)		√	3	0.5	0.25	N-S	0	√			
M09	M09_200_1307em2	12	12.66	4	B	2268211.23	6965484.25	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail		√	3		0.25	N-S	0	√			
M09	M09_204_1307em2	10	12.1	4	C	2268165.48	6965485.61	11-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	scrap	FE	√	6	1	0.25	N-S	0	√			
M09	M09_205_1307em2	10	12.07	4	C	2268128.19	6965493.17	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
M09	M09_206_1307em2	13	12.01	4	B	2268199.09	6965504.5	14-Jun-06	Alan Merriman	√													√	CIV	3	2	1	nail		√	3	0.5	0.25		90	√			
M09	M09_209_1307em2	13	11.55	4	B	2268207.02	6965456.63	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	aluminum can		√	3	6	0.25	E-W	0	√			
M09	M09_213_1307em2	13	11.08	4	B	2268153.34	6965522.63	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	wire		√	> 24	0.5	0.25		0	√			
M09	M09_220_1307em2	9	10.59	4	C	2268198.38	6965511.78	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_224_1307em2	12	10.37	4	B	2268198.57	6965520.79	14-Jun-06	Alan Merriman	√													√	CIV	0	2	1	4" carage bolt/square nut/washer		√	3	0.5	0.5	E-W	0	√			
M09	M09_227_1307em2	12	10.33	4	B	2268204.11	6965473.46	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail		√	3	0.5	0.25	NE-SW	0	√			
M09	M09_230_1307em2	13	10.17	4	B	2268178.18	6965503.41	14-Jun-06	Alan Merriman	√													√	CIV	6	1	1	nails		√	3	0.5	0.25	N-S	0	√			
M09	M09_250_1307em2	13	9.53	4	B	2268192.49	6965483.38	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	rusty nail		√	3	1	0.25	E-W	0	√			
M09	M09_251_1307em2	14	9.52	4	A	2268214.19	6965522.16	14-Jun-06	Alan Merriman	√													√	CIV	0	5	1	nails		√	3	0.5	0.25		0	√			
M09	M09_253_1307em2	15	9.26	4	A	2268135.76	6965444.27	14-Jun-06	Alan Merriman	√													√	MIL	3	1	2	metal scrap			3	4	1		0	√			
M09	M09_254_1307em2	10	9.22	4	C	2268121.05	6965497.73	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	2	0.25	N-S	0	√			
M09	M09_26_1307em2	12	108.15	4	B	2268176.13	6965477.17	17-Aug-06	Alan Merriman	√													√	CIV	3	> 10	1	nails, nail	FE	√	3	0.5	0.25	NE-SW	45	√			
M09	M09_261_1307em2	12	8.83	4	B	2268218.03	6965485.13	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	9	0.5	0.25	NE-SW	45	√			
M09	M09_263_1307em2	13	8.77	4	B	2268212.65	6965473.81	14-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	nail/556 brass									3	1	0.25	SE-NW	45	√			
M09	M09_267_1307em2	11	8.67	4	B	2268194.59	6965530.43	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail		√	3	0.5	0.5	SE-NW	0	√			
M09	M09_274_1307em2	12	8.48	4	B	2268127.21	6965463.46	14-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	al scrap/frag from 1962									3	2	1		45	√			
M09	M09_278_1307em2	12	8.36	4	B	2268159.23	6965437.38	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	handle		√	12	0.5	0.25	E-W	45	√			
M09	M09_281_1307em2	12	8.22	4	B	2268179.07	6965459.05	14-Jun-06	Alan Merriman	√													√	MIL	0	1	1	aircraft part		√	9	2	1	E-W	0	√			
M09	M09_289_1307em2	11	7.91	4	B	2268207.09	6965484.22	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wood connection device			3	0.5	0.25	N-S	90	√			
M09	M09_29_1307em2	9	101.24	4	C	2268165.68	6965463.93	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25	N-S	0	√			
M09	M09_290_1307em2	13	7.87	4	B	2268188.91	6965487.41	14-Jun-06	Alan Merriman	√													√	CIV	6	1	1	valve lock vintage '86		√	3	1	1	N-S	0	√			
M09	M09_293_1307em2	11	7.75	4	B	2268184.98	6965512.25	14-Jun-06	Alan Merriman	√													√	CIV	3	2	1	16 penny nail/staple romey		√	3	0.5	0.25	E-W	45	√			
M09	M09_296_1307em2	13	7.69	4	B	2268215.98	6965474.73	17-Aug-06	Alan Merriman	√							√	ORD MD	3	1	1	556mm/blank/M200/Lake City '78							OTHER							√			
M09	M09_306_1307em2	12	7.23	4	B	2268130.47	6965503.48	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail 1/2 penny			3	0.5	0.25	N-S	0	√			
M09	M09_309_1307em2	13	7.12	4	B	2268163.68	6965451.23	14-Jun-06	Alan Merriman	√													√	MIL	3	1	1	aircraft part			3		0.25	N-S	0	√			
M09	M09_310_1307em2	10	7.07	4	C	2268199.11	6965481.84	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M09	M09_312_1307em2	12	7.02	4	B	2268188.08	6965444.24	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail		√	6		0.25	E-W	0	√			
M09	M09_313_1307em2	14	6.97	4	A	2268217.92	6965523.02	14-Jun-06	Alan Merriman	√													√	CIV	3	2	1	16 penny nails from 1992		√	3	0.5	0.25	NE-SW	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M09	M09_314_1307em2	10	6.96	4	C	2268200.97	6965477.39	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M09	M09_33_1307em2	13	89.63	4	B	2268173.19	6965489.86	14-Jun-06	Alan Merriman	√													√	MIL	6	1	4	truck part		√	9	1	1	NE-SW	45	√			
M09	M09_330_1307em2	12	6.49	4	B	2268173.37	6965502.81	14-Jun-06	Alan Merriman	√													√	CIV	6	2	1	nail wire		√	12	0.5	0.25	NE-SW	45	√			
M09	M09_332_1307em2	11	6.47	4	B	2268154.84	6965495.73	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	twisted wire			3	0.5	0.25	N-S	0	√			
M09	M09_335_1307em2	12	6.43	4	B	2268136	6965461.86	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	nail		√	3	0.5	0.25	NE-SW	0	√			
M09	M09_344_1307em2	12	6.26	4	B	2268177.3	6965463.37	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail		√	9	0.5	0.25	N-S	0	√			
M09	M09_348_1307em2	12	6.13	4	B	2268212.84	6965478.08	14-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.75	556mm brass								√	3	0.5	0.25	NE-SW	0	√			
M09	M09_352_1307em2	12	5.97	4	B	2268146.35	6965499.74	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	12	1	0.25	N-S	0	√			
M09	M09_354_1307em2	12	5.96	4	B	2268203	6965534.46	14-Jun-06	Alan Merriman	√													√	CIV		2	1	nails		√	3	0.5	0.25	E-W	45	√			
M09	M09_355_1307em2	11	5.92	4	B	2268153.67	6965470.39	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire/nail		√	3	0.5	0.25	N-S	0	√			
M09	M09_356_1307em2	13	5.9	4	B	2268191.17	6965452.43	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail		√	3	0.5	0.25	NE-SW	45	√			
M09	M09_358_1307em2	13	5.86	4	B	2268191.42	6965444.46	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail		√	3	2	0.25	N-S	0	√			
M09	M09_359_1307em2	10	5.78	4	C	2268183.24	6965505.71	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_362_1307em2	11	5.71	4	B	2268201.27	6965508.83	14-Jun-06	Alan Merriman	√													√	MIL	0	1	1	al scrap			3	1	0.25		0	√			
M09	M09_363_1307em2	13	5.7	4	B	2268205.48	6965529.68	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	wire		√	9	0.5	0.5		45	√			
M09	M09_374_1307em2	11	5.42	4	B	2268120	6965501.15	14-Jun-06	Alan Merriman	√													√	CIV	6	1	1	heapless 16 penny nail made 1987		√	6	0.5	0.25		90	√			
M09	M09_376_1307em2	11	5.4	4	B	2268210.88	6965456.32	14-Jun-06	Alan Merriman	√													√	CIV	6	1	1	spike		√	6	0.5	0.25	NE-SW	45	√			
M09	M09_381_1307em2	15	5.23	4	A	2268203.08	6965495.07	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nail		√	3	0.5	0.25	NE-SW	0	√			
M09	M09_382_1307em2	11	5.17	4	B	2268171.74	6965509.52	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	twisted wire		√	12	0.5	0.25	E-W	0	√			
M09	M09_384_1307em2	11	5.12	4	B	2268175.67	6965510.06	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	twisted wire		√	12	0.5	0.25	N-S	0	√			
M09	M09_388_1307em2	12	5.11	4	B	2268206.3	6965521.15	14-Jun-06	Alan Merriman	√													√	CIV	0	2	1	nails		√	6	0.5	0.25	N-S	0	√			
M09	M09_40_1307em2	13	78.85	4	B	2268184.5	6965501.43	14-Jun-06	Alan Merriman	√													√	CIV	3	3	1	nails		√	3	0.5	0.25	NE-SW	0	√			
M09	M09_404_1307em2	10	4.88	4	C	2268150.71	6965498.57	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M09	M09_405_1307em2	10	4.82	4	C	2268202.98	6965522.98	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_416_1307em2	9	4.51	4	C	2268191.04	6965531.18	11-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_42_1612em2	14	6.45	4	A	2268138.13	6965505.51	14-Jun-06	Alan Merriman	√													√	CIV	6	2	≥8	2' piece of rebar/4' angle iron		√	> 24	1	1	NE-SW	0	√			
M09	M09_421_1307em2	12	4.4	4	B	2268202.54	6965448.89	14-Jun-06	Alan Merriman	√													√	MIL	6	1	1	aluminum scrap			3	2	0.25	N-S	0	√			
M09	M09_43_1307em2	12	67.29	4	B	2268176.22	6965488.36	14-Jun-06	Alan Merriman	√													√	CIV	6	5	1	nails		√	6		0.25	SE-NW	90	√			
M09	M09_430_1307em2	10	4.28	4	C	2268126.85	6965466.99	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
M09	M09_439_1307em2	11	4.16	4	B	2268196.88	6965475.32	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	nails		√	3	0.5	0.25	N-S	0	√			
M09	M09_449_1307em2	12	3.95	4	B	2268144.39	6965495.09	14-Jun-06	Alan Merriman	√							√	ORD MD	6		1	556mm blanks								√	3	1	0.25	N-S	0	√			
M09	M09_455_1307em2	11	3.89	4	B	2268206.52	6965510.15	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	1/2 washer/t-post clip from 1962		√	3	2	0.5		0	√			
M09	M09_46_1307em2	10	62.77	4	C	2268176.07	6965482.34	11-Jul-06	Jim Thoren	√													√	CIV	0	10	0.25	nails, bolt, nut, washer (4)	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_473_1307em2	12	3.59	3	B	2268198.92	6965470.63	14-Jun-06	Alan Merriman	√													√	CIV	3	2	1	nails		√	3		0.25	NE-SW	0	√			
M09	M09_487_1307em2	11	3.41	3	B	2268194.18	6965439.53	14-Jun-06	Alan Merriman	√													√	MIL	3	1	1	banding		√	6	0.5	0.25	NE-SW	0	√			
M09	M09_49_1307em2	13	58.67	4	B	2268185.38	6965483.23	14-Jun-06	Alan Merriman	√													√	CIV	3	> 10	1	nails		√	3	0.5	0.25	NE-SW	45	√			
M09	M09_50_1318em2	12	8.57	4	B	2268142.45	6965471.41	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	bulk wire		√	3	0.5	0.5	N-S	0	√			
M09	M09_503_1307em2	12	3.24	3	B	2268132.94	6965494.64	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	paint can lid			6	6	0.5		0	√			
M09	M09_52_1307em2	13	53.18	4	B	2268181.66	6965467.83	14-Jun-06	Alan Merriman	√													√	CIV	6	1	1	nails		√	6		0.25	N-S	0	√			
M09	M09_520_1307em2	11	3.08	3	B	2268212	6965508.45	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	can			6	4	0.25	N-S	0	√			
M09	M09_523_1307em2	11	3.04	3	B	2268134.34	6965517.63	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	link			3	1	0.5		0	√			
M09	M09_54_1318em2	12	7.67	4	B	2268148.11	6965466.05	14-Jun-06	Alan Merriman	√													√	CIV	3	4	1	nails		√	3	0.5	0.25	N-S	0	√			
M09	M09_55_1307em2	12	51.04	4	B	2268192.12	6965526.73	14-Jun-06	Alan Merriman	√													√	CIV	6	1	2	large bolt & metal piece		√	9	0.5	0.5	NE-SW	45	√			
M09	M09_568_1307em2	9	2.61	3	C	2268184.55	6965443.51	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3					√			
M09	M09_571_1307em2	11	2.59	3	B	2268144.16	6965506.54	14-Jun-06	Alan Merriman	√							√	ORD MD	3	1	1	762mm blank								√	3	0.5	0.25	N-S	0	√			
M09	M09_58_1307em2	9	49.85	4	C	2268136.89	6965510.36	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	7.62 blank							OTHER	√	3	0.5	0.25	N-S	0	√			
M09	M09_60_1307em2	9	49.48	4	C	2268176.23	6965473.62	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	hinge	FE	√	9	4	0.25	N-S	0	√			
M09	M09_61_1307em2	11	49.2	4	B	2268172.59	6965478.76	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	large bolt		√	9	0.5	0.5	NE-SW	45	√			
M09	M09_62_1307em2	12	49.13	4	B	2268181.88	6965475.05	14-Jun-06	Alan Merriman	√													√	CIV	3	3	1	scrap metal & nails		√	3	0.5	0.25	E-W	90	√			
M09	M09_62_1318em2	12	6.54	4	B	2268150.98	6965463.99	14-Jun-06	Alan Merriman	√													√	CIV	3	4	1	nails		√	3	0.5	0.25	N-S	0	√			
M09	M09_67_1307em2	10	46.86	4	C	2268161.91	6965464.77	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	hinge	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_68_1307em2	9	46.59	4	C	2268166.8	6965489.4	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	9	0.5	1	N-S	0	√			
M09	M09_7_1307em2	15	921.84	4	A	2268134.26	6965501.3	14-Jun-06	Alan Merriman	√													√	CIV	6	2	≥8	2" piece of rebar/4' angle iron		√	> 24	0.5	0.5	NE-SW	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M09	M09_71_1307em2	12	43.16	4	B	2268194.3	6965514.54	14-Jun-06	Alan Merriman	√													√	CIV	0	1	1	carridge bolt (same as 104)		√	9	0.5	0.5	NE-SW	45	√			
M09	M09_73_1307em2	11	39.55	4	B	2268170.55	6965487.37	14-Jun-06	Alan Merriman	√													√	CIV	3	5	1	nails		√	6	0.5	0.5	NE-SW	45	√			
M09	M09_78_1307em2	12	37.31	4	B	2268188.72	6965526.2	14-Jun-06	Alan Merriman	√													√	CIV	6	3	1	nails		√	3	0.5	0.25	N-S	0	√			
M09	M09_79_1307em2	16	36.92	4	A	2268124.06	6965499.51	14-Jun-06	Alan Merriman	√													√	CIV	6	10	1	16 penny nails		√	6	0.5	0.25	NE-SW	45	√			
M09	M09_80_1307em2	10	36.77	4	C	2268189.09	6965506.29	11-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
M09	M09_81_1307em2	10	36.63	4	C	2268179.48	6965483.6	11-Jul-06	Jim Thoren	√													√	CIV	3	4	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
M09	M09_82_1307em2	12	36.35	4	B	2268168.4	6965467.18	17-Aug-06	Alan Merriman	√													√	CIV	6	1	1	large bolt, metal band		√	9	0.5	0.5	E-W	90	√			
M09	M09_83_1307em2	12	36.2	4	B	2268195.43	6965485.06	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	20 penny nail (same 89)		√	3		0.25	N-S	0	√			
M09	M09_84_1307em2	12	35.11	4	B	2268163.15	6965492.98	14-Jun-06	Alan Merriman	√													√	CIV	3	5	1	nails (same as 84)		√	3	0.5	0.25	E-W	90	√			
M09	M09_89_1307em2	13	33.29	4	B	2268199.04	6965485.64	14-Jun-06	Alan Merriman	√													√	CIV	3	1	1	20 penny nail		√	3	0.5	0.25	N-S	0	√			
M09	M09_9_1307em2	12	465.07	4	B	2268140.38	6965508.36	14-Jun-06	Alan Merriman	√													√	CIV	6	1	4	metal ring/large		√	24	0.5	0.5	NE-SW	45	√			
M09	M09_90_1307em2	12	33.19	4	B	2268168.61	6965475.33	14-Jun-06	Alan Merriman	√													√	CIV	3	4	1	nails		√	3	0.5	0.25	N-S	0	√			
M09	M09_91_1307em2	13	33.13	4	B	2268192.11	6965474.37	14-Jun-06	Alan Merriman	√													√	CIV	3	3	1	nails		√	3	1	1	E-W	45	√			
M09	M09_92_1307em2	12	32.89	4	B	2268169.51	6965462.04	14-Jun-06	Alan Merriman	√													√	CIV	6	1	1	bailing wire		√	9	0.5	0.25	N-S	0	√			
M09	M09_93_1307em2	10	32.57	4	C	2268181.94	6965486.73	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_93_1318em2	10	4.06	4	C	2268146.58	6965459.65	11-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_94_1318em2	10	4.04	4	C	2268151.38	6965459.84	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
M09	M09_95_1307em2	9	31.18	4	C	2268179.43	6965479.02	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	nail., nail	FE	√	6	0.5	0.25	N-S	0	√			
M09	M09_98_1307em2	9	30.35	4	C	2268191.64	6965462.35	11-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	3	0.5	0.25	N-S	0	√			
M10	M10_105_1307em2	16	28.17	4	A	2268304.96	6965479.48	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M10	M10_11_1307em2	16	245.94	4	A	2268308.75	6965479.19	16-Aug-06	Jim Thoren	√													√	MIL	0	1	1	scrap, nails								√			
M10	M10_12_1307em2	13	223.44	4	B	2268308.78	6965532.02	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M10	M10_128_1307em2	13	20.66	4	B	2268316.29	6965527.8	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_129_1307em2	14	20.45	4	A	2268304.8	6965531.55	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M10	M10_132_1307em2	13	19.9	4	B	2268279.13	6965488.38	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_133_1307em2	14	19.85	4	A	2268260.62	6965453.45	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M10	M10_148_1307em2	10	18.26	4	C	2268219.73	6965478.25	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
M10	M10_15_1307em2	16	194.5	4	A	2268280.45	6965500.96	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_155_1307em2	12	17.5	4	B	2268291.49	6965469.11	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_16_1307em2	16	174.76	4	A	2268287.92	6965509.07	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M10	M10_164_1307em2	13	16.37	4	B	2268243.15	6965468.79	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	nail, scrap	FE	√	9	1	0.25			√			
M10	M10_166_1307em2	12	16.18	4	B	2268234.64	6965476.19	15-Jun-06	Jim Thoren	√													√	CIV	12	1	1	banding		√	6	1	0.25			√			
M10	M10_17_1307em2	16	174.19	4	A	2268293.59	6965452.54	16-Aug-06	Jim Thoren	√													√	CIV	3	1	1	scrap, nails								√			
M10	M10_170_1307em2	16	15.74	4	A	2268312.34	6965479.04	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_171_1307em2	12	14.99	4	B	2268288.71	6965450.65	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	3	0.5	0.25			√			
M10	M10_173_1307em2	11	14.86	4	B	2268317.81	6965467.05	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M10	M10_18_1307em2	15	169.09	4	A	2268316.17	6965461.21	15-Jun-06	Jim Thoren	√													√	MIL	0	4	1	scrap								√			
M10	M10_190_1307em2	13	13.47	4	B	2268249.19	6965476.56	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M10	M10_194_1307em2	13	13.22	4	B	2268240.47	6965526.57	15-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire		√	24	0.5	0.25			√			
M10	M10_195_1307em2	10	13.05	4	C	2268229.09	6965471.84	17-Aug-06	Jim Thoren	√													√	CIV	3	2	0.25	nails, nail	FE	√	3	0.5	0.25	N-S	0	√			
M10	M10_198_1307em2	13	12.95	4	B	2268303.2	6965465.75	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_199_1307em2	14	12.68	4	A	2268316.27	6965514.62	16-Aug-06	Jim Thoren	√													√	CIV	3	1	1	nail, nail		√	9	0.5	0.25			√			
M10	M10_202_1307em2	12	12.43	4	B	2268247.84	6965533.53	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	24	0.5	0.25			√			
M10	M10_210_1307em2	12	11.46	4	B	2268299.44	6965446.45	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	scrap, nails	FE							√			
M10	M10_211_1307em2	10	11.35	4	C	2268249.42	6965455.81	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	9	0.5	0.25	N-S	0	√			
M10	M10_215_1307em2	11	11.01	4	B	2268289.85	6965475.98	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_222_1307em2	10	10.44	4	C	2268305.26	6965462.52	11-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_223_1307em2	13	10.38	4	B	2268234.66	6965467.18	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	3	0.5	0.25			√			
M10	M10_231_1307em2	10	10.1	4	C	2268248.91	6965460.9	11-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	nails	SS	√	3	0.5	0.25	N-S	0	√			
M10	M10_232_1307em2	13	10.07	4	B	2268298.88	6965508.49	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M10	M10_234_1307em2	12	9.98	4	B	2268307.06	6965443.28	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.5			√			
M10	M10_235_1307em2	10	9.95	4	C	2268314.41	6965524.42	11-Jul-06	Jim Thoren	√							√	ED MD	3	1	0.25	starter cart scrap							FE	√	6	4	0.25	N-S	0	√			
M10	M10_236_1307em2	13	9.93	4	B	2268263.34	6965476.61	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	nail, small arms (brass)	FE	√	6	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M10	M10_237_1307em2	12	9.89	4	B	2268245.17	6965476.49	17-Aug-06	Jim Thoren	√													√	CIV	6	1	1	banding, rust flakes	FE	√	24	1	0.25			√			
M10	M10_238_1307em2	9	9.87	4	C	2268277.62	6965476.06	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	wire, nail	FE	√	3	0.5	0.25	N-S	0	√			
M10	M10_239_1307em2	11	9.83	4	B	2268242.85	6965462.2	15-Jun-06	Jim Thoren	√													√	CIV	3	2	1	nails		√	3	0.5	0.25			√			
M10	M10_24_1307em2	15	125.76	4	A	2268314.37	6965496.31	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_240_1307em2	14	9.77	4	A	2268263.8	6965455.59	15-Jun-06	Jim Thoren	√													√	CIV	3	2	1	nail		√	3	0.5	0.25			√			
M10	M10_241_1307em2	9	9.74	4	C	2268219.62	6965481.79	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	wire, scrap	SS	√	12	0.5	0.25	N-S	0	√			
M10	M10_242_1307em2	13	9.74	4	B	2268257.81	6965463.96	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_247_1307em2	10	9.64	4	C	2268267.34	6965460.17	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_252_1307em2	12	9.5	4	B	2268272.29	6965467.14	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M10	M10_258_1307em2	11	8.94	4	B	2268314.31	6965471.38	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	nail, nail		√	6	0.5	0.25			√			
M10	M10_259_1307em2	12	8.84	4	B	2268264.61	6965495.31	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_260_1307em2	10	8.83	4	C	2268310.73	6965445.52	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	nail, scrap, nails	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_266_1307em2	11	8.72	4	B	2268314.39	6965441.67	17-Aug-06	Jim Thoren	√													√	CIV	0	1	1	nail, banding	FE	√	3	0.5	0.25			√			
M10	M10_27_1307em2	13	105.19	4	B	2268301.55	6965462.02	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_271_1307em2	10	8.57	4	C	2268253.67	6965524.19	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_275_1307em2	11	8.44	4	B	2268259.87	6965476.48	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	3	0.5	0.25			√			
M10	M10_277_1307em2	13	8.38	4	B	2268230.62	6965513.66	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	3	0.5	0.25			√			
M10	M10_28_1307em2	13	103.76	4	B	2268312.47	6965527.86	15-Jun-06	Jim Thoren	√													√	MIL	6	1	1	scrap								√			
M10	M10_285_1307em2	12	8.07	4	B	2268310.34	6965471.84	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_286_1307em2	12	8.02	4	B	2268272.63	6965457.09	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_294_1307em2	11	7.71	4	B	2268257.19	6965494.41	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_295_1307em2	8	7.69	4	D	2268305.09	6965473.11	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_299_1307em2	14	7.6	4	A	2268255.83	6965497.44	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M10	M10_30_1307em2	16	98.57	4	A	2268273.85	6965487.41	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_303_1307em2	13	7.31	4	B	2268295.16	6965508.55	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M10	M10_304_1307em2	13	7.27	4	B	2268227.06	6965475.68	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap		√	6	1	0.25			√			
M10	M10_305_1307em2	9	7.26	4	C	2268288.7	6965447.05	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	nail, nail, nail 16D	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_318_1307em2	12	6.84	4	B	2268276.81	6965455.95	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	nail		√	6	0.5	0.25			√			
M10	M10_320_1307em2	12	6.74	4	B	2268281.02	6965479.04	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	3	0.5	0.25			√			
M10	M10_321_1307em2	9	6.74	4	C	2268267.38	6965456.89	11-Jul-06	Jim Thoren	√													√	CIV	6	3	0.25	nails and screws	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_323_1307em2	11	6.67	4	B	2268308.43	6965448.82	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	scrap, scrap	FE							√			
M10	M10_324_1307em2	11	6.65	4	B	2268260.1	6965468.65	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_325_1307em2	12	6.64	4	B	2268279.53	6965473.02	15-Jun-06	Jim Thoren	√													√	MIL	3	2	1	scrap								√			
M10	M10_328_1307em2	13	6.5	4	B	2268260.99	6965507.61	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M10	M10_329_1307em2	11	6.5	4	B	2268250.31	6965473.27	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap		√	12	1	0.25			√			
M10	M10_333_1307em2	9	6.46	4	C	2268240.93	6965464.87	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_337_1307em2	11	6.39	4	B	2268229.9	6965466.93	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	3	0.5	0.25			√			
M10	M10_342_1307em2	13	6.34	4	B	2268285.34	6965458.08	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
M10	M10_351_1307em2	13	6.03	4	B	2268311.02	6965452.83	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_357_1307em2	10	5.89	4	C	2268223.8	6965473.25	17-Aug-06	Jim Thoren	√													√	CIV	3	2	0.25	2 nails, nail	FE	√	3	0.5	0.25	N-S	0	√			
M10	M10_36_1307em2	13	81.78	4	B	2268297.52	6965465.53	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M10	M10_360_1307em2	8	5.77	4	D	2268272.75	6965453.34	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_361_1307em2	15	5.75	4	A	2268291.29	6965508.65	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M10	M10_365_1307em2	9	5.67	4	C	2268271.89	6965492.38	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	spitlo	FE	√	9	0.5	0.25	N-S	0	√			
M10	M10_368_1307em2	9	5.58	4	C	2268238.3	6965475.37	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
M10	M10_369_1307em2	10	5.53	4	C	2268301.23	6965475.83	11-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_37_1307em2	13	80.69	4	B	2268302.83	6965500.01	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_370_1307em2	10	5.52	4	C	2268238.57	6965469.73	11-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_372_1307em2	9	5.47	4	C	2268250.31	6965481	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	9	0.5	0.25	N-S	0	√			
M10	M10_377_1307em2	9	5.39	4	C	2268253.73	6965528.35	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire bundle	FE	√	3	4	0.25	N-S	0	√			
M10	M10_378_1307em2	9	5.29	4	C	2268312.63	6965464.87	11-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_380_1307em2	12	5.25	4	B	2268219.66	6965497.75	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M10	M10_383_1307em2	11	5.14	4	B	2268222.01	6965500.1	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M10	M10_385_1307em2	11	5.12	4	B	2268257.23	6965455.71	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_389_1307em2	10	5.11	4	C	2268272.7	6965448.11	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_39_1307em2	14	78.88	4	A	2268314.25	6965487.37	16-Aug-06	Jim Thoren	√													√	MIL	6	1	1	scrap, nails								√			
M10	M10_390_1307em2	8	5.09	4	D	2268297.34	6965475.25	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_391_1307em2	12	5.07	4	B	2268300.72	6965528.88	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
M10	M10_394_1307em2	12	5.02	4	B	2268289.98	6965529.13	15-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire								√			
M10	M10_395_1307em2	12	5.02	4	B	2268284.65	6965481.81	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M10	M10_396_1307em2	11	5.02	4	B	2268256.88	6965526.02	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M10	M10_398_1307em2	10	4.95	4	C	2268283.26	6965454.39	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_399_1307em2	11	4.93	4	B	2268263.65	6965466.69	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_401_1307em2	12	4.91	4	B	2268293.56	6965529.45	15-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire		√	> 24	0.5	0.25			√			
M10	M10_403_1307em2	9	4.89	4	C	2268260.04	6965472.79	11-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_407_1307em2	12	4.77	4	B	2268252.66	6965463.1	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	3	0.5	0.25			√			
M10	M10_408_1307em2	11	4.73	4	B	2268267.88	6965496.17	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_410_1307em2	12	4.7	4	B	2268242.86	6965453.23	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	9	0.5	0.25			√			
M10	M10_411_1307em2	11	4.69	4	B	2268286.59	6965444.11	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	scrap, scrap								√			
M10	M10_412_1307em2	10	4.64	4	C	2268254.43	6965469.21	11-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_414_1307em2	11	4.58	4	B	2268262.41	6965510.97	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	9	0.5	0.25			√			
M10	M10_415_1307em2	10	4.58	4	C	2268296.88	6965530.17	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap metal	FE	√	3	2	0.25	N-S	0	√			
M10	M10_417_1307em2	12	4.5	4	B	2268222.3	6965484.12	15-Jun-06	Jim Thoren	√													√	CIV	6	1	1	nail		√	6	0.5	0.25			√			
M10	M10_419_1307em2	13	4.41	4	B	2268275.77	6965466.93	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	link								√			
M10	M10_423_1307em2	10	4.39	4	C	2268314.26	6965446.65	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	9	0.5	0.25	N-S	0	√			
M10	M10_424_1307em2	10	4.39	4	C	2268264.13	6965532.64	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.25	N-S	0	√			
M10	M10_426_1307em2	8	4.32	4	D	2268297.47	6965471.1	11-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nails and wire	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_427_1307em2	9	4.31	4	C	2268252.54	6965476.2	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_431_1307em2	11	4.28	4	B	2268246.9	6965483.08	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M10	M10_435_1307em2	9	4.23	4	C	2268236.74	6965481.48	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_44_1307em2	13	64.25	4	B	2268267.67	6965527.33	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	rebar		√	> 24	0.5	0.25			√			
M10	M10_440_1307em2	8	4.15	4	D	2268245.38	6965459.55	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M10	M10_441_1307em2	9	4.11	4	C	2268252.37	6965459.39	11-Jul-06	Jim Thoren	√							√	ORD MD	3	5	0.25	5.56 blanks	√	CIV				nail	FE	√	3	0.5	0.5	N-S	0	√			
M10	M10_444_1307em2	13	4.02	4	B	2268259.2	6965497.46	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	24	0.5	0.25			√			
M10	M10_447_1307em2	12	3.97	4	B	2268244.34	6965527.01	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	24	0.5	0.25			√			
M10	M10_456_1307em2	11	3.87	4	B	2268303.19	6965443.54	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap		√	9	0.5	0.25			√			
M10	M10_460_1307em2	12	3.84	4	B	2268297.13	6965489.48	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M10	M10_469_1307em2	12	3.63	4	B	2268279.61	6965462.57	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	link								√			
M10	M10_488_1307em2	10	3.39	3	C	2268246.49	6965497.5	11-Jul-06	Jim Thoren	√							√	ORD MD	3	2	0.25	7.62 blank	√	CIV				nail	FE	√	3	0.5	0.25	N-S	0	√			
M10	M10_490_1307em2	12	3.38	3	B	2268308.6	6965461.69	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_493_1307em2	11	3.35	3	B	2268280.1	6965533.76	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	12	0.5	0.25			√			
M10	M10_507_1307em2	11	3.21	3	B	2268269.91	6965499.25	15-Jun-06	Jim Thoren	√													√	CIV	6	1	1	scrap								√			
M10	M10_51_1307em2	16	53.59	4	A	2268220.06	6965442.7	16-Aug-06	Jim Thoren	√													√	CIV	3	1	1	scrap, nails								√			
M10	M10_541_1307em2	12	2.85	3	B	2268277.24	6965502.52	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	carp level		√	12	2	1			√			
M10	M10_584_1307em2	6	2.44	2	D	2268275.84	6965470.84	11-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	nails	FE	√	6	0.5	0.25			√			
M10	M10_617_1307em2	13	2.15	2	B	2268284.15	6965501.61	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_631_1307em2	10	2.05	2	C	2268293.46	6965442.77	11-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	nails	FE	√	6	0.5	0.25			√			
M10	M10_64_1307em2	15	47.9	4	A	2268284.7	6965474.46	16-Aug-06	Jim Thoren	√													√	MIL	3	4	1	scrap, nail								√			
M10	M10_65_1307em2	13	47.61	4	B	2268306.9	6965496.32	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M10	M10_663_1307em2	6	1.82	1	D	2268305.1	6965446.75	11-Jul-06	Jim Thoren	√													√	CIV	0	5	0.25	nails	FE	√	6	0.5	0.25			√			
M10	M10_69_1307em2	10	45.44	4	C	2268312.62	6965532.91	11-Jul-06	Jim Thoren	√							√	ED MD	3	1	0.25	starter cart scrap							FE	√	3	2	0.25	N-S	0	√			
M10	M10_76_1307em2	13	38.55	4	B	2268310.64	6965490.09	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M10	M10_87_1307em2	12	33.89	4	B	2268230.87	6965476.79	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	bolt		√	12	0.5	0.5			√			
M10	M10_94_1307em2	12	31.88	4	B	2268271.77	6965527.35	15-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire		√	12	0.5	0.25			√			
M10	M10_99_1307em2	10	29.61	4	C	2268310.5	6965523.68	17-Aug-06	Jim Thoren	√							√	ED MD	3	2	0.25	starter cart scrap	√	CIV	3	2	0.25	nails	FE	√	3	2	0.25	N-S	0	√			
M10	QAdig_M10_514		5.8		QA	2268251.86	6965443.96	15-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	nails	FE	√	6	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M11	M11_108_1307em2	13	27.19	4	B	2268349.13	6965459.06	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6		0.25	N-S		√			
M11	M11_112_1307em2	12	26.27	4	B	2268337.04	6965451.79	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	nail, nail	FE	√	6	0.5	0.25			√			
M11	M11_116_1307em2	12	24.69	4	B	2268351.88	6965453.04	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M11	M11_117_1307em2	12	24.53	4	B	2268347.34	6965449.06	15-Jun-06	Jim Thoren	√													√	CIV	0	2	1	nails		√	6	0.5	0.25			√			
M11	M11_119_1307em2	12	24.04	4	B	2268358.85	6965439.87	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	3	0.5	0.25			√			
M11	M11_120_1307em2	12	23.81	4	B	2268339.95	6965450.08	15-Jun-06	Jim Thoren	√													√	CIV	3	2	1	nails		√	6	0.5	0.25			√			
M11	M11_122_1307em2	9	23.26	4	C	2268360.84	6965451.98	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	nail, nails	FE	√	6	0.5	0.25	N-S	0	√			
M11	M11_123_1307em2	12	22.06	4	B	2268355.1	6965452.36	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6		0.25			√			
M11	M11_125_1307em2	13	21.29	4	B	2268403.99	6965477.89	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M11	M11_127_1307em2	11	21.03	4	B	2268337.42	6965457.43	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	9	0.5	0.25			√			
M11	M11_130_1307em2	16	20.42	4	A	2268327.34	6965522.42	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M11	M11_14_1612em2	13	28.23	4	B	2268324.3	6965451.2	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
M11	M11_149_1307em2	11	18.23	4	B	2268344.5	6965447.34	17-Aug-06	Jim Thoren	√													√	CIV	3	3	1	nail, nail	FE	√	6	0.5	0.25			√			
M11	M11_162_1307em2	9	16.57	4	C	2268327.92	6965440.34	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M11	M11_168_1307em2	9	15.87	4	C	2268333.8	6965456.99	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.5	N-S	0	√			
M11	M11_169_1307em2	15	15.84	4	A	2268318.76	6965479.46	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M11	M11_172_1307em2	13	14.92	4	B	2268340.41	6965527.19	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M11	M11_180_1307em2	12	14.23	4	B	2268339.98	6965442.05	15-Jun-06	Jim Thoren	√													√	CIV	3	2	1	nails		√	6	0.5	0.25			√			
M11	M11_181_1307em2	10	14.21	4	C	2268378.02	6965534.08	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	chain	FE	√	6	0.5	0.25	N-S	0	√			
M11	M11_182_1307em2	13	14.16	4	B	2268411.58	6965473.64	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap		√	24	0.5	0.25			√			
M11	M11_186_1307em2	13	13.67	4	B	2268324.23	6965440.75	17-Aug-06	Jim Thoren	√													√	CIV	3	2	1	nails, nails	FE	√	6	0.5	0.25			√			
M11	M11_189_1307em2	10	13.54	4	C	2268406.98	6965470.14	17-Aug-06	Jim Thoren	√													√	CIV	3	4	0.25	scrap, nails	OTHER	√	3	4	0.25	N-S	0	√			
M11	M11_19_1612em2	16	19.31	4	A	2268387.82	6965465.72	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M11	M11_201_1307em2	10	12.65	4	C	2268334.05	6965461.37	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M11	M11_216_1307em2	11	10.9	4	B	2268335.84	6965512.71	15-Jun-06	Jim Thoren	√													√	CIV	3	2	1	nail		√	6	0.5	0.25			√			
M11	M11_217_1307em2	12	10.85	4	B	2268356.32	6965441.96	17-Aug-06	Jim Thoren	√													√	CIV	3	2	1	nails, wire, nail	FE	√	6	0.5	0.25			√			
M11	M11_22_1307em2	14	142.97	4	A	2268347.07	6965508.71	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
M11	M11_22_1612em2	14	17.17	4	A	2268378.13	6965459.5	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M11	M11_226_1307em2	12	10.35	4	B	2268340.74	6965461.48	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	nail		√	6	0.5	0.25			√			
M11	M11_229_1307em2	9	10.24	4	C	2268340.02	6965455.31	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M11	M11_23_1612em2	13	15.86	4	B	2268327.02	6965445.44	17-Aug-06	Jim Thoren	√													√	MIL	3	1	2	scrap, nails								√			
M11	M11_243_1307em2	12	9.71	4	B	2268348.41	6965441.61	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	nail, wire, nail 16D	FE	√	6	0.5	0.25			√			
M11	M11_245_1307em2	12	9.69	4	B	2268331.34	6965442.2	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6		0.25			√			
M11	M11_25_1307em2	13	120.21	4	B	2268320.46	6965452.43	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M11	M11_257_1307em2	10	9.04	4	C	2268415.7	6965489.23	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal projo							CU	√	3	0.5	0.25	N-S	0	√			
M11	M11_262_1307em2	11	8.79	4	B	2268344.05	6965441.9	17-Aug-06	Jim Thoren	√													√	CIV	3	1	1	nail, nail	FE	√	6		0.25			√			
M11	M11_276_1307em2	12	8.42	4	B	2268337.07	6965465.97	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M11	M11_279_1307em2	9	8.35	4	C	2268359.87	6965456.66	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M11	M11_284_1307em2	12	8.13	4	B	2268365.02	6965448.82	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M11	M11_298_1307em2	13	7.65	4	B	2268396.95	6965528.57	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	9	0.5	0.25			√			
M11	M11_300_1307em2	12	7.58	4	B	2268366.7	6965438.56	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M11	M11_302_1307em2	9	7.49	4	C	2268321.31	6965446.85	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	nail, nail 16D	FE	√	6	0.5	0.25	N-S	0				
M11	M11_307_1307em2	13	7.2	4	B	2268318.57	6965523.22	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap-rust								√			
M11	M11_315_1307em2	13	6.9	4	B	2268359.59	6965508.14	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	3	0.5	0.25			√			
M11	M11_32_1307em2	16	90.4	4	A	2268396.7	6965491.83	15-Jun-06	Jim Thoren	√							√	ORD MD	3	1	≥8	VT fuze														√			
M11	M11_32_1612em2	8	10.68	4	D	2268324.36	6965458.7	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M11	M11_322_1307em2	10	6.67	4	C	2268362.94	6965439.01	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	FE	√	6	1	0.25	N-S	0	√			
M11	M11_338_1307em2	9	6.38	4	C	2268352.2	6965446.26	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M11	M11_339_1307em2	10	6.37	4	C	2268323.55	6965437.52	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M11	M11_340_1307em2	8	6.36	4	D	2268343.05	6965451.3	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	45	√			
M11	M11_345_1307em2	16	6.26	4	A	2268375.6	6965458.24	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
M11	M11_349_1307em2	12	6.12	4	B	2268381.96	6965532.39	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire								√			
M11	M11_379_1307em2	12	5.27	4	B	2268334.84	6965470.98	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M11	M11_386_1307em2	11	5.11	4	B	2268321.01	6965530.84	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	6	0.5	0.25			√			
M11	M11_392_1307em2	12	5.05	4	B	2268357.31	6965534.77	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail								√			
M11	M11_400_1307em2	13	4.91	4	B	2268390.9	6965522.28	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	wire		√	6	0.5	0.25			√			
M11	M11_42_1307em2	13	73.67	4	B	2268335.04	6965440.46	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M11	M11_420_1307em2	12	4.41	4	B	2268339.53	6965481.44	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M11	M11_436_1307em2	11	4.23	4	B	2268367.45	6965530.64	15-Jun-06	Jim Thoren	√													√	CIV	3	3	1	nail		√	6	0.5	0.25			√			
M11	M11_446_1307em2	10	3.97	4	C	2268343.08	6965531.48	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal projo							CU	√	3	0.5	0.25	N-S	0	√			
M11	M11_45_1307em2	14	63.15	4	A	2268389.09	6965535.02	15-Jun-06	Jim Thoren	√							√	ORD MD	3	1	≥8	fuze														√			
M11	M11_46_1612em2	13	5.92	4	B	2268383.82	6965458.21	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
M11	M11_466_1307em2	11	3.69	4	B	2268354.06	6965510.09	15-Jun-06	Jim Thoren	√													√	CIV	6	1	1	nail		√	6	0.5	0.25			√			
M11	M11_47_1307em2	13	62.53	4	B	2268341.08	6965505.9	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M11	M11_472_1307em2	11	3.59	3	B	2268363.25	6965508.99	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap		√	6	1	0.25			√			
M11	M11_48_1307em2	13	62	4	B	2268319.29	6965458.57	15-Jun-06	Jim Thoren	√													√	MIL	6	3	≥8	scrap								√			
M11	M11_5_1612em2	16	82.16	4	A	2268324.02	6965479.16	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M11	M11_50_1307em2	14	55.09	4	A	2268379.62	6965528.54	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M11	M11_509_1307em2	11	3.2	3	B	2268351.21	6965536.2	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1			√	6	0.5	0.25			√			
M11	M11_526_1307em2	11	2.98	3	B	2268355.62	6965464.66	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	nail		√	6	0.5	0.25			√			
M11	M11_528_1307em2	11	2.98	3	B	2268337.81	6965506.55	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M11	M11_54_1307em2	13	51.48	4	B	2268320.13	6965469.41	15-Jun-06	Jim Thoren	√													√	MIL	0	1	1	scrap								√			
M11	M11_56_1612em2	13	4.56	4	B	2268324.57	6965466.47	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M11	M11_57_1307em2	15	49.92	4	A	2268404.23	6965465.37	15-Jun-06	Jim Thoren	√													√	MIL	0	1	0.75	scrap								√			
M11	M11_573_1307em2	11	2.59	3	B	2268411.47	6965453.8	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	wire		√	> 24	0.5	0.25			√			
M11	M11_59_1612em2	12	4.01	4	B	2268393.06	6965458.18	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap								√			
M11	M11_6_1612em2	16	76.6	4	A	2268328.29	6965469.82	16-Aug-06	Jim Thoren	√													√	MIL	0	1	1	scrap, scrap								√			
M11	M11_641_1307em2	11	1.95	2	B	2268390.77	6965529.57	15-Jun-06	Jim Thoren	√							√	ORD MD	3	3	1	blank														√			
M11	M11_66_1307em2	15	47.53	4	A	2268408.41	6965485.86	15-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	flare								√	6	2	0.25			√			
M11	M11_72_1307em2	13	43.11	4	B	2268345.34	6965459.48	15-Jun-06	Jim Thoren	√													√	CIV	6	4	1	nail		√	6	0.5	0.25			√			
M11	M11_72_1612em2	11	2.78	3	B	2268328.06	6965458.96	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	nail		√	6	0.5	0.25			√			
M11	M11_74_1307em2	13	38.91	4	B	2268385.95	6965536.09	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M11	M11_77_1307em2	14	37.65	4	A	2268415.88	6965482.93	15-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap								√			
M11	M11_96_1307em2	13	31	4	B	2268406.89	6965474.46	15-Jun-06	Jim Thoren	√													√	CIV	0	1	1	scrap, nail	FE							√			
M11	M11_96_1612em2	7	1.75	1	D	2268324.01	6965488.53	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	banding, scrap	FE	√	6					√			
M11	M11_97_1307em2	15	30.75	4	A	2268330.92	6965470.38	15-Jun-06	Jim Thoren	√													√	CIV	3	1	1	scrap								√			
M11	QAdig_M11_407		6.8		QA	2268331.21	6965448.93	15-Aug-06	Alan Merriman	√													√	CIV	0	3	0.25	nails	FE	√	6	0.5	0.25			√			
M12	M12_115_1307em2	16	25.17	4	A	2268478.44	6965466.96	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3	1	0.25			√			
M12	M12_135_1307em2	13	19.66	4	B	2268459.48	6965485.51	20-Jun-06	Jim Thoren	√													√	CIV	3	1	1	charin		√	3	0.5				√			
M12	M12_152_1307em2	14	17.58	4	A	2268517.98	6965497.1	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	aluminum scrap		√	3	0.5	0.25			√			
M12	M12_154_1307em2	16	17.52	4	A	2268493.85	6965502.61	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	aluminum scrap		√	6	2	0.25			√			
M12	M12_160_1307em2	12	16.82	4	B	2268457.29	6965488.17	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	5.56 blank								√	3	0.5				√			
M12	M12_167_1307em2	15	15.92	4	A	2268432.27	6965499.16	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket								√	6	2	0.25			√			
M12	M12_178_1307em2	12	14.34	4	B	2268498.76	6965533.95	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze antenna								√	6	1	0.25			√			
M12	M12_184_1307em2	14	13.9	4	A	2268438.36	6965440.57	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	steel scrap		√	3	2	0.25			√			
M12	M12_193_1307em2	15	13.25	4	A	2268440.61	6965486.91	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	6	1	0.25			√			
M12	M12_203_1307em2	14	12.18	4	A	2268487.63	6965528.67	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	6	4	0.25			√			
M12	M12_207_1307em2	13	11.86	4	B	2268456.82	6965506.76	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	wire bundle		√	12	2	0.25			√			
M12	M12_218_1307em2	13	10.79	4	B	2268446.47	6965455.5	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	part of vt fuze								√	3	0.5	0.25			√			
M12	M12_228_1307em2	15	10.25	4	A	2268429.39	6965485.62	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze antenna								√	3	2	1			√			
M12	M12_246_1307em2	13	9.67	4	B	2268455.08	6965495.62	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze antenna								√	3	1	1			√			
M12	M12_264_1307em2	14	8.74	4	A	2268482.59	6965512.68	20-Jun-06	Jim Thoren	√							√	ORD MD	0	1	2	bomb frag								√	3	2	0.5			√			
M12	M12_280_1307em2	13	8.24	4	B	2268514.47	6965531.16	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	aluminum scrap		√	3	1	0.25			√			
M12	M12_282_1307em2	14	8.22	4	A	2268474.77	6965467.45	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze bracket								√	6	2	0.25			√			
M12	M12_291_1307em2	14	7.8	4	A	2268447.97	6965485.96	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	barb wire		√	9	1	0.5			√			
M12	M12_297_1307em2	13	7.66	4	B	2268465.69	6965501.59	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	vt fuze antenna								√	3	1	1			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M12	M12_34_1307em2	16	87.97	4	A	2268452	6965452.23	20-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	vt fuze part								√	3					√			
M12	M12_347_1307em2	13	6.15	4	B	2268481.07	6965501.05	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	barb wire		√	12		0.25			√			
M12	M12_375_1307em2	13	5.42	4	B	2268460.45	6965505.81	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	5.56 blank								√	3		0.25			√			
M12	M12_418_1307em2	11	4.46	4	B	2268495.41	6965529.41	20-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	steel scrap		√	6	0.5	0.25			√			
M12	M12_422_1307em2	10	4.4	4	C	2268485.25	6965480.91	11-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze rod, vt							SS	√	3	0.5	0.25	N-S	0	√			
M12	M12_434_1307em2	12	4.24	4	B	2268419.65	6965474.93	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt		√	3	1				√			
M12	M12_454_1307em2	11	3.92	4	B	2268450.2	6965511.24	17-Aug-06	Jim Thoren	√													√	MIL	3	1	0.25	ammo link, 7.62 links	FE	√	3					√			
M12	M12_458_1307em2	12	3.85	4	B	2268419.22	6965481.84	20-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	50 cal brass								√	6	0.5	0.25			√			
M12	M12_467_1307em2	14	3.67	4	A	2268507.56	6965484.3	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel scrap		√	3		0.25			√			
M12	M12_471_1307em2	11	3.6	3	B	2268421.86	6965497.8	20-Jun-06	Jim Thoren	√													√	CIV	12	1	0.25	barb wire		√	24		0.25			√			
M12	M12_475_1307em2	9	3.54	3	C	2268478.16	6965470.28	11-Jul-06	Jim Thoren																			no contact											
M12	M12_482_1307em2	11	3.46	3	B	2268483.98	6965527.97	20-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm								√	6	1				√			
M12	M12_494_1307em2	12	3.35	3	B	2268439.61	6965530.14	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	small gage wire		√	9		0.25			√			
M12	M12_53_1307em2	16	52.73	4	A	2268518.23	6965514.26	20-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	starter cart part								√			0.25			√			
M12	M12_531_1307em2	12	2.93	3	B	2268507.12	6965495.47	20-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	small gage wire		√	9		0.25			√			
M12	M12_550_1307em2	12	2.72	3	B	2268475.37	6965500.31	20-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	barb wire		√	24		0.25			√			
M13	M13_108_1306em2	13	10.33	4	B	2268617.04	6965468.73	21-Jun-06	Alan Merriman	√													√	MIL	3	2	0.25	ejection seat part&piece of alum		√	3	0.5	0.5	NE-SW	45	√			
M13	M13_11_1306em2	16	102.46	4	A	2268605.39	6965498.27	21-Jun-06	Alan Merriman	√							√	ORD MD	> 24	10	0.25	5.56 and 7.62 carts	√	CIV	> 24	5	0.25	metal scrap	FE	√	3	0.5	0.5	NE-SW	45	√			
M13	M13_115_1306em2	13	10.08	4	B	2268532.77	6965528.97	21-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	vt fuze stabilizer								√	6	0.5	0.5	E-W	90	√			
M13	M13_130_1306em2	13	9.27	4	B	2268592.12	6965498.27	21-Jun-06	Alan Merriman	√							√	ORD MD	3	3	0.25	50 cal bullets								√	3	0.5	0.5	E-W	45	√			
M13	M13_140_1306em2	16	8.92	4	A	2268598.71	6965496	16-Aug-06	Alan Merriman	√							√	ORD MD	3	2	0.25	50 cal bullet, scrap, small arms								√	3	0.5	0.25	N-S	0	√			
M13	M13_15_1306em2	16	69.26	4	A	2268518.79	6965515.11	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	7.62mm bullet cart								√	3	0.5	0.5	NE-SW	0	√			
M13	M13_156_1306em2	13	7.86	4	B	2268596.65	6965509.83	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	vt fuze, m166 stabilizer								√	6	0.5	0.5	E-W	0	√			
M13	M13_158_1306em2	16	7.75	4	A	2268523.62	6965456.02	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	metal piece from a vt fuze								√	6	0.5	0.25	NE-SW	45	√			
M13	M13_18_1306em2	16	63.63	4	A	2268608.77	6965498.15	21-Jun-06	Alan Merriman	√							√	ORD MD	24	> 10	0.25	5.56 and 7.62 carts	√	CIV	> 24	5	0.25	metal scrap	FE	√	3	0.5	0.5	NE-SW	45	√			
M13	M13_184_1306em2	9	6.59	4	C	2268524.47	6965531.57	11-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze rod, vt							FE	√	3	0.5	0.25	N-S	0	√			
M13	M13_194_1306em2	15	5.97	4	A	2268565.45	6965501.12	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	20mm round								√	3	0.5	0.5	N-S	0	√			
M13	M13_198_1306em2	13	5.83	4	B	2268603.37	6965512.16	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	flat piece of aluminum		√	9	4	0.25	NE-SW	0	√			
M13	M13_20_1306em2	15	57.96	4	A	2268613.34	6965498.47	16-Aug-06	Alan Merriman	√							√	ORD MD	12	10	4	(8)50 cal,(2)7.62 carts, same								√	3	0.5	0.5	N-S	0	√			
M13	M13_204_1306em2	12	5.72	4	B	2268559.52	6965530.77	21-Jun-06	Alan Merriman	√													√	CIV	12	3	0.25	nail,piece of wire, chunk of mtl		√	3	0.5	0.25	NE-SW	0	√			
M13	M13_206_1306em2	11	5.64	4	B	2268584.61	6965496.64	21-Jun-06	Alan Merriman	√													√	CIV	6	2	0.25	2 balls of bailing wire		√	9	0.5	0.5	N-S	90	√			
M13	M13_229_1306em2	14	4.98	4	A	2268589.04	6965459.79	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of frag/ metal								√	3	0.5	0.5	E-W	90	√			
M13	M13_231_1306em2	13	4.91	4	B	2268548.75	6965532.28	21-Jun-06	Alan Merriman	√							√	ORD MD	6	2	0.25	7.62 ctg & piece of wire								√	3	0.5	0.25	NE-SW	0	√			
M13	M13_251_1306em2	14	4.45	4	A	2268562.82	6965462.06	21-Jun-06	Alan Merriman	√							√	ORD MD	6	3	0.25	50cal bullet,7.62 ctg,ball of wi								√	3	0.5	0.25	NE-SW	0	√			
M13	M13_256_1306em2	12	4.33	4	B	2268583.35	6965529.85	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.5	chunk of aluminum		√	3	0.5	0.5	E-W	90	√			
M13	M13_268_1306em2	10	4.19	4	C	2268580.91	6965527.09	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	18" sm gauge wire	FE	√	24	0.5	0.25	N-S	0	√			
M13	M13_278_1306em2	11	3.98	4	B	2268605.66	6965470.95	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of frag/ metal								√	3	0.5	0.5	E-W	90	√			
M13	M13_307_1306em2	12	3.48	3	B	2268582.88	6965437.46	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	ball of bailing wire		√	6	0.5	0.25	N-S	0	√			
M13	M13_31_1306em2	15	32.58	4	A	2268616.83	6965497.07	21-Jun-06	Alan Merriman	√							√	ORD MD	3	> 10	4	(1) bolt,(10)50 cal carts							FE	√	3	0.5	0.5	NE-SW	45	√			
M13	M13_327_1306em2	11	3.27	3	B	2268580.73	6965461.54	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	50 cal bullet								√	3	0.5	0.5	NE-SW	45	√			
M13	M13_334_1306em2	11	3.21	3	B	2268578.41	6965509.19	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of m166 vt fuze								√	3	0.5	0.5	E-W	90	√			
M13	M13_362_1306em2	11	2.94	3	B	2268581.02	6965534.41	21-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	5.56 ctg								√	3	0.5	0.5	N-S	0	√			
M13	M13_370_1306em2	11	2.88	3	B	2268536.91	6965519.93	17-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	nail		√	6	0.5	0.25	E-W	45	√			
M13	M13_42_1306em2	14	25.65	4	A	2268518.73	6965496.61	21-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	aluminum scrap	AL	√	3	0.5	0.25			√			
M13	M13_45_1306em2	16	22.97	4	A	2268596.67	6965474.06	21-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	mtl piece from m166 vt fuze (sam								√	6	0.5	0.25	NE-SW	45	√			
M13	M13_49_1306em2	15	21.67	4	A	2268606.23	6965447.14	16-Aug-06	Alan Merriman	√							√	ORD MD	0	1	0.25	Air Craft Part	√	CIV	3	1	0.25	length of wire		√	6	0.5	0.25	NE-SW	90	√			
M13	M13_494_1306em2	8	1.88	1	D	2268562.79	6965473.23	17-Aug-06	Alan Merriman	√							√	ORD MD	3	1	0.25	aircraft part (Al)	√	CIV	3	1	0.25	nails	FE	√	6	0.5	0.25			√			
M13	M13_5_1306em2	15	133.75	4	A	2268569.95	6965500.73	21-Jun-06	Alan Merriman	√													√	CIV	0	1	1	2' pieces of hollow pipe		√	24	1	0.25	N-S	0	√			
M13	M13_54_1306em2	14	18.65	4	A	2268590	6965508.36	21-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	small piece frm electric motor &		√	9	0.5	0.5	E-W	45	√			
M13	M13_70_1306em2	13	14.08	4	B	2268613.47	6965484.09	21-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	metal rod, bolt	FE	√	9	0.5	0.5	NE-SW	45	√			
M13	M13_97_1306em2	16	11.35	4	A	2268592.7	6965473.25	16-Aug-06	Alan Merriman	√							√	ORD MD	0	1	0.25	mtl piece from m166 vt fuze								√	6	0.5	0.25	NE-SW	45	√			
M13	QAdig_M13_32		71		QA	2268559.24	6965484.09	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
M14	M14_102_1306em2	11	10.96	4	B	2268637.32	6965499.38	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	banding	FE	√	6	1	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M14	M14_109_1306em2	15	10.33	4	A	2268690.99	6965507.14	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25			√			
M14	M14_12_1306em2	14	85.92	4	A	2268701.89	6965526.32	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	steel rod	FE	√	> 24	0.5				√			
M14	M14_125_1306em2	14	9.49	4	A	2268667.68	6965459.43	26-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	vt fuze part								√	3	2	0.25			√			
M14	M14_127_1306em2	14	9.35	4	A	2268624.68	6965527.96	26-Jun-06	Jim Thoren	√													√	MIL	3	1	1	scrap	FE	√	6	2	0.25			√			
M14	M14_128_1306em2	15	9.34	4	A	2268705.75	6965527.52	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	barb wire	FE	√	9	0.5	0.25			√			
M14	M14_129_1306em2	13	9.28	4	B	2268716.98	6965443.29	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	24	0.5	0.25	N-S	0	√			
M14	M14_133_1306em2	14	9.18	4	A	2268685.47	6965469.42	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	fence staple	FE	√	6	0.5	0.25			√			
M14	M14_138_1306em2	13	9.01	4	B	2268709.33	6965530.96	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3	2	0.25	N-S	0	√			
M14	M14_14_1306em2	13	71.57	4	B	2268626	6965501.24	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.5	steel wire wrapped	FE	√	24	0.5				√			
M14	M14_142_1306em2	11	8.68	4	B	2268657.66	6965447.47	26-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			
M14	M14_144_1306em2	12	8.61	4	B	2268675.72	6965460.84	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	frag							FE	√	3	2	0.25	N-S	0	√			
M14	M14_150_1306em2	15	8.13	4	A	2268673.39	6965510.07	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	7.62 link							FE	√	3	1	0.25			√			
M14	M14_152_1306em2	11	8.11	4	B	2268701.1	6965481.87	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_155_1306em2	15	7.92	4	A	2268698.95	6965529.95	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.5	steel scrap	FE	√	3	1	0.5			√			
M14	M14_157_1306em2	13	7.77	4	B	2268631.2	6965482.9	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
M14	M14_160_1306em2	13	7.72	4	B	2268620.82	6965527.52	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	24	0.5	0.25	N-S	0	√			
M14	M14_162_1306em2	10	7.67	4	C	2268639.32	6965507.19	11-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	50 cal projo							FE	√	3	0.5	0.25	N-S	0	√			
M14	M14_165_1306em2	15	7.47	4	A	2268668.86	6965446.62	16-Aug-06	Jim Thoren	√													√	CIV	3	3	0.25	fence staples, fence staples	FE	√	3	0.5	0.25			√			
M14	M14_177_1306em2	12	6.91	4	B	2268657.34	6965530.55	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25	N-S	0	√			
M14	M14_195_1306em2	11	5.94	4	B	2268680.7	6965466.85	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_197_1306em2	13	5.85	4	B	2268627.84	6965482.06	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.5	N-S	0	√			
M14	M14_199_1306em2	11	5.83	4	B	2268643.45	6965502.09	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	slag	FE	√	6	2	0.25	N-S	0	√			
M14	M14_202_1306em2	11	5.76	4	B	2268675.98	6965479.84	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_212_1306em2	13	5.35	4	B	2268662.16	6965496.33	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	2	0.25	N-S	0	√			
M14	M14_217_1306em2	14	5.28	4	A	2268649.84	6965525.34	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12	0.5	0.25			√			
M14	M14_226_1306em2	13	5.04	4	B	2268703.87	6965517.72	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_227_1306em2	11	5.01	4	B	2268693.28	6965456.64	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.25	N-S	0	√			
M14	M14_230_1306em2	12	4.95	4	B	2268653.92	6965524.78	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	50 cal							FE	√	3	0.5	0.25	N-S	0	√			
M14	M14_239_1306em2	11	4.63	4	B	2268718.17	6965520.34	26-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6	2	0.25	N-S	0	√			
M14	M14_241_1306em2	11	4.58	4	B	2268683.95	6965526.88	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
M14	M14_242_1306em2	11	4.55	4	B	2268714.76	6965503.75	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_244_1306em2	11	4.53	4	B	2268658.59	6965444.27	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	6	1	0.25	N-S	0	√			
M14	M14_248_1306em2	13	4.47	4	B	2268709.16	6965509.45	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
M14	M14_249_1306em2	16	4.47	4	A	2268671.15	6965495.02	26-Jun-06	Jim Thoren	√													√	CIV	6	1	0.75	wire		√	24	0.5	0.25			√			
M14	M14_25_1306em2	16	45.29	4	A	2268695.36	6965514.11	26-Jun-06	Jim Thoren	√													√	MIL	6	1	0.25	scrap		√	12	2	0.25			√			
M14	M14_252_1306em2	10	4.37	4	C	2268678.48	6965536.04	11-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	part of fuze bracket, vt							SS	√	3	2	0.25	N-S	0	√			
M14	M14_254_1306em2	12	4.36	4	B	2268646.77	6965475.07	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	ac part	AL	√	3	1	0.25	N-S	0	√			
M14	M14_274_1306em2	10	4.01	4	C	2268630.2	6965497.98	11-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	grenade spoon							FE	√	6	0.5	0.5	N-S	0	√			
M14	M14_275_1306em2	11	4	4	B	2268629.36	6965502.71	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	20mm pieces							OTHER	√	3	2	0.25	N-S	0	√			
M14	M14_276_1306em2	11	4	4	B	2268708.33	6965482.75	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_284_1306em2	13	3.86	4	B	2268708.75	6965501	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_287_1306em2	12	3.81	4	B	2268630.33	6965468.22	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	7.62 projo							CU	√	3	0.5	0.25	N-S	0	√			
M14	M14_29_1306em2	14	34.62	4	A	2268620.6	6965497.87	26-Jun-06	Jim Thoren	√							√	ORD MD	12	> 10	1	small arms scrap, brass, lead&cco							CU	√	3	0.5				√			
M14	M14_290_1306em2	12	3.74	4	B	2268679.79	6965445.04	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	24	0.5	0.25	N-S	0	√			
M14	M14_298_1306em2	11	3.61	4	B	2268707.62	6965518.01	26-Jun-06	Jim Thoren	√													√	CIV	12	1	0.25	barb wire	FE	√	12	0.5	0.25	N-S	0	√			
M14	M14_323_1306em2	11	3.28	3	B	2268619.98	6965477.18	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	1	N-S	0	√			
M14	M14_326_1306em2	12	3.27	3	B	2268713.89	6965515.72	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
M14	M14_330_1306em2	15	3.23	3	A	2268695.75	6965525.25	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25			√			
M14	M14_34_1306em2	16	30.27	4	A	2268670.42	6965511.84	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket							FE	√	6	2	0.25			√			
M14	M14_340_1306em2	11	3.14	3	B	2268716.48	6965528.33	26-Jun-06	Jim Thoren	√													√	CIV	6	2	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
M14	M14_344_1306em2	11	3.11	3	B	2268713.04	6965442.77	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_347_1306em2	11	3.1	3	B	2268660.78	6965529.79	26-Jun-06	Jim Thoren	√													√	CIV	3	3	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_35_1306em2	14	29.9	4	A	2268633.82	6965496.74	26-Jun-06	Jim Thoren	√													√	CIV	3	1	1	steel scrap	FE	√	6	4	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M14	M14_365_1306em2	11	2.93	3	B	2268636.27	6965480.1	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	washer	AL	√	3	0.5	0.25	N-S	0	√			
M14	M14_371_1306em2	11	2.87	3	B	2268702.8	6965447.27	26-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			
M14	M14_391_1306em2	11	2.63	3	B	2268669.43	6965534.65	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	4	0.25	N-S	0	√			
M14	M14_399_1306em2	11	2.56	3	B	2268642.16	6965441.49	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	1	0.25	N-S	0	√			
M14	M14_43_1306em2	14	25.5	4	A	2268627.88	6965525.64	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	vt fuze part							FE	√	6	2	2			√			
M14	M14_53_1306em2	11	21.1	4	B	2268634.04	6965501.23	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	6	4	0.25			√			
M14	M14_55_1306em2	14	17.45	4	A	2268674.4	6965476.62	16-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	wire, wire	FE	√	12	0.5	0.25			√			
M14	M14_56_1306em2	14	16.74	4	A	2268655.91	6965496.77	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24	0.5	0.25			√			
M14	M14_57_1306em2	14	16.7	4	A	2268702.89	6965477.15	26-Jun-06	Jim Thoren	√							√	ORD MD	3	1	4	75mm ap frag								√	6	4	2			√			
M14	M14_58_1306em2	13	16.32	4	B	2268640.58	6965504.04	26-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	slag	FE	√	3	2	0.5			√			
M14	M14_59_1306em2	14	16.23	4	A	2268682.16	6965470.31	26-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire		√	12	0.5	0.25			√			
M14	M14_71_1306em2	13	13.86	4	B	2268710.09	6965523.11	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	barb wire	FE	√	12	0.5	0.25			√			
M14	M14_72_1306em2	13	13.82	4	B	2268713.43	6965524.86	26-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	wire		√	24	0.5	0.25			√			
M14	M14_73_1306em2	12	13.79	4	B	2268687.66	6965514.27	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_74_1306em2	13	13.75	4	B	2268690.05	6965450.87	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
M14	M14_79_1306em2	16	13.33	4	A	2268667.26	6965496.23	26-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	> 24	0.5	0.25			√			
M14	M14_88_1306em2	13	12.27	4	B	2268656.34	6965516.08	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
M14	M14_92_1306em2	12	12.01	4	B	2268624.23	6965496.33	26-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	0.5	0.5	N-S	0	√			
M14	M14_93_1306em2	13	11.96	4	B	2268629.73	6965508.93	26-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.5	fuze part, vt							FE	√	3	0.5	2	N-S	0	√			
M14	QAdig_M14_230		10.7		QA	2268670.17	6965486.47	15-Aug-06	Alan Merriman	√																		too small to find								√			
M15	M15_1_1611em2	14	1507.78	4	A	2268739.36	6965504.86	06-Jul-06	Jim Thoren	√													√	CIV	0	1	≥8	scrap-plate	FE	√	12	6	0.5			√			
M15	M15_126_1611em2	13	12.58	4	B	2268742.24	6965509.17	06-Jul-06	Jim Thoren	√													√	CIV	0	1	≥8	scrap-plate	FE	√	12	> 6	0.5			√			
M15	M15_131_1611em2	13	12.16	4	B	2268766.61	6965504.03	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							FE	√	3	2	0.5			√			
M15	M15_132_1611em2	13	12.1	4	B	2268762.77	6965500.48	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze ant							AL	√	6	2	1			√			
M15	M15_139_1611em2	13	11.32	4	B	2268771.12	6965514.97	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
M15	M15_144_1611em2	10	10.72	4	C	2268762.73	6965487.61	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	bundle of wire	FE	√	3	0.5	0.25	N-S	0	√			
M15	M15_145_1611em2	12	10.69	4	B	2268782.93	6965533.49	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
M15	M15_152_1611em2	13	10.27	4	B	2268759.91	6965490.1	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze pt							AL	√	3	1	0.25			√			
M15	M15_162_1611em2	12	9.35	4	B	2268725.05	6965483.52	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	2	0.25			√			
M15	M15_166_1611em2	13	8.93	4	B	2268769.66	6965505.38	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3		0.25			√			
M15	M15_173_1611em2	13	8.51	4	B	2268728.08	6965439.78	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	link		√	3	1	0.25			√			
M15	M15_177_1611em2	10	8.2	4	C	2268725.85	6965479.89	11-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
M15	M15_179_1611em2	12	8.05	4	B	2268789.59	6965440.46	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
M15	M15_186_1611em2	12	7.45	4	B	2268727.88	6965457.69	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	1				√			
M15	M15_190_1611em2	14	7.21	4	A	2268720.82	6965497.44	16-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	wire, wire	FE	√	24	0.5				√			
M15	M15_198_1611em2	13	7.01	4	B	2268818.02	6965460.69	06-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	fence clips/wire	FE	√	3		0.25			√			
M15	M15_205_1611em2	13	6.63	4	B	2268758.45	6965511.76	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire		√	6		0.25			√			
M15	M15_212_1611em2	11	6.29	4	B	2268771.26	6965451.65	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3		0.25			√			
M15	M15_219_1611em2	11	6.04	4	B	2268728.23	6965511.74	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12		0.25			√			
M15	M15_221_1611em2	13	5.94	4	B	2268736.17	6965490.57	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze ant							AL	√	6	2	1			√			
M15	M15_237_1611em2	12	5.49	4	B	2268768.59	6965483.93	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
M15	M15_244_1611em2	13	5.25	4	B	2268734.95	6965487.11	06-Jul-06	Jim Thoren																															
M15	M15_248_1611em2	9	5.18	4	C	2268772.83	6965485.65	11-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze part, vt							SS	√	3	0.5	0.25	N-S	0	√			
M15	M15_260_1611em2	12	4.84	4	B	2268720.05	6965520.36	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire		√	12		0.25			√			
M15	M15_268_1611em2	11	4.69	4	B	2268739.79	6965491.71	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze pt							AL	√	3		0.25			√			
M15	M15_270_1611em2	12	4.6	4	B	2268771.58	6965518.25	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9		0.25			√			
M15	M15_285_1611em2	12	4.26	4	B	2268748.39	6965463.21	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	CU	√	3	0.5	0.25			√			
M15	M15_287_1611em2	10	4.24	4	C	2268762.95	6965504.16	11-Jul-06	Jim Thoren																			too small to locate											
M15	M15_310_1611em2	11	3.75	4	B	2268769.07	6965462.62	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24		0.25			√			
M15	M15_325_1611em2	9	3.44	3	C	2268766.48	6965489.9	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	barb wire	FE	√	6	0.5	0.25	N-S	0	√			
M15	M15_328_1611em2	11	3.38	3	B	2268769.23	6965448.27	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9		0.25			√			
M15	M15_332_1611em2	11	3.31	3	B	2268724.29	6965495.44	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
M15	M15_341_1611em2	11	3.1	3	B	2268740.23	6965488.19	06-Jul-06	Jim Thoren																															

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M15	M15_366_1611em2	11	2.72	3	B	2268812.5	6965510.26	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
M15	M15_371_1611em2	11	2.7	3	B	2268778.77	6965458.57	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24		0.25			√			
M15	M15_60_1611em2	14	29.91	4	A	2268726.59	6965461.86	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket								√	6	2	0.25			√			
M15	M15_76_1611em2	13	21.92	4	B	2268770.1	6965487.61	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	flare							AL	√	6	2	0.25			√			
M15	M15_87_1611em2	13	18.8	4	B	2268728.66	6965443.57	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							FE	√	6	2	0.25			√			
M15	M15_9_1611em2	13	183.8	4	B	2268742.05	6965501.96	06-Jul-06	Jim Thoren	√													√	CIV	0	1	≥8	scrap plate	FE	√	12	> 6	0.5			√			
M15	QAdig_M15_306		8.3		QA	2268754.36	6965455.86	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
M16	M16_100_1221em2	12	10.23	4	B	2268840.63	6965455.63	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25	N-S	0	√			
M16	M16_101_1221em2	12	10.08	4	B	2268870.09	6965440.01	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
M16	M16_104_1221em2	12	9.57	4	B	2268875.43	6965467.61	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
M16	M16_105_1221em2	12	9.55	4	B	2268892.59	6965515.36	28-Jun-06	Jim Thoren																			no contact, reacquired 8/1/06												
M16	M16_114_1221em2	12	7.9	4	B	2268844.45	6965455.31	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M16	M16_115_1221em2	11	7.68	4	B	2268836.7	6965439.95	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M16	M16_124_1221em2	12	6.7	4	B	2268898.55	6965530.14	28-Jun-06	Jim Thoren																			no contact, reacquired 8/1/06												
M16	M16_125_1221em2	12	6.57	4	B	2268889.96	6965513.37	28-Jun-06	Jim Thoren																			no contact, reacquired 8/1/06												
M16	M16_131_1221em2	12	6.01	4	B	2268842.06	6965437.95	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M16	M16_136_1221em2	11	5.75	4	B	2268844.96	6965512.63	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.5	wire	FE	√	6	0.5	0.25	N-S	0	√			
M16	M16_138_1221em2	12	5.39	4	B	2268894.49	6965491.59	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M16	M16_147_1221em2	15	5.08	4	A	2268875.99	6965527.2	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	FE	√	3	0.5	0.25	N-S	0	√			
M16	M16_148_1221em2	12	5.01	4	B	2268859.09	6965490.2	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
M16	M16_158_1221em2	11	4.53	4	B	2268836.2	6965498.04	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
M16	M16_161_1221em2	12	4.23	4	B	2268850.62	6965463.14	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.5	22 ctg case, brass		√	3	0.5	0.25	N-S	0	√			
M16	M16_164_1221em2	13	4.08	4	B	2268872.27	6965476.02	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
M16	M16_173_1221em2	13	3.62	4	B	2268841.59	6965444.19	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket							FE	√	3	2	0.25	N-S	0	√			
M16	M16_185_1221em2	11	3.39	3	B	2268831.9	6965516.11	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
M16	M16_211_1221em2	10	2.59	3	C	2268866.79	6965512	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	chain link	FE	√	3					√			
M16	M16_71_1221em2	9	36.36	4	C	2268851.15	6965471.8	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	9		0.25			√			
M16	M16_74_1221em2	10	29.3	4	C	2268853.16	6965476.32	17-Aug-06	Jim Thoren	√													√	CIV	0	5	0.25	fence clips fence clips	FE	√	3		0.25			√			
M16	M16_81_1221em2	14	19.68	4	A	2268831.12	6965478.9	16-Aug-06	Alan Merriman	√							√	ORD MD	3	1	0.25	5.56mm blank, small arms							OTHER	√	3	0.5	0.25	N-S	0	√			
M16	M16_83_1221em2	13	18.9	4	B	2268840.02	6965532.35	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	frag							FE	√	3	0.5	0.25	N-S	0	√			
M16	M16_88_1221em2	12	13.74	4	B	2268827.47	6965498.66	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
M16	M16_92_1221em2	13	12.05	4	B	2268847.12	6965463.45	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
M16	M16_93_1221em2	12	11.99	4	B	2268877.08	6965475.65	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
M16	QAdig_M16_183		13.1		QA	2268866.47	6965501.22	15-Aug-06	Alan Merriman																			no contact												
M16	QAdig_M16_261		9.4		QA	2268887.16	6965510.21	15-Aug-06	Alan Merriman	√													√	CIV	0	3	0.25	nails	FE	√	3	0.5	0.25			√			
M16	QAdig_M16_302		8.4		QA	2268883.35	6965501.03	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
M16	QAdig_M16_355		7.4		QA	2268854.94	6965439.06	15-Aug-06	Alan Merriman																			no contact												
M16	QAdig_M16_37		60.2		QA	2268870.76	6965460.16	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
M16	QAdig_M16_434		6.5		QA	2268856.94	6965527.05	15-Aug-06	Alan Merriman	√							√	ORD MD	3	1	0.25	1/4 of 7.62mm link							FE							√			
M17	M17_115_1304em2	16	9.24	4	A	2268941.68	6965504.52	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3		1			√			
M17	M17_119_1304em2	13	8.98	4	B	2269013.35	6965524.26	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	can	AL	√	6	4	0.25	N-S	45	√			
M17	M17_136_1304em2	13	6.97	4	B	2268990.12	6965439.17	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
M17	M17_146_1304em2	13	6.56	4	B	2268926.8	6965436.95	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
M17	M17_160_1304em2	13	5.65	4	B	2268957.04	6965462.92	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	battery "O"	FE	√	3	2				√			
M17	M17_17_1304em2	16	120.24	4	A	2268946.01	6965477.01	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	sign	FE	√	12	4	0.25			√			
M17	M17_173_1304em2	12	5.37	4	B	2268931.91	6965530.66	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6		0.25			√			
M17	M17_178_1304em2	12	4.96	4	B	2268949.05	6965488.12	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	9		0.25			√			
M17	M17_181_1304em2	11	4.91	4	B	2269001.76	6965454.1	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
M17	M17_186_1304em2	12	4.66	4	B	2268927.55	6965468.17	07-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	wire	FE	√	9		0.25			√			
M17	M17_189_1304em2	13	4.53	4	B	2268949.42	6965464.39	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	12		0.25			√			
M17	M17_193_1304em2	13	4.28	4	B	2268964.9	6965446.29	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
M17	M17_195_1304em2	16	4.26	4	A	2268942.23	6965477.23	07-Jul-06	Jim Thoren																			no contact												
M17	M17_197_1304em2	13	4.15	4	B	2268967.93	6965447.74	07-Jul-06	Jim Thoren																			no contact												

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
M17	M17_199_1304em2	13	4.14	4	B	2268981.73	6965507.54	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	2	0.25			√			
M17	M17_209_1304em2	13	3.95	4	B	2268947.78	6965460.95	07-Jul-06	Jim Thoren	√													√	CIV				scrap	FE	√	12	1	0.5			√			
M17	M17_215_1304em2	12	3.71	4	B	2268936.17	6965437	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9		0.25			√			
M17	M17_221_1304em2	13	3.63	4	B	2268952.82	6965477.01	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6		0.25			√			
M17	M17_223_1304em2	11	3.59	3	B	2269011.85	6965521.18	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
M17	M17_224_1304em2	11	3.57	3	B	2268953.16	6965467.83	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
M17	M17_235_1304em2	11	3.33	3	B	2268954.06	6965502.88	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	0.5	0.25			√			
M17	M17_39_1304em2	16	50	4	A	2268949.36	6965476.08	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	pipe	FE	√	9	4	0.25			√			
M17	M17_49_1304em2	15	33.86	4	A	2268970.57	6965478.32	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	9		0.25			√			
M17	M17_60_1304em2	13	26.89	4	B	2268924.94	6965531.43	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	12	0.5				√			
M17	M17_66_1304em2	13	22.18	4	B	2268993.5	6965440.8	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	nail, nail	FE	√	6		0.25			√			
M17	M17_72_1304em2	16	18.51	4	A	2268944.52	6965460.62	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	6	4	0.25			√			
M17	M17_88_1304em2	11	13.53	4	B	2268939.22	6965441.62	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3		0.25			√			
M18	M18_1_1304em2	15	1584.38	4	A	2269083.91	6965468.12	07-Jul-06	Jim Thoren	√													√	CIV	> 24	2	0.25	telephone pole, tiedown rod	FE	√	> 24	0.5	0.5	N-S	0	√			
M18	M18_11_1304em2	15	280.15	4	A	2269097.37	6965464.06	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	pipe	FE	√	6	4				√			
M18	M18_125_1304em2	9	8.55	4	C	2269089.46	6965451.14	11-Jul-06	Jim Thoren																			no contact											
M18	M18_130_1304em2	16	7.59	4	A	2269054.17	6965512.5	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3		0.5			√			
M18	M18_131_1304em2	12	7.52	4	B	2269098.66	6965468.66	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nut	FE	√	3		0.25			√			
M18	M18_140_1304em2	15	6.76	4	A	2269101.37	6965463.92	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	washer	FE	√	3		0.25			√			
M18	M18_162_1304em2	13	5.63	4	B	2269049.61	6965485.23	07-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	3		0.25			√			
M18	M18_165_1304em2	11	5.6	4	B	2269092.21	6965509.23	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	lag bolt	FE	√	3		0.5			√			
M18	M18_172_1304em2	14	5.38	4	A	2269067.8	6965440.91	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	24		0.25			√			
M18	M18_192_1304em2	9	4.3	4	C	2269086.18	6965449.61	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
M18	M18_2_1304em2	12	1120.99	4	B	2269091.23	6965454.52	07-Jul-06	Jim Thoren	√													√	CIV	> 24	1	0.25	telephone pole, tiedown rod	FE	√	> 24	1	1	N-S	0	√			
M18	M18_201_1304em2	12	4.12	4	B	2269022.15	6965503.29	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	24		0.25			√			
M18	M18_204_1304em2	11	4.1	4	B	2269108.67	6965527.17	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3		0.25			√			
M18	M18_216_1304em2	11	3.7	4	B	2269030	6965505.34	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	2	0.25			√			
M18	M18_218_1304em2	13	3.67	4	B	2269063.83	6965463.72	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6		0.25			√			
M18	M18_220_1304em2	12	3.65	4	B	2269020.23	6965497.76	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
M18	M18_222_1304em2	11	3.59	3	B	2269037.47	6965465.59	07-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap	FE	√	3	2	0.25			√			
M18	M18_227_1304em2	11	3.48	3	B	2269075.6	6965465.49	07-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	6		0.25			√			
M18	M18_228_1304em2	11	3.48	3	B	2269044.47	6965486.02	07-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3		0.25			√			
M18	M18_3_1304em2	15	754.29	4	A	2269080.27	6965467.66	07-Jul-06	Jim Thoren	√													√	CIV	> 24	2	0.25	telephone pole and tiedown rod	FE	√	> 24	0.5	0.5	N-S	0	√			
M18	M18_35_1304em2	15	56.38	4	A	2269087.31	6965467.11	07-Jul-06	Jim Thoren	√													√	CIV	> 24	1	≥8	telephone pole, tiedown rod	FE	√	> 24	1	1	N-S	0	√			
M18	M18_4_1304em2	12	702.72	4	B	2269091.28	6965458.33	07-Jul-06	Jim Thoren	√													√	CIV	> 24	1	0.25	telephone pole, tiedown rod	FE	√	> 24	1	1	N-S	0	√			
M18	M18_6_1304em2	15	485.17	4	A	2269083.01	6965464.33	07-Jul-06	Jim Thoren	√													√	CIV	> 24	1	≥8	telephone pole, tiedown rod	FE	√	> 24	1	1	N-S	0	√			
M18	M18_74_1304em2	15	18.15	4	A	2269101.14	6965509.46	07-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3		0.25			√			
M18	M18_87_1304em2	12	13.73	4	B	2269034.37	6965491.73	07-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12		0.25			√			
N01	N01_10_1215em1	15	31.51	4	A	2267395.94	6965381.36	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	donkey shoe	FE	√	6	6	0.25			√			
N02	N02_27_1304em1	16	48.79	4	A	2267419.1	6965402.61	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	scrap							AL	√	6	2	2			√			
N02	N02_30_1304em1	15	30.62	4	A	2267428.07	6965338.3	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	2	fuze part							FE	√	3	4	4			√			
N02	N02_40_1304em1	16	10.66	4	A	2267513.41	6965412.64	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25			√			
N02	N02_59_1304em1	12	3.26	3	B	2267494.35	6965394.74	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	FE	√						√			
N04	N04_34_1309em2	16	10.92	4	A	2267699.67	6965389.08	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	JATO bottle part							FE	√	3	2	0.5			√			
N04	N04_43_1309em2	14	8.11	4	A	2267709.45	6965430.34	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.5	A/C seat part	AL	√	3	1	1			√			
N05	N05_29_1311em2	11	4.02	4	B	2267781.95	6965378.96	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	large nut/scrap metal	FE	√	3	1	0.5	N-S	0	√			
N05	N05_32_1311em2	11	3.23	3	B	2267749.59	6965410.65	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	window latch	FE	√	3	0.5	0.5	N-S	45	√			
N06	N06_11_1311em2	13	9.11	4	B	2267876.29	6965436.17	06-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	scrap	AL	√	3	0.5	0.25	N-S	45	√			
N06	N06_12_1311em2	13	8.26	4	B	2267909.27	6965389.25	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
N06	N06_13_1311em2	15	7.5	4	A	2267914.99	6965379.84	28-Jun-06	Jim Thoren	√													√	CIV	0	4	0.25	fence parts	FE	√	3	0.5	0.25			√			
N06	N06_18_1311em2	13	6.18	4	B	2267890.55	6965435.7	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips, fence wire	FE	√	3	0.5	0.25	N-S	0	√			
N06	N06_21_1311em2	14	4.91	4	A	2267862.93	6965362.46	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	A/C flare part							AL	√	3	0.5	0.5			√			
N06	N06_22_1311em2	14	4.76	4	A	2267897.7	6965358.39	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	scrap							AL	√	3	0.5	0.5			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
N06	N06_26_1311em2	13	4.34	4	B	2267886.62	6965416.85	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap metal	FE	√	3	1	0.25	N-S	0	√			
N06	N06_27_1311em2	15	4.16	4	A	2267902.48	6965414.03	28-Jun-06	Jim Thoren																			No Contact											
N06	N06_3_1311em2	16	45.88	4	A	2267898.27	6965414.62	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	9	0.5	0.5			√			
N06	N06_34_1316em2	13	5.94	4	B	2267906.62	6965397.87	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
N06	N06_7_1316em2	15	46.33	4	A	2267907.3	6965389.42	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap	FE	√	6	0.5	0.25			√			
N06	N06_8_1311em2	13	12.67	4	B	2267901.62	6965407.25	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
N06	N06_9_1311em2	14	12.28	4	A	2267916.01	6965359.01	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	A/C seat part	FE	√	3	1	1			√			
N06	QAdig_N06_498		5.9		QA	2267881.45	6965374.9	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
N07	N07_1_1311em2	15	128.07	4	A	2267919.08	6965369.48	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	fence part	FE	√	3	1	0.25			√			
N07	N07_16_1311em2	16	6.62	4	A	2267945.73	6965371.44	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	Scrap							FE	√	3	0.5	0.25			√			
N07	N07_2_1311em2	13	71.1	4	B	2268018.2	6965339.02	06-Jul-06	Alan Merriman																			no find, reaquired 7/25/06											
N07	N07_202_1311em2	5	1	1	D	2268010.03	6965337.47	17-Aug-06	Alan Merriman	√													√	CIV	0	4	0.25	nails	FE							√			
N07	N07_23_1311em2	12	4.74	4	B	2268011.43	6965420.44	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part type unknown							OTHER	√	3	0.5	0.25	N-S	0	√			
N07	N07_24_1311em2	14	4.7	4	A	2267923.08	6965360.19	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	fence part	FE	√	3	0.5	0.25			√			
N07	N07_30_1311em2	14	3.85	4	A	2267926.76	6965349.73	28-Jun-06	Jim Thoren	√													√	CIV	0	3	0.25	fence parts	FE	√	3	0.5	0.25			√			
N07	N07_31_1311em2	11	3.35	3	B	2267931.73	6965340.73	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
N07	N07_7_1311em2	15	13.4	4	A	2267983.24	6965424.82	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	Hook	FE	√	6	0.5	1			√			
N07	QAdig_N07_366		7.3		QA	2267931.48	6965359.58	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
N08	N08_14_1316em2	13	18.15	4	B	2268035.4	6965385.08	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	tractor part (rod)	FE	√	9	0.5	0.25	NE-SW	0	√			
N08	N08_233_1307em2	15	10.01	4	A	2268078.8	6965381.69	28-Jun-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	90	√			
N08	N08_255_1307em2	15	9.12	4	A	2268078.39	6965372.31	16-Aug-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips, T-post clips	FE	√	3	0.5	0.25	N-S	0	√			
N08	N08_272_1307em2	15	8.54	4	A	2268077.29	6965351.96	16-Aug-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips, T-post clip	FE	√	3	0.5	0.25	E-W	90	√			
N08	N08_311_1307em2	14	7.05	4	A	2268078.07	6965361.09	28-Jun-06	Alan Merriman	√													√	CIV	0	4	0.25	fence clips	SS	√	3	0.5	0.25	E-W	45	√			
N08	N08_327_1307em2	16	6.58	4	A	2268089.95	6965404.75	28-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze, vt part							FE	√	3	4	0.25	NE-SW	45	√			
N08	N08_336_1307em2	14	6.42	4	A	2268083.53	6965411.22	28-Jun-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips	FE	√	6	0.5	0.25	NE-SW	45	√			
N08	N08_4_1316em2	16	70.25	4	A	2268064.71	6965347.13	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.5	t47 fuze adapter							FE	√	6	2	2	E-W	90	√			
N08	N08_402_1307em2	13	4.9	4	B	2268083.82	6965421.7	17-Aug-06	Alan Merriman	√													√	CIV	3	4	0.25	fence clips, t-post clips	FE	√	3	0.5	0.25	NE-SW	45	√			
N08	N08_406_1307em2	13	4.78	4	B	2268075.29	6965341.28	06-Jul-06	Alan Merriman	√													√	CIV	3	4	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	45	√			
N08	N08_413_1307em2	11	4.6	4	B	2268084.01	6965430.86	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence clips	FE	√	3	0.5	0.25	N-S	0	√			
N08	N08_429_1307em2	14	4.29	4	A	2268115.61	6965388.92	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze adapter							AL	√	3	2	1	N-S	45	√			
N08	N08_452_1307em2	14	3.92	4	A	2268078.72	6965391.56	28-Jun-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips	FE	√	6	0.5	0.25	NE-SW	45	√			
N08	N08_47_1316em2	15	4.27	4	A	2268043.09	6965420.62	28-Jun-06	Alan Merriman	√													√	CIV	6	4	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	45	√			
N08	N08_5_1316em2	16	66.67	4	A	2268051.21	6965409.33	28-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze, vt part							FE	√	6	4	0.25	NE-SW	45	√			
N08	N08_516_1307em2	12	3.11	3	B	2268080.18	6965401.41	06-Jul-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	45	√			
N08	N08_53_1316em2	15	3.92	4	A	2268050.37	6965413.27	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze, vt part							FE	√	6	4	0.25	NE-SW	45	√			
N08	N08_542_1307em2	13	2.84	3	B	2268112.95	6965419.24	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	bailing wire	FE	√	9	0.5	0.25	NE-SW	0	√			
N08	N08_9_1316em2	13	36.81	4	B	2268036.18	6965388.59	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	tractor part (rod)	FE	√	9	0.5	0.25	NE-SW	0	√			
N09	N09_1_1219em2	15	454.26	4	A	2268203.77	6965409.45	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	chunk of aluminum	AL	√	9	4	0.25	N-S	45	√			
N09	N09_11_1219em2	16	45.89	4	A	2268198.75	6965357.68	28-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	piece of aluminum	AL	√	6	0.5	0.25	NE-SW	45	√			
N09	N09_131_1219em2	12	4.4	4	B	2268201.86	6965388.94	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	pieces of aluminum	AL	√	3	4	0.25	N-S	45	√			
N09	N09_138_1219em2	12	4.17	4	B	2268158.32	6965417.34	06-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	37mm piece							FE	√	3	0.5	0.5	E-W	90	√			
N09	N09_167_1219em2	11	2.95	3	B	2268215.92	6965391.46	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	part of vt fuze							FE	√	3	0.5	0.25	N-S	0	√			
N09	N09_23_1219em2	16	22.38	4	A	2268175.36	6965413.59	28-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	aluminum pieces	AL	√	3	0.5	0.25	NE-SW	45	√			
N09	N09_36_1219em2	13	13.76	4	B	2268202.77	6965352.44	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	piece of aluminum	AL	√	3	1	0.25	N-S	0	√			
N09	N09_7_1219em2	16	76.88	4	A	2268188.62	6965393.21	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	magazine clip w/blank 7.62 rds							FE	√	6	1	0.25	NE-SW	45	√			
N09	N09_73_1219em2	15	7.79	4	A	2268138.55	6965400.99	28-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	37mm rd piece							FE	√	3	0.5	0.5	NE-SW	45	√			
N09	N09_74_1219em2	12	7.63	4	B	2268183.8	6965434.61	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	45	√			
N09	N09_84_1219em2	12	7.23	4	B	2268190.77	6965426.83	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.5	NE-SW	45	√			
N09	N09_90_1219em2	13	6.55	4	B	2268197.02	6965388.95	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	piece of aluminum	AL	√	3	4	0.25	N-S	45	√			
N09	N09_95_1219em2	16	6.29	4	A	2268199.91	6965408.69	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	part of fuze							FE	√	3	4	0.25	NE-SW	90	√			
N09	N09_98_1219em2	12	6.19	4	B	2268182.66	6965417.16	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	20 penny nail	FE	√	6	0.5	0.25	N-S	45	√			
N10	N10_102_1219em2	12	5.91	4	B	2268287.42	6965430.45	06-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	nails	FE	√	3	0.5	0.25	NE-SW	0	√			
N10	N10_112_1219em2	14	5.32	4	A	2268246.03	6965373.83	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze, vt antenna							FE	√	6	0.5	0.25	N-S	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
N10	N10_12_1219em2	15	45.46	4	A	2268283.41	6965378.18	28-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	2' length of chain	FE	√	> 24	0.5	0.25	N-S	0	√			
N10	N10_120_1219em2	13	4.86	4	B	2268271.02	6965420.16	06-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	nails	FE	√	3	0.5	0.25	N-S	45	√			
N10	N10_122_1219em2	10	4.69	4	C	2268315.89	6965407.42	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
N10	N10_125_1219em2	12	4.62	4	B	2268302.12	6965435.64	06-Jul-06	Alan Merriman	√													√	CIV	3	4	0.25	nails	FE	√	3	0.5	0.25	NE-SW	45	√			
N10	N10_128_1219em2	12	4.51	4	B	2268285.37	6965436.19	06-Jul-06	Alan Merriman	√													√	CIV	12	> 10	0.25	bed of nails	FE	√	3	0.5	0.25	NE-SW	45	√			
N10	N10_133_1219em2	13	4.3	4	B	2268297.89	6965431.86	06-Jul-06	Alan Merriman	√													√	CIV	3	4	0.25	nails	FE	√	3	0.5	0.25	NE-SW	45	√			
N10	N10_136_1219em2	11	4.23	4	B	2268284.24	6965415.54	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	16 penny nail	FE	√	6	0.5	0.25	NE-SW	45	√			
N10	N10_14_1219em2	15	42.8	4	A	2268228.59	6965348.07	28-Jun-06	Alan Merriman	√													√	CIV	0	1	≥8	7" length of chain	FE	√	9	0.5	0.5	N-S	0	√			
N10	N10_145_1219em2	11	3.7	4	B	2268277.75	6965431.04	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	45	√			
N10	N10_15_1219em2	14	38.14	4	A	2268269.1	6965431.55	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	ball of cable	FE	√	6	2	2	NE-SW	45	√			
N10	N10_172_1413em2	15	7.96	4	A	2268224.74	6965390.34	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze piece, vt							FE	√	3	4	0.25	NE-SW	45	√			
N10	N10_198_1219em2	11	2.47	2	B	2268222.71	6965414.65	06-Jul-06	Alan Merriman	√							√	ORD MD	12	5	0.25	7.62 blanks	√	CIV	3	1	0.25	machinary part	FE	√	6	1	1	NE-SW	45	√			
N10	N10_20_1219em2	14	24.64	4	A	2268258.48	6965434.65	28-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	0.25	5.56 and7.62 carts	√	CIV	12	5	0.25	metal scrap	FE		3	0.5	0.5	N-S	45	√			
N10	N10_24_1219em2	16	21.88	4	A	2268279.32	6965366.07	28-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	wire	FE	√	6	0.5	0.25	N-S	45	√			
N10	N10_25_1219em2	15	21.58	4	A	2268279.67	6965378.14	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	2' length of chair	FE	√	> 24	0.5	0.25	N-S	45	√			
N10	N10_3_1219em2	16	128.32	4	A	2268223.98	6965347.88	28-Jun-06	Alan Merriman	√													√	CIV	0	1	≥8	7' length of chain	FE	√	9	0.5	0.5	N-S	0	√			
N10	N10_31_1219em2	14	14.54	4	A	2268247.11	6965338.36	28-Jun-06	Alan Merriman	√							√	ORD MD	> 24	> 10	0.25	5.56 and 7.62 carts	√	CIV	24	5	0.25	metal scrap	FE	√	3	0.5	0.5	N-S	45	√			
N10	N10_38_1219em2	16	13.52	4	A	2268219.41	6965336.93	28-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	square metal washer	FE	√	3	0.5	0.5	NE-SW	45	√			
N10	N10_78_1219em2	12	7.53	4	B	2268311.85	6965420.52	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	45	√			
N10	N10_81_1219em2	12	7.34	4	B	2268291.44	6965427.12	17-Aug-06	Alan Merriman	√													√	CIV	3	3	0.25	nails, nails	FE	√	3	0.5	0.25	N-S	45	√			
N11	N11_105_1219em2	9	5.79	4	C	2268332.16	6965433.39	11-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	nails	FE	√	6	0.5	0.25	N-S	0	√			
N11	N11_106_1219em2	12	5.6	4	B	2268335.04	6965411.91	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	20 penny nail	FE	√	3	0.5	0.25	N-S	0	√			
N11	N11_108_1219em2	12	5.54	4	B	2268324.52	6965420.1	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap metal	FE	√	3	0.5	0.25	N-S	0	√			
N11	N11_111_1219em2	13	5.38	4	B	2268393.87	6965407.25	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	20 penny nail	FE	√	3	0.5	0.25	N-S	0	√			
N11	N11_117_1219em2	9	5.07	4	C	2268371.41	6965363.3	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
N11	N11_119_1219em2	12	4.9	4	B	2268338.26	6965413.48	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	20 penny nail	FE	√	3	0.5	0.25	N-S	0	√			
N11	N11_123_1219em2	12	4.65	4	B	2268336.1	6965427.32	06-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	ac cable connector	AL	√	3	1	1	N-S	0	√			
N11	N11_124_1219em2	15	4.64	4	A	2268398.89	6965358.31	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	pipe strap	FE	√	6	1	0.25	N-S	0	√			
N11	N11_141_1219em2	11	3.88	4	B	2268380.24	6965375.96	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	steel bar	FE	√	3	0.5	0.5	N-S	0	√			
N11	N11_151_1219em2	11	3.5	3	B	2268319.92	6965424.91	06-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	5.56mm blank m200 expended							OTHER	√	3	0.5	0.25	N-S	0	√			
N11	N11_180_1413em2	13	7.32	4	B	2268350.8	6965398.79	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	pipe strap	FE	√	6	1	0.25	N-S	0	√			
N11	N11_185_1219em2	8	2.59	3	D	2268345.8	6965429.1	17-Aug-06	Alan Merriman	√													√	CIV	0	4	0.25	nails	FE							√			
N11	N11_210_1413em2	12	5.17	4	B	2268357.05	6965387.3	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	pipe strap	FE	√	6	0.5	0.5	N-S	0	√			
N11	N11_255_1413em2	11	3.55	3	B	2268353.84	6965385.22	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	pipe strap	FE	√	6	0.5	0.5	N-S	0	√			
N11	N11_266_1413em2	11	3.32	3	B	2268350.48	6965390.58	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	pipe strap	FE	√	6	1	1	N-S	0	√			
N11	N11_28_1219em2	13	16.34	4	B	2268354.09	6965424.36	06-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	nails, contaminated	FE	√	3	0.5	0.25	N-S	0	√			
N11	N11_32_1219em2	10	14.23	4	C	2268354.87	6965433.78	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	9	0.5	0.25	N-S	0	√			
N11	N11_34_1219em2	13	14.07	4	B	2268341.41	6965432.64	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	pipe strap	FE	√	6	0.5	0.5	N-S	0	√			
N11	N11_46_1219em2	15	10.46	4	A	2268400.95	6965343.43	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.25	sprite can	AL	√	3	1	0.25	N-S	0	√			
N11	N11_47_1219em2	12	10.32	4	B	2268352.12	6965428.24	06-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	nails, (telephone pole)	FE	√	3	0.5	0.25	N-S	0	√			
N11	N11_50_1219em2	12	9.99	4	B	2268334.12	6965430.74	17-Aug-06	Alan Merriman	√													√	CIV	3	2	0.25	nails, various sizes, more nails	FE	√	6	0.5	0.25	N-S	0	√			
N11	N11_58_1219em2	10	9.48	4	C	2268359.35	6965431.79	11-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	nail, nails	FE	√	6	0.5	0.25	N-S	0	√			
N11	N11_64_1219em2	13	8.42	4	B	2268414.67	6965337.67	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wad of wire	FE	√	6	0.5	0.25	N-S	0	√			
N11	N11_69_1219em2	13	8.14	4	B	2268346.12	6965434.68	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	scrap metal, nails (telephone po		√	3	0.5	0.25	N-S	0	√			
N11	N11_75_1219em2	16	7.61	4	A	2268333.12	6965383.18	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	explosive bolt	√	CIV	3	1	0.25	wire bundle	FE	√	12	1	0.25	NE-SW	0	√			
N11	N11_76_1219em2	9	7.61	4	C	2268365.83	6965430.3	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
N11	N11_9_1219em2	15	50.14	4	A	2268403.59	6965359.82	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze, vt part, aluminum & copper							FE	√	3	4	0.25	N-S	45				
N11	QAdig_N11_162		14.7		QA	2268361.2	6965425.96	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
N11	QAdig_N11_502		5.9		QA	2268340.4	6965429.47	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25			√			
N12	N12_108_1413em2	16	15.41	4	A	2268447.22	6965350.14	28-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze base							FE	√	3	2	1	N-S	0	√			
N12	N12_139_1413em2	16	11.64	4	A	2268475.07	6965372.55	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze cap							FE	√	3	0.5	0.25	N-S	0	√			
N12	N12_199_1413em2	14	6.15	4	A	2268506.06	6965422.78	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	37mm frag							FE	√	3	0.5	0.25	N-S	0	√			
N12	N12_2_1413em2	16	221.03	4	A	2268427.13	6965339.46	16-Aug-06	Jim Thoren	√							√	ORD MD	0	2	4	(2) m166 vt fuzes,(2)7.62mm blnk							OTHER	√	3	4	4	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
N12	N12_209_1413em2	13	5.19	4	B	2268488.69	6965404.88	06-Jul-06	Jim Thoren	√													√	MIL	0	2	0.25	ac scrap	AL	√	3	1	0.25	N-S	0	√			
N12	N12_235_1413em2	15	4.3	4	A	2268491.32	6965351.19	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	bracket with bolt	AL	√	3	1	1	N-S	45	√			
N12	N12_83_1413em2	16	21.14	4	A	2268497.52	6965382.66	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	milspec part	FE	√	3	4	0.5	E-W	0	√			
N12	QAdig_N12_446		6.4		QA	2268472.71	6965429.38	15-Aug-06	Alan Merriman																			no contact											
N13	N13_102_1218em2	16	11.32	4	A	2268576.26	6965415.73	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	ac scrap	AL	√	3	0.5	0.25	N-S	0	√			
N13	N13_104_1218em2	16	11.08	4	A	2268605.83	6965351.11	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap metal	FE	√	9	4	0.25	N-S	45	√			
N13	N13_146_1218em2	15	7.16	4	A	2268615.46	6965407.84	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	ac scrap	AL	√	3	1	0.25	N-S	0	√			
N13	N13_154_1218em2	14	6.57	4	A	2268591.04	6965421.54	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	ac flare mt							AL	√	3	1	0.25	N-S	0	√			
N13	N13_157_1218em2	12	6.41	4	B	2268534.91	6965431.52	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag							FE	√	6	1	0.25	E-W	0	√			
N13	N13_208_1218em2	14	4.77	4	A	2268528.07	6965374.27	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	ac scrap	AL	√	3	1	0.25	N-S	0	√			
N13	N13_212_1218em2	15	4.69	4	A	2268570.7	6965381.55	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							AL	√	3	1	0.25	NE-SW	45	√			
N13	N13_248_1218em2	12	3.67	4	B	2268549.84	6965396.31	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	ac scrap	AL	√	3	1	0.25	N-S	0	√			
N13	N13_61_1218em2	13	21.47	4	B	2268601.4	6965399.6	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	5.56 blank							OTHER	√	3	0.5	0.25	N-S	0	√			
N13	N13_90_1218em2	12	12.35	4	B	2268605.53	6965399.45	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze strap, vt							AL	√	6	1	0.25	E-W	0	√			
N14	N14_104_1413em2	11	15.87	4	B	2268702.97	6965423.61	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze booster, mt							FE	√	3	2	2	N-S	0	√			
N14	N14_122_1413em2	13	13.29	4	B	2268681.88	6965358.06	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bar, vt							FE	√	3	1	0.5	N-S	0	√			
N14	N14_125_1413em2	15	13.02	4	A	2268668.56	6965408.24	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	ac part	SS	√	3	2	0.25	N-S	0	√			
N14	N14_127_1413em2	15	12.97	4	A	2268701.24	6965366.52	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.5	frag							FE	√	3	1	0.25	N-S	0	√			
N14	N14_133_1413em2	15	11.95	4	A	2268692.76	6965350.61	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	20 penny nail	FE	√	6	0.5	0.25	N-S	90	√			
N14	N14_136_1413em2	13	11.82	4	B	2268683.38	6965414.9	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	wire, bolt	FE	√	6	0.5	0.25	N-S	0	√			
N14	N14_138_1413em2	14	11.67	4	A	2268702.57	6965414.97	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wad of wire	FE	√	9	1	0.25	N-S	0	√			
N14	N14_142_1413em2	14	11.26	4	A	2268661.87	6965414.66	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barb wire	FE	√	9	0.5	0.25	N-S	0	√			
N14	N14_143_1413em2	15	11.25	4	A	2268675.93	6965420.73	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	tractor gear	FE	√	3	0.5	0.25	N-S	0	√			
N14	N14_159_1413em2	13	8.84	4	B	2268703.27	6965433.47	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wad of wire	FE	√	9	0.5	0.25	N-S	0	√			
N14	N14_165_1218em2	14	6.08	4	A	2268680.75	6965436.08	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze bar, vt							FE	√	3	1	0.5	N-S	0	√			
N14	N14_168_1413em2	13	8.1	4	B	2268702.6	6965429.55	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wad of wire	FE	√	9	0.5	0.25	N-S	0	√			
N14	N14_173_1413em2	14	7.71	4	A	2268710.49	6965415.27	06-Jul-06	Jim Thoren	√													√	CIV	3	5	0.25	staples	FE	√	3	0.5	0.25	N-S	0	√			
N14	N14_179_1413em2	14	7.4	4	A	2268706.18	6965385.65	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barb wire	FE	√	9	0.5	0.25	N-S	0	√			
N14	N14_194_1413em2	11	6.68	4	B	2268716.38	6965420.81	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
N14	N14_21_1413em2	14	78.66	4	A	2268705.31	6965354.51	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze body, vt (aL,CU&FE)							OTHER	√	3	4	4	N-S	90	√			
N14	N14_212_1413em2	14	5.1	4	A	2268640.11	6965419.86	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	thick wire	FE	√	6	0.5	0.25	N-S	0	√			
N14	N14_217_1413em2	12	5.05	4	B	2268711.62	6965397.84	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	staples in tree stump	FE										
N14	N14_232_1413em2	11	4.41	4	B	2268684.51	6965411.11	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	bolt	FE	√	9	0.5	0.25	N-S	0	√			
N14	N14_242_1413em2	14	4.07	4	A	2268641.41	6965406.53	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	3	1	0.25	N-S	0	√			
N14	N14_249_1413em2	14	3.84	4	A	2268671.69	6965377.29	16-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	wire staples, staples	FE	√	3	1	0.25	N-S	0	√			
N14	N14_25_1413em2	15	68.7	4	A	2268644.73	6965364.45	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	ac seat part	AL	√	6	1	0.25	N-S	0	√			
N14	N14_250_1413em2	12	3.82	4	B	2268655.31	6965418.45	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	wad of wire	FE	√	6	0.5	0.25	N-S	0	√			
N14	N14_284_1413em2	11	3.01	3	B	2268712.12	6965405.39	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barb wire	FE	√	12	0.5	0.25	N-S	45	√			
N14	N14_334_1413em2	11	2.28	2	B	2268645.59	6965376.98	06-Jul-06	Jim Thoren	√							√	ORD MD				5.56mm blanks, brass							OTHER	√	3	0.5	0.25	N-S	0	√			
N14	N14_40_1413em2	15	51.5	4	A	2268633.13	6965398.47	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	cover	AL	√	3	4	0.25	N-S	0	√			
N14	N14_422_1413em2	7	1.61	1	D	2268694.3	6965426.89	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
N14	N14_64_1413em2	16	30.98	4	A	2268642.65	6965409.7	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	thick wire	FE	√	24	0.5	0.25	N-S	0	√			
N14	N14_72_1413em2	14	25.05	4	A	2268706.28	6965425.28	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
N14	N14_73_1413em2	10	24.75	4	C	2268676.72	6965356.2	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	9		1			√			
N15	N15_105_1413em2	13	15.65	4	B	2268735.7	6965402.09	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	> 6	> 4			√			
N15	N15_109_1218em2	15	10.39	4	A	2268763.91	6965366.49	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	wire	FE	√	6	> 6	> 4			√			
N15	N15_120_1218em2	12	9.08	4	B	2268771.58	6965381.21	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire		√	6	> 6	> 4			√			
N15	N15_141_1218em2	12	7.58	4	B	2268752.23	6965411.55	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barbed wire	FE	√	6	> 6	> 4			√			
N15	N15_145_1218em2	10	7.27	4	C	2268771.02	6965353.89	11-Jul-06	Jim Thoren	√													√					already dug ass. with N15_81											
N15	N15_147_1413em2	13	10.93	4	B	2268738.41	6965406.78	06-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	barbed wire		√	3	0.5				√			
N15	N15_170_1218em2	12	6.02	4	B	2268758.93	6965419.98	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	barbed wire	FE	√	6	0.5	0.25			√			
N15	N15_174_1218em2	12	5.97	4	B	2268764.95	6965429.32	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	flare piece							AL							√			
N15	N15_175_1218em2	14	5.9	4	A	2268745.07	6965337.25	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	chain link fence	FE	√	12	6	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
N15	N15_180_1218em2	11	5.62	4	B	2268785.99	6965369.28	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	7.62 brass	√	MIL	6	4	0.25	ammo links and fence clips	FE	√	3	0.5	0.5	NE-SW	45	√			
N15	N15_187_1218em2	11	5.53	4	B	2268770.71	6965348.24	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	> 6	> 4			√			
N15	N15_194_1218em2	12	5.22	4	B	2268727.92	6965337.33	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part							AL	√	3	0.5	0.25	N-S	0	√			
N15	N15_196_1218em2	14	5.16	4	A	2268769.36	6965391.38	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	6		0.25			√			
N15	N15_198_1218em2	11	5.13	4	B	2268719.28	6965420.12	06-Jul-06	Jim Thoren	√							√	ORD MD	3	3	0.25	brass & links							FE							√			
N15	N15_203_1413em2	12	5.66	4	B	2268737.16	6965424.57	06-Jul-06	Jim Thoren	√													√	CIV	12	2	0.5	barb wire and staples	FE	√	12	0.5	0.25	NE-SW	45	√			
N15	N15_209_1218em2	11	4.74	4	B	2268759.99	6965369.31	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	> 6	> 4			√			
N15	N15_214_1218em2	13	4.66	4	B	2268757.95	6965435.38	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barbed wire	FE	√	6	0.5	0.25			√			
N15	N15_221_1413em2	13	4.93	4	B	2268796.07	6965398.27	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	> 6	> 4			√			
N15	N15_225_1218em2	10	4.36	4	C	2268760.92	6965429.59	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
N15	N15_232_1218em2	12	4.12	4	B	2268752.02	6965382.94	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	> 6	> 4			√			
N15	N15_236_1218em2	12	4.03	4	B	2268804.65	6965355.81	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	> 6	> 4			√			
N15	N15_247_1218em2	10	3.73	4	C	2268721.15	6965423.27	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE							√			
N15	N15_250_1218em2	12	3.67	4	B	2268763.92	6965378.43	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	wire, wire	FE	√	6	> 6	> 4			√			
N15	N15_262_1218em2	12	3.37	3	B	2268753.75	6965342.51	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire		√	9	> 6	> 4			√			
N15	N15_263_1413em2	11	3.36	3	B	2268742.96	6965411.31	06-Jul-06	Jim Thoren																			no contact											
N15	N15_267_1218em2	10	3.28	3	C	2268748.91	6965401.19	11-Jul-06	Jim Thoren	√																													
N15	N15_270_1218em2	11	3.18	3	B	2268767.74	6965420.82	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.5	barbed wire / wad	FE							√			
N15	N15_271_1413em2	11	3.22	3	B	2268732.92	6965429.36	06-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	staples								√			
N15	N15_289_1218em2	9	2.72	3	C	2268768.52	6965345.74	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	wire, fence wire	FE	√	3	0.5	0.25			√			
N15	N15_312_1218em2	8	2.37	2	D	2268781.65	6965427.71	17-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	wire								√			
N15	N15_48_1218em2	15	31.68	4	A	2268769.31	6965435.89	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	10 gauge wire	FE	√	12	0.5	0.25			√			
N15	N15_50_1218em2	15	26.92	4	A	2268756.5	6965401.23	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze body							OTHER	√	3	4	4	N-S	90	√			
N15	N15_56_1218em2	15	25.16	4	A	2268734.96	6965435.7	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.5	vt fuze body							FE							√			
N15	N15_62_1218em2	15	21.34	4	A	2268748.23	6965380.3	16-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	wire, wire	FE	√	6	> 6	> 4			√			
N15	N15_71_1218em2	16	18.93	4	A	2268725.13	6965349.08	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	ac flare							AL	√	6	2	1			√			
N15	N15_77_1218em2	15	16.42	4	A	2268726.98	6965365.6	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	> 6	> 4			√			
N15	N15_81_1218em2	14	15.51	4	A	2268766.46	6965350.7	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	> 6	> 4			√			
N15	N15_82_1218em2	13	15.49	4	B	2268752.99	6965428.87	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	barbed wire, wire	FE	√	6	0.5	0.25			√			
N15	N15_86_1218em2	13	13.17	4	B	2268816.69	6965429.27	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	> 6	> 4			√			
N15	QAdig_N15_21		112.1		QA	2268778.85	6965421.25	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
N15	QAdig_N15_372		7.3		QA	2268738.31	6965372.8	15-Aug-06	Alan Merriman																			no contact											
N15	QAdig_N15_397		6.9		QA	2268743.41	6965350.01	15-Aug-06	Alan Merriman																			no contact											
N15	QAdig_N15_83		25.3		QA	2268720	6965343	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
N16	N16_1_1218em2	16	3798.16	4	A	2268910.52	6965380.99	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.5	metal sign	FE	√	12	> 6	0.25			√			
N16	N16_106_1218em2	12	10.83	4	B	2268842.47	6965404.4	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
N16	N16_106_1317em2	12	6.47	4	B	2268845.46	6965380.53	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
N16	N16_110_1218em2	10	10.25	4	C	2268845.35	6965387.38	11-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.25	fuze brkt							FE	√	6	2	0.25			√			
N16	N16_111_1218em2	12	10.23	4	B	2268854.34	6965411.96	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
N16	N16_114_1317em2	12	6.22	4	B	2268845.05	6965384.53	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
N16	N16_124_1218em2	11	8.97	4	B	2268869.71	6965421.14	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	> 6	> 4			√			
N16	N16_130_1218em2	9	8.41	4	C	2268854.3	6965388.34	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24		0.25			√			
N16	N16_131_1218em2	14	8.36	4	A	2268912.92	6965396.47	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	0.5	0.5			√			
N16	N16_138_1218em2	13	7.8	4	B	2268875.97	6965405.48	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	> 6	> 4			√			
N16	N16_143_1218em2	12	7.44	4	B	2268880.13	6965428.1	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	ac part	FE	√	3	0.5	0.5	N-S	0	√			
N16	N16_144_1218em2	11	7.44	4	B	2268835.95	6965417.23	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25		FE	√	3	0.5	0.25			√			
N16	N16_151_1218em2	13	7.01	4	B	2268915.09	6965377.36	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3	> 6	> 4			√			
N16	N16_168_1218em2	12	6.04	4	B	2268849.3	6965399.07	17-Aug-06	Jim Thoren	√													√	CIV	12	1	0.25	wire, fence wire	FE	√	24	0.5	0.25	NE-SW	45	√			
N16	N16_173_1218em2	12	5.98	4	B	2268851.29	6965421.97	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	wire, wire	FE	√	3	0.5	0.25			√			
N16	N16_176_1218em2	11	5.88	4	B	2268873.56	6965393.81	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
N16	N16_184_1218em2	12	5.56	4	B	2268883.05	6965337.1	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail 16D	FE	√	3					√			
N16	N16_188_1218em2	15	5.5	4	A	2268851.7	6965428.81	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	762 cart case							OTHER	√	3	0.5	0.25			√			
N16	N16_192_1218em2	13	5.27	4	B	2268851.47	6965418.52	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
N16	N16_213_1218em2	12	4.67	4	B	2268869.77	6965417.07	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	> 6	> 4			√			
N16	N16_215_1218em2	12	4.64	4	B	2268909.05	6965433.55	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	wire	FE	√	9	> 6	> 4			√			
N16	N16_217_1218em2	12	4.6	4	B	2268828.55	6965358.6	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6	0.5	0.25			√			
N16	N16_218_1218em2	10	4.59	4	C	2268832.91	6965360.99	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
N16	N16_223_1218em2	9	4.41	4	C	2268844.91	6965427.62	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	1	0.25			√			
N16	N16_224_1218em2	11	4.41	4	B	2268846.48	6965405.99	06-Jul-06	Jim Thoren	√													√	CIV	12	1	0.5	wire	FE	√	24	0.5	0.25	NE-SW	45	√			
N16	N16_229_1218em2	13	4.24	4	B	2268851.46	6965358.48	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	16 penny nail	FE	√	6	0.5	0.25			√			
N16	N16_230_1218em2	10	4.22	4	C	2268839.9	6965436.38	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
N16	N16_234_1218em2	12	4.07	4	B	2268879.31	6965405.01	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barbed wire	FE	√	3	> 6	> 4			√			
N16	N16_234_1317em2	11	2.35	2	B	2268848.73	6965367.03	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	3	0.5	0.25			√			
N16	N16_242_1218em2	11	3.89	4	B	2268837.4	6965421.06	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
N16	N16_252_1218em2	11	3.62	4	B	2268840.11	6965430.33	06-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	wire	FE	√	12	0.5	0.25	NE-SW	45	√			
N16	N16_292_1218em2	7	2.62	3	D	2268848.93	6965410.36	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
N16	N16_31_1218em2	16	109.2	4	A	2268906.5	6965381.32	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.5	metal sign	FE	√	12	> 6	0.25			√			
N16	N16_35_1218em2	15	85.05	4	A	2268853.5	6965368.85	06-Jul-06	Jim Thoren	√													√	CIV	6	2	0.25	wire, more than 3' from flag	FE	√	3	0.5	0.25	NE-SW	45	√			
N16	N16_39_1317em2	13	18.41	4	B	2268838.84	6965370.05	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze bracket							FE	√	6	2	0.25			√			
N16	N16_51_1218em2	14	26.73	4	A	2268832.95	6965357.61	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25			√			
N16	N16_54_1218em2	14	26.25	4	A	2268846.93	6965414	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	vt fuze strap							FE	√	6	2	0.25			√			
N16	N16_67_1218em2	16	19.86	4	A	2268915.23	6965381.16	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	1" nut	FE							√			
N16	N16_75_1218em2	13	17.4	4	B	2268903.81	6965390.96	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24	> 6	> 4			√			
N16	N16_76_1317em2	12	9.53	4	B	2268840.41	6965382.95	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
N16	N16_83_1218em2	14	15.27	4	A	2268870.08	6965393.98	16-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	wire, chain link pieces	FE	√	6	> 6	> 4			√			
N16	N16_85_1318em2	11	4.72	4	B	2268883.59	6965392.52	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6	> 6	> 4			√			
N16	N16_87_1218em2	12	12.97	4	B	2268843.43	6965436.24	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
N16	N16_91_1218em2	12	12.02	4	B	2268844.84	6965423.35	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	wire, wire	FE	√	3	0.5	0.25			√			
N16	N16_95_1218em2	13	11.86	4	B	2268876.14	6965358.02	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	> 6	> 4			√			
N16	N16_96_1317em2	12	7.31	4	B	2268839.3	6965379.39	06-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	wire	FE	√	9	0.5	0.25			√			
N16	N16_97_1218em2	12	11.66	4	B	2268870.31	6965347.07	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	> 24	> 6	> 4			√			
N16	N16_98_1218em2	15	11.65	4	A	2268870.55	6965365.3	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire		√	6	> 6	> 4			√			
N16	N16_99_1218em2	14	11.64	4	A	2268827.81	6965375.19	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
N16	QAdig_N16_255		9.7		QA	2268817.92	6965372.93	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
N17	N17_108_1218em2	16	10.55	4	A	2268976.59	6965352.4	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	4 link chain	FE	√	6	0.5	0.25	N-S	0	√			
N17	N17_126_1218em2	13	8.81	4	B	2268938.55	6965371.66	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
N17	N17_133_1218em2	14	8.33	4	A	2268931.14	6965417.2	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
N17	N17_161_1218em2	15	6.24	4	A	2268965.54	6965420.19	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	wire	SS	√	6	0.5	0.25	N-S	0	√			
N17	N17_162_1218em2	13	6.18	4	B	2268923.76	6965435.69	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	barb wire	FE	√	6	0.5	0.25	N-S	0	√			
N17	N17_169_1218em2	13	6.03	4	B	2268988.94	6965401.58	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nut 1"	FE	√	3	0.5	0.25	N-S	0	√			
N17	N17_172_1218em2	11	6	4	B	2268930.93	6965370.79	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
N17	N17_179_1218em2	15	5.71	4	A	2268957.7	6965348.68	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bar, vt							FE	√	3	1	0.5	N-S	0	√			
N17	N17_193_1218em2	14	5.26	4	A	2269014.8	6965347.42	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	screw and plow end	FE	√	6	1	0.5	NE-SW	0	√			
N17	N17_202_1218em2	12	5.05	4	B	2268976.44	6965340.25	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	4 link chain	FE	√	6	0.5	0.25	N-S	0	√			
N17	N17_227_1218em2	11	4.3	4	B	2268976.65	6965345.36	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	SS	√	6	0.5	0.25	N-S	0	√			
N17	N17_233_1218em2	16	4.09	4	A	2268959.33	6965367.7	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	part (seat)							AL	√	3	1	0.25	N-S	0	√			
N17	N17_272_1218em2	11	3.12	3	B	2268921.61	6965363.7	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze part, vt							FE	√	3	0.5	0.25	N-S	0	√			
N17	N17_36_1218em2	15	69.42	4	A	2268933.95	6965393.93	06-Jul-06	Jim Thoren	√													√	CIV	3	1	1	caster	FE	√	6	4	2	N-S	0	√			
N17	N17_64_1218em2	13	20.32	4	B	2268936.63	6965409.11	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.5	drum plug	AL	√	3	0.5	0.25	N-S	0	√			
N17	N17_65_1218em2	16	20.24	4	A	2268957.81	6965392.2	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	beer can	AL	√	6	2	0.25	N-S	0	√			
N17	N17_74_1218em2	16	17.43	4	A	2268975.81	6965386.7	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze bracket, vt							FE	√	6	1	0.5	N-S	45	√			
N17	N17_85_1218em2	15	13.66	4	A	2268986.25	6965346.54	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	4 link chain	FE	√	6	0.5	0.25	N-S	0	√			
N18	N18_1_1305em2	15	2056.87	4	A	2269066.81	6965347.53	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	≥8	rod, scrap & telephone tole tie	FE	√	> 24	1	1	N-S	90	√			
N18	N18_129_1305em2	14	9.75	4	A	2269051.28	6965353.76	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	long bolt	FE	√	12	0.5	0.5	NE-SW	45	√			
N18	N18_134_1305em2	10	9.48	4	C	2269049.76	6965339.38	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
N18	N18_147_1305em2	12	8.77	4	B	2269033.61	6965389.02	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.25	NE-SW	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
N18	N18_149_1305em2	12	8.4	4	B	2269054.74	6965376.38	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	metal pin and rod	FE	√	9	0.5	0.25	N-S	45	√			
N18	N18_154_1305em2	15	7.72	4	A	2269062.83	6965385.76	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nut	FE	√	3	2	2	N-S	0	√			
N18	N18_180_1305em2	11	6.27	4	B	2269086.15	6965410.21	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	tie down bolt	FE	√	9	0.5	0.25	NE-SW	45	√			
N18	N18_184_1305em2	8	6.14	4	D	2269064.07	6965338.1	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	scrap	FE	√	24	0.5	0.25			√			
N18	N18_19_1305em2	14	68.87	4	A	2269054.55	6965355.13	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	long bolt	FE	√	12	0.5	0.5	NE-SW	45	√			
N18	N18_196_1305em2	13	5.67	4	B	2269044.71	6965425.12	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25	NE-SW	45	√			
N18	N18_206_1305em2	13	5.36	4	B	2269070.77	6965388.47	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	can	FE	√	6	4	0.25	NE-SW	0	√			
N18	N18_215_1305em2	12	5.16	4	B	2269047.25	6965337.14	06-Jul-06	Jim Thoren	√													√	CIV	3	4		nails	FE	√	3	0.5	0.25	NE-SW	45	√			
N18	N18_22_1305em2	12	56.59	4	B	2269049.72	6965424.73	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.25	N-S	45	√			
N18	N18_255_1305em2	13	4.36	4	B	2269030.94	6965366.3	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	length	FE	√	6	0.5	0.25	N-S	90	√			
N18	N18_275_1305em2	10	4.08	4	C	2269031.65	6965349.7	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
N18	N18_276_1305em2	9	4.07	4	C	2269033.89	6965359.06	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.5			√			
N18	N18_278_1305em2	12	4.07	4	B	2269066.09	6965399.57	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.25	NE-SW	45	√			
N18	N18_279_1305em2	12	4.04	4	B	2269028.27	6965349.17	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bottle cap	AL	√	3	0.5	0.25	N-S	45	√			
N18	N18_3_1305em2	15	730.65	4	A	2269062.94	6965348.32	06-Jul-06	Jim Thoren	√													√	CIV	> 24	2	≥8	rod & telephone pole tie down ro	FE	√	> 24	1	1	N-S	90	√			
N18	N18_303_1305em2	10	3.71	4	C	2269086.12	6965400.29	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.5			√			
N18	N18_307_1305em2	13	3.69	4	B	2269018.38	6965422.83	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	barbed wire	FE	√	3	0.5	0.25	NE-SW	45	√			
N18	N18_319_1305em2	12	3.56	3	B	2269061.15	6965393.84	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	metal pin and nail	FE	√	6	0.5	0.25	E-W	90	√			
N18	N18_371_1305em2	11	2.97	3	B	2269078.7	6965375.74	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	bolt	FE	√	3	0.5	0.25	N-S	45	√			
N18	N18_38_1305em2	12	27.12	4	B	2269035.49	6965354.43	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	long bolt	FE	√	9	0.5	0.25	NE-SW	45	√			
N18	N18_39_1305em2	14	26.44	4	A	2269076.85	6965394.62	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	length of rebar	FE	√	6	0.5	0.25	NE-SW	45	√			
N18	N18_42_1305em2	15	25.48	4	A	2269059.27	6965347.1	16-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	scrp,telephone pole tiedown left	FE	√	6	0.5	0.25	N-S	45	√			
N18	N18_48_1305em2	12	22.49	4	B	2269069.63	6965364.9	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	9	0.5	0.5	NE-SW	45	√			
N18	N18_5_1305em2	12	414.38	4	B	2269037.29	6965406.77	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	30' length of chain	FE	√	> 24	0.5	0.5	NE-SW	0	√			
N18	N18_54_1305em2	12	19.4	4	B	2269082.32	6965403.2	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
N18	N18_6_1305em2	15	372.42	4	A	2269035.88	6965410.01	06-Jul-06	Jim Thoren	√													√	CIV	0	1	≥8	30' length of chain	FE	√	24	0.5	0.5			√			
N18	N18_80_1305em2	12	15.11	4	B	2269031.99	6965355.15	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	metal cap	FE	√	3	0.5	0.25	NE-SW	45	√			
N18	N18_81_1305em2	12	15.02	4	B	2269069.74	6965410.96	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	3	0.5	0.25	N-S	45	√			
N18	N18_85_1305em2	15	14.56	4	A	2269048.6	6965382.22	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	1/2 of horse shoe	FE	√	3	0.5	0.25	N-S	45	√			
O01	O01_22_1309em2	16	19.54	4	A	2267413.51	6965321.59	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	37mm frag	√	CIV	0	1	0.25	10 gauge wire	FE	√	6	0.5	0.25	N-S	0	√			
O01	O01_31_1309em2	15	13.49	4	A	2267384.69	6965327.43	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	fence wire	FE	√	3	0.5	0.25	N-S	0	√			
O01	O01_52_1309em2	11	4.83	4	B	2267413.76	6965327.43	06-Jul-06	Alan Merriman	√													√	CIV	3	1		scrap wire 16ga.	FE	√	9	0.5	0.25	NE-SW	0	√			
O02	O02_39_1309em2	14	9.41	4	A	2267460.27	6965315.44	28-Jun-06	Jim Thoren	√													√	CIV	6	1	1	tractor part	FE	√	3	1	1	N-S	0	√			
O02	O02_47_1309em2	13	6.57	4	B	2267463.63	6965314.97	06-Jul-06	Alan Merriman																			no contact											
O04	O04_3_1310em2	12	57.5	4	B	2267672.64	6965237.69	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	rebar	FE	√	24	0.5	0.5	NE-SW	0	√			
O04	O04_4_1310em2	10	38.56	4	C	2267675.73	6965239.73	11-Jul-06	Jim Thoren	√													√	CIV	> 24	4	1	rebar	FE	√	6	0.5	0.25			√			
O04	O04_6_1310em2	15	16.54	4	A	2267668.96	6965290.87	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	length of wire	FE	√	24	0.5	0.25	NE-SW	45	√			
O04	O04_7_1310em2	15	15.44	4	A	2267671.52	6965288.79	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	length of wire	FE	√	24	0.5	0.25	N-S	45	√			
O05	O05_11_1310em2	14	6.72	4	A	2267786.62	6965268.14	28-Jun-06	Alan Merriman	√							√	ED MD	3	1	0.25	piece of scrap flare							AL	√	6	0.5	0.25	N-S	0	√			
O05	O05_14_1310em2	11	4.07	4	B	2267740.66	6965335.49	06-Jul-06	Alan Merriman																			no contact											
O06	O06_10_1310em2	14	7.31	4	A	2267826.83	6965273.84	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of slap flare							AL	√	6	0.5	0.5	E-W	45	√			
O06	O06_12_1310em2	15	5.84	4	A	2267827.2	6965264.98	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	end piece of slap flare							AL	√	3	0.5	0.25	E-W	90	√			
O06	O06_15_1310em2	11	3.85	4	B	2267913.8	6965310.69	06-Jul-06	Alan Merriman																			no contact											
O06	O06_8_1310em2	15	10.67	4	A	2267823.21	6965264.79	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	piece of slap flare							AL	√	6	0.5	0.25	NE-SW	45	√			
O07	O07_10_1314em2	15	19.03	4	A	2267959.71	6965274.11	16-Aug-06	Alan Merriman	√													√	CIV	18	1	0.25	barbed wire/in ground, wire	FE	√	12	0.5	0.25	NE-SW	90	√			
O07	O07_12_1314em2	13	12.03	4	B	2268017.66	6965332.56	06-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	ac scrap	AL	√	3	0.5	0.25	N-S	0	√			
O07	O07_16_1314em2	13	10.06	4	B	2267957.2	6965286.72	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze adapter threads							FE	√	6	0.5	0.5	N-S	0	√			
O07	O07_19_1314em2	16	8.65	4	A	2267962.58	6965264.23	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	45	√			
O07	O07_21_1314em2	14	7.79	4	A	2267935.61	6965331.08	28-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	90	√			
O07	O07_23_1314em2	15	7.42	4	A	2267975.74	6965238.63	28-Jun-06	Alan Merriman	√													√	CIV	3	10	0.25	fence clips	FE	√	6	0.5	0.25	NE-SW	45	√			
O07	O07_27_1314em2	14	5.93	4	A	2267972.04	6965245.9	28-Jun-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips	SS	√	3	0.5	0.5	NE-SW	90	√			
O07	O07_3_1314em2	15	67.4	4	A	2267948.23	6965299.43	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.5	length of rebar	FE	√	12	0.5	0.5	E-W	0	√			
O07	O07_30_1314em2	14	5.68	4	A	2267942.39	6965311.89	28-Jun-06	Alan Merriman	√													√	CIV	3	2	0.25	fence clips	FE	√	3	0.5	0.25	N-S	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
O07	O07_31_1314em2	16	5.61	4	A	2267947.48	6965303.37	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	length of rebar	FE	√	12	0.5	0.5	E-W	45	√			
O07	O07_34_1314em2	14	4.86	4	A	2267959.2	6965277.72	28-Jun-06	Alan Merriman	√													√	CIV	18	1	0.25	barbed wire in ground	FE	√	12	1	0.25	NE-SW	45				
O07	O07_38_1314em2	11	4.3	4	B	2267945.51	6965333.72	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	steel rod	FE	√	3	0.5	0.5	N-S	45	√			
O07	O07_40_1314em2	15	4.26	4	A	2267967.13	6965254.47	28-Jun-06	Alan Merriman	√													√	CIV	3	3	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	0	√			
O07	O07_42_1314em2	11	4.15	4	B	2267952.71	6965293.22	06-Jul-06	Alan Merriman	√													√	CIV	3	2	1	fence wire t-post clip	FE	√	9	0.5	0.25	N-S	0	√			
O07	O07_45_1314em2	11	3.68	4	B	2267948.55	6965335.09	06-Jul-06	Alan Merriman	√							√	ORD MD	3	2	0.25	5.56mm blank							OTHER	√	3	0.5	0.25	N-S	0				
O07	O07_50_1314em2	14	3.15	3	A	2268013.49	6965335.7	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	chunk of aluminum	AL	√	3	0.5	0.5	E-W	90	√			
O07	O07_51_1314em2	11	3.1	3	B	2267964.06	6965239.91	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	3	0.5	0.25	N-S	0	√			
O08	O08_104_1219em2	14	5.82	4	A	2268069.41	6965292.34	28-Jun-06	Alan Merriman	√													√	CIV	0	> 10	0.25	fence clips	FE	√	3	0.5	0.25	E-W	0	√			
O08	O08_121_1219em2	13	4.85	4	B	2268041.37	6965297.7	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ac flare part							AL	√	3	1	1	N-S	45	√			
O08	O08_132_1219em2	14	4.35	4	A	2268023.06	6965329.31	28-Jun-06	Alan Merriman	√													√	CIV	0	1	0.5	electric fence post	AL	√	12	0.5	0.5	E-W	90	√			
O08	O08_143_1219em2	11	3.82	4	B	2268050.15	6965327.43	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wad of wire	FE	√	9	0.5	0.25	N-S	0	√			
O08	O08_27_1219em2	16	17.22	4	A	2268072.84	6965311.96	28-Jun-06	Alan Merriman	√													√	CIV	3	4	0.25	fence posts	FE	√	3	0.5	0.25	NE-SW	0	√			
O08	O08_33_1219em2	16	14.1	4	A	2268069.2	6965272.13	28-Jun-06	Alan Merriman	√													√	CIV	0	2	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	45	√			
O08	O08_4_1219em2	15	98.13	4	A	2268019.48	6965327.45	16-Aug-06	Alan Merriman	√													√	CIV	0	1	0.5	electric fence post, T-post clip	AL	√	24	0.5	0.5	E-W	0	√			
O08	O08_40_1219em2	16	12.02	4	A	2268068.84	6965282.88	16-Aug-06	Alan Merriman	√													√	CIV	3	3	0.25	fence clips, T-post clips	FE	√	3	0.5	0.25	N-S	45	√			
O08	O08_85_1219em2	13	7.2	4	B	2268073.38	6965332.42	06-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
O08	O08_96_1219em2	12	6.21	4	B	2268067.13	6965322.35	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	adapter booster threads							FE	√	3	0.5	0.25	N-S	0	√			
O08	O08_99_1219em2	13	6.12	4	B	2268067.35	6965242.62	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
O09	O09_24_1217em2	16	22.66	4	A	2268152.98	6965257.43	28-Jun-06	Alan Merriman	√													√	MIL	6	1	1	chunk of aluminum	AL	√	6	2	2	E-W	90	√			
O09	O09_29_1217em2	15	19.61	4	A	2268131.77	6965254.87	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	flare container							AL	√	6	2	0.25	N-S	45	√			
O09	O09_74_1217em2	13	5.16	4	B	2268131.58	6965250.25	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	flare body							AL	√	3	1	0.25	N-S	0	√			
O09	O09_9_1314em2	16	19.37	4	A	2268201.55	6965258.37	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	part of slap flare							AL	√	6	2	0.25	NE-SW	45	√			
O10	O10_14_1314em2	15	10.87	4	A	2268219.53	6965336.5	28-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	square metal washer	FE	√	3	0.5	0.5	NE-SW	45	√			
O10	O10_2_1314em2	16	75.07	4	A	2268294.77	6965262.71	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze adapter							FE	√	6	0.5	0.25	NE-SW	45	√			
O10	O10_24_1314em2	15	6.65	4	A	2268293.63	6965265.84	28-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part, vt							FE	√	3	0.5	0.25	NE-SW	45	√			
O10	O10_33_1314em2	16	5.05	4	A	2268303.92	6965335	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ac part	FE	√	6	0.5	0.25	N-S	0	√			
O10	O10_36_1314em2	15	4.61	4	A	2268278.24	6965237.53	28-Jun-06	Alan Merriman	√													√	MIL	3	1	0.25	ac part	FE	√	3	0.5	0.25	NE-SW	45	√			
O10	O10_4_1314em2	15	66.44	4	A	2268295.69	6965295.8	28-Jun-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part, vt							FE	√	3	0.5	0.25	NE-SW	45	√			
O11	O11_1_1217em2	16	410.01	4	A	2268387.77	6965324.73	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap metal	FE	√	12	> 6	0.25	N-S	0	√			
O11	O11_144_1217em2	9	2.24	2	C	2268389.76	6965318.24	11-Jul-06	Jim Thoren	√							√	ORD MD	0	3	0.25	small arms (brass)							OTHER							√			
O11	O11_17_1217em2	13	27.84	4	B	2268405.62	6965304.99	06-Jul-06	Alan Merriman	√													√	CIV	12	1	0.25	cable wire	FE	√	9	0.5	0.5	NE-SW	45	√			
O11	O11_21_1217em2	14	24.53	4	A	2268390.08	6965305.38	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	ac scrap	AL	√	3	2	0.25	N-S	0	√			
O11	O11_211_1217em2	6	1.61	1	D	2268413.94	6965302.34	17-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
O11	O11_26_1217em2	13	20.66	4	B	2268406.1	6965298.15	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	FE	√	12	0.5	0.25	N-S	0	√			
O11	O11_28_1217em2	12	19.89	4	B	2268413.72	6965309.15	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	all thread	OTHER	√	6	0.5	0.5	N-S	45	√			
O11	O11_33_1217em2	12	13.56	4	B	2268318.9	6965242.7	06-Jul-06	Alan Merriman																			no contact											
O11	O11_34_1217em2	14	12.83	4	A	2268402.64	6965307.92	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	spike, 20d	AL	√	9	0.5	0.25	N-S	90	√			
O11	O11_36_1217em2	12	10.82	4	B	2268402.84	6965295.64	17-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire, fence wire	FE	√	6	0.5	0.25	N-S	0	√			
O11	O11_41_1217em2	13	9.89	4	B	2268394.54	6965304.63	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	3	4	1	N-S	0	√			
O11	O11_44_1217em2	14	8.58	4	A	2268349.98	6965333.1	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	ac scrap	AL	√	6	2	0.25	N-S	0	√			
O11	O11_46_1217em2	9	8.29	4	C	2268403.09	6965300.66	11-Jul-06	Jim Thoren	√													√	MIL	6	1	0.25	scrap	FE	√	3	2	0.25	N-S	0	√			
O11	O11_48_1217em2	12	8.01	4	B	2268407.55	6965311.6	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	16 penny nail	FE	√	3	0.5	0.25	N-S	0	√			
O11	O11_51_1217em2	9	7.38	4	C	2268411.77	6965306.23	11-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag							FE	√	3	1	0.25	N-S	0	√			
O11	O11_52_1217em2	16	7.13	4	A	2268391.88	6965325.44	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap metal	FE	√	12	6	0.25	N-S	0	√			
O11	O11_55_1217em2	13	6.68	4	B	2268398.8	6965297.92	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
O11	O11_61_1217em2	13	6.18	4	B	2268409.55	6965299.09	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	pipe strap	FE	√	6	0.5	0.5	N-S	0	√			
O11	O11_64_1217em2	12	6.04	4	B	2268387.18	6965310.54	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire, very small <20mm	FE	√	3	0.5	0.25	N-S	0	√			
O11	O11_68_1217em2	12	5.58	4	B	2268392.1	6965312.63	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	wad of wire	FE	√	6	2	2	N-S	0	√			
O11	O11_71_1217em2	10	5.25	4	C	2268398.7	6965309.6	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	nail	FE	√	3	0.5	0.25	N-S	0	√			
O11	O11_72_1217em2	11	5.25	4	B	2268382.78	6965309.73	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	16 penny nail	FE	√	3	0.5	0.25	N-S	0	√			
O11	O11_81_1217em2	10	4.35	4	C	2268394.44	6965308.73	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
O11	O11_94_1217em2	11	3.44	3	B	2268390.33	6965297.54	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ac flare mt							AL	√	3	1	0.5	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
O11	O11_97_1217em2	12	3.37	3	B	2268351.26	6965312.74	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	faucet handle, brass	OTHER	√	3	0.5	1	E-W	45	√			
O11	QAdig_O11_477		6.1		QA	2268385.57	6965287.7	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	nail	FE	√	6	0.5	0.25			√			
O12	O12_1_1316em2	16	219.46	4	A	2268463.41	6965255.72	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	m166 vt fuze m/t							OTHER	√	3	4	4	N-S	0	√			
O12	O12_10_1217em2	15	49.33	4	A	2268429.35	6965334.04	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.5	ac seat part	FE	√	9	1	1	NE-SW	45	√			
O12	O12_14_1217em2	15	31.06	4	A	2268459.59	6965322.75	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	survey nail 20d	FE	√	9	0.5	0.25	N-S	90	√			
O12	O12_23_1316em2	13	9.11	4	B	2268475.96	6965257.64	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	ac flare frag							AL	√	3	1	1	N-S	0	√			
O12	O12_24_1316em2	13	7.83	4	B	2268474.84	6965275.26	06-Jul-06	Jim Thoren	√							√	ORD MD	6	1	0.5	frag, projo							FE	√	9	2	0.25	N-S	0	√			
O12	O12_25_1217em2	16	21.19	4	A	2268435.21	6965284.24	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire fence type, 10 guage	FE	√	12	0.5	0.25	N-S	45	√			
O12	O12_31_1217em2	12	16.6	4	B	2268440.86	6965293.76	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	20 penny nail	FE	√	3	0.5	0.25	N-S	0	√			
O12	O12_37_1316em2	16	5.23	4	A	2268462.6	6965259.65	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	2	m166 vt fuze							OTHER	√	3	4	4	N-S	0	√			
O12	O12_45_1217em2	16	8.32	4	A	2268454.66	6965323.38	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap aluminum	AL	√	6	2	0.25	E-W	0	√			
O12	O12_69_1217em2	13	5.43	4	B	2268418.46	6965336.32	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wad of wire	FE	√	6	0.5	0.25	N-S	0	√			
O12	O12_83_1217em2	11	4.1	4	B	2268494.01	6965315.51	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	7.62mm brass x 1								√	3	0.5	0.25	N-S	0	√			
O12	O12_85_1217em2	12	4.06	4	B	2268484.85	6965262.44	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
O12	O12_88_1217em2	11	3.74	4	B	2268435.28	6965298.97	06-Jul-06	Jim Thoren																			no contact											
O12	O12_9_1217em2	16	69.46	4	A	2268447.22	6965319.36	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	scrap metal	FE	√	9	4	0.25	NE-SW	0	√			
O13	O13_10_1316em2	15	36.52	4	A	2268609.38	6965241.18	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
O13	O13_12_1316em2	14	24.88	4	A	2268595.64	6965267.45	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.5	horseshoe	FE	√	3	0.5	0.25	N-S	0	√			
O13	O13_2_1316em2	15	84.7	4	A	2268561.69	6965306.32	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	3	4	4	N-S	90	√			
O13	O13_21_1316em2	14	9.44	4	A	2268596.14	6965263.81	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	horseshoe	FE	√	3	0.5	0.25	N-S	0	√			
O13	O13_22_1316em2	16	9.24	4	A	2268609.72	6965237.14	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12	0.5	0.25	N-S	0	√			
O13	O13_45_1316em2	15	4.5	4	A	2268562.35	6965302.26	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze body, vt							OTHER	√	3	4	4	N-S	90	√			
O13	O13_52_1316em2	11	3.92	4	B	2268522.89	6965272.59	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
O13	O13_54_1316em2	12	3.9	4	B	2268580.57	6965303.37	06-Jul-06	Jim Thoren																			no contact											
O13	O13_57_1316em2	14	3.85	4	A	2268568.57	6965333.66	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	ac scrap	AL	√	3	1	1	N-S	0	√			
O14	O14_103_1217em2	12	3.26	3	B	2268674.29	6965244.3	06-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	staples	FE	√	3	0.5	0.25	N-S	0	√			
O14	O14_13_1217em2	15	35.9	4	A	2268632.02	6965286.61	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	horseshoe	FE	√	3	2	0.25	N-S	0	√			
O14	O14_19_1217em2	15	26.42	4	A	2268705.82	6965301.43	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25		FE	√	12	4	0.25	N-S	0	√			
O14	O14_19_1316em2	13	11.23	4	B	2268676.73	6965315.86	06-Jul-06	Jim Thoren	√							√	ORD MD	6	2	0.25	frag,37mm&rotating bar (impact h							FE	√	3	2	0.25	N-S	0	√			
O14	O14_32_1217em2	15	13.78	4	A	2268680.16	6965269.96	16-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	barb wire, wire	FE	√	12	0.5	0.25	NE-SW	90	√			
O14	O14_47_1217em2	13	8.08	4	B	2268679.32	6965277.14	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	gas cap tractor (1948)	FE	√	3	0.5	0.25	N-S	0	√			
O14	O14_49_1217em2	11	7.94	4	B	2268687.82	6965333.53	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	hay bailer claw	FE	√	3	2	0.25	N-S	0	√			
O14	O14_7_1217em2	16	87.96	4	A	2268661.97	6965269.53	06-Jul-06	Jim Thoren	√							√	ORD MD				fuze part, vt							FE	√	3	0.5	0.25	N-S	0	√			
O14	O14_78_1217em2	14	4.62	4	A	2268660.47	6965329.12	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze bar, vt							FE	√	3	1	0.5	N-S	0	√			
O14	O14_8_1217em2	16	73.59	4	A	2268650.51	6965308.09	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	1	fuze part, vt							FE	√	3	4	4	N-S	0	√			
O14	O14_93_1217em2	13	3.5	3	B	2268681.41	6965252.37	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
O15	O15_102_1217em2	10	3.3	3	C	2268788.54	6965239.64	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	cast iron scrap	FE	√	3	0.5	0.25	N-S	0	√			
O15	O15_11_1217em2	15	40.81	4	A	2268749.55	6965336.05	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire		√	6	0.5	0.25			√			
O15	O15_15_1217em2	13	29.11	4	B	2268773.38	6965237.74	17-Aug-06	Jim Thoren	√													√	CIV	0	3	0.25	chain link, fence wire	FE							√			
O15	O15_16_1217em2	11	27.91	4	B	2268743.45	6965276.3	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	chain link, fence wire	FE							√			
O15	O15_20_1217em2	15	25.61	4	A	2268751.41	6965278.34	06-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	chain link								√			
O15	O15_209_1317em2	11	2.67	3	B	2268745.8	6965293.8	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire		√	9	> 6	> 4			√			
O15	O15_23_1217em2	14	22.87	4	A	2268778.61	6965308.34	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	horseshoe	FE	√	9	4	0.25			√			
O15	O15_31_1317em2	14	21.84	4	A	2268744.63	6965272.04	16-Aug-06	Jim Thoren	√													√	CIV	3			chain link, chain link	FE							√			
O15	O15_35_1217em2	14	11.57	4	A	2268747.63	6965276.04	06-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	chain link pieces								√			
O15	O15_4_1217em2	15	120.57	4	A	2268739.07	6965276.8	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	rebar	FE	√	> 24	0.5	0.5			√			
O15	O15_40_1317em2	11	17.87	4	B	2268745.18	6965275.77	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	cut up chain link								√			
O15	O15_42_1217em2	16	9.81	4	A	2268755.86	6965278.3	06-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	chain link								√			
O15	O15_43_1217em2	14	9.33	4	A	2268725.98	6965314.07	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	barbed wire	FE	√	9	> 6	> 4						
O15	O15_50_1217em2	13	7.54	4	B	2268738.98	6965311.48	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	AL	√	3	1	0.25			√			
O15	O15_57_1217em2	15	6.55	4	A	2268793.87	6965324.62	06-Jul-06	Jim Thoren	√													√	CIV	0	1	2	chain link	FE							√			
O15	O15_58_1217em2	14	6.42	4	A	2268801.3	6965335.04	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	> 6	> 4			√			
O15	O15_62_1217em2	11	6.1	4	B	2268753.84	6965251.17	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	vt fuze pt							FE	√	3		0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
O15	O15_63_1217em2	15	6.09	4	A	2268789.19	6965296.2	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	wire	FE	√	9	> 6	> 4			√			
O15	O15_65_1217em2	14	6.03	4	A	2268781.16	6965287.82	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	ac seat part	AL	√	6	0.5	0.5			√			
O15	O15_66_1217em2	13	6.03	4	B	2268743.5	6965312.24	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3	1	0.25			√			
O15	O15_67_1217em2	13	5.95	4	B	2268779.02	6965243.36	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	chain link	FE							√			
O15	O15_73_1217em2	11	5.23	4	B	2268773.2	6965243.71	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	chain link	FE							√			
O15	O15_75_1217em2	12	4.73	4	B	2268749.25	6965244.83	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	> 6	> 4			√			
O15	O15_84_1217em2	11	4.07	4	B	2268765.23	6965295.57	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	barbed wire	FE	√	9	> 6	> 4			√			
O15	O15_98_1217em2	11	3.35	3	B	2268760.86	6965303.07	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	ac part/vehicle	FE	√	3	1	0.5			√			
O15	QAdig_O15_247		10.2		QA	2268743.5	6965284	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
O16	O16_112_1218em2	12	10.17	4	B	2268843.23	6965250.11	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6	0.5	0.25			√			
O16	O16_113_1218em2	9	10.13	4	C	2268851.01	6965267.5	11-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	rod	FE	√	24		0.25			√			
O16	O16_115_1218em2	14	10.01	4	A	2268835.57	6965254.01	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25			√			
O16	O16_117_1218em2	12	9.78	4	B	2268840.75	6965284.82	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6	0.5	0.25			√			
O16	O16_119_1218em2	9	9.34	4	C	2268832.91	6965293.82	11-Jul-06	Jim Thoren																			no contact, reaquired 7/25/06											
O16	O16_125_1218em2	13	8.87	4	B	2268821.48	6965239.19	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	20D nail	FE	√	6	0.5	0.25			√			
O16	O16_132_1218em2	10	8.34	4	C	2268849.38	6965278.9	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9		0.25			√			
O16	O16_139_1218em2	9	7.71	4	C	2268842.61	6965324.95	11-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	wire	FE	√	12		0.25			√			
O16	O16_140_1218em2	12	7.61	4	B	2268844.61	6965303.35	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
O16	O16_142_1218em2	9	7.48	4	C	2268849.05	6965275.42	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9		0.25			√			
O16	O16_152_1218em2	12	6.97	4	B	2268872.91	6965238.34	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE							√			
O16	O16_153_1218em2	11	6.83	4	B	2268873.83	6965296.5	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	> 6	> 4			√			
O16	O16_183_1218em2	12	5.56	4	B	2268850.8	6965330.18	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	frag	√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
O16	O16_186_1218em2	9	5.54	4	C	2268842.5	6965328.35	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	> 24		0.25			√			
O16	O16_190_1218em2	11	5.32	4	B	2268854.08	6965333.19	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6	0.5	0.25			√			
O16	O16_203_1218em2	13	5.01	4	B	2268880.73	6965254.03	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	> 6	> 4			√			
O16	O16_204_1218em2	11	4.99	4	B	2268847.91	6965314.97	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6	0.5	0.25			√			
O16	O16_211_1218em2	12	4.72	4	B	2268850.77	6965298.32	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6	0.5	0.25			√			
O16	O16_221_1218em2	12	4.46	4	B	2268877	6965254.29	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	> 6	> 4			√			
O16	O16_228_1218em2	9	4.27	4	C	2268829.39	6965293.66	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9		0.25			√			
O16	O16_237_1218em2	11	4.02	4	B	2268889.45	6965242.88	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	chain hook	FE	√	3	1	0.5			√			
O16	O16_238_1218em2	11	4	4	B	2268829.05	6965312.64	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	chain link	FE	√	6	0.5	0.25			√			
O16	O16_40_1218em2	16	55.18	4	A	2268832.89	6965288.1	06-Jul-06	Jim Thoren	√													√	CIV	> 24			wire	FE	√	> 24	0.5	0.25			√			
O16	O16_47_1218em2	14	31.86	4	A	2268844.56	6965289.69	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12	0.5	0.25			√			
O16	O16_53_1218em2	10	26.52	4	C	2268825.96	6965333.27	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9		0.25			√			
O16	O16_55_1218em2	14	25.63	4	A	2268845.6	6965247.6	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	1	0.25			√			
O16	O16_66_1218em2	14	20.14	4	A	2268829.02	6965288.64	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
O16	O16_93_1218em2	11	11.97	4	B	2268824.78	6965238.93	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24	> 6	> 4			√			
O16	O16_94_1218em2	12	11.87	4	B	2268872.72	6965247.7	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	> 6	> 4			√			
O17	O17_103_1218em2	16	11.3	4	A	2269008.37	6965250.37	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
O17	O17_122_1218em2	16	9.03	4	A	2268995.2	6965246.23	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	padlock	FE	√	3	1	0.5	N-S	0	√			
O17	O17_160_1218em2	12	6.27	4	B	2268960.56	6965254.39	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt	FE	√	6	0.5	0.25	N-S	0	√			
O17	O17_164_1218em2	12	6.14	4	B	2269017.73	6965328.84	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	bolt	FE	√	3	0.5	0.25	N-S	0	√			
O17	O17_167_1218em2	13	6.05	4	B	2269000.48	6965260.43	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
O17	O17_199_1218em2	12	5.12	4	B	2268994.02	6965262.7	06-Jul-06	Jim Thoren	√																		too small to find											
O17	O17_219_1218em2	13	4.49	4	B	2268992.3	6965305.43	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
O17	O17_220_1218em2	10	4.49	4	C	2269000.52	6965290.68	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	AL	√	3		0.25			√			
O17	O17_222_1218em2	11	4.45	4	B	2268939.62	6965302.53	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze part, vt							FE	√	6	0.5	0.25	N-S	0	√			
O17	O17_231_1218em2	14	4.18	4	A	2268995.61	6965319.3	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	pipe strap	FE	√	9	0.5	0.25	N-S	0	√			
O17	O17_243_1218em2	12	3.83	4	B	2268950.95	6965259.28	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	6	0.5	0.25	N-S	0	√			
O17	O17_251_1218em2	12	3.64	4	B	2268982.16	6965263.04	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	ac part	FE	√	3	1	0.25	N-S	0	√			
O17	O17_58_1218em2	13	23.94	4	B	2268990.32	6965260.89	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	bolt	FE	√	9	0.5	0.25	N-S	0	√			
O18	O18_104_1305em2	12	12.15	4	B	2269061.83	6965332.81	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	metal pin	FE	√	6	0.5	0.5	N-S	45	√			
O18	O18_152_1305em2	12	7.84	4	B	2269038.29	6965282.52	17-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	large bolt (2)	FE	√	6	0.5	0.25	NE-SW	90	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
O18	O18_153_1305em2	16	7.73	4	A	2269028.07	6965325.33	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	vent plug and metal rod	FE	√	9	0.5	0.25	N-S	90	√			
O18	O18_174_1305em2	12	6.53	4	B	2269034.59	6965282	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	bolt and banding strap	FE	√	3	0.5	0.25	NE-SW	45	√			
O18	O18_192_1305em2	11	5.77	4	B	2269052.66	6965321.46	06-Jul-06	Alan Merriman	√													√	CIV	6	5	0.25	pieces of wire	FE	√	6	0.5	0.25	N-S	45	√			
O18	O18_200_1305em2	12	5.63	4	B	2269037.12	6965328.81	06-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	nail and bolt	FE	√	6	0.5	0.25	NE-SW	45	√			
O18	O18_216_1305em2	12	5.13	4	B	2269053.02	6965333.67	06-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	nails	FE	√	3	0.5	0.25	NE-SW	45	√			
O18	O18_243_1305em2	12	4.63	4	B	2269027.59	6965249.37	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	padlock (american)	FE	√	3	0.5	0.5	NE-SW	45	√			
O18	O18_246_1305em2	11	4.57	4	B	2269040.04	6965299.86	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	large screw	FE	√	6	0.5	0.25	NE-SW	45	√			
O18	O18_253_1305em2	11	4.39	4	B	2269036.68	6965299.53	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nails	FE	√	6	0.5	0.25	NE-SW	45	√			
O18	O18_28_1305em2	13	36.41	4	B	2269034.66	6965259.27	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	grass cutting blade	FE	√						√			
O18	O18_32_1305em2	15	28.82	4	A	2269060.21	6965325	16-Aug-06	Alan Merriman	√													√	CIV	12	1	0.25	length of cable left in ground	FE	√	24	0.5	0.25	NE-SW	45	√			
O18	O18_331_1305em2	11	3.48	3	B	2269050.78	6965318.47	06-Jul-06	Alan Merriman	√													√	CIV	3	4	0.25	metal pieces	FE	√	6	0.5	0.25	NE-SW	45	√			
O18	O18_385_1305em2	11	2.85	3	B	2269042.69	6965332.73	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25	N-S	90	√			
O18	O18_47_1305em2	16	22.53	4	A	2269047.58	6965288.03	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze adapter ring							FE	√	6	4	1	N-S	45	√			
O18	O18_61_1305em2	14	17.93	4	A	2269056.41	6965325.63	06-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	metal pieces	FE	√	6	0.5	0.25	NE-SW	45	√			
O18	O18_66_1305em2	12	17.26	4	B	2269051.05	6965330.51	06-Jul-06	Alan Merriman	√													√	CIV	6	3	0.5	nails	FE	√	3	0.5	0.25	NE-SW	45	√			
P02	P02_49_1219em1	14	13.8	4	A	2267467.48	6965159.53	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	9 gauge wire	FE	√	12	0.5	0.25	N-S	0	√			
P02	P02_53_1219em1	15	12.79	4	A	2267514.74	6965223.4	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	18 gauge wire	FE	√	12	0.5	0.25	N-S	45	√			
P02	P02_69_1219em1	13	8.45	4	B	2267465.23	6965156.81	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	37mm piece	√	CIV	6	1	0.25	length of wire	FE	√	9	0.5	0.25	NE-SW	90	√			
P02	P02_84_1219em1	11	4.99	4	B	2267420.97	6965223.93	06-Jul-06	Alan Merriman																			no find											
P02	P02_98_1219em1	11	3.58	3	B	2267502.65	6965207.92	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	45	√			
P03	P03_93_1219em1	13	3.82	4	B	2267525.64	6965200.77	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	length of wire	FE	√	9	0.5	0.25	NE-SW	45	√			
P04	P04_5_1310em2	16	24.68	4	A	2267632.27	6965191.51	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	flare frag							AL	√	6	2	0.25	NE-SW	45	√			
P05	P05_2_1310em2	12	70.28	4	B	2267759.81	6965198.09	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.5	length of rebar	FE	√	12	0.5	0.25	N-S	0	√			
P05	P05_9_1310em2	15	8.88	4	A	2267754.98	6965198.23	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	piece of rebar	FE	√	12	0.5	0.5	E-W	45	√			
P06	P06_1_1310em2	16	90.28	4	A	2267850.84	6965198.59	28-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.75	half of vt fuze							FE	√	6	4	4	E-W	90	√			
P07	P07_103_1219em2	13	5.85	4	B	2267968.35	6965165.73	06-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	metal frag							FE	√	3	4	0.5	NE-SW	45	√			
P07	P07_115_1219em2	13	5.2	4	B	2267984.12	6965226.33	06-Jul-06	Alan Merriman	√													√	MIL	6	1	0.25	ammo clip	FE	√	3	0.5	0.25	NE-SW	90	√			
P07	P07_137_1219em2	14	4.23	4	A	2267990.2	6965191.29	28-Jun-06	Alan Merriman	√													√	CIV	6	1	0.25	piece of wire	FE	√	6	0.5	0.25	NE-SW	45	√			
P07	P07_17_1612em2	16	20.12	4	A	2268000.3	6965179.68	28-Jun-06	Alan Merriman	√													√	CIV	0	4	0.25	fence clips	FE	√	6	0.5	0.25	NE-SW	90	√			
P07	P07_28_1612em2	16	13.25	4	A	2268015.26	6965141.89	16-Aug-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips, fence clips	FE	√	6	0.5	0.25	NE-SW	45	√			
P07	P07_31_1612em2	14	11.19	4	A	2268006.8	6965232.43	28-Jun-06	Alan Merriman	√													√	CIV	6	1	0.5	metal ring	FE	√	6	0.5	0.5	NE-SW	90	√			
P07	P07_41_1219em2	12	11.48	4	B	2267974.61	6965236.37	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	fence clip	FE	√	3	0.5	0.25	NE-SW	45	√			
P07	P07_43_1219em2	16	10.74	4	A	2267990.86	6965199.07	28-Jun-06	Alan Merriman	√													√	CIV	0	3	0.25	fence clips	FE	√	6	0.5	0.25	NE-SW	90	√			
P07	P07_45_1219em2	16	10.48	4	A	2267983.58	6965218.07	28-Jun-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips	FE	√	6	0.5	0.25	NE-SW	45	√			
P07	P07_48_1219em2	15	10.23	4	A	2267987.62	6965208.52	28-Jun-06	Alan Merriman	√													√	CIV	0	4	0.25	fence clips	FE	√	6	0.5	0.25	E-W	45	√			
P07	P07_53_1612em2	14	5.27	4	A	2268018.66	6965143.18	28-Jun-06	Alan Merriman	√													√	CIV	6	5	0.25	fence clips	FE	√	6	0.5	0.25	NE-SW	45	√			
P07	P07_55_1612em2	16	4.89	4	A	2268008.29	6965161.79	28-Jun-06	Alan Merriman	√													√	CIV	3	4	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	45	√			
P07	P07_60_1612em2	11	3.94	4	B	2267993.17	6965187.45	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	fence clips	FE	√	3	0.5	0.25	N-S	45	√			
P07	P07_62_1612em2	14	3.85	4	A	2268009.83	6965230.95	28-Jun-06	Alan Merriman	√													√	CIV	6	2	0.25	fence clips	FE	√	6	0.5	0.25	NE-SW	45	√			
P07	P07_64_1612em2	11	3.58	3	B	2268013.66	6965231.28	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	piece of fence wire	FE	√	3	0.5	0.25	N-S	45	√			
P07	P07_66_1612em2	12	3.43	3	B	2267997.47	6965189.34	06-Jul-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips	FE	√	3	0.5	0.25	N-S	45	√			
P07	P07_77_1219em2	13	7.6	4	B	2267976.25	6965229.82	06-Jul-06	Alan Merriman	√													√	MIL	6	1	0.25	scrap	AL	√	3	2	0.25			√			
P07	P07_83_1219em2	14	7.28	4	A	2267973.29	6965198.88	28-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	half piece of 37mm							FE	√	3	0.5	0.5	NE-SW	45	√			
P07	P07_87_1219em2	12	6.87	4	B	2267978.83	6965234.96	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	fence clip, fence clips	FE	√	3	0.5	0.25	NE-SW	45	√			
P07	P07_9_1612em2	16	66.36	4	A	2268004.44	6965170.85	16-Aug-06	Alan Merriman	√													√	CIV	6	2	0.5	scrap & fence clip, fence clip	FE	√	6	4	0.25	NE-SW	45	√			
P07	P07_91_1219em2	11	6.39	4	B	2267978.4	6965226.83	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence clip	FE	√	3	0.5	0.25	N-S	45	√			
P08	P08_107_1219em2	13	5.6	4	B	2268064.47	6965231.61	06-Jul-06	Alan Merriman	√													√	CIV	0	5	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	45	√			
P08	P08_110_1219em2	14	5.4	4	A	2268059.43	6965161.67	28-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	90	√			
P08	P08_126_1219em2	10	4.61	4	C	2268062.22	6965182.29	11-Jul-06	Jim Thoren	√													√	CIV	0	10	0.25	fence wire	FE	√	3	0.5	0.25	N-S	0	√			
P08	P08_13_1219em2	16	44.97	4	A	2268039.65	6965148.43	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze, vt part							FE	√	3	4	0.25	N-S	90	√			
P08	P08_130_1219em2	12	4.45	4	B	2268023.47	6965145.82	06-Jul-06	Alan Merriman	√							√	ORD MD	6	1	0.25	fuze part, vt							FE	√	3	4	0.25	N-S	0	√			
P08	P08_163_1219em2	12	3.14	3	B	2268025.4	6965188.29	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	bailing wire	FE	√	6	0.5	0.25	N-S	45	√			
P08	P08_176_1219em2	13	2.78	3	B	2268062.37	6965173.1	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence clips	FE	√	3	0.5	0.25	N-S	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
P08	P08_21_1219em2	14	23.72	4	A	2268062.23	6965187.94	16-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	half mule shoe, t-post clips	FE	√	6	1	0.5	N-S	0	√			
P08	P08_37_1314em2	11	4.48	4	B	2268028.57	6965167.68	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.5	fuze piece, base							FE	√	3	0.5	0.5	NE-SW	45	√			
P08	P08_47_1314em2	13	3.49	3	B	2268032.34	6965159.16	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze part, vt							FE	√	3	4	0.25	N-S	45	√			
P08	P08_49_1219em2	16	10.18	4	A	2268062.2	6965203.05	16-Aug-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clips, t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
P08	P08_53_1219em2	11	9.89	4	B	2268062.03	6965192.24	06-Jul-06	Alan Merriman	√													√	CIV	0	5	0.25	fence clips	FE	√	3	0.5	0.25	N-S	45	√			
P08	P08_55_1219em2	15	9.64	4	A	2268059.11	6965171.23	16-Aug-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clips, t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
P08	P08_57_1219em2	15	9.53	4	A	2268058	6965152	16-Aug-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clips, t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
P08	P08_6_1314em2	16	45.19	4	A	2268035.06	6965156.36	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze, vt part							FE	√	3	4	0.25	N-S	90	√			
P08	P08_62_1219em2	14	8.77	4	A	2268064.23	6965222.3	28-Jun-06	Jim Thoren	√													√	CIV	0	3	0.25	t-post clip on a fence line	FE	√	3	0.5	0.25	N-S	0	√			
P08	P08_82_1219em2	15	7.29	4	A	2268064.09	6965212.38	28-Jun-06	Jim Thoren	√													√	CIV	0	3	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
P08	P08_89_1219em2	14	6.56	4	A	2268057.98	6965141.51	16-Aug-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clips, t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
P09	P09_41_1216em2	16	6.09	4	A	2268185.01	6965218.93	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire 20 gauge	FE	√	9	0.5	0.25	N-S	0	√			
P09	P09_55_1216em2	14	4.21	4	A	2268188.28	6965218.34	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire 20 gauge	FE	√	3	0.5	0.25	N-S	0	√			
P10	P10_3_1216em2	16	65.13	4	A	2268296.29	6965225.28	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap metal	FE	√	12	4	0.25	N-S	0	√			
P10	P10_37_1216em2	15	6.55	4	A	2268303.77	6965156.25	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel rods	FE	√	3	0.5	0.25	N-S	0	√			
P10	P10_42_1216em2	14	5.57	4	A	2268225.64	6965188.48	28-Jun-06	Jim Thoren	√							√	ORD MD	6	1	0.25	20mm 1/2 mt and brass							FE	√	3	0.5	0.5	N-S	0	√			
P10	P10_52_1216em2	13	4.45	4	B	2268298.69	6965205.84	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	length of wire	FE	√	6	0.5	0.25	N-S	45	√			
P10	P10_69_1216em2	14	3.38	3	A	2268292.55	6965224.18	28-Jun-06	Jim Thoren	√													√	MIL	0	1	0.25	scrap metal, steel	FE		9	4	0.25	N-S	0	√			
P10	QAdig_P10_216		11.2		QA	2268219.04	6965234.9	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
P11	P11_10_1216em2	16	36.09	4	A	2268341.61	6965176.45	16-Aug-06	Jim Thoren	√													√	MIL	3	1	2	cam action solenoid ac related	AL	√	6	4	0.5	N-S	0	√			
P11	P11_45_1216em2	14	5.39	4	A	2268361.27	6965157.67	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire loops	FE	√	12	0.5	0.25	N-S	0	√			
P11	P11_49_1216em2	11	4.59	4	B	2268417.64	6965149.91	06-Jul-06	Alan Merriman																			no find											
P11	P11_61_1216em2	12	3.81	4	B	2268407.48	6965194.82	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	20mm rd							FE	√	3	1	1	N-S	45	√			
P11	P11_69_1316em2	11	3.1	3	B	2268319.32	6965160.04	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	fuze piece, vt							FE	√	6	4	0.25	N-S	45	√			
P11	QAdig_P11_187		12.9		QA	2268352.63	6965192.79	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
P12	P12_15_1316em2	14	12.38	4	A	2268508.98	6965206.36	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	ac part, actuator							FE	√	3	1	1	N-S	0	√			
P12	P12_30_1216em2	12	9.6	4	B	2268422.81	6965141.89	06-Jul-06	Jim Thoren																			no contact											
P12	P12_38_1316em2	15	5.11	4	A	2268508.44	6965202.97	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	ac part, actuator							FE	√	3	1	1	N-S	0	√			
P12	P12_41_1316em2	14	4.88	4	A	2268462.52	6965227.68	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	actuator,also with alum & copper							FE	√	3	0.5	0.5	N-S	45	√			
P12	P12_54_1216em2	10	4.27	4	C	2268420.23	6965152.19	11-Jul-06	Jim Thoren																			no contact											
P12	P12_59_1316em2	12	3.7	4	B	2268466.94	6965140.17	06-Jul-06	Jim Thoren																			no contact											
P12	P12_8_1316em2	15	39.49	4	A	2268468.2	6965203.42	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	fuze, vt assembly							FE	√	6	4	0.25	N-S	0	√			
P12	QAdig_P12_430		6.5		QA	2268427.37	6965192.58	15-Aug-06	Alan Merriman																			no contact											
P13	P13_1_1216em2	15	106.01	4	A	2268615.14	6965168.07	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze body, vt (AL,CU,FE&brass)							OTHER	√	3	4	2	N-S	90	√			
P13	P13_59_1216em2	11	3.96	4	B	2268574.45	6965141.58	06-Jul-06	Jim Thoren																			no contact											
P14	P14_17_1216em2	13	16.34	4	B	2268680.98	6965142.72	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	brake part	FE		9	1	1	N-S	0	√			
P14	P14_174_1317em2	12	3.54	3	B	2268715.02	6965196.96	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.25	staples	FE	√	3	0.5	0.25	NE-SW	45	√			
P14	P14_20_1216em2	14	15.29	4	A	2268691.97	6965230.43	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	steel bar	FE	√	6	0.5	0.5	NE-SW	45	√			
P14	P14_21_1216em2	15	14.39	4	A	2268675.34	6965221.64	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.5	staples	FE	√	3	0.5	0.25	NE-SW	45	√			
P14	P14_23_1216em2	16	13.82	4	A	2268705.92	6965211.15	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	> 24	0.5	0.25	N-S	0	√			
P14	P14_27_1216em2	13	11.3	4	B	2268708.98	6965174.1	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	pipe	FE	√	6	1	1	N-S	0	√			
P14	P14_28_1216em2	13	10.74	4	B	2268711.16	6965225.05	06-Jul-06	Jim Thoren	√													√	CIV	12	1	0.5	horseshoe	FE	√	6	6	0.5	N-S	0	√			
P14	P14_31_1216em2	14	8.71	4	A	2268689.11	6965232.04	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.5	NE-SW	45	√			
P14	P14_32_1216em2	12	7.78	4	B	2268704.32	6965225.04	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	20 penny nail	FE	√	6	0.5	0.25	N-S	0	√			
P14	P14_35_1216em2	11	7.33	4	B	2268696.2	6965216.25	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	20 penny nail	FE	√	6	0.5	0.25	N-S	0	√			
P14	P14_4_1216em2	16	44.78	4	A	2268709.77	6965144.23	06-Jul-06	Jim Thoren	√													√	CIV	6	2	0.25	barb wire	FE	√	24	0.5	0.25	N-S	0	√			
P14	P14_40_1216em2	13	6.13	4	B	2268684.22	6965176.6	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	barb wire	FE	√	12	0.5	0.25	N-S	0	√			
P14	P14_489_1317em2	6	1.02	1	D	2268716.94	6965143.57	17-Aug-06	Alan Merriman	√													√	CIV	0	3	0.25	staples	FE							√			
P14	P14_5_1216em2	15	43.98	4	A	2268672.02	6965220.79	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	horseshoe	FE	√	6	6	0.5	N-S	0	√			
P14	P14_66_1216em2	11	3.53	3	B	2268709.99	6965148.02	06-Jul-06	Jim Thoren	√													√	CIV	> 24	10	0.5	barb wire reel end	FE	√	3	0.5	0.25	NE-SW	45	√			
P14	P14_8_1216em2	16	38.87	4	A	2268680.77	6965151.29	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze body, vt							FE	√	3	4	4	N-S	90	√			
P15	P15_116_1317em2	12	5.95	4	B	2268802.77	6965216.71	06-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	metal disk	FE	√	3	1	1	NE-SW	45	√			
P15	P15_13_1216em2	14	28.23	4	A	2268770.16	6965234.65	06-Jul-06	Jim Thoren	√													√	CIV	3	3	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
P15	P15_130_1317em2	12	5.08	4	B	2268799.34	6965153.51	06-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	metal scrap	FE	√	3	1	1	NE-SW	45	√			
P15	P15_139_1317em2	12	4.79	4	B	2268804.73	6965194.18	06-Jul-06	Jim Thoren	√													√					hot soil, road											
P15	P15_14_1216em2	12	27	4	B	2268794.97	6965169.36	06-Jul-06	Jim Thoren	√													√	CIV	3	1	1	steel hook	FE	√	9	1	1	NE-SW	0	√			
P15	P15_143_1317em2	9	4.72	4	C	2268806.18	6965217.46	11-Jul-06	Jim Thoren	√													√					hot soil, reaq 7/31/06											
P15	P15_181_1317em2	9	3.3	3	C	2268804.68	6965145.2	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
P15	P15_19_1216em2	9	15.8	4	C	2268795.23	6965174.56	11-Jul-06	Jim Thoren	√													√					hot soil, reaq 7/31/06											
P15	P15_2_1216em2	14	86.45	4	A	2268777.65	6965233.38	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	1	fuze body, vt							AL	√	3	4	4	N-S	0	√			
P15	P15_22_1216em2	15	14.33	4	A	2268786.3	6965170.14	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	chain link	FE	√	12	0.5	0.5	N-S	0	√			
P15	P15_24_1216em2	15	13.74	4	A	2268761.17	6965188.8	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24	0.5	0.25	N-S	0	√			
P15	P15_25_1216em2	16	13.33	4	A	2268783.13	6965171.78	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	chain link	FE	√	12	0.5	0.25	N-S	0	√			
P15	P15_29_1216em2	15	10.7	4	A	2268786.41	6965200.04	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
P15	P15_33_1216em2	12	7.57	4	B	2268811.19	6965171.33	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
P15	P15_36_1216em2	13	6.82	4	B	2268767.17	6965173.94	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
P15	P15_38_1216em2	15	6.39	4	A	2268765.54	6965188.68	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	SS	√	24	0.5	0.25	N-S	0	√			
P15	P15_46_1216em2	12	5.18	4	B	2268813.75	6965149.11	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
P15	P15_56_1216em2	12	4.14	4	B	2268811.2	6965188.26	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
P15	P15_57_1216em2	13	4.05	4	B	2268760.05	6965217.38	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
P15	P15_6_1216em2	16	43.56	4	A	2268792.87	6965200.95	16-Aug-06	Jim Thoren	√													√	CIV	0	5	0.25	chain link pieces, chain links		√	3	0.5	0.25	N-S	0				
P15	P15_60_1216em2	11	3.9	4	B	2268754.85	6965199.55	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag							FE	√	3	0.5	0.25	N-S	45	√			
P15	P15_62_1216em2	12	3.65	4	B	2268791.28	6965210.78	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	1357 brass	OTHER	√	3	0.5	0.25	N-S	0	√			
P15	P15_66_1317em2	10	10.68	4	C	2268798.59	6965167.68	11-Jul-06	Jim Thoren	√													√					hot soil, reaq 7/31/06											
P15	P15_85_1216em2	11	2.99	3	B	2268811.87	6965227.43	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	nut	FE	√	3	0.5	0.25	N-S	0	√			
P15	QAdig_P15_428		6.6		QA	2268803.57	6965189.02	14-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
P16	P16_100_1215em2	9	13.88	4	C	2268841.95	6965195.83	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
P16	P16_109_1215em2	9	12.3	4	C	2268834.75	6965234.25	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
P16	P16_114_1215em2	14	11.99	4	A	2268855.01	6965176.46	06-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	fence wire	FE	√	3	0.5	0.25	SE-NW	0	√			
P16	P16_117_1215em2	15	11.91	4	A	2268854.49	6965186.69	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	fence wire	FE	√	3	0.5	0.25	SE-NW	0	√			
P16	P16_119_1215em2	11	11.77	4	B	2268834.17	6965159.18	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	fence wire	FE	√	6	0.5	0.25	E-W	0	√			
P16	P16_122_1215em2	13	11.42	4	B	2268839.67	6965149.32	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	fence wire	FE	√	3	0.5	0.25	E-W	0	√			
P16	P16_131_1215em2	15	10.21	4	A	2268856.29	6965208.82	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
P16	P16_136_1215em2	12	9.49	4	B	2268871.96	6965169.31	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
P16	P16_142_1215em2	16	8.68	4	A	2268894.27	6965185.62	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	4 link chain	FE	√	9	0.5	0.25	N-S	0	√			
P16	P16_144_1215em2	12	8.33	4	B	2268839.32	6965177.3	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	fence wire	FE	√	3	0.5	0.25	NE-SW	0	√			
P16	P16_154_1215em2	14	7.23	4	A	2268871.9	6965177.09	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	16 penny nail	FE	√	3	1	0.25	N-S	0	√			
P16	P16_155_1215em2	12	7.19	4	B	2268836.83	6965189.05	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	fence wire	FE	√	3	0.5	0.25	NE-SW	0	√			
P16	P16_159_1215em2	10	7.03	4	C	2268827.66	6965158.16	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	fence wire	FE	√	3	0.5	0.25	N-S	0	√			
P16	P16_165_1215em2	10	6.47	4	C	2268820.45	6965230.72	11-Jul-06	Jim Thoren																			no find, reaquired 7/25/06											
P16	P16_167_1215em2	12	6.38	4	B	2268854.23	6965221.68	06-Jul-06	Jim Thoren	√													√	MIL	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
P16	P16_168_1215em2	12	6.09	4	B	2268837.62	6965164.24	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
P16	P16_171_1215em2	13	5.76	4	B	2268845.29	6965137.49	06-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	fence wire	FE	√	6	0.5	0.25	NE-SW	0	√			
P16	P16_173_1215em2	13	5.62	4	B	2268824.52	6965136.74	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	fence wire	FE	√	6	0.5	0.25	NE-SW	0	√			
P16	P16_186_1215em2	10	5.13	4	C	2268822.71	6965223.03	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
P16	P16_200_1215em2	13	4.35	4	B	2268848.61	6965226.53	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE		6	0.5	0.5	NE-SW	45	√			
P16	P16_204_1215em2	13	4.26	4	B	2268851.66	6965145.2	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	fence	FE	√	3	0.5	0.25	NE-SW	0	√			
P16	P16_219_1215em2	12	3.5	3	B	2268834.91	6965145.59	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	fence wire	FE	√	3	0.5	0.25	E-W	0	√			
P16	P16_313_1215em2	7	1.81	1	D	2268829.34	6965163.59	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
P16	P16_32_1317em2	12	21.63	4	B	2268851.99	6965176.29	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	fence wire	FE	√	3	0.5	0.25	NE-SW	0	√			
P16	P16_322_1215em2	8	1.7	1	D	2268851.21	6965213.82	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	3	0.5	0.25			√			
P16	P16_50_1215em2	11	45.33	4	B	2268821.58	6965138.39	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	banding matrial	FE	√	9	4	0.25	E-W	0	√			
P16	P16_58_1317em2	13	11.63	4	B	2268852.99	6965186.18	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	fence wire	FE	√	6	0.5	0.25	E-W	0	√			
P16	P16_60_1215em2	13	29.9	4	B	2268845.16	6965143.56	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	fence wire	FE	√	3	0.5	0.25	E-W	0	√			
P16	P16_60_1317em2	12	11.32	4	B	2268847.8	6965160.83	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	3	0.5	0.25	NE-SW	0	√			
P16	P16_61_1215em2	13	29.19	4	B	2268821.81	6965167.95	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	fence wire	FE	√	6	0.5	0.25	E-W	0	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
P16	P16_62_1215em2	11	27.8	4	B	2268838.78	6965233.02	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.5	metal hanger	FE	√	12	0.5	0.25	N-S	45	√			
P16	P16_65_1215em2	16	26.5	4	A	2268897.3	6965211.27	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	cap	SS	√	3	1	0.25	N-S	0	√			
P16	P16_66_1318em2	13	5.83	4	B	2268878.6	6965190.73	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	pin	FE	√	3	0.5	0.25	N-S	0	√			
P16	P16_68_1215em2	11	25.68	4	B	2268824.62	6965162.75	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	fence wire	FE	√	6	0.5	0.25	E-W	0	√			
P16	P16_73_1215em2	13	22.96	4	B	2268821.99	6965159.86	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	fence wire	FE	√	3	0.5	0.25	SE-NW	0	√			
P16	P16_75_1215em2	14	21.65	4	A	2268845.02	6965188.65	06-Jul-06	Jim Thoren	√													√	CIV	3	2	0.25	fence wire	FE	√	6	0.5	0.25	E-W	0	√			
P16	P16_81_1215em2	13	18.98	4	B	2268848.52	6965146.64	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	fence wire	FE	√	6	0.5	0.25	E-W	0	√			
P16	P16_82_1215em2	11	18.93	4	B	2268848.8	6965201.86	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25	N-S	0	√			
P16	P16_83_1215em2	9	18.61	4	C	2268851.14	6965207.26	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
P16	P16_87_1215em2	12	17.93	4	B	2268838.88	6965198.78	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	fence wire, log chain	FE	√	3	0.5	0.25	NE-SW	0	√			
P16	P16_88_1215em2	13	17.67	4	B	2268842.1	6965139.98	06-Jul-06	Jim Thoren	√													√	CIV	3	4	0.25	fence wire	FE	√	6	0.5	0.25	SE-NW	0	√			
P16	P16_89_1215em2	9	17.66	4	C	2268841.79	6965202.41	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
P16	P16_92_1317em2	8	7.54	4	D	2268851.7	6965162.21	11-Jul-06	Jim Thoren	√													√	CIV	18	1	0.25	wrench	FE	√	12	1	0.25	N-S	0	√			
P16	P16_93_1215em2	12	15.9	4	B	2268824.41	6965173.71	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	6	0.5	0.25	SE-NW	0	√			
P16	P16_98_1215em2	12	14.2	4	B	2268872.4	6965223.64	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
P17	P17_102_1215em2	12	13.63	4	B	2268997.2	6965232.94	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	long screw	FE	√	9	0.5	0.5	NE-SW	45	√			
P17	P17_115_1215em2	15	11.93	4	A	2268958.57	6965178.59	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	large fence post	FE	√	6	0.5	0.25	N-S	45	√			
P17	P17_178_1215em2	11	5.39	4	B	2268924.36	6965138.88	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	length of cable	FE	√	6	0.5	0.25	N-S	0	√			
P17	P17_189_1215em2	12	4.9	4	B	2268990.51	6965184.63	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	length of cable	FE	√	6	0.5	0.25	NE-SW	45	√			
Q02	Q02_19_1309em2	16	21.39	4	A	2267502.91	6965122.28	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6	0.5	0.25			√			
Q02	Q02_25_1309em2	12	17.01	4	B	2267497.49	6965133.34	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire	FE	√	6	0.5	0.25	N-S	45	√			
Q02	Q02_44_1309em2	13	7.42	4	B	2267501.45	6965134.61	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire	FE	√	6	0.5	0.25	N-S	0	√			
Q02	Q02_56_1309em2	12	3.75	4	B	2267475.36	6965130.85	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	45	√			
Q02	Q02_92_1309em2	11	1.92	2	B	2267506.53	6965121.71	06-Jul-06	Alan Merriman																															
Q03	Q03_48_1408em2	11	4.13	4	B	2267603.28	6965041.68	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	45	√			
Q03	Q03_49_1408em2	14	4.11	4	A	2267615.75	6965127.45	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	Belt buckle	FE	√	3	1	1	N-S	0	√			
Q04	Q04_9_1408em2	16	98.41	4	A	2267621.91	6965108.35	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.5	fuze, vt component							AL	√	3	4	1	N-S	0	√			
Q05	Q05_24_1408em2	14	12.6	4	A	2267741.84	6965044.31	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	hay cutter tip 1957	FE	√	6	1	1	N-S	0	√			
Q05	Q05_25_1408em2	14	11.97	4	A	2267747.85	6965057.49	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	pipe 1"	FE	√	12	1	1	N-S	0	√			
Q05	Q05_38_1408em2	14	5.03	4	A	2267755.28	6965061.05	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze rheostadt							FE	√	3	0.5	0.5	N-S	0	√			
Q05	Q05_45_1408em2	12	4.28	4	B	2267787.95	6965097.93	06-Jul-06	Alan Merriman	√													√	CIV	12	2	0.25	nails	FE	√	6	0.5	0.25	NE-SW	0	√			
Q05	Q05_47_1408em2	12	4.18	4	B	2267783.26	6965089.79	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	90	√			
Q05	Q05_52_1408em2	10	4.04	4	C	2267793.1	6965083.09	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	nail	FE	√	6		0.25			√			
Q06	Q06_10_1409em2	15	16.81	4	A	2267865.66	6965095.08	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	rebar	FE	√	12	1	0.5	N-S	90	√			
Q07	Q07_2_1409em2	15	116.5	4	A	2267965.39	6965106.55	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	1	fuze, vt							FE	√	3	4	2	N-S	0	√			
Q07	Q07_32_1409em2	12	7.38	4	B	2267948.15	6965056.53	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	piece of metal	FE	√	3	0.5	0.25	NE-SW	90	√			
Q07	Q07_35_1409em2	12	6.73	4	B	2267949.35	6965060.04	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	30 penny nail		√	6	0.5	0.25	NE-SW	0	√			
Q07	QAdig_Q07_64		31.7		QA	2267920.2	6965105.22	15-Aug-06	Alan Merriman	√													√	CIV				Survey nail											
Q07	QAdig_Q07_9		407.2		QA	2268012.99	6965125.81	15-Aug-06	Alan Merriman	√													√	CIV	0	1	1	fence post part	FE	√	6	0.5	0.25			√			
Q08	Q08_1_1409em2	16	296.36	4	A	2268055.63	6965119.98	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel post	FE	√	12	2	1	N-S	90	√			
Q08	Q08_11_1409em2	13	16.57	4	B	2268060.12	6965110.88	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	fence clip	FE	√	3	0.5	0.25	NE-SW	45	√			
Q08	Q08_12_1409em2	13	15.99	4	B	2268072.21	6965133.32	17-Aug-06	Alan Merriman																			no contact, reaquired 8/17/06											
Q08	Q08_14_1409em2	14	12.34	4	A	2268116.43	6965042.89	28-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clip	FE	√	3	0.5	0.25			√			
Q08	Q08_15_1409em2	12	10.83	4	B	2268059.03	6965119.95	17-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	20 penny nail, nail	FE	√	6	0.5	0.25	N-S	45	√			
Q08	Q08_16_1409em2	15	10.78	4	A	2268074.73	6965052.37	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	3	0.5	0.25			√			
Q08	Q08_17_1409em2	16	10.72	4	A	2268102.91	6965059.52	28-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clip	FE	√	3	0.5	0.25			√			
Q08	Q08_18_1409em2	14	10.47	4	A	2268065.34	6965105.31	16-Aug-06	Jim Thoren	√													√	CIV	0	2	0.25	wire, fence, t-post clips	FE	√	6	0.5	0.25	N-S	0	√			
Q08	Q08_19_1409em2	14	10.15	4	A	2268090.27	6965074.59	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	t-post clip	FE	√	3	0.5	0.25			√			
Q08	Q08_20_1409em2	16	8.85	4	A	2268109.81	6965052.88	16-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	t-post clip, t-post clips	FE	√	3	0.5	0.25			√			
Q08	Q08_21_1409em2	14	8.34	4	A	2268037.58	6965091.53	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
Q08	Q08_22_1409em2	15	8.33	4	A	2268098.34	6965069.7	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	6	0.5	0.25			√			
Q08	Q08_23_1409em2	16	8.23	4	A	2268048.77	6965065.31	28-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clip	FE	√	3	0.5	0.25			√			
Q08	Q08_24_1409em2	16	7.98	4	A	2268041.39	6965083.65	16-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	t-post clip, t-post clips	FE	√	3	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
Q08	Q08_27_1409em2	15	7.86	4	A	2268070.92	6965098.31	16-Aug-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clips, t-post clips	FE	√	3	0.5	0.25			√			
Q08	Q08_29_1409em2	14	7.76	4	A	2268033.73	6965134.02	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	fence work	FE	√	6	1	0.25	N-S	0	√			
Q08	Q08_3_1409em2	15	109.28	4	A	2268055.09	6965102.18	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	survey marker	FE	√	12	0.5	1	N-S	90	√			
Q08	Q08_30_1409em2	14	7.42	4	A	2268060.68	6965114.69	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire, fence, rusted	FE	√	24	0.5	0.25			√			
Q08	Q08_33_1409em2	12	6.84	4	B	2268028.9	6965111.48	06-Jul-06	Alan Merriman	√													√	CIV	3	10	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	90	√			
Q08	Q08_36_1409em2	14	6.44	4	A	2268083.07	6965081.59	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	t-post clip	FE	√	3	0.5	0.25			√			
Q08	Q08_37_1409em2	14	6.35	4	A	2268077.16	6965091.23	28-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25			√			
Q08	Q08_4_1409em2	15	43.11	4	A	2268057.16	6965047.53	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	t-post bracket	FE	√	6	4	0.25	N-S	90	√			
Q08	Q08_41_1409em2	14	5.94	4	A	2268082.48	6965086.14	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	t-post clip	FE	√	3	0.5	0.25			√			
Q08	Q08_45_1409em2	14	5.38	4	A	2268044.69	6965075.12	28-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	t-post clip	FE	√	3	0.5	0.25			√			
Q08	Q08_46_1409em2	12	5.34	4	B	2268027.61	6965115.05	06-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	45				
Q08	Q08_48_1409em2	12	5	4	B	2268052.39	6965055.74	06-Jul-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	45	√			
Q08	Q08_50_1409em2	15	4.91	4	A	2268095.62	6965066.9	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	t-post clips	FE	√	3	0.5	0.25			√			
Q08	Q08_53_1409em2	11	4.56	4	B	2268099.09	6965041.03	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	chunk of aluminum	AL	√	3	2	0.5	NE-SW	45	√			
Q08	Q08_54_1409em2	14	4.28	4	A	2268057.85	6965044.06	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	t-post bracket	FE	√	6	4	0.25	N-S	90	√			
Q08	Q08_57_1409em2	12	3.99	4	B	2268098.16	6965073.06	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	fence clip	FE	√	3	0.5	0.25	NE-SW	45	√			
Q08	Q08_58_1409em2	13	3.98	4	B	2268037.45	6965095.62	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	fence clips	FE	√	3	0.5	0.25	N-S	45	√			
Q08	Q08_59_1409em2	13	3.94	4	B	2268042.49	6965109.38	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	ball of bailing wire	FE	√	6	2	0.25	NE-SW	45	√			
Q08	Q08_61_1409em2	11	3.8	4	B	2268055.04	6965114.36	06-Jul-06	Alan Merriman																			no find											
Q08	Q08_62_1409em2	13	3.76	4	B	2268031.84	6965103.29	06-Jul-06	Alan Merriman	√													√	CIV	6	3	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	45	√			
Q08	Q08_64_1409em2	13	3.61	4	B	2268075.28	6965087.88	06-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	fence clips	FE	√	3	0.5	0.25	N-S	45	√			
Q08	Q08_67_1409em2	11	3.15	3	B	2268090.63	6965078.96	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	bailing wire	FE	√	6	0.5	0.25	N-S	45	√			
Q08	Q08_7_1409em2	15	25.54	4	A	2268106.53	6965038.52	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	fence wire	FE	√	9	0.5	0.25			√			
Q08	Q08_8_1409em2	15	21.17	4	A	2268048.17	6965131.12	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	wire handle	FE	√	9	0.5	0.25	N-S	45	√			
Q08	Q08_9_1409em2	15	17.54	4	A	2268057.55	6965116.82	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	steel spike	FE	√	6	0.5	0.5	N-S	90	√			
Q08	QAdig_Q08_169		13.9		QA	2268072.63	6965123.81	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
Q09	Q09_47_1409em2	15	5.25	4	A	2268197.12	6965123.26	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	fuze rheostadt							FE	√	3	4	0.25			√			
Q09	Q09_55_1409em2	12	4.27	4	B	2268148.38	6965118.29	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	37mm piece							FE	√	6	1	0.5	NE-SW	0	√			
Q09	Q09_56_1409em2	14	4.07	4	A	2268136.62	6965079.52	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire fence	FE	√	3	0.5	0.25			√			
Q09	Q09_70_1409em2	12	2.63	3	B	2268196.24	6965119.82	06-Jul-06	Alan Merriman	√							√	ED MD	6	1	0.25	fuze part, vt							FE	√	6	4	0.25	N-S	45	√			
Q10	Q10_49_1409em2	15	4.94	4	A	2268300.82	6965117.15	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire, knotted	FE	√	3	2	0.25	N-S	45	√			
Q10	Q10_6_1409em2	15	27.39	4	A	2268218.37	6965136.04	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	corner post rebar	FE	√	12	0.5	0.25	N-S	90	√			
Q10	QAdig_Q10_305		8.4		QA	2268305.42	6965125.85	15-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	chain links	FE							√			
Q10	QAdig_Q10_457		6.3		QA	2268266.47	6965123.29	15-Aug-06	Alan Merriman																			no contact											
Q11	Q11_48_1411em2	11	3.49	3	B	2268372.47	6965131.29	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	length of wire	FE	√	9	4	0.25	NE-SW	45	√			
Q11	Q11_70_1411em2	11	2.68	3	B	2268394.91	6965109.06	06-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	length of wire	FE	√	6	0.5	0.5	NE-SW	45	√			
Q12	Q12_4_1410em2	16	16.81	4	A	2268448.22	6965040.48	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	ac flare							AL	√	3	2	0.25	N-S	0	√			
Q12	Q12_5_1410em2	14	12.09	4	A	2268424.02	6965053.12	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire, 1/4"	FE	√	6	0.5	0.25	N-S	45	√			
Q13	Q13_116_1215em2	13	11.93	4	B	2268608.78	6965042.11	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	empty cad							AL	√	3	2	2	NE-SW	0	√			
Q13	Q13_193_1215em2	12	4.74	4	B	2268594.68	6965070.18	06-Jul-06	Jim Thoren																			no contact											
Q14	Q14_120_1215em2	16	11.71	4	A	2268645.13	6965055.5	06-Jul-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze part, vt							FE	√	3	4	0.5	N-S	90	√			
Q14	Q14_127_1317em2	10	5.25	4	C	2268679.86	6965065.51	11-Jul-06	Jim Thoren	√													√	CIV	6	2	0.25	staples	FE	√	3	0.5	0.25			√			
Q14	Q14_129_1317em2	12	5.21	4	B	2268681.12	6965100.29	06-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	cap	FE	√	3	1	1	N-S	0	√			
Q14	Q14_140_1317em2	13	4.77	4	B	2268680.31	6965115.12	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	cap	FE	√	3	2	0.25	N-S	0	√			
Q14	Q14_170_1317em2	11	3.65	4	B	2268680.02	6965107.66	06-Jul-06	Jim Thoren	√													√	CIV	> 24	> 10	0.25	staple	FE	√	3	0.5	0.25	NE-SW	45	√			
Q14	Q14_30_1317em2	15	23.68	4	A	2268707.69	6965070.57	06-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	washer 1" & nail	OTHER	√	3	0.5	0.25	N-S	0	√			
Q14	Q14_80_1215em2	14	19.56	4	A	2268718.16	6965133.82	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	scrap	FE	√	9	0.5	0.25	N-S	0	√			
Q14	Q14_84_1317em2	15	8.11	4	A	2268695.1	6965116.79	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	half horseshoe	FE	√	3	1	0.25	N-S	0	√			
Q15	Q15_101_1317em2	13	6.95	4	B	2268814.95	6965094.54	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	chain link fence	SS	√	6	0.5	0.25	N-S	45	√			
Q15	Q15_103_1215em2	12	13.38	4	B	2268755.87	6965060.76	06-Jul-06	Alan Merriman	√													√	MIL	6	1	0.25	metal pin	FE	√	6	0.5	0.25	N-S	45	√			
Q15	Q15_103_1317em2	12	6.79	4	B	2268805.09	6965054.52	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	barbed wire	FE	√	6	0.5	0.25	N-S	45	√			
Q15	Q15_109_1317em2	12	6.36	4	B	2268807.52	6965111.12	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	chain link fence	SS	√	6	0.5	0.25	N-S	45	√			
Q15	Q15_117_1317em2	11	5.8	4	B	2268805.55	6965087.11	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	piece of chain link	SS	√	9	0.5	0.25	SE-NW	90	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
Q15	Q15_129_1215em2	13	10.41	4	B	2268749.95	6965046.79	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	barbed wire	FE	√	3	0.5	0.25	N-S	45	√			
Q15	Q15_133_1215em2	13	9.79	4	B	2268749.93	6965052.81	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	barbed wire	FE	√	3	0.5	0.25	N-S	90	√			
Q15	Q15_138_1317em2	10	4.81	4	C	2268812.41	6965105.99	11-Jul-06	Jim Thoren	√													√					too small											
Q15	Q15_145_1215em2	13	8.32	4	B	2268782.66	6965060.41	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	length of wire	FE	√	9	0.5	0.25	SE-NW	45	√			
Q15	Q15_154_1317em2	13	4.2	4	B	2268719.38	6965065.13	06-Jul-06	Jim Thoren	√													√	CIV	3	5	0.25	staples, wire	FE		3	0.5	0.25	N-S	0	√			
Q15	Q15_156_1317em2	11	4.18	4	B	2268802.53	6965085.44	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	piece of chain link	SS	√	9	0.5	0.25	N-S	45	√			
Q15	Q15_161_1215em2	14	6.93	4	A	2268766.45	6965085.11	06-Jul-06	Alan Merriman	√							√	ED MD	3	1	0.25	vt fuze antenna	√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.5	NE-SW	45	√			
Q15	Q15_164_1317em2	12	3.88	4	B	2268817.37	6965104.92	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	chain link fence	SS	√	9	0.5	0.25	E-W	90	√			
Q15	Q15_169_1317em2	11	3.67	4	B	2268812.43	6965089.56	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	nail 16 penny	FE	√	6	0.5	0.25	NE-SW	90	√			
Q15	Q15_172_1215em2	11	5.66	4	B	2268731.05	6965116.28	06-Jul-06	Alan Merriman																			no contact											
Q15	Q15_176_1215em2	13	5.49	4	B	2268806.58	6965135.28	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	chain link fence	SS	√	6	0.5	0.25	N-S	90	√			
Q15	Q15_181_1215em2	12	5.29	4	B	2268757.34	6965073.29	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire	FE	√	9	0.5	0.25	N-S	90	√			
Q15	Q15_194_1317em2	11	2.93	3	B	2268813.05	6965102.64	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	chain link fence piece	SS	√	9	0.5	0.25	NE-SW	45	√			
Q15	Q15_196_1215em2	11	4.54	4	B	2268753	6965069.14	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire	FE	√	6	0.5	0.25	NE-SW	0	√			
Q15	Q15_51_1215em2	16	44.86	4	A	2268753.16	6965045.93	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire	FE	√	3	0.5	0.25	N-S	45	√			
Q15	Q15_53_1317em2	14	12.61	4	A	2268792.37	6965069.23	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	chain link fence pieces	FE	√	9	0.5	0.25	N-S	45	√			
Q15	Q15_59_1317em2	12	11.58	4	B	2268723.09	6965090.45	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.5	horseshoe	FE	√	6	4	0.25	NE-SW	45	√			
Q15	Q15_67_1317em2	14	10.58	4	A	2268804.8	6965097.86	16-Aug-06	Alan Merriman	√													√	CIV	6	1	0.25	chain link fence, chain links	SS	√	9	0.5	0.25	NE-SW	90	√			
Q15	Q15_71_1215em2	14	24.45	4	A	2268761.91	6965073.23	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire	FE	√	9	0.5	0.25	N-S	90	√			
Q15	Q15_8_1317em2	14	91.07	4	A	2268737.38	6965111.77	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	Survey pin in ground	FE	√	6	0.5	0.25		90				
Q15	Q15_80_1317em2	12	8.78	4	B	2268810.61	6965116.43	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	chain link fence	SS	√	6	0.5	0.25	N-S	45	√			
Q15	Q15_87_1317em2	12	7.84	4	B	2268722.17	6965093.96	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	horseshoe	FE	√	6	4	0.5	N-S	45	√			
Q15	Q15_98_1317em2	13	7.17	4	B	2268814.27	6965097.79	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	chain link fence	SS	√	6	0.5	0.25	NE-SW	90	√			
Q15	Q15_99_1317em2	12	7.12	4	B	2268817.3	6965101.47	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	chain link	SS	√	9	0.5	0.25	N-S	45	√			
Q15	QAdig_Q15_160		14.9		QA	2268802.5	6965123	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25			√			
Q16	Q16_105_1215em2	11	13.06	4	B	2268850.66	6965075.12	06-Jul-06	Alan Merriman	√													√	CIV	12	2	0.25	soda can and fence wire	CU	√	6	4	0.25	N-S	45	√			
Q16	Q16_118_1215em2	15	11.89	4	A	2268873.84	6965080.6	16-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire, wire	SS	√	3	0.5	0.25	NE-SW	0	√			
Q16	Q16_124_1215em2	9	11.29	4	C	2268834	6965114.68	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	N-S	0	√			
Q16	Q16_125_1215em2	12	11.22	4	B	2268840.72	6965130.01	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	fence wire	SS	√	6	0.5	0.25	NE-SW	90	√			
Q16	Q16_126_1215em2	12	10.96	4	B	2268850.05	6965047.84	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	fence wire	SS	√	6	0.5	0.25	NE-SW	45	√			
Q16	Q16_13_1317em2	10	51.2	4	C	2268843.42	6965107.53	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	scrap	FE	√	6	0.5	0.25	N-S	0	√			
Q16	Q16_130_1215em2	10	10.32	4	C	2268851.3	6965101.44	11-Jul-06	Jim Thoren	√													√	CIV	0	2	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
Q16	Q16_131_1317em2	10	5.06	4	C	2268846.39	6965047.88	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.5	wire	FE	√	6	0.5	0.25	N-S	0	√			
Q16	Q16_132_1215em2	14	10.05	4	A	2268857.26	6965110.77	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	NE-SW	45	√			
Q16	Q16_135_1215em2	15	9.51	4	A	2268835.38	6965095.92	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	NE-SW	45	√			
Q16	Q16_138_1215em2	10	9.33	4	C	2268825	6965096.98	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire		√	9	0.5	0.25	N-S	0				
Q16	Q16_139_1215em2	14	9.19	4	A	2268856.93	6965097.24	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	fence wire	SS	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_14_1317em2	9	45.11	4	C	2268843.52	6965099.84	11-Jul-06	Jim Thoren	√													√	CIV	0	3	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
Q16	Q16_140_1215em2	12	8.72	4	B	2268853.16	6965128.32	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_141_1215em2	15	8.7	4	A	2268857.59	6965056.2	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	E-W	0	√			
Q16	Q16_147_1215em2	12	8.21	4	B	2268833.59	6965099.63	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_149_1215em2	12	8.02	4	B	2268880.28	6965063.34	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_150_1215em2	13	7.89	4	B	2268834.92	6965039.18	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	length of barb wire	FE	√	9	0.5	0.25	N-S	45	√			
Q16	Q16_150_1317em2	11	4.29	4	B	2268843.91	6965118.48	06-Jul-06	Alan Merriman																			no contact, reacquired 8/7/06											
Q16	Q16_152_1215em2	12	7.77	4	B	2268874.15	6965067.07	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_157_1215em2	12	7.12	4	B	2268837.58	6965128.36	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_162_1215em2	13	6.67	4	B	2268857.57	6965072.55	06-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	fence wire	SS	√	9	0.5	0.25	NE-SW	45	√			
Q16	Q16_163_1215em2	9	6.6	4	C	2268855.4	6965124.02	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	SS	√	3	0.5	0.25	N-S	0	√			
Q16	Q16_166_1215em2	14	6.44	4	A	2268857.21	6965127.17	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	NE-SW	45	√			
Q16	Q16_17_1317em2	9	38.22	4	C	2268841.16	6965087.9	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	banding	FE	√	> 24	1	0.25	N-S	0	√			
Q16	Q16_170_1215em2	12	5.9	4	B	2268848.35	6965133.82	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	fence wire and aluminum	SS	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_179_1317em2	11	3.4	3	B	2268847.07	6965098.25	06-Jul-06	Alan Merriman	√													√	CIV	3	5	0.25	fence wire pieces	SS	√	6	0.5	0.25	NE-SW	45	√			
Q16	Q16_180_1215em2	12	5.3	4	B	2268851.43	6965136.02	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	NE-SW	90	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
Q16	Q16_185_1215em2	12	5.14	4	B	2268857.59	6965052.62	06-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	fence wire and nail	FE	√	6	0.5	0.25	NE-SW	45	√			
Q16	Q16_190_1215em2	10	4.82	4	C	2268878.96	6965040.77	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
Q16	Q16_197_1215em2	12	4.49	4	B	2268837.59	6965136.1	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	N-S	45	√			
Q16	Q16_198_1215em2	12	4.36	4	B	2268832.89	6965050.86	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	bailing wire	FE	√	9	0.5	0.25	NE-SW	90	√			
Q16	Q16_199_1215em2	9	4.35	4	C	2268855.17	6965075.64	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
Q16	Q16_21_1317em2	11	32.81	4	B	2268844.17	6965096.27	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	NE-SW	45	√			
Q16	Q16_213_1215em2	11	3.74	4	B	2268828.36	6965050.43	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	N-S	45	√			
Q16	Q16_218_1215em2	11	3.56	3	B	2268825.44	6965041.39	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	fence wire	FE	√	9	0.5	0.25	NE-SW	45	√			
Q16	Q16_23_1317em2	12	29.73	4	B	2268839.33	6965119.16	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_231_1215em2	11	3.1	3	B	2268851.97	6965082.62	06-Jul-06	Alan Merriman	√													√	CIV	12	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_258_1215em2	9	2.56	3	C	2268850.38	6965058.27	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
Q16	Q16_269_1215em2	9	2.43	2	C	2268877.06	6965044.41	11-Jul-06	Jim Thoren	√													√	CIV	12	1	0.25	wire	FE	√	9					√			
Q16	Q16_27_1317em2	9	26.55	4	C	2268841.2	6965084.55	11-Jul-06	Jim Thoren	√													√	CIV	> 24	1	≥8	grounding rod	FE	√	> 24	1	1	E-W	90	√			
Q16	Q16_45_1215em2	16	112.92	4	A	2268825.3	6965065.32	06-Jul-06	Alan Merriman	√													√	CIV	6	1	1	farm equipment blade	FE	√	12	6	0.25	N-S	0	√			
Q16	Q16_47_1317em2	12	16.01	4	B	2268843.43	6965114.44	06-Jul-06	Alan Merriman	√																		no find, reacquired 8/7/06											
Q16	Q16_54_1215em2	13	38.91	4	B	2268849.8	6965097.39	06-Jul-06	Alan Merriman	√													√	CIV	3	4	0.25	fence wire	SS	√	3	0.5	0.25	N-S	45	√			
Q16	Q16_55_1215em2	14	38.31	4	A	2268834.87	6965073.28	06-Jul-06	Alan Merriman	√													√	CIV	6	1	1	metal rod	FE	√	24	0.5	0.5	N-S	0	√			
Q16	Q16_56_1317em2	12	11.88	4	B	2268846.16	6965065.94	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	fence wire	SS	√	6	0.5	0.25	N-S	45	√			
Q16	Q16_57_1215em2	13	35.02	4	B	2268850.47	6965120.25	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	NE-SW	90	√			
Q16	Q16_59_1215em2	8	32.43	4	D	2268854.98	6965068.96	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.5	rod	FE	√	24	0.5	0.25	N-S	0	√			
Q16	Q16_6_1317em2	13	151.27	4	B	2268840.72	6965094.3	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	barbed wire	FE	√	9	2	0.25	N-S	45	√			
Q16	Q16_62_1317em2	13	10.96	4	B	2268847.79	6965123.03	17-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire, wire	SS	√	6	0.5	0.25	N-S	45	√			
Q16	Q16_69_1215em2	13	25.18	4	B	2268855.27	6965117.51	06-Jul-06	Alan Merriman	√													√	CIV	3	10	0.25	fence wire and clips	FE	√	6	0.5	0.25	NE-SW	90	√			
Q16	Q16_70_1215em2	12	24.57	4	B	2268873.27	6965127.22	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_75_1317em2	12	9.59	4	B	2268843.8	6965080.34	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	NE-SW	45	√			
Q16	Q16_76_1215em2	12	21.31	4	B	2268857.09	6965085.61	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	fence wire	SS	√	9	0.5	0.25	N-S	45	√			
Q16	Q16_77_1215em2	13	21.2	4	B	2268873.01	6965119.19	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	3	0.5	0.25	N-S	45	√			
Q16	Q16_78_1317em2	9	9.26	4	C	2268836.98	6965115.09	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
Q16	Q16_82_1317em2	10	8.37	4	C	2268841.65	6965103.68	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
Q16	Q16_83_1317em2	13	8.24	4	B	2268841.77	6965074.87	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	bailing wire	FE	√	6	0.5	0.25	NE-SW	90	√			
Q16	Q16_86_1215em2	11	18.14	4	B	2268854.08	6965133.11	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	3	0.5	0.25	N-S	45	√			
Q16	Q16_88_1317em2	10	7.82	4	C	2268838.88	6965039.41	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24	0.5	0.25	N-S	0	√			
Q16	Q16_9_1317em2	12	69.78	4	B	2268846.33	6965116.11	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	45	√			
Q16	Q16_91_1215em2	12	16.72	4	B	2268875.82	6965086.48	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	3	0.5	0.25	NE-SW	45	√			
Q16	Q16_92_1215em2	12	16.22	4	B	2268854.57	6965049.41	06-Jul-06	Alan Merriman	√													√	MIL	3	3	0.25	nail and (2) fence wire	FE	√	6	0.5	0.25	N-S	45	√			
Q16	Q16_94_1215em2	13	15.64	4	B	2268834.19	6965120.64	06-Jul-06	Alan Merriman	√													√	CIV				fence wire	SS	√						√			
Q16	QAdig_Q16_209		11.5		QA	2268850.29	6965067.75	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
Q16	QAdig_Q16_212		11.4		QA	2268828.24	6965110.9	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
R03	R03_40_1408em2	14	4.95	4	A	2267605.56	6965034.71	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25	t-post clip	FE	√	9			E-W	45	√			
R04	R04_18_1313em2	11	4.34	4	B	2267692.33	6964999.34	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	metal rod	FE	√	6	0.5	0.5	N-S	45	√			
R04	R04_33_1313em2	11	2.64	3	B	2267661.29	6964983.51	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	2 nails	FE	√	3	0.5	0.25	NE-SW	45	√			
R04	R04_5_1313em2	16	12.34	4	A	2267676.17	6965026.95	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	ac flare							AL	√	3	1	1	N-S	0	√			
R04	R04_6_1313em2	15	12.18	4	A	2267667.08	6965033.58	28-Jun-06	Alan Merriman	√							√	ORD MD	3	1	0.25	37mm frag							FE	√	3	1	0.5	N-S	45	√			
R04	R04_8_1313em2	15	10.6	4	A	2267630.59	6964960.34	28-Jun-06	Alan Merriman	√							√	ORD MD	6	1	0.25	37mm half							FE	√	3	1	0.25	N-S	0	√			
R05	R05_12_1313em2	13	5.54	4	B	2267761.68	6964979.41	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	bolt	FE	√	6	0.5	0.5	E-W	90	√			
R05	R05_15_1313em2	15	4.73	4	A	2267760.72	6965012.45	28-Jun-06	Alan Merriman	√													√	CIV	3	1	0.25		FE	√	9	0.5	0.25	N-S	0	√			
R05	R05_25_1313em2	12	3.69	4	B	2267730.39	6964995.38	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	chain clip	FE	√	3	0.5	0.5	E-W	90	√			
R05	R05_26_1313em2	12	3.67	4	B	2267723.65	6964998.46	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	length of barbed wire	FE	√	6	0.5	0.25	NE-SW	90	√			
R08	QAdig_R08_24		101.7		QA	2268017.4	6965026.68	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.5	Tpost foot	FE	√	3	2	0.25			√			
R08	QAdig_R08_90		23		QA	2268104.24	6964974.95	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
R08	R08_1_1313em2	14	47.61	4	A	2268104.5	6965016.96	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	fuze scrap							FE	√	3	4	4			√			
R08	R08_10_1313em2	14	6.76	4	A	2268065.04	6965028.55	28-Jun-06	Jim Thoren	√													√	CIV	3	5	0.25	fence crap		√	3	0.5	0.25			√			
R08	R08_11_1313em2	12	6.66	4	B	2268115.16	6964967.59	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	bolt	SS	√	3	0.5	0.5	NE-SW	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
R08	R08_13_1313em2	13	4.82	4	B	2268080.04	6964990.58	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence clip	FE	√	3	0.5	0.25	NE-SW	90	√			
R08	R08_14_1313em2	13	4.74	4	B	2268086.21	6965016.48	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	length of barbed wire	FE	√	9	0.5	0.25	N-S	45	√			
R08	R08_17_1313em2	13	4.52	4	B	2268077.63	6965023.88	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	ball of barbed wire	FE	√	6	0.5	0.5	E-W	45	√			
R08	R08_19_1313em2	13	4.33	4	B	2268093.4	6964964.52	06-Jul-06	Alan Merriman	√													√	CIV	3	5	0.25	fence clips	FE	√	3	0.5	0.25	NE-SW	90	√			
R08	R08_2_1313em2	16	23.44	4	A	2268080.71	6965014.5	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	small aluminum piece	AL	√	3	0.5	0.25			√			
R08	R08_21_1313em2	12	4.13	4	B	2268111.62	6964970.12	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	nail	FE	√	6	0.5	0.25	N-S	0	√			
R08	R08_22_1313em2	14	4.09	4	A	2268074.44	6965010.71	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	fence crap	FE	√	3	0.5	0.25			√			
R08	R08_23_1313em2	13	4.09	4	B	2268077.64	6964999.09	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence clip	FE	√	3	0.5	0.5	NE-SW	45	√			
R08	R08_24_1313em2	13	3.74	4	B	2268085.22	6964982.32	06-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	fence clip	FE	√	3	0.5	0.25	E-W	45	√			
R08	R08_28_1313em2	11	3.51	3	B	2268068.09	6965019.8	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	fence clip	FE	√	3	0.5	0.25	NE-SW	45	√			
R08	R08_29_1313em2	11	3.31	3	B	2268088.92	6964989.93	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.25	vt fuze part							FE	√	3	0.5	0.25	N-S	45	√			
R08	R08_3_1313em2	14	23.01	4	A	2268112.07	6964974.38	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	small aluminum piece	AL	√	3	0.5	0.25			√			
R08	R08_30_1313em2	12	3.3	3	B	2268100.97	6964944.27	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	aluminum tubing and fence clips	AL	√	6	0.5	0.25	N-S	45	√			
R08	R08_7_1313em2	12	11.11	4	B	2268117.21	6964964.3	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	bolt	FE	√	6	0.5	0.5	NE-SW	45	√			
R09	QAdig_R09_52		39.7		QA	2268133.97	6965034.61	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
R09	R09_25_1409em2	16	7.93	4	A	2268172.11	6964973.41	28-Jun-06	Jim Thoren	√													√	CIV	0	5	0.25	fence parts	FE	√	3	0.5				√			
R09	R09_26_1409em2	16	7.92	4	A	2268166.12	6964982.09	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.25	fence parts	FE	√	3	0.5				√			
R09	R09_28_1409em2	16	7.76	4	A	2268159.69	6964989.51	28-Jun-06	Jim Thoren	√													√	CIV	0	3	0.25	fence part	FE	√	3	0.5				√			
R09	R09_31_1409em2	16	7.4	4	A	2268140.38	6965012.71	28-Jun-06	Jim Thoren	√													√	CIV	0	4	0.25	fence parts	FE	√	3	0.5	0.25			√			
R09	R09_34_1409em2	15	6.81	4	A	2268153.25	6964997.51	28-Jun-06	Jim Thoren	√													√	CIV	0	4	0.25	fence parts	FE	√	3	0.5	0.25			√			
R09	R09_38_1409em2	15	6.25	4	A	2268184.17	6964957.92	28-Jun-06	Jim Thoren	√													√	CIV	0	5	0.25	fence parts	FE	√	3	0.5	0.25			√			
R09	R09_39_1409em2	15	6.03	4	A	2268190.75	6964950.34	28-Jun-06	Jim Thoren	√													√	CIV	0	5	0.25	fence parts	FE	√	3	0.5	0.25			√			
R09	R09_40_1409em2	15	5.94	4	A	2268147.41	6965003.54	28-Jun-06	Jim Thoren	√													√	CIV	0	4	0.25	fence parts	FE	√	3	0.5	0.25			√			
R09	R09_42_1409em2	13	5.86	4	B	2268123.62	6964946.17	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	bolt	SS	√	3	0.5	0.5	NE-SW	45	√			
R09	R09_43_1409em2	13	5.84	4	B	2268201.83	6964989.41	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	machinery part	FE	√	6	0.5	0.5	NE-SW	45	√			
R09	R09_44_1409em2	15	5.56	4	A	2268128.59	6965028.26	28-Jun-06	Jim Thoren	√													√	CIV	0	4	0.25	fence parts	FE	√	3	0.5	0.25			√			
R09	R09_51_1409em2	13	4.88	4	B	2268197.07	6964943.79	06-Jul-06	Alan Merriman	√													√	CIV	3	4	0.25	fence clips-same item as 72	FE	√	3	0.5	0.25	N-S	45	√			
R09	R09_52_1409em2	13	4.83	4	B	2268120.57	6965035.46	06-Jul-06	Alan Merriman	√													√	CIV	3	4	0.25	fence clips	SS	√	3	0.5	0.25	NE-SW	90	√			
R09	R09_60_1409em2	13	3.81	4	B	2268179.66	6964964.95	06-Jul-06	Alan Merriman	√													√	CIV	3	10	0.25	fence clips galore	FE	√	3	0.5	0.25	N-S	0	√			
R09	R09_72_1409em2	11	2.5	3	B	2268196.59	6964940.33	06-Jul-06	Alan Merriman	√													√	CIV	3	4	0.25	fence clips - same item as 51	FE	√	3	0.5	0.25	N-S	45	√			
R10	R10_1_1410em2	16	123.3	4	A	2268237.58	6965006.98	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	4	fuze							FE	√	3	4				√			
R10	R10_10_1410em2	16	5.83	4	A	2268310.05	6965023.7	28-Jun-06	Jim Thoren																			no find											
R10	R10_2_1410em2	16	35.79	4	A	2268306.91	6965024.76	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.5	fuze, part							FE	√	3	4				√			
R10	R10_6_1410em2	16	11.78	4	A	2268261.08	6965018.01	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	1	fuze, part							FE	√	3	2				√			
R10	R10_8_1410em2	13	6.62	4	B	2268235.59	6964962.33	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	machinery part	SS	√	6	0.5	0.5	N-S	0	√			
R10	R10_9_1410em2	15	5.96	4	A	2268225.4	6965001.01	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	ac flare component							AL	√	3	1				√			
R12	R12_7_1410em2	13	7.37	4	B	2268504.86	6964947.7	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wad of wire	FE	√	6	2	0.25	N-S	0	√			
R14	R14_11_1411em2	13	13.83	4	B	2268684.85	6964994.27	06-Jul-06	Alan Merriman	√													√	CIV	> 24	1	0.5	horseshoe	FE		3	0.5	0.25	N-S	0	√			
R14	R14_119_1411em2	6	1.59	1	D	2268712.05	6964937.45	17-Aug-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
R14	R14_19_1411em2	13	9.08	4	B	2268712.65	6964997.36	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	length of wire	FE	√	9	0.5	0.25	NE-SW	0	√			
R14	R14_20_1411em2	13	8.58	4	B	2268713.85	6964980.61	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	wire, barbed	FE	√	6	0.5	0.25	NE-SW	45	√			
R14	R14_40_1411em2	11	4.47	4	B	2268716.65	6965019.57	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	wire pieces	FE	√	3	0.5	0.5	NE-SW	45	√			
R14	R14_57_1411em2	11	3.24	3	B	2268698.2	6965019.44	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	16 penny nail	FE	√	6	0.5	0.25	N-S	45	√			
R15	QAdig_R15_298		8.5		QA	2268721.92	6964947.66	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
R15	R15_154_1413em2	12	9.66	4	B	2268725.75	6964944.4	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	nail	FE	√	3	0.5	0.25	N-S	45	√			
R15	R15_251_1413em2	13	3.73	4	B	2268764.43	6964976.98	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	nail	FE	√	3	0.5	0.25	NE-SW	45	√			
R15	R15_275_1413em2	12	3.13	3	B	2268724.76	6964939.93	06-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	shot gun shell							CU	√	3	0.5	0.25	N-S	45	√			
R15	R15_278_1413em2	11	3.08	3	B	2268768.88	6964964.45	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire	FE	√	6	0.5	0.25	NE-SW	45	√			
R15	R15_3_1411em2	15	25.79	4	A	2268757.1	6965019.76	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.5	mule shoe	FE	√	6	4	0.5	N-S	0	√			
R15	R15_31_1411em2	10	5.29	4	C	2268814.89	6964983.39	11-Jul-06	Jim Thoren	√													√					hot soil, reaquired 7/25/06											
R15	R15_312_1413em2	12	2.55	3	B	2268784.27	6964977.32	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	barbed wire	FE	√	3	0.5	0.25	NE-SW	45	√			
R15	R15_33_1411em2	12	5.01	4	B	2268816.63	6964994.69	06-Jul-06	Alan Merriman																			no find, reacquired 4/31/06											
R15	R15_34_1411em2	14	4.88	4	A	2268748.23	6964999.25	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	barbed wire	FE	√	6	0.5	0.25	NE-SW	45	√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
R15	R15_361_1413em2	11	1.98	2	B	2268744.3	6964939.18	06-Jul-06	Jim Thoren																			no find, too small												
R15	R15_37_1411em2	13	4.68	4	B	2268768.93	6964992.84	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	barbed wire	FE	√	3	0.5	0.25	NE-SW	45	√			
R15	R15_42_1411em2	12	4.15	4	B	2268813.82	6964989.83	06-Jul-06	Alan Merriman																			no find, reacquired 7/31/05												
R15	R15_43_1411em2	11	4.15	4	B	2268720.62	6965030.13	06-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	fence clips	FE	√	3	0.5	0.25	N-S	45	√			
R15	R15_52_1411em2	12	3.35	3	B	2268801.09	6965036.34	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25	N-S	45	√			
R15	R15_56_1411em2	11	3.29	3	B	2268774.09	6964983.07	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	barbed wire	FE	√	3	0.5	0.25	NE-SW	0	√			
R15	R15_58_1413em2	15	34.68	4	A	2268742.26	6964943.39	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	ball of wire	FE	√	9	6	0.25	N-S	45	√			
R15	R15_8_1411em2	13	15.57	4	B	2268758.3	6965022.83	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.5	mule shoe	FE	√	6	4	0.5	N-S	0	√			
R16	R16_1_1411em2	12	36.31	4	B	2268850.69	6964997.93	06-Jul-06	Alan Merriman	√													√	CIV	> 24	1	1	metal thread rebar	FE	√	3	0.5	0.25	N-S	0	√			
R16	R16_10_1411em2	12	14.16	4	B	2268843.7	6965036.33	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	fence wire	SS	√	6	0.5	0.25	N-S	45	√			
R16	R16_22_1411em2	11	8.15	4	B	2268844.05	6965013.14	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	NE-SW	45	√			
R16	R16_24_1411em2	12	7.49	4	B	2268836.01	6964986.34	06-Jul-06	Alan Merriman	√													√	CIV	12	1	0.25	chain link fence piece	SS	√	12	0.5	0.25	N-S	45	√			
R16	R16_25_1411em2	11	7.18	4	B	2268841.78	6965033.02	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√	6	0.5	0.25	N-S	45	√			
R16	R16_27_1411em2	12	6.65	4	B	2268843.81	6965016.48	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	SS	√						√			
R16	R16_28_1411em2	12	6.38	4	B	2268836.47	6964989.71	06-Jul-06	Alan Merriman	√													√	CIV	12	1	0.25	chain link fence piece	SS	√	12	0.5	0.5	NE-SW	45	√			
R16	R16_30_1411em2	10	5.77	4	C	2268839.4	6965011.71	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
R16	R16_32_1411em2	13	5.25	4	B	2268818.94	6965005.21	06-Jul-06	Alan Merriman	√													√	CIV	6	2	0.25	tent stake & bailing wire	SS	√	12	4	1	NE-SW	90	√			
R16	R16_36_1411em2	13	4.69	4	B	2268822.15	6964999.27	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	soda can	AL	√	6	2	0.25	N-S	45	√			
R16	R16_39_1411em2	12	4.56	4	B	2268837.35	6965036.36	06-Jul-06	Alan Merriman	√													√	CIV	0	4	0.25	nails	FE	√	3	0.5	0.25	E-W	90	√			
R16	R16_59_1411em2	11	3.05	3	B	2268849.58	6965030.02	17-Aug-06	Jim Thoren	√													√	CIV	3	1	0.25	chain link fence, fence parts	SS	√	12	0.5	0.25	N-S	45	√			
S05	S05_13_1314em2	9	11.65	4	C	2267814.41	6964836.74	11-Jul-06	Jim Thoren																			no contact, reaquired 7/25/06												
S05	S05_26_1314em2	9	6.31	4	C	2267810.65	6964837.01	11-Jul-06	Jim Thoren	√													√	CIV	3	1	1	horseshoe	FE	√	6	4	0.5			√			
S07	S07_60_1210em2	14	4.56	4	A	2267959.41	6964927.29	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	scrap	FE	√	3	1	0.25			√			
S08	S08_19_1210em2	16	13.82	4	A	2268104.44	6964935.07	16-Aug-06	Jim Thoren	√													√	CIV	3	3	0.25	fence parts, fence clip	FE	√	3	0.5	0.25			√			
S08	S08_2_1210em2	16	190.95	4	A	2268110.03	6964932.86	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	fence sign	AL	√	6	6	0.25			√			
S08	S08_25_1210em2	14	9.19	4	A	2268103.11	6964859.5	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.5	fence parts	FE	√	3	0.5	0.25			√			
S08	S08_3_1210em2	16	149.38	4	A	2268110.02	6964864.55	28-Jun-06	Jim Thoren	√													√	CIV	> 24	1	2	fence post	FE	√	> 24	0.5	0.5	NE-SW	45	√			
S08	S08_38_1210em2	15	6.85	4	A	2268101.48	6964904.81	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1	0.25	VT fuze part							FE	√	6	0.5	0.25			√			
S08	S08_44_1210em2	14	6.14	4	A	2268111.82	6964917.39	28-Jun-06	Jim Thoren	√													√	CIV		10	0.25	fence parts	FE	√	3	0.5	0.25						
S08	S08_59_1210em2	14	4.67	4	A	2268092.42	6964854.55	28-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	fence parts	FE	√	3	0.5	0.25			√			
S08	S08_6_1210em2	16	68.48	4	A	2268113.56	6964864.7	28-Jun-06	Jim Thoren	√													√	CIV	> 24	1	2	fence post	FE	√	> 24	0.5	0.5	NE-SW	45	√			
S08	S08_61_1210em2	14	4.38	4	A	2268062.77	6964839.57	28-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	fence parts	FE	√	3	0.5	0.25			√			
S08	S08_68_1210em2	12	3.93	4	B	2268094.84	6964847	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	twisted wire	FE	√	6	0.5	0.5	N-S	45	√			
S08	S08_77_1210em2	11	3.44	3	B	2268081.42	6964849.67	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
S09	S09_1_1210em2	16	361.73	4	A	2268119.46	6964902.74	28-Jun-06	Jim Thoren	√													√	CIV	> 24	1	≥8	post in cement	FE	√	24	1	1	NE-SW	45	√			
S09	S09_1_1315em2	16	728.7	4	A	2268133.84	6964865.82	28-Jun-06	Jim Thoren	√													√	CIV	> 24	1	0.25	post in cement	FE	√	24	1	1	E-W	90	√			
S09	S09_11_1210em2	14	28.04	4	A	2268181.91	6964893.67	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.5	horseshoe	FE	√	6	4	0.5			√			
S09	S09_12_1315em2	16	17.54	4	A	2268137.16	6964866.7	28-Jun-06	Jim Thoren	√													√	CIV	> 24	1	0.25	post in cement	FE	√	> 24	1	1	E-W	90	√			
S09	S09_19_1315em2	16	8.28	4	A	2268129.95	6964870.92	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25			√			
S09	S09_21_1210em2	16	11.7	4	A	2268210.12	6964927.24	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.25	fence parts	FE	√	3	0.5	0.25			√			
S09	S09_22_1315em2	12	7.24	4	B	2268123.57	6964868.24	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	fence wire	FE	√	3	0.5	0.25	N-S	0	√			
S09	S09_24_1210em2	13	9.39	4	B	2268119.3	6964867.42	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	2" pipe	FE	√	> 24	2	0.25	N-S	90	√			
S09	S09_24_1315em2	13	7.09	4	B	2268124.58	6964884.41	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
S09	S09_28_1210em2	16	8.33	4	A	2268204.56	6964890.43	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.25	scrap	FE	√	3	0.5	0.25			√			
S09	S09_28_1315em2	13	6.55	4	B	2268123.29	6964892.48	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	gate hinge	FE	√	3	0.5	0.5	N-S	0	√			
S09	S09_3_1315em2	14	118.08	4	A	2268128.12	6964883.93	16-Aug-06	Jim Thoren	√													√	CIV				fence line post in ground	FE										
S09	S09_31_1210em2	16	7.66	4	A	2268216.34	6964919.3	28-Jun-06	Jim Thoren	√													√	CIV	0	3	0.25	fence parts	FE	√	3	0.5	0.25			√			
S09	S09_33_1315em2	13	5.22	4	B	2268133.01	6964872.93	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	FE	√	3	0.5	0.25	N-S	0	√			
S09	S09_34_1315em2	13	5.18	4	B	2268130.38	6964866.52	06-Jul-06	Alan Merriman	√													√	CIV	3	3	0.25	t-post(left in place) fence wire	FE	√	3	1	0.25	N-S	0				
S09	S09_39_1210em2	12	6.83	4	B	2268138.82	6964841.21	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire handle	FE	√	9	0.5	0.25	N-S	0	√			
S09	S09_41_1210em2	12	6.27	4	B	2268170.75	6964841.77	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
S09	S09_42_1210em2	13	6.19	4	B	2268128.81	6964843.95	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	FE	√	12	0.5	0.25	N-S	0	√			
S09	S09_43_1210em2	15	6.17	4	A	2268139.45	6964850.79	28-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire	FE	√	12	0.5	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
S09	S09_46_1210em2	14	5.83	4	A	2268203.65	6964934.18	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.25	fence parts, fence wire	FE	√	3	0.5	0.25			√			
S09	S09_46_1315em2	13	4.06	4	B	2268121.09	6964880.26	16-Aug-06	Alan Merriman	√													√	CIV	3	2	0.25	wad of wire	FE	√	6	0.5	0.25	N-S	0	√			
S09	S09_5_1315em2	12	55.14	4	B	2268128.84	6964879.6	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	t-post bracket	FE	√	3	4	0.25	N-S	0	√			
S09	S09_55_1315em2	12	3.32	3	B	2268134.99	6964857.99	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	bundle of wire	FE	√	6	0.5	0.25	N-S	0	√			
S09	S09_56_1210em2	13	4.86	4	B	2268155.66	6964874.01	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
S09	S09_59_1315em2	12	3.01	3	B	2268125.78	6964874.87	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wad of wire	FE	√	12	0.5	0.25	N-S	0	√			
S09	S09_70_1210em2	11	3.77	4	B	2268192.16	6964851.56	06-Jul-06	Alan Merriman																			no contact											
S09	S09_73_1210em2	13	3.64	4	B	2268143.93	6964841.73	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
S09	S09_80_1210em2	13	3.26	3	B	2268194.94	6964870.43	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	FE	√	12	0.5	0.25	N-S	0	√			
S09	S09_83_1210em2	14	2.89	3	A	2268178.56	6964870.4	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	24	0.5	0.25			√			
S09	S09_84_1210em2	11	2.86	3	B	2268143.31	6964837.83	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	fence/barb wire	FE	√	9	0.5	0.25	N-S	0	√			
S09	S09_9_1210em2	15	34.76	4	A	2268142.87	6964851.7	28-Jun-06	Jim Thoren	√													√	CIV	6	1	1	wire	FE	√	12	0.5	0.25			√			
S10	S10_10_1210em2	15	31.1	4	A	2268252.08	6964928.67	28-Jun-06	Jim Thoren	√							√	ORD MD	3	1		VT fuze							FE	√	3	4	0.25			√			
S10	S10_13_1210em2	16	21.28	4	A	2268240.68	6964888.03	28-Jun-06	Jim Thoren	√													√	CIV	0	3	0.25	fence parts	FE	√	3	0.5	0.25			√			
S10	S10_20_1210em2	16	11.74	4	A	2268260.13	6964864.59	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.25	fence parts	FE	√	3	0.5	0.25			√			
S10	S10_22_1210em2	15	10.62	4	A	2268266.52	6964857.15	28-Jun-06	Jim Thoren	√													√	CIV	0	5	0.25	fence parts	FE	√	3	0.5	0.25			√			
S10	S10_23_1210em2	15	9.44	4	A	2268245.52	6964860.88	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	9	0.5	0.25			√			
S10	S10_25_1315em2	14	7	4	A	2268272.58	6964849.41	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.25	fence parts	FE	√	3	0.5	0.25			√			
S10	S10_26_1210em2	16	9.1	4	A	2268222.96	6964911.57	28-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	fence parts	FE	√	3	0.5	0.25			√			
S10	S10_29_1315em2	16	6.52	4	A	2268277.46	6964902.7	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.25	washer	FE	√	3	4	0.25			√			
S10	S10_30_1210em2	14	7.94	4	A	2268234.78	6964895.8	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.25	fence parts	FE	√	3	0.5	0.25			√			
S10	S10_33_1210em2	16	7.47	4	A	2268255.18	6964871.73	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.25	fence parts	FE	√	3	0.5	0.25			√			
S10	S10_36_1210em2	16	7.11	4	A	2268248.11	6964879.68	28-Jun-06	Jim Thoren	√													√	CIV	0	5	0.25	fence parts	FE	√	3	0.5	0.25			√			
S10	S10_48_1210em2	15	5.73	4	A	2268251.86	6964872.46	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.25	fence parts	FE	√	3	0.5	0.25			√			
S10	S10_63_1210em2	16	4.3	4	A	2268229.1	6964904.05	28-Jun-06	Jim Thoren	√													√	CIV	0	10	0.25	fence parts	FE	√	3	0.5	0.25			√			
S10	S10_79_1210em2	12	3.34	3	B	2268230.45	6964895.33	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
S10	S10_97_1210em2	13	2.53	3	B	2268257.77	6964862.24	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
S11	S11_6_1205em2	16	16.6	4	A	2268366.09	6964853.57	28-Jun-06	Jim Thoren	√							√	ORD MD	0	1	0.25	flare							AL	√	12	2	0.25			√			
S12	S12_17_1205em2	15	6.58	4	A	2268494.74	6964864.51	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.5	scrap	FE	√	6	2	0.25			√			
S12	S12_20_1205em2	10	6.12	4	C	2268517.19	6964917.27	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	> 24		0.25			√			
S12	S12_21_1205em2	11	5.67	4	B	2268470.01	6964929.41	06-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	bolt with nut and washer	FE	√	3	0.5	0.25	N-S	0	√			
S12	S12_22_1205em2	10	5.31	4	C	2268518.02	6964911.73	11-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	12		0.25			√			
S12	S12_27_1205em2	12	4.11	4	B	2268518.15	6964922.69	06-Jul-06	Jim Thoren	√													√	CIV	0	1	0.25	wad of wire	FE	√	9	4	0.25	N-S	0	√			
S12	S12_32_1205em2	9	3.23	3	C	2268517.97	6964837.93	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	wire	FE	√	3	0.5	0.25			√			
S12	S12_5_1205em2	15	17.07	4	A	2268499.2	6964865.22	28-Jun-06	Jim Thoren	√													√	MIL	3	1	0.5	scrap	FE	√	6	2	0.5			√			
S12	S12_7_1205em2	10	15.9	4	C	2268512.98	6964919.96	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	pipe	AL	√	24	1	0.25			√			
S13	S13_14_1205em2	14	8.32	4	A	2268574.53	6964848.54	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	wire	FE	√	6	0.5	0.25	N-S	0	√			
S13	S13_15_1205em2	14	7.22	4	A	2268525.54	6964913.29	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
S13	S13_19_1205em2	13	6.14	4	B	2268606.81	6964929.22	06-Jul-06	Alan Merriman	√							√	ORD MD	0	1	0.25	fuze part, vt							FE	√	3	0.5	0.5	N-S	0	√			
S13	S13_24_1205em2	14	4.81	4	A	2268550.92	6964839.98	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	wire	FE	√	9	0.5	0.25	N-S	0	√			
S13	S13_26_1205em2	10	4.46	4	C	2268523.33	6964907.82	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	6		0.25			√			
S13	S13_3_1205em2	13	26.63	4	B	2268520.12	6964919.35	17-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wad of wire, wire	FE	√	9	2	0.25	N-S	0	√			
S13	S13_8_1205em2	16	14.64	4	A	2268560.05	6964920.72	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	padlock, combination, long shank	FE	√	6	2	1	N-S	0	√			
S13	S13_9_1205em2	13	12.82	4	B	2268521.57	6964914.16	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire, long, bent	FE	√	12	0.5	0.25	N-S	0	√			
S14	QAdig_S14_295		8.5		QA	2268682.59	6964901.05	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
S14	S14_1_1205em2	15	104.37	4	A	2268637.29	6964883.2	06-Jul-06	Alan Merriman	√													√	CIV	3	1	2	truck part	FE	√	12	2	0.25	N-S	0	√			
S14	S14_10_1205em2	14	12.15	4	A	2268688.7	6964874.25	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	soda can	AL	√	6	2	0.25	N-S	0	√			
S14	S14_13_1205em2	15	8.53	4	A	2268633.27	6964883.73	06-Jul-06	Alan Merriman																			no source found											
S14	S14_18_1205em2	14	6.34	4	A	2268687.38	6964905.25	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	nail & fence wire	FE	√	6	0.5	0.25	E-W	0	√			
S14	S14_23_1205em2	14	4.83	4	A	2268717.42	6964915.89	06-Jul-06	Alan Merriman	√													√	CIV	6	3	0.25	fence wire	FE	√	9	0.5	0.25	E-W	0	√			
S14	S14_4_1205em2	14	18.24	4	A	2268704.21	6964911.87	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.5	horseshoe	FE	√	6	6	0.25	NE-SW	0	√			
S14	S14_52_1205em2	11	2.1	2	B	2268714.23	6964891.55	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barb wire	FE	√	3	0.5	0.25	NE-SW	45	√			
S15	S15_1_1527em2	15	82.16	4	A	2268731.78	6964916.98	16-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	survey nail left in ground		√	6	0.5	0.25	N-S	90				

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
S15	S15_117_1527em2	11	1.81	1	B	2268720.5	6964935.26	17-Aug-06	Jim Thoren	√													√	CIV	0	1	0.25	fence strap	FE	√	6	0.5	0.25			√			
S15	S15_12_1527em2	13	20.75	4	B	2268732.27	6964905.3	06-Jul-06	Alan Merriman	√													√	MIL	6	1	0.5	blue pipe bomb / test seed item	FE	√	6	2	2	NE-SW	45	√			
S15	S15_15_1527em2	15	14.83	4	A	2268733.51	6964913.22	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	bolt	FE	√	6	0.5	0.5	NE-SW	45	√			
S15	S15_24_1527em2	14	10.47	4	A	2268720.26	6964931.91	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.5	metal ring	FE	√	6	6	0.5	NE-SW	45	√			
S15	S15_30_1527em2	13	7.97	4	B	2268746.96	6964913.15	06-Jul-06	Alan Merriman	√							√	ORD MD	3	1	0.5	large blue bolt / test seed item							FE	√	6	0.5	0.5	NE-SW	45	√			
S15	S15_34_1527em2	12	7.03	4	B	2268740.97	6964926.67	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire	FE	√	12	0.5	0.25	N-S	45	√			
S15	S15_37_1527em2	14	6	4	A	2268740.96	6964922.86	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	barbed wire	FE		6	0.5	0.25	NE-SW	45	√			
S15	S15_44_1527em2	13	4.92	4	B	2268775.73	6964936.6	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	length of wire	FE	√	9	0.5	0.25	NE-SW	45	√			
S15	S15_45_1527em2	13	4.78	4	B	2268724.69	6964908.42	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire	FE	√	6	0.5	0.25	N-S	45	√			
S15	S15_48_1527em2	13	4.47	4	B	2268724.04	6964911.77	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	barbed wire	FE	√	6	0.5	0.25	N-S	45	√			
S15	S15_51_1527em2	12	4.39	4	B	2268735.08	6964902.8	06-Jul-06	Alan Merriman	√													√	MIL	6	1	0.75	blue pipebomb (seed same as #12)	FE	√	6	2	4	NE-SW	45	√			
S15	S15_60_1527em2	14	3.7	4	A	2268720.7	6964928.61	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.5	metal ring	FE	√	6	4	0.5	NE-SW	45	√			
S15	S15_68_1527em2	11	3.32	3	B	2268733.56	6964926.55	06-Jul-06	Alan Merriman	√													√	CIV	6	1	0.25	barbed wire	FE	√	12	0.5	0.25	N-S	90	√			
S15	S15_69_1527em2	11	3.22	3	B	2268770.88	6964929.06	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	barbed wire	FE	√	6	0.5	0.25	NE-SW	90	√			
S15	S15_87_1527em2	11	2.38	2	B	2268741.39	6964918.9	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	barbed wire	FE	√	6	0.5	0.25	N-S	45	√			
T06	T06_11_1408em2	15	72.99	4	A	2267910.99	6964806.72	28-Jun-06	Jim Thoren	√													√	CIV	3	1	1	rebar	FE	√	> 24					√			
T06	T06_22_1408em2	15	16.39	4	A	2267864.87	6964819.91	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	9	0.5	0.25			√			
T06	T06_29_1408em2	14	9.06	4	A	2267891.54	6964823.76	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	nail	FE	√	6	0.5	0.25			√			
T06	T06_44_1408em2	11	4.38	4	B	2267855.79	6964830.91	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	steel rod	FE	√	6	0.5	0.25	N-S	0	√			
T07	T07_149_1611em2	13	10.35	4	B	2267987.53	6964800.9	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T07	T07_182_1611em2	13	7.89	4	B	2268008.45	6964809.41	06-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T07	T07_301_1611em2	13	3.84	4	B	2267970.91	6964788.91	06-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T07	T07_309_1611em2	12	3.76	4	B	2268015.07	6964814.25	06-Jul-06	Alan Merriman	√													√	CIV	0	5	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T07	T07_377_1611em2	11	2.64	3	B	2267977.14	6964796.12	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T08	QAdig_T08_154		15.2		QA	2268066.5	6964832	15-Aug-06	Alan Merriman	√							√	ORD MD	0	1	0.25	VT fuze bar							FE	√	3	2	0.25			√			
T08	T08_100_1611em2	9	16.2	4	C	2268078.16	6964827.08	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	12		0.25			√			
T08	T08_216_1611em2	13	6.08	4	B	2268044.88	6964827.95	06-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T08	T08_257_1611em2	12	4.96	4	B	2268035.55	6964823.63	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T08	T08_262_1611em2	13	4.82	4	B	2268052.67	6964833.03	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T08	T08_263_1611em2	13	4.78	4	B	2268024.74	6964818.62	06-Jul-06	Alan Merriman	√													√	CIV	0	4	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T08	T08_265_1611em2	13	4.72	4	B	2268055.3	6964835.07	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T08	T08_28_1611em2	12	68.21	4	B	2268113.45	6964831.38	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	barb wire spool end	FE	√	3	0.5	0.25	N-S	0	√			
T08	T08_36_1611em2	12	56.72	4	B	2268110.11	6964833.73	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	barb wire spool end	FE	√	3	0.5	0.25	N-S	0	√			
T08	T08_56_1611em2	12	33.36	4	B	2268110.44	6964829.61	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	barb wire spool end	FE	√	3	0.5	0.25	N-S	0	√			
T09	QAdig_T09_258		9.5		QA	2268181.67	6964823.27	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire	FE	√	6	0.5	0.25			√			
T09	QAdig_T09_68		29.6		QA	2268140.08	6964835.38	15-Aug-06	Alan Merriman	√													√	CIV	0	1	0.25	wire clips	FE							√			
T09	T09_105_1611em2	12	14.83	4	B	2268177.76	6964795.51	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire handle	FE	√	9	0.5	0.25	N-S	0	√			
T09	T09_108_1611em2	13	14.43	4	B	2268203.62	6964780.55	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wire, barbed, new school	FE	√	9	0.5	0.25	N-S	0	√			
T09	T09_115_1611em2	13	13.85	4	B	2268154.22	6964819.77	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	dog chain, unspecfied breed		√	> 24	0.5	0.5	N-S	0				
T09	T09_121_1611em2	14	13.19	4	A	2268124.42	6964820.61	28-Jun-06	Jim Thoren	√													√	CIV	0			wire		√	12	0.5	0.25			√			
T09	T09_133_1611em2	13	11.94	4	B	2268191.07	6964761.16	06-Jul-06	Alan Merriman																			no contact, reacquired 8/1/06											
T09	T09_137_1611em2	13	11.44	4	B	2268215.81	6964741.91	06-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	ac parts	FE	√	3	2	0.5	N-S	0	√			
T09	T09_140_1611em2	13	11.14	4	B	2268185.52	6964811.97	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	wad of wire	FE	√	12	0.5	0.25	N-S	0	√			
T09	T09_154_1611em2	10	10.22	4	C	2268169.05	6964788.56	11-Jul-06	Jim Thoren	√													√	CIV	6	1	0.25	wire	FE	√	12		0.25			√			
T09	T09_16_1611em2	12	118.64	4	B	2268175.66	6964816.63	17-Aug-06	Alan Merriman	√													√	CIV	0	2	0.25	fence strap (2)	FE	√	6	0.5	0.5	N-S	90	√			
T09	T09_161_1611em2	13	9.37	4	B	2268194.34	6964762.21	06-Jul-06	Alan Merriman																			no contact, reacquired 8/1/06											
T09	T09_163_1611em2	13	9.18	4	B	2268165.21	6964806.2	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wad of wire	FE	√	> 24	0.5	0.25	N-S	0	√			
T09	T09_191_1611em2	13	7.19	4	B	2268196.68	6964827.54	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wad of wire	FE	√	6	0.5	0.25	N-S	0	√			
T09	T09_226_1611em2	11	5.9	4	B	2268181.21	6964793.77	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire handle	FE	√	9	0.5	0.25	N-S	0	√			
T09	T09_238_1611em2	13	5.4	4	B	2268198.4	6964824.21	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	wad of wire	FE	√	6	0.5	0.25	N-S	0	√			
T09	T09_252_1611em2	13	5.08	4	B	2268155.18	6964816.07	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wad of wire	FE	√	12	0.5	0.25	N-S	0	√			
T09	T09_253_1611em2	14	5.02	4	A	2268185.77	6964835.64	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	can	AL	√	6	6				√			
T09	T09_26_1611em2	14	72.52	4	A	2268170.49	6964807.04	28-Jun-06	Jim Thoren	√													√	CIV	6	1	0.25	fence post blade	FE	√	3	6	0.25			√			

Appendix A
INTRUSIVE INVESTIGATION RESULTS DATABASE

											Material Potential Presenting an Explosive Hazard (MPPEH)						Munitions Debris (MD)						Non-Ordnace and Explosive (Non-OE) Materials																	
Grid	Anomaly ID	Rank Sum	Peak Amplitude	Rank BTMF	Grade	Easting	Northing	Clearance Date	UXOS Team Leader	Source Found	MPPEH Found	Type	Depth	Quantity	Weight	Description	MD Found	Type	Depth	Quantity	Weight	Description	Non-OE Found	Type	Depth	Quantity	Weight	Description	Metal Type	Aspect Ratio	Aspect Length	Aspect Width	Aspect Thickness	Aspect Major Azimuth	Aspect Dip	Anomaly Cleared	Destoryed	Destroy Date	Destoyed By
T09	T09_275_1611em2	12	4.49	4	B	2268207.07	6964780.95	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire, barbed, dinner bell shape	FE	√	6	0.5	0.25	N-S	0	√			
T09	T09_291_1611em2	12	4.06	4	B	2268184.12	6964808.96	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	t-post clips	FE	√	3	0.5	0.25	N-S	0	√			
T09	T09_3_1611em2	16	575.45	4	A	2268150.16	6964830.75	16-Aug-06	Jim Thoren	√													√	CIV	0	1		post in concrete left in ground	FE										
T09	T09_300_1611em2	14	3.84	4	A	2268149.66	6964826.21	16-Aug-06	Jim Thoren	√													√	CIV	3	1		fence wire, wire	FE	√	6	0.5	0.25			√			
T09	T09_306_1611em2	12	3.79	4	B	2268168.61	6964796.44	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	steel handle	FE	√	9	0.5	0.25	N-S	0	√			
T09	T09_308_1611em2	12	3.77	4	B	2268161.17	6964822.98	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire	FE	√	6	0.5	0.25	N-S	0	√			
T09	T09_334_1611em2	11	3.24	3	B	2268165.91	6964791.98	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	steel handle	FE	√	9	0.5	0.25	N-S	0	√			
T09	T09_70_1611em2	12	24.23	4	B	2268164.74	6964815.92	17-Aug-06	Alan Merriman	√													√	CIV	3	1	0.5	clevis pin, fence strap	FE	√	6	1	1	N-S	0	√			
T09	T09_71_1611em2	12	24.14	4	B	2268168.44	6964816.99	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	ac thread	FE	√	9	1	0.25	N-S	45	√			
T09	T09_72_1611em2	12	23.14	4	B	2268166.86	6964812.75	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.5	ac trread 1"	FE	√	9	1	1	N-S	45	√			
T09	T09_80_1611em2	8	20.82	4	D	2268170.25	6964814.19	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	fence staple	FE	√	3	1	0.25			√			
T09	T09_98_1611em2	13	16.67	4	B	2268217.41	6964745.11	06-Jul-06	Alan Merriman	√													√	MIL	3	1	0.25	ac scrap	FE	√	3	4	0.5	N-S	0	√			
T10	T10_14_1408em2	13	56.17	4	B	2268301.66	6964797.03	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	t-post bracket	FE	√	3	0.5	0.25			√			
T10	T10_17_1408em2	16	32.22	4	A	2268284.88	6964825.98	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire wad	FE	√	6	> 6	0.25						
T10	T10_18_1408em2	12	29.27	4	B	2268294.69	6964821.2	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire bolt	FE	√	9	> 6	> 4			√			
T10	T10_20_1408em2	12	17.95	4	B	2268304.77	6964790.41	06-Jul-06	Alan Merriman																			No Contact											
T10	T10_23_1408em2	16	12.93	4	A	2268224.93	6964780.07	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire wad	FE	√	6	6	0.25			√			
T10	T10_26_1408em2	15	10.85	4	A	2268233.99	6964739.75	28-Jun-06	Jim Thoren	√													√	CIV			0.25	wire wad	FE	√	3	6	0.25			√			
T10	T10_28_1408em2	13	9.43	4	B	2268298.76	6964817.97	06-Jul-06	Alan Merriman	√													√	CIV	0	3	0.25	t-post clip	FE	√	3	6	> 4			√			
T10	T10_30_1408em2	15	7.09	4	A	2268304.82	6964809.77	28-Jun-06	Jim Thoren	√													√	CIV	3	5	0.25	fence wire	FE	√	3	0.5	0.25			√			
T10	T10_31_1408em2	14	6.9	4	A	2268234.38	6964758.08	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire wad	FE	√	6	6				√			
T10	T10_35_1408em2	12	5.62	4	B	2268273.99	6964822.75	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	bolt	FE	√	6	0.5	0.5	N-S	90	√			
T10	T10_36_1408em2	16	5.49	4	A	2268305.36	6964778.46	28-Jun-06	Jim Thoren	√													√	CIV	3	3	0.25	wire fence parts	FE	√	3		0.25			√			
T10	T10_37_1408em2	13	5.22	4	B	2268233.39	6964743.35	06-Jul-06	Alan Merriman	√													√	CIV			0.25	wire wad-same as 26 A	FE	√	3	6	0.25			√			
T10	T10_41_1408em2	14	4.74	4	A	2268263.13	6964790.71	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	wire	FE	√	3	0.5	0.25			√			
T10	T10_42_1408em2	12	4.49	4	B	2268271.99	6964819.2	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	tractor lug nut-Massey Furgeson	FE							√			
T10	T10_51_1408em2	10	4.09	4	C	2268287.32	6964832.14	11-Jul-06	Jim Thoren	√													√	CIV	3	1	0.25	fence pts	FE							√			
T10	T10_55_1408em2	12	3.53	3	B	2268225.82	6964776.79	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	wire wad-same as 23 A		√	6	6	0.25			√			
T10	T10_56_1408em2	11	3.34	3	B	2268281.21	6964817.38	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	16d nail	FE	√	3	> 6	> 4	N-S	0	√			
T10	T10_57_1408em2	13	3.29	3	B	2268291.46	6964793.43	06-Jul-06	Alan Merriman	√													√	CIV	3	2	0.25	fence wire		√	9	> 6	> 4			√			
T10	T10_58_1408em2	11	3.24	3	B	2268261.39	6964746.1	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire bundle	FE	√	6	2	> 4			√			
T10	T10_59_1408em2	11	3.14	3	B	2268260.3	6964742.98	06-Jul-06	Alan Merriman	√													√	CIV	3	1	0.25	fence wire bundled		√	6	2	> 4			√			
T10	T10_8_1408em2	15	109.35	4	A	2268302.93	6964793.53	28-Jun-06	Jim Thoren	√													√	CIV	0	1	0.5	rod		√	> 24	0.5	0.5						
T11	T11_1_1408em2	13	4923.48	4	B	2268342.17	6964768.62	06-Jul-06	Alan Merriman	√													√	CIV	0	1	≥8	3" steel fence post	FE	√	3	> 6	0.25		90				
T11	T11_10_1408em2	13	80.1	4	B	2268326.84	6964782.17	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.5	fence post cap 3"	FE	√	3				90	√			
T11	T11_12_1408em2	15	69.52	4	A	2268350.66	6964768.29	28-Jun-06	Jim Thoren	√													√	CIV				rebar in cement	FE										
T11	T11_13_1408em2	13	64.41	4	B	2268320.88	6964790.84	06-Jul-06	Alan Merriman	√													√	CIV	0	1	0.25	fence wire 10 ga		√	3	> 6	> 4	N-S	0	√			
T11	T11_15_1408em2	16	52.88	4	A	2268327.05	6964761.98	28-Jun-06	Jim Thoren	√													√	CIV	3	1	0.25	fence post cap	FE	√	3	2	0.25			√			
T11	T11_16_1408em2	16	49.7	4	A	2268340.73	6964807.91	28-Jun-06	Jim Thoren	√													√	CIV		1			FE		6	4	0.25			√			
T11	T11_2_1408em2	10	4337.87	4	C	2268323.49	6964783.53	11-Jul-06	Jim Thoren	√													√	CIV				fence post left in ground											
T11	T11_3_1408em2	13	2287.64	4	B	2268334.32	6964770.79	06-Jul-06	Alan Merriman	√													√	CIV	0	1	≥8	3" steel fence post	FE	√	3	> 6	0.25		90				
T11	T11_32_1408em2	15	6.03	4	A	2268401.39	6964754.87	28-Jun-06	Jim Thoren	√													√	CIV	3	4	0.25	fence wire	FE	√	3	0.5	0.25			√			
T11	T11_34_1408em2	14	5.63	4	A	2268380.34	6964757.97	28-Jun-06	Jim Thoren	√													√	CIV	0	3	0.25	fence wire	FE		3	0.5	0.25			√			
T11	T11_4_1408em2	12	1685.16	4	B	2268335.65	6964775.16	06-Jul-06	Alan Merriman	√													√	CIV	0	1	≥8	3" steel fence post	FE	√	3	> 6	0.25		90				
T11	T11_43_1408em2	14	4.45	4	A	2268370.57	6964762.13	28-Jun-06	Jim Thoren	√													√	CIV	0	2	0.25	fence wire	FE	√	3	0.5	0.25			√			
T11	T11_5_1408em2	13	1600.78	4	B	2268341.62	6964772.84	06-Jul-06	Alan Merriman	√													√	CIV	0	1	≥8	3" steel fence post	FE										
T11	T11_54_1408em2	11	3.57	3	B	2268360.64	6964764.39	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clip	FE	√	3	> 6	> 4			√			
T11	T11_6_1408em2	15	1157.95	4	A	2268320.96	6964785.96	28-Jun-06	Jim Thoren	√													√	CIV	0	1		fence post	FE										
T11	T11_63_1408em2	12	2.7	3	B	2268391.22	6964755.34	06-Jul-06	Alan Merriman	√													√	CIV	0	2	0.25	t-post clips	FE	√	3	> 6	> 4			√			
T11	T11_7_1408em2	10	1106.77	4	C	2268323.3	6964788.58	11-Jul-06	Jim Thoren	√													√	CIV				fence post left in ground											
T12	T12_1_1407em2	12	5.4	4	B	2268473.03	6964801.35	06-Jul-06	Jim Thoren	√							√	ORD MD	3	1	0.25	frag							FE	√	6	1	0.25	NE-SW	0	√			
T12	T12_3_1407em2	13	4.38	4	B	2268515.5	6964796.8	06-Jul-06	Jim Thoren	√													√	MIL	3	1	0.25	firing wire reel end	FE	√	3	0.5	0.25	N-S	0	√			
T13	QAdig_T13_484		6		QA	2268569.29	6964835.93	15-Aug-06	Alan Merriman	√																		too small to find								√			

APPENDIX B
SCRAP DISPOSITION DOCUMENTATION

1461 East Cooley Drive, Suite 100, Colton, California 92324

Telephone
909.554.5000
Facsimile
909.424.1924

Date: August 7, 2006

Address: Mainfield Metal and Rubber
4300 F.M. 1187
Burleson, TX. 76028
(817)-551-0896

Subject: **Documentation of Munitions Potentially Presenting an Explosive Hazard (MPPEH) Generated at the Former Carswell Explosive Ordnance Disposal (EOD) Range Ordnance Removal/Clearance Operation:**

Dear Sirs,

All located MPPEH items were inspected by a minimum of two qualified UXO personnel for explosive hazards, and classified as either Munitions and Explosives of Concern (MEC), or Munitions Debris (MD) which are non-hazardous remnants. All items classified as MEC were destroyed using explosive demolition methods as described in the Site Work Plan for the Former Carswell EOD Range dated August 14, 2006. After explosive demolition operations all resultant MD produced was re-inspected to ensure the absence of explosive hazards.

After being inspected and certified free of explosive hazards IAW Chapter 11 of the Site Work Plan, all MD was secured in closed labeled and sealed containers and documented as listed below:

Maintaining Chain of Custody for all MD located at the Former Carswell EOD Range for each Container	
Material Content	Type of Medal; Mixed
Estimated Weight for total	9000 lbs
Unique ID No. For each container	N/A
Location of MDs origin by container	. Site
Seal Identification No. if different from container ID. Site Inspection Work Plan,	N/A

This letter **"certifies that the material listed has been 100 percent inspected IAW the Site Inspection Work Plan for the Former Carswell Explosive Ordnance Disposal Range dated 14 August 2006, and to the best of our knowledge and belief, are free of explosive hazards, and is classified as MD.**

SUXOS: Kelly R Hickman
Senior UXO Supervisor
Kelly Hickman

UXOSO: Brian Wilson
UXO Safety Officer
Brian Wilson

As per the established agreement between Earth Tech Inc. and Mainsfield Metal and Rubber , and having received the listed containers each with its unique identification no.

1461 East Cooley Drive, Suite 100, Colton, California 92324

and unbroken seal ensuring continued chain of custody, and after reviewing all the provided supporting documentation, sign for receiving the documented materials. By signing this document you are verifying receipt of the inventoried materials and agreeing to the following:

- Received containers will not be sold, traded, or otherwise given to another party until the contents has been smelted or shredded, and are only identifiable by their basic content.
- Send notification and supporting documentation to Earth Tech Inc. documenting the sealed containers contents has been smelted or shredded, and are now only identifiable by their basic content.

Not at Mansfied Metal – send off to be done

The above documented containers containing MD have been received by ~~Mainfield~~ Mansfield Metal and Rubber on 7 August 2006.
Signature for receipt: Paula Chambers Date: 8-2-06.

Thank you for your support in this effort, if you have any questions please feel free to contact me at 909-554-5000.

Telephone
909.554.5000
Facsimile
909.424.1924

Respectfully,

Earth Tech Inc.

Kelly Hickman
Senior UXO Supervisor

ELECTRONIC SCALE TICKET

No. 48118

Date 14:33 07/24/06
48118 ID. NO.
5640 lb GR

Seller
Buyer

14:46 07/24/06
48118 ID. NO.
5640 lb GR RECALLED
5560 lb TR
80 lb NT

Address
City
State Zip
Commodity TIN Price
Driver
Weigher 31 - Brass sheet w lead

MANSFIELD METALS (817) 551-0896

ELECTRONIC SCALE TICKET

No. 48346

Date 07:56 08/01/06
48346 ID. NO.
6640 lb GR

Seller
Buyer

08:09 08/01/06
48346 ID. NO.
6640 lb GR RECALLED
7540 lb TR
-100 lb NT

Address
City
State Zip
Commodity Price
Driver OM
Weigher

MANSFIELD METALS (817) 551-0896

ELECTRONIC SCALE TICKET

No. 48433

Date 12:27 08/03/06
48433 ID. NO.
11080 lb GR

Seller
Buyer

12:34 08/03/06
48433 ID. NO.
11080 lb GR RECALLED
7520 lb TR
3560 lb NT

Address
City
State Zip
Commodity S/S Price
Driver
Weigher

MANSFIELD METALS (817) 551-0896

ELECTRONIC SCALE TICKET

No. 48435

Date 12:55 08/03/06
48435 ID. NO.
7540 lb GR

Seller
Buyer

13:00 08/03/06
48435 ID. NO.
7540 lb GR RECALLED
7380 lb TR
160 lb NT

Address
City
State Zip
Commodity IRON Price
Driver OFF
Weigher

MANSFIELD METALS (817) 551-0896

ELECTRONIC SCALE TICKET

No. 48420

Date 08:55 08/03/06
48420 ID. NO.
10680 lb GR

Seller
Buyer

09:25 08/03/06
48420 ID. NO.
10680 lb GR RECALLED
7340 lb TR
3340 lb NT

Address
City
State Zip
Commodity Price
Driver
Weigher

MANSFIELD METALS (817) 551-0896

ELECTRONIC SCALE TICKET

No. 47912

Date 09:27 08/07/06
47912 ID. NO.
8380 lb GR

Seller
Buyer

09:42 08/07/06
47912 ID. NO.
8380 lb GR RECALLED
7580 lb TR
800 lb NT

Address
City
State Zip
Commodity Price
Driver OM
Weigher

MANSFIELD METALS (817) 551-0896

APPENDIX C
SOIL SAMPLE LABORATORY REPORT

SEVERN TRENT STL

STL Sacramento
880 Riverside Parkway
West Sacramento, CA 95605

Tel: 916 373 5600
Fax: 916 372 1059
www.stl-inc.com

August 28, 2006

STL SACRAMENTO PROJECT NUMBER: G6H180310
PO/CONTRACT: 06S-9916-SB11

Greg Peterson
Earth Tech, Inc.
1461 East Cooley Drive
Suite 100
Colton, CA 92324

Dear Mr. Peterson,

This report contains the analytical results for the samples received under chain of custody by STL Sacramento on August 18, 2006. These samples are associated with your 87633.02.02 project.

The test results in this report meet all NELAC requirements for parameters that accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The case narrative is an integral part of this report.

If you have any questions, please feel free to call me at (916) 374-4442.

Sincerely,

Pravani Pillay
Project Manager

TABLE OF CONTENTS

STL SACRAMENTO PROJECT NUMBER G6H180310

Case Narrative

STL Sacramento Quality Assurance Program

Sample Description Information

Chain of Custody Documentation

SOLID, 8330, Explosives
Samples: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18
- Sample Data Sheets
- Method Blank Reports
- Laboratory QC Reports

Raw Data

CASE NARRATIVE

STL SACRAMENTO PROJECT NUMBER G6H180310

There were no anomalies associated with this project.

SEVERN TRENT STL

ACCREDITED IN ACCORDANCE WITH nelac

STL Sacramento Certifications/Accreditations

Certifying State	Certificate #	Certifying State	Certificate #
Alaska	UST-055	Oregon*	CA 200005
Arizona	AZ0616	Pennsylvania	68-1272
Arkansas	04-067-0	South Carolina	87014002
California*	01119CA	Texas	TX 270-2004A
Colorado	NA	Utah*	QUAN1
Connecticut	PH-0691	Virginia	00178
Florida*	E87570	Washington	C087
Georgia	960	West Virginia	9930C, 334
Hawaii	NA	Wisconsin	998204680
Louisiana*	01944	NFESC	NA
Michigan	9947	USACE	NA
Nevada	CA44	USDA Foreign Plant	37-82605
New Jersey*	CA005	USDA Foreign Soil	S-46613
New York*	11666		

*NELAP accredited. A more detailed parameter list is available upon request. Update 1/27/05

QC Parameter Definitions

QC Batch: The QC batch consists of a set of up to 20 field samples that behave similarly (i.e., same matrix) and are processed using the same procedures, reagents, and standards at the same time.

Method Blank: An analytical control consisting of all reagents, which may include internal standards and surrogates, and is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background contamination.

Laboratory Control Sample and Laboratory Control Sample Duplicate (LCS/LCSD): An aliquot of blank matrix spiked with known amounts of representative target analytes. The LCS (and LCSD as required) is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects. If an LCSD is performed, it may also be used to evaluate the precision of the process.

Duplicate Sample (DU): Different aliquots of the same sample are analyzed to evaluate the precision of an analysis.

Surrogates: Organic compounds not expected to be detected in field samples, which behave similarly to target analytes. These are added to every sample within a batch at a known concentration to determine the efficiency of the sample preparation and analytical process.

Matrix Spike and Matrix Spike Duplicate (MS/MSD): An MS is an aliquot of a matrix fortified with known quantities of specific compounds and subjected to an entire analytical procedure in order to indicate the appropriateness of the method for a particular matrix. The percent recovery for the respective compound(s) is then calculated. The MSD is a second aliquot of the same matrix as the matrix spike, also spiked, in order to determine the precision of the method.

Isotope Dilution: For isotope dilution methods, isotopically labeled analogs (internal standards) of the native target analytes are spiked into the sample at time of extraction. These internal standards are used for quantitation, and monitor and correct for matrix effects. Since matrix effects on method performance can be judged by the recovery of these analogs, there is little added benefit of performing MS/MSD for these methods. MS/MSD are only performed for client or QAPP requirements.

Control Limits: The reported control limits are either based on laboratory historical data, method requirements, or project data quality objectives. The control limits represent the estimated uncertainty of the test results.

Sample Summary
G6H180310

WO#	Sample #	Client Sample ID	Sampling Date	Received Date
JCPCN	1	OWSA-L13-212-S0001	8/17/2006 11:00 AM	8/18/2006 09:05 AM
JCPCX	2	OWSA-L13-212-S0002	8/17/2006 11:05 AM	8/18/2006 09:05 AM
JCPC1	3	OWSA-L13-212-S0003	8/17/2006 11:10 AM	8/18/2006 09:05 AM
JCPC2	4	OWSA-L13-212-S0004	8/17/2006 11:15 AM	8/18/2006 09:05 AM
JCPC3	5	OWSA-L13-212-S0005	8/17/2006 11:20 AM	8/18/2006 09:05 AM
JCPC4	6	OWSA-L15-229-S0006	8/17/2006 11:36 AM	8/18/2006 09:05 AM
JCPC5	7	OWSA-H13-5-S0007	8/17/2006 11:40 AM	8/18/2006 09:05 AM
JCPC6	8	OWSA-H13-10-S0008	8/17/2006 11:50 AM	8/18/2006 09:05 AM
JCPC8	9	OWSA-G15-248-S0009	8/17/2006 12:05 PM	8/18/2006 09:05 AM
JCPDA	10	OWSA-J16-85-S0011	8/17/2006 12:30 PM	8/18/2006 09:05 AM
JCPDD	11	OWSA-LIVE OAK CREEK BED A	8/17/2006 01:00 PM	8/18/2006 09:05 AM
JCPDE	12	OWSA-LIVE OAK CREEK BED B	8/17/2006 01:05 PM	8/18/2006 09:05 AM
JCPDF	13	OWSA-A10-121-S0010A	8/17/2006 01:15 PM	8/18/2006 09:05 AM
JCPDH	14	OWSA-A10-121-S0010B	8/17/2006 01:20 PM	8/18/2006 09:05 AM
JCPDJ	15	OWSA-E13-119-S0012	8/17/2006 01:10 PM	8/18/2006 09:05 AM
JCPDK	16	OWSA-F12-199-S0013	8/17/2006 01:30 PM	8/18/2006 09:05 AM
JCPDN	17	OWSA-G10-5-S0014	8/17/2006 01:40 PM	8/18/2006 09:05 AM
JCPDT	18	OWSA-K06-59-S0015	8/17/2006 01:50 PM	8/18/2006 09:05 AM

Notes(s):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity, pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight

Chain of Custody Record

TRENT STL
Severn Trent Laboratories, Inc.

G6H180310

STL-4124 (0901)

Client	Project Manager	Date	Chain of Custody Number
Earth Tech	Greg Peterson	8/17/06	[illegible]
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	
1461 East Cooley Dr Suite 100	909-554-5047		Page 1 of 2
City / **State** / **Zip Code**	**Site Contact**	**Lab Contact**	
Colton / CA / 92324	Brian Wilson	Pravani	
Project Name and Location (State)	**Carrier/Waybill Number**		
Carswell Air Force Base	8312 6194 4950		
Contract/Purchase Order/Quote No.			
Project # 97633-02.02			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis (Attach list if more space is needed): SW8330 Explosives											Special Instructions/ Conditions of Receipt
OWSA-L13-212-S0001	8/17/06	11:00				X							X											
OWSA-L13-212-S0002	8/17/06	11:05				X							X											
OWSA-L13-212-S0003	8/17/06	1110				X							X											
OWSA-L13-212-S0004	8/17/06	1115				X							X											
OWSA-L13-212-S0005	8/17/06	1120				X							X											
OWSA-L15-229-S0006	8/17/06	1136				X							X											
OWSA-H13-5-S0007	8/17/06	1140				X							X											
OWSA-H13-10-S0008	8/17/06	1150				X							X											
OWSA-G15-248-S0009	8/17/06	1205				X							X											
OWSA-J16-65-S0011	8/17/06	1230				X							X										ML	
OWSA-Live Oak Creek Bed A	8/17/06	1300				X							X											
OWSA-Live Oak Creek Bed B	8/17/06	1305				X							X											

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By: Matt Sellu	8/17/06	1507	1. Received By: FedEx for shipment	8/17/06	1630
2. Relinquished By			2. Received By: Matthew J.	8/18/06	1355
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

STL Sacramento (916) 373-5600

Chain of Custody Record

G6H180310

STL-4124 (0901)

SEVERN TRENT STL

Severn Trent Laboratories, Inc.

Client: Earth Tech	Project Manager: Grey Peterson	Date: 8/17/06	Chain of Custody Number:
Address: 1461 East Cooley Drive Suite 100	Telephone Number (Area Code)/Fax Number: 909-554-5047	Lab Number:	Page 2 of 2
City: Colton; State: CA; Zip Code: 92324	Site Contact: Brian Wilson	Lab Contact: Pravani	
Project Name and Location (State): Carswell Air Force Base Texas	Carrier/Waybill Number: 8312-6194 4550		
Contract/Purchase Order/Quote No.: Project # 87633-02.02			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	SW9330 Explosives	Special Instructions/ Conditions of Receipt
OWSA-A10-121-50010A	8/17/06	1315				X							X	
OWSA-A10-121-50010B	8/17/06	1320				X							X	
OWSA-E13-119-50012	8/17/06	1310				X							X	
OWSA-F12-199-50013	8/17/06	1330				X							X	
OWSA-G10-5-50014	8/17/06	1340				X							X	
OWSA-K06-59-50015	8/17/06	1350				X							X	

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal: ☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other ____

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: Matt Miller	8/17/06	1907	1. Received By: Fed Ex	8/17/06	1630
2. Relinquished By:			2. Received By: Matthew J.	8/18/06	1355
3. Relinquished By:			3. Received By:		

Comments:

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

STL Sacramento (916) 373-5600

SEVERN TRENT STL

LOT RECEIPT CHECKLIST
STL Sacramento

CLIENT Earth tech PM ~~NXL~~ PP LOG # 46631

DT# (QUANTIMS ID) G6H180310 QUOTE# 71952 LOCATION WZD

	Initials	Date
ATE RECEIVED 8/18/06 TIME RECEIVED 905	MC	8/18/06

ELIVERED BY ☑ FEDEX ☐ CA OVERNIGHT ☐ CLIENT ☐ AIRBORNE ☐ GOLDENSTATE ☐ DHL ☐ UPS ☐ BAX GLOBAL ☐ GO-GETTERS ☐ STL COURIER ☐ COURIERS ON DEMAND ☐ OTHER

USTODY SEAL STATUS ☑ INTACT ☐ BROKEN ☐ N/A

CUSTODY SEAL #(S) 795005, 796405

IPPPING CONTAINER(S) ☑ STL ☐ CLIENT ☐ N/A

MPERTURE RECORD (IN °C) IR 1 ☑ 3 ☐ ☐ OTHER

COC #(S) 295109, 295108

MPERATURE BLANK Observed: 2, 2 Corrected: 2, 2

SAMPLE TEMPERATURE

bserved: 4 3 3 Average: 3 Corrected Average: 3

OLLECTOR'S NAME: ☐ Verified from COC ☑ Not on COC

MEASURED ☐ YES ☐ ANOMALY ☑ N/A

ABELED BY.....

BELS CHECKED BY.....

ER REVIEW ☑ NA

HORT HOLD TEST NOTIFICATION

SAMPLE RECEIVING
WETCHEM ☑ N/A
VOA-ENCORES ☑ N/A

METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL ☑ N/A

COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES ☐ N/A

Clouseau ☐ TEMPERATURE EXCEEDED (2 °C – 6 °C)*1 ☑ N/A

WET ICE ☐ BLUE ICE ☐ GEL PACK ☐ NO COOLING AGENTS USED ☐ PM NOTIFIED

otes:

cceptable temperature range for State of Wisconsin samples is ≤4°C.
LEAVE NO SPACES BLANK. USE "N/A" IF NOT APPLICABLE. INITIAL AND DATE ALL "N/A" ENTRIES.

EVERN TRENT STL

Bottle Lot Inventory

Lot ID: G6H180310

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DA*																				
DAh*																				
GB																				
GBs																				
50AGB																				
50AGBs																				
50AGBn																				
00AGB																				
__AGJ																				
00AGJ																				
50AGJ																				
25AGJ																				
__CGJ																				
00CGJ																				
50CGJ																				
25CGJ																				
in																				
0PJ																				
0PJn																				
0PJna																				
0PJzn/na																				
0PJ																				
0PJn																				
0PJna																				
0PJzn/na																				
tate Tube																				
__"CT																				
core																				
lder/filter																				
F																				
tri/Filter																				
D Trap																				
loc																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

hydrochloric acid s = sulfuric acid na = sodium hydroxide n = nitric acid zn = zinc acetate

ıber of VOAs with air bubbles present / total number of VOA's

QA-185 3/05 EM

Page 2

SOLID, 8330, Explosives

Earth Tech, Inc.

Client Sample ID: OWSA-L13-212-S0001

HPLC

Lot-Sample #...: G6H180310-001 Work Order #...: JCPCN1AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	**0.069 J**	**0.25**	**mg/kg**	**0.050**
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	109	(81 - 127)

NOTE(S):

J Estimated result. Result is less than RL.

Earth Tech, Inc.

Client Sample ID: OWSA-L13-212-S0002

HPLC

Lot-Sample #...: G6H180310-002 Work Order #...: JCPCX1AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	**0.085 J**	**0.25**	**mg/kg**	**0.050**
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	110	(81 - 127)

NOTE(S):

J Estimated result. Result is less than RL.

Earth Tech, Inc.

Client Sample ID: OWSA-L13-212-S0003

HPLC

Lot-Sample #...: G6H180310-003 Work Order #...: JCPC11AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	110	(81 - 127)

Earth Tech, Inc.

Client Sample ID: OWSA-L13-212-S0004

HPLC

Lot-Sample #...: G6H180310-004 Work Order #...: JCPC21AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	111	(81 - 127)

Earth Tech, Inc.

Client Sample ID: OWSA-L13-212-S0005

HPLC

Lot-Sample #...: G6H180310-005
Date Sampled...: 08/17/06
Prep Date.....: 08/22/06
Prep Batch #...: 6234596
Dilution Factor: 1

Work Order #...: JCPC31AA
Date Received..: 08/18/06
Analysis Date..: 08/25/06

Method.....: SW846 8330

Matrix.....: SO

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	108	(81 - 127)

Earth Tech, Inc.

Client Sample ID: OWSA-L15-229-S0006

HPLC

Lot-Sample #...: G6H180310-006 Work Order #...: JCPC41AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	111	(81 - 127)

Earth Tech, Inc.

Client Sample ID: OWSA-H13-5-S0007

HPLC

Lot-Sample #...: G6H180310-007 Work Order #...: JCPC51AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	0.11 J	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	109	(81 - 127)

NOTE(S):

J Estimated result. Result is less than RL.

Earth Tech, Inc.

Client Sample ID: OWSA-H13-10-S0008

HPLC

Lot-Sample #...: G6H180310-008 Work Order #...: JCPC61AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	108	(81 - 127)

Earth Tech, Inc.

Client Sample ID: OWSA-G15-248-S0009

HPLC

Lot-Sample #...: G6H180310-009 Work Order #...: JCPC81AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	0.027 J	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	111	(81 - 127)

NOTE(S):

J Estimated result. Result is less than RL.

Earth Tech, Inc.

Client Sample ID: OWSA-J16-85-S0011

HPLC

Lot-Sample #...: G6H180310-010 Work Order #...: JCPDA1AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	0.031 J	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	110	(81 - 127)

NOTE(S):

J Estimated result. Result is less than RL.

Earth Tech, Inc.

Client Sample ID: OWSA-LIVE OAK CREEK BED A

HPLC

Lot-Sample #...: G6H180310-011 Work Order #...: JCPDD1AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	110	(81 - 127)

Earth Tech, Inc.

Client Sample ID: OWSA-LIVE OAK CREEK BED B

HPLC

Lot-Sample #...: G6H180310-012 Work Order #...: JCPDE1AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	110	(81 - 127)

Earth Tech, Inc.

Client Sample ID: OWSA-A10-121-S0010A

HPLC

Lot-Sample #...: G6H180310-013
Date Sampled...: 08/17/06
Prep Date.....: 08/22/06
Prep Batch #...: 6234596
Dilution Factor: 1

Work Order #...: JCPDF1AA
Date Received..: 08/18/06
Analysis Date..: 08/25/06

Matrix.....: SO

Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	0.43 J	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	0.048 J	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	108	(81 - 127)

NOTE(S):

J Estimated result. Result is less than RL.

Earth Tech, Inc.

Client Sample ID: OWSA-A10-121-S0010B

HPLC

Lot-Sample #...: G6H180310-014 Work Order #...: JCPDH1AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	0.031 J	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	111	(81 - 127)

NOTE(S):

J Estimated result. Result is less than RL.

Earth Tech, Inc.

Client Sample ID: OWSA-E13-119-S0012

HPLC

Lot-Sample #...: G6H180310-015
Date Sampled...: 08/17/06
Prep Date.....: 08/22/06
Prep Batch #...: 6234596
Dilution Factor: 1

Work Order #...: JCPDJ1AA
Date Received..: 08/18/06
Analysis Date..: 08/25/06

Matrix.....: SO

Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	111	(81 - 127)

Earth Tech, Inc.

Client Sample ID: OWSA-F12-199-S0013

HPLC

Lot-Sample #...: G6H180310-016
Date Sampled...: 08/17/06
Prep Date.....: 08/22/06
Prep Batch #...: 6234596
Dilution Factor: 1

Work Order #...: JCPDK1AA
Date Received..: 08/18/06
Analysis Date..: 08/25/06

Matrix.....: SO

Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	109	(81 - 127)

Earth Tech, Inc.

Client Sample ID: OWSA-G10-5-S0014

HPLC

Lot-Sample #...: G6H180310-017 Work Order #...: JCPDN1AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	0.053 J	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	112	(81 - 127)

NOTE(S):

J Estimated result. Result is less than RL.

Earth Tech, Inc.

Client Sample ID: OWSA-K06-59-S0015

HPLC

Lot-Sample #...: G6H180310-018 Work Order #...: JCPDT1AA Matrix.....: SO
Date Sampled...: 08/17/06 Date Received..: 08/18/06
Prep Date.....: 08/22/06 Analysis Date..: 08/25/06
Prep Batch #...: 6234596
Dilution Factor: 1 Method.....: SW846 8330

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
4-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	0.020
2-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	0.10
1,3-Dinitrobenzene	ND	0.25	mg/kg	0.050
2,4-Dinitrotoluene	ND	0.25	mg/kg	0.020
2,6-Dinitrotoluene	ND	0.25	mg/kg	0.030
HMX	ND	0.25	mg/kg	0.030
Nitrobenzene	ND	0.25	mg/kg	0.050
Nitroglycerin	ND	0.50	mg/kg	0.13
2-Nitrotoluene	ND	0.25	mg/kg	0.080
3-Nitrotoluene	ND	0.25	mg/kg	0.070
4-Nitrotoluene	ND	0.25	mg/kg	0.080
PETN	ND	0.50	mg/kg	0.16
RDX	ND	0.25	mg/kg	0.040
Tetryl	ND	0.25	mg/kg	0.050
1,3,5-Trinitrobenzene	0.033 J	0.25	mg/kg	0.020
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	0.020

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	111	(81 - 127)

NOTE(S):
J Estimated result. Result is less than RL.

QC DATA ASSOCIATION SUMMARY

G6H180310

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	SO	SW846 8330		6234596	6234373
002	SO	SW846 8330		6234596	6234373
003	SO	SW846 8330		6234596	6234373
004	SO	SW846 8330		6234596	6234373
005	SO	SW846 8330		6234596	6234373
006	SO	SW846 8330		6234596	6234373
007	SO	SW846 8330		6234596	6234373
008	SO	SW846 8330		6234596	6234373
009	SO	SW846 8330		6234596	6234373
010	SO	SW846 8330		6234596	6234373
011	SO	SW846 8330		6234596	6234373
012	SO	SW846 8330		6234596	6234373
013	SO	SW846 8330		6234596	6234373
014	SO	SW846 8330		6234596	6234373
015	SO	SW846 8330		6234596	6234373
016	SO	SW846 8330		6234596	6234373
017	SO	SW846 8330		6234596	6234373
018	SO	SW846 8330		6234596	6234373

METHOD BLANK REPORT

HPLC

Client Lot #...: G6H180310 Work Order #...: JCXPA1AA Matrix.....: SOLID
MB Lot-Sample #: G6H220000-596

Prep Date.....: 08/22/06
Analysis Date..: 08/24/06 Prep Batch #...: 6234596
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
1,3-Dinitrobenzene	ND	0.25	mg/kg	SW846 8330
2,4-Dinitrotoluene	ND	0.25	mg/kg	SW846 8330
2,6-Dinitrotoluene	ND	0.25	mg/kg	SW846 8330
Nitrobenzene	ND	0.25	mg/kg	SW846 8330
Nitroglycerin	ND	0.50	mg/kg	SW846 8330
1,3,5-Trinitrobenzene	ND	0.25	mg/kg	SW846 8330
2,4,6-Trinitrotoluene	ND	0.25	mg/kg	SW846 8330
HMX	ND	0.25	mg/kg	SW846 8330
RDX	ND	0.25	mg/kg	SW846 8330
Tetryl	ND	0.25	mg/kg	SW846 8330
2-Nitrotoluene	ND	0.25	mg/kg	SW846 8330
3-Nitrotoluene	ND	0.25	mg/kg	SW846 8330
4-Nitrotoluene	ND	0.25	mg/kg	SW846 8330
2-Amino-2,6-dinitrotoluene	ND	0.25	mg/kg	SW846 8330
4-Amino-4,6-dinitrotoluene	ND	0.30	mg/kg	SW846 8330
PETN	ND	0.50	mg/kg	SW846 8330

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	110	(81 - 127)

NOTE(S):
Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

HPLC

Client Lot #...: G6H180310 Work Order #...: JCXPA1AC Matrix.....: SOLID
LCS Lot-Sample#: G6H220000-596
Prep Date.....: 08/22/06 Analysis Date..: 08/24/06
Prep Batch #...: 6234596
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD
2-Amino-4,6-dinitrotoluene	99	(80 - 125)	SW846 8330
4-Amino-2,6-dinitrotoluene	99	(80 - 125)	SW846 8330
1,3-Dinitrobenzene	103	(80 - 125)	SW846 8330
2,4-Dinitrotoluene	98	(80 - 125)	SW846 8330
2,6-Dinitrotoluene	100	(80 - 120)	SW846 8330
HMX	104	(75 - 125)	SW846 8330
Nitrobenzene	102	(75 - 125)	SW846 8330
Nitroglycerin	105	(74 - 112)	SW846 8330
2-Nitrotoluene	101	(80 - 125)	SW846 8330
3-Nitrotoluene	102	(75 - 120)	SW846 8330
4-Nitrotoluene	101	(75 - 125)	SW846 8330
PETN	89	(75 - 117)	SW846 8330
RDX	101	(70 - 135)	SW846 8330
Tetryl	101	(87 - 119)	SW846 8330
1,3,5-Trinitrobenzene	97	(75 - 125)	SW846 8330
2,4,6-Trinitrotoluene	101	(55 - 140)	SW846 8330

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	108	(81 - 127)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE DATA REPORT

HPLC

Client Lot #...: G6H180310 Work Order #...: JCXPA1AC Matrix.....: SOLID
LCS Lot-Sample#: G6H220000-596
Prep Date.....: 08/22/06 Analysis Date..: 08/24/06
Prep Batch #...: 6234596
Dilution Factor: 1

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	METHOD
2-Amino-4,6-dinitrotoluene	1.00	0.994	mg/kg	99	SW846 8330
4-Amino-2,6-dinitrotoluene	1.00	0.994	mg/kg	99	SW846 8330
1,3-Dinitrobenzene	1.00	1.03	mg/kg	103	SW846 8330
2,4-Dinitrotoluene	1.00	0.979	mg/kg	98	SW846 8330
2,6-Dinitrotoluene	1.00	1.00	mg/kg	100	SW846 8330
HMX	1.00	1.04	mg/kg	104	SW846 8330
Nitrobenzene	1.00	1.02	mg/kg	102	SW846 8330
Nitroglycerin	5.00	5.23	mg/kg	105	SW846 8330
2-Nitrotoluene	1.00	1.01	mg/kg	101	SW846 8330
3-Nitrotoluene	1.00	1.02	mg/kg	102	SW846 8330
4-Nitrotoluene	1.00	1.01	mg/kg	101	SW846 8330
PETN	5.00	4.44	mg/kg	89	SW846 8330
RDX	1.00	1.01	mg/kg	101	SW846 8330
Tetryl	1.00	1.01	mg/kg	101	SW846 8330
1,3,5-Trinitrobenzene	1.00	0.973	mg/kg	97	SW846 8330
2,4,6-Trinitrotoluene	1.00	1.01	mg/kg	101	SW846 8330

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	108	(81 - 127)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

HPLC

Client Lot #...: G6H180310
MS Lot-Sample #: G6H180310-001
Date Sampled...: 08/17/06
Prep Date.....: 08/22/06
Prep Batch #...: 6234596
Dilution Factor: 1

Work Order #...: JCPCN1AC-MS
JCPCN1AD-MSD
Date Received..: 08/18/06
Analysis Date..: 08/25/06

Matrix.....: SO

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
2-Amino-4,6-dinitrotoluene	98	(80 - 125)			SW846 8330
	97	(80 - 125)	0.92	(0-30)	SW846 8330
4-Amino-2,6-dinitrotoluene	99	(80 - 125)			SW846 8330
	97	(80 - 125)	1.1	(0-30)	SW846 8330
1,3-Dinitrobenzene	102	(80 - 125)			SW846 8330
	101	(80 - 125)	0.48	(0-30)	SW846 8330
2,4-Dinitrotoluene	97	(80 - 125)			SW846 8330
	96	(80 - 125)	0.67	(0-30)	SW846 8330
2,6-Dinitrotoluene	100	(80 - 120)			SW846 8330
	99	(80 - 120)	1.3	(0-30)	SW846 8330
HMX	102	(75 - 125)			SW846 8330
	102	(75 - 125)	0.0	(0-30)	SW846 8330
Nitrobenzene	98	(75 - 125)			SW846 8330
	98	(75 - 125)	0.44	(0-30)	SW846 8330
Nitroglycerin	105	(74 - 112)			SW846 8330
	105	(74 - 112)	0.50	(0-30)	SW846 8330
2-Nitrotoluene	102	(80 - 125)			SW846 8330
	101	(80 - 125)	0.74	(0-30)	SW846 8330
3-Nitrotoluene	103	(75 - 120)			SW846 8330
	103	(75 - 120)	0.27	(0-30)	SW846 8330
4-Nitrotoluene	102	(75 - 125)			SW846 8330
	101	(75 - 125)	0.57	(0-30)	SW846 8330
2,4,6-Trinitrotoluene	101	(55 - 140)			SW846 8330
	100	(55 - 140)	0.72	(0-30)	SW846 8330
PETN	87	(75 - 117)			SW846 8330
	84	(75 - 117)	2.8	(0-30)	SW846 8330
RDX	91	(70 - 135)			SW846 8330
	91	(70 - 135)	0.69	(0-30)	SW846 8330
Tetryl	101	(87 - 119)			SW846 8330
	100	(87 - 119)	0.44	(0-30)	SW846 8330
1,3,5-Trinitrobenzene	98	(75 - 125)			SW846 8330
	95	(75 - 125)	2.5	(0-30)	SW846 8330

(Continued on next page)

MATRIX SPIKE SAMPLE EVALUATION REPORT

HPLC

Client Lot #...: G6H180310 Work Order #...: JCPCN1AC-MS Matrix.....: SO
MS Lot-Sample #: G6H180310-001 JCPCN1AD-MSD

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	107	(81 - 127)
	106	(81 - 127)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE DATA REPORT

HPLC

Client Lot #...: G6H180310
MS Lot-Sample #: G6H180310-001
Date Sampled...: 08/17/06
Prep Date.....: 08/22/06
Prep Batch #...: 6234596
Dilution Factor: 1

Work Order #...: JCPCN1AC-MS
JCPCN1AD-MSD
Date Received..: 08/18/06
Analysis Date..: 08/25/06

Matrix.....: SO

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD
2-Amino-4,6-dinitrotoluene	ND	1.00	0.983	mg/kg	98		SW846 8330
	ND	1.00	0.974	mg/kg	97	0.92	SW846 8330
4-Amino-2,6-dinitrotoluene	ND	1.00	0.985	mg/kg	99		SW846 8330
	ND	1.00	0.975	mg/kg	97	1.1	SW846 8330
1,3-Dinitrobenzene	ND	1.00	1.02	mg/kg	102		SW846 8330
	ND	1.00	1.01	mg/kg	101	0.48	SW846 8330
2,4-Dinitrotoluene	ND	1.00	0.971	mg/kg	97		SW846 8330
	ND	1.00	0.965	mg/kg	96	0.67	SW846 8330
2,6-Dinitrotoluene	ND	1.00	1.00	mg/kg	100		SW846 8330
	ND	1.00	0.987	mg/kg	99	1.3	SW846 8330
HMX	ND	1.00	1.02	mg/kg	102		SW846 8330
	ND	1.00	1.02	mg/kg	102	0.0	SW846 8330
Nitrobenzene	0.069	1.00	1.05	mg/kg	98		SW846 8330
	0.069	1.00	1.05	mg/kg	98	0.44	SW846 8330
Nitroglycerin	ND	5.00	5.26	mg/kg	105		SW846 8330
	ND	5.00	5.23	mg/kg	105	0.50	SW846 8330
2-Nitrotoluene	ND	1.00	1.02	mg/kg	102		SW846 8330
	ND	1.00	1.01	mg/kg	101	0.74	SW846 8330
3-Nitrotoluene	ND	1.00	1.03	mg/kg	103		SW846 8330
	ND	1.00	1.03	mg/kg	103	0.27	SW846 8330
4-Nitrotoluene	ND	1.00	1.02	mg/kg	102		SW846 8330
	ND	1.00	1.01	mg/kg	101	0.57	SW846 8330
2,4,6-Trinitrotoluene	ND	1.00	1.01	mg/kg	101		SW846 8330
	ND	1.00	1.00	mg/kg	100	0.72	SW846 8330
PETN	ND	5.00	4.34	mg/kg	87		SW846 8330
	ND	5.00	4.22	mg/kg	84	2.8	SW846 8330
RDX	ND	1.00	0.912	mg/kg	91		SW846 8330
	ND	1.00	0.905	mg/kg	91	0.69	SW846 8330
Tetryl	ND	1.00	1.01	mg/kg	101		SW846 8330
	ND	1.00	1.00	mg/kg	100	0.44	SW846 8330
1,3,5-Trinitrobenzene	ND	1.00	0.975	mg/kg	98		SW846 8330
	ND	1.00	0.951	mg/kg	95	2.5	SW846 8330

(Continued on next page)

MATRIX SPIKE SAMPLE DATA REPORT

HPLC

Client Lot #...: G6H180310 Work Order #...: JCPCN1AC-MS Matrix.....: SO
MS Lot-Sample #: G6H180310-001 JCPCN1AD-MSD

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
3,4-Dinitrotoluene	107	(81 - 127)
	106	(81 - 127)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

APPENDIX D
DATA QUALITY OBJECTIVES

D DATA QUALITY OBJECTIVES

This section provides a detailed description of the Data Quality Objectives (DQOs) developed for the OWSA EOD Range clearance project. The DQOs define performance criteria and provide objective metrics for determining whether the data collected and work performed meet the requirements to validate and justify issuance of a Certificate of MEC Clearance for the site. Adherence to the DQOs ensured the collection of high quality data.

D.1 GEOPHYSICAL DATA QUALITY OBJECTIVES

Required Data - The geophysical investigation consisted of data collection, reduction, and analysis of digital electromagnetic (EM) data with the goal of identifying anomalous responses that potentially have MEC, MPPEH, or MD sources. The investigation was performed such that the detection minima, as specified below, were met. Data resolution was such that the location of anomalies could be determined to within a 3.3-foot (1 meter) radius of the source.

D.1.1 Positioning System Performance for Land Survey Operations

Problem

Is the overall accuracy of the survey positioning systems used during field operations known?

Decision Required

Determine the accuracy for the survey equipment that are used during general field operations such as locating survey monuments or control points, and capturing UXO positions, burial pits, and other geographic features to update and enhance the project's geographic information system (GIS) database.

Inputs to the Decision

- Equipment used
- Survey methodologies
- Accuracy of the positioning of existing survey monuments.

Boundaries of Decision

- Instrument precision and required accuracy
- Satellite and atmospheric factors influencing the operation of survey positioning systems
- Environmental factors influencing the operation of survey positioning systems (e.g., multipath errors, obstructions, base station location and reception, etc.)

Decision Rules

If the survey positioning system has the necessary precision and has achieved the required accuracy, then accuracy in the survey positioning equipment has been achieved.

If the survey positioning system does not have the necessary precision and has not achieved the required accuracy, then the equipment was replaced and the data from the affected area were reevaluated and resurveyed, as necessary.

Tolerance Limits for Decision Error

The survey positioning systems had accuracies of ± 1 foot (0.3 meter) for locating MEC and buried pits and for establishing grid corners and seeds. The survey positioning systems had horizontal and vertical control accuracies of "Class I, Third Order" or better for establishing monuments and control points.

The survey positioning systems had accuracies of ± 2.5 feet (0.8 meter) for update and enhancement of the position of geographic features.

Horizontal positioning was based on the North American Datum of 1983 (NAD83) and the Texas State Plane (TSP) coordinate system. Vertical control was based on the North American Vertical Datum of 1988 (NAVD88), in U.S. survey feet.

Achieve Optimal Design

All survey systems located desired geographic points within specified and agreed upon criteria.

D.1.2 Positioning System Performance for Geophysical Operations

Problem

Are the anomalous EM responses and recovered MEC accurately located?

Decision Required

Determine the overall positional accuracy under site-specific field conditions for the survey equipment used for establishing grid corners, monuments, control points for acquiring geophysical data and for relocating and resolving EM anomalies (i.e., excavate and actually find the identified items).

Inputs for Decision

- Geophysical survey navigational data and field notes
- Accuracy of the positioning of existing survey monuments
- Empirical accuracy and precision of utilized global positioning system (GPS) instruments
- Contractor quality control (QC) of transect spacing and data density.
- Boundaries of Decision
- Satellite factors that influence the operation of survey positioning systems
- Environmental factors that influence the operation of survey positioning systems (e.g., slope and line of sight limits, canopy cover)
- Instrument precision and required accuracy.

Decision Rules

If the survey positioning system has the necessary precision and has achieved the required accuracy, then accuracy in the positioning equipment has been achieved.

If the survey positioning system does not have the necessary precision and has not achieved the required accuracy, the equipment was replaced and the data from the affected area were reevaluated and resurveyed, as necessary.

Anomalies must be accurately located to within 3.3 feet (1 meter). Relocated anomalies (Part 2) must be accurately located to within 3.3 feet (1 meter) (limits will be assessed and may be adjusted based on site-specific conditions).

Tolerance Limits for Decision Error

The survey positioning systems had an initial minimum accuracy of ± 1 foot (0.3 meter) and were reassessed and adjusted, if necessary, based on site conditions.

Achieve Optimal Design

All survey positioning systems locate desired anomalous areas within specified and agreed upon criteria.

D.1.3 Geophysical Data Processing and Target Selection

Problem

Are the data processing routines and target selection procedures useful and adequate?

Decision Required

Data processing routines and target selection procedures are useful and adequate to identify the location of potential MEC sources.

Inputs for Decision

- Data processing routines
- Target identification procedures
- Geophysical Prove-out (GPO) test results
- Intrusive investigation results.

Boundaries of Decision

Evaluation of utility and accuracy was limited to consideration only of those routines, procedures, or protocols used to generate project deliverables.

Decision Rule(s)

If the data processing and target selection produces the requisite deliverables and those deliverables are useful and adequate in locating potential MEC-sourced anomalies, then the utility and accuracy of the routines and procedures was verified.

Tolerance Limits for Decision Error

The purpose of data processing and target selection is to consistently identify potential MEC sources. All QC seeds must be detected. Any failure in this regard resulted in reprocessing or resurveying, depending on the reason for failure. Results of the intrusive investigation were used to apply further tolerance limits, as appropriate. Although a high level of false positives may not be indicative of data processing or target selection failures (e.g., presence of mineralized soils, targets near but not on the transect, etc.), the percentage of false positives versus the total number of targets for the same instrument and processing should be similar, within 15 percent (false positives vs. total) of recently mapped adjacent or nearby areas. The allowable percentage of false positives was further refined as additional data were collected in a specific area. Failure to meet this self-imposed standard required review by the geophysical QC officer, who specified

appropriate corrective actions. False negatives were checked for by the geophysical QC process, which involved reprocessing a percentage of the data and selecting targets independently of the standard processing. If any additional anomalies were identified through the QC process that suggests a source similar to or larger than the smallest munition of concern, the reason for the false negative was determined and the data processing routines and target selection procedures were revised accordingly to ensure improved performance.

Achieve Optimal Design

Utilize data processing routines and target selection procedures that properly identify the location of potential MEC sources.

D.1.4 Geophysical Anomaly Targeting Criteria

Problem

Are the criteria for selecting anomalous EM responses for the intrusive investigation rule-based?

Decision Required

Determine the criteria for selecting anomalous EM responses.

Inputs for Decision

- The Minimum and Maximum Expected Ordnance Items of Concern (20mm and 105mm projectiles, respectively)
- Identified noise and background level
- GPO test results
- Intrusive investigation results.

Boundaries of Decision

The criteria for target selection were applied to the EM data

Decision Rule(s)

A target selection level was established based on the smaller of the responses for the Minimum and Maximum Expected Ordnance Items of Concern at their respective Detection Depths. This level will be initially determined from the amplitudes of the filtered EM anomalous response (response above background level) and inverted model parameters for data collected at the GPO test plot. Refinement of the target selection process was made to ensure selection of additional likely metallic sources and to remove responses that resulted from identified noise. Results of the intrusive investigation (Part 2) were used to improve manual selection and potentially adjust selection levels.

Tolerance Limits for Decision Error

All anomalous EM responses resulting from QC seeds must be detected.

Achieve Optimal Design

Determine a threshold and target selection process that detects the smallest MEC to the maximum required detection depth. Target selection procedures were revised to achieve this result if necessary.

D.1.5 Geophysical Data Fidelity

Problem

Do the recorded EM data faithfully represent the response to a particular class (size, type, composition, orientation, and depth) of target?

Decision Required

The character and response parameters of identified anomalies are adequately accounted for by the source(s) identified by the intrusive investigation.

Inputs for Decision

- GPO test results
- Documentation of daily QC checks
- Profiles of anomalous EM response
- Project database presenting anomaly data (e.g., anomaly identity, maximum amplitude, width, potential source, estimated depth-to-target, discovered source).

Boundaries of Decision

The smallest munition of concern will dictate characteristics of the response to be considered.

The anomalous EM response to individual items will be characterized by closed, contours (amplitude versus spatial dimension). Profiles should still reflect the closed nature of the response.

Decision Rule(s)

If the recorded EM responses reflect the contrasting electrical properties in the near surface, then the data were sufficient to identify and characterize significant subsurface sources.

Tolerance Limits for Decision Error

The anomalous EM response curves were reviewed to ensure that the anomalies were representative of that which would be expected for the particular source discovered during the intrusive investigation. Inadequately explained anomalies required reinvestigation.

Achieve Optimal Design

Potential problems with the data (e.g., excessive noise) have been identified and resolved either by reprocessing or reevaluation of that data.

D.1.6 Geophysical Data Utility

Problem.

Are the data useful for detecting and resolving MEC items of concern.

Decision Required

The Minimum and Maximum Expected Ordnance Items of Concern can be detected and mapped, at their respective Estimated Detection Depths or shallower, using the deployed instrumentation and methodology.

Inputs for Decision

- GPO test results
- Target lists
- Anomaly profiles
- Reacquisition records
- Intrusive investigation results.

Boundaries of Decision

Only objects the same size or larger than the smallest munition of concern need to be resolved.

Decision Rule(s)

If,

- Data were collected in accordance with the specifications of the Work Plan
- Data adequately covered the site
- Data were properly located
- Noise levels in the data were sufficiently low to allow adequate signal-to-noise differentiation of pertinent anomalies
- Intrusive investigation results yield metal sources with size equal to or larger than the smallest munition of concern

Then, the data are useful and data acquisition achieved or exceeded minimum QC standards.

Tolerance Limits for Decision Error

Project goals require that all MEC underlying the project site were detected to the maximum reliable depth of detection as specified by U.S. Army Corps of Engineers (USACE) DID MR-005-05.01 (Geophysical Target Objective Box). Instruments were expected to provide the same detection capability as identified during the Equipment Detection Performance Validation.

Achieve Optimal Design

Deploy systems that detect and map MEC, as specified by DID's performance minima.

D.1.7 Geophysical Data Objectivity

Problem

Are the EM data reproducible?

Decision Required

The instrumentation produces like EM responses, within an acceptance range, to similar sources each time the same source and receiver geometry is encountered under similar background conditions.

Inputs for Decision

- GPO test results
- Field logs

- Data postings
- Standardization data (geophysical and positional).

Boundaries of Decision

Only objects that underlay the physical footprints of the deployed instrumentation were considered.

Decision Rule(s)

If,

- The data were accurately located relative to TSP coordinates
- The field logs recorded progress over the survey area
- The standardization results were within the acceptance range
- System was performing within acceptable limits

Then, the EM data could be reasonably reproduced.

Tolerance Limits for Decision Error

Any discrepancies in positional accuracy of the data that were noted during the field review were described, including corrective actions to resolve any such QC issues.

Data gaps or inexplicable data shortages, if not detected during the field review and scheduled for reacquisition, were discussed with personnel on site to identify the root problem and steps needed for resolution.

Achieve Optimal Design

Deploy only instrumentation for which the capacity to collect reproducible data has been established.

D.1.8 Data Integrity

Problem

Are the data kept secured and uncorrupted?

Decision Required

No environmental, incidental process, or manipulative causes or entities external to project activities have impacted/accessed the data.

Inputs for Decision

- Data preservation (data to include but not limited to, raw data, processed data, and field notes)
- Documentation of edits and processing.

Boundaries of Decision

Decision applies to EM, positioning, and other field data (both raw and processed), as well as the quality management process, QC tests, and documentation.

Decision Rule(s)

If data were archived on appropriate storage media (optical disk or magnetic tape) with creation date appended and re-opening verified data integrity, and the date and data properly correspond to field and data processing notes, then the data were properly secured.

Tolerance Limits for Decision Error

There is no acceptable error when securing data integrity.

D.2 GEOPHYSICAL INVESTIGATION PERFORMANCE GOALS

D.2.1 MEC Detection.

The allowable tolerance for positional accuracy for the geophysical investigation after anomaly reacquisition is no more than ± 3.3 feet (1 meter).

Basis of Detection Criteria.

The depth performance met the detection range specified by USACE DID MR-005-05.01 (the Estimated Detection Depth, i.e., the maximum depth performance, is nominally 11 times the MEC item diameter).

Minimum and Maximum MEC Diameter.

The Minimum Expected Ordnance Item of Concern was a 20mm projectile; the maximum was a 105mm projectile. The estimated detection depth for these items is approximately 8 inches (20 cm) and 4 feet (1.2 meters), respectively. The actual detection depths were determined by surveying the GPO test plot with the Geonics EM61 system. Based on results, the Maximum Project Detection Depth below existing grade was determined to be 5 to 8 inches for 20mm projectiles and as deep as 56 inches for a 105mm projectile.

Quality Failure.

Any unexcavated (missed) item that has an intermediate principal axis diameter that fits within the target acceptance box is considered to be a quality failure. Earth Tech, at no expense to the government, corrected the quality deficiency and re-swept and performed QC on all areas mapped continuously in time with the quality failure before resubmitting to the government for verification and acceptance.

D.2.2 False Positives.

The occurrence of False Positives was less than 5 percent.

D.3 INTRUSIVE INVESTIGATION DATA QUALITY OBJECTIVES

The subsurface distribution of MEC from range and munitions disposal and training activities conducted in the past is limited, and is addressed by the following DQO. The DQO for this activity has been developed to help ensure proper characterization of the targets in the OWSA EOD Range areas.

Problem

Subsurface MPPEH/MEC must be discovered and removed.

Decision Required

The anomalies identified in the approved dig sheet were investigated and recovered and a source of each anomaly was identified and the identified source is representative of the anomalous response.

Inputs for Decision

- Reacquisition data and documentation
- Documentation of the search of the critical radius
- Field logs
- Documentation of anomaly clearance
- Source Identification/"Dig" results
- QC reports.

Boundaries of Decision

The boundary of the decision was all anomalies identified in the dig sheet and based on the DQO parameters, as requiring further intrusive investigation.

Decision Rule(s)

If, for each anomaly, the intrusive investigation documents an exploratory excavation within the critical one meter radius, a representative anomaly source or sources was discovered, the "dig" team notes document the removal of a reconfirmed anomaly source, and the UXO QC Specialist (UXOQC) and project geophysicist agree the source is representative of the anomaly signature, then the intrusive investigation of that anomaly was considered complete.

Tolerance Limits for Decision Error

All reported sources were within the critical search radius (18 inches) of the reacquired anomaly locations and there were no metal sources greater than 20mm (diameter) x 100mm (length) found within that radius of those locations during the QC or quality assurance (QA) audits.

Achieve Optimal Design

Archival and data security tasks were implemented that ensured that uncorrupted copies of the field, processed, and hardcopy data were preserved and no data were lost to corruption or inadvertent destruction. Electronic data archives were updated daily, with complete backups made weekly onto portable hard drives, CD-Rom disks, tape back ups, or other media, and securely stored in a separate (from either the field or home office) physical location. Source and destination files were compared to verify data integrity. Hard copy data were stored in secure locations only.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX E

QUALITY CONTROL/QUALITY ASSURANCE

E QUALITY CONTROL/QUALTY ASSURANCE

Quality Control (QC) procedures were performed internally to control and monitor work processes for the purposes of validating quality standards, as specified in the contract. Quality Assurance (QA) initiatives were performed by a 2nd Party subcontractor to assure quality standards are in strict compliance with the contractual specifications.

E.1 GEOPHYSICAL MAPPING AND EQUIPMENT

The geophysical investigation followed a multi-step process to ensure high-quality data collection, processing, and interpretation as well as execution of good-quality workmanship. These steps were intended to (1) verify positional accuracy and precision of the collected data; (2) ensure that good field practices were employed; (3) verify that equipment was properly operating and that data were repeatable; (4) ensure adequate coverage and completeness of data, with sufficient signal-to-noise ratio to identify significant EM anomalies; (5) evaluate the data to determine if discovered subsurface sources were representative of the EM anomaly that led to their detection; and (6) ensure that the project objectives were met.

Quality management and implemented quality controls ensured that all geophysical investigation DQOs were met. EM survey activities and data, both raw and processed, were reviewed by the Earth Tech Project Geophysicist. Unusable or incomplete data were recollected.

E.1.1 Positional Accuracy

The location of transects corresponded to the areas actually investigated by the geophysical teams. Further, the data acquired along each transect was accurate relative to TSP coordinates to assure proper characterization of the data. Achievable tolerances for positional accuracy for the geophysical investigation were determined from the Equipment Detection Performance Evaluation (GPO test).

The landmarks, fiducials, and locations of anomalous responses represented in the processed EM data were compared to geophysically referenced spatial data (GIS base maps). The features of the GIS that were reflected in the geophysical data were coincident to within 2.5 feet (0.8 meter). Any discrepancies in positional accuracy of the data noted during the field review were described, including steps taken to correct or resolve any such QC issues.

The positional accuracy of the GPS systems was monitored daily to ensure that chosen tolerances were maintained (i.e., Reference Tests). Metal stakes were placed in the ground and their location measured using RTK/GPS. Each EM system measured two of these stakes by positioning the antenna directly over the stake. The offset between the measured and known locations did not exceed the established tolerances for accuracy of ±1 foot (0.3 meter).

During surveying, if the orientation of a given transect was changed because of terrain or other considerations, the reason for the deviation and the actual mode of progression was fully described

in the field log book. Plots of the survey progress were updated each day and transferred to a site map to aid in tracking the actual areas that were searched.

E.1.2 EM Instrument Precision

For instrument standardization, *residual anomalous responses* varied by no more than ± 20 percent of the *standard response* obtained for each deployed EM system.

E.1.3 Survey Completeness

Data were collected in such a manner that an EM profile with a station spacing that was appropriate to the specific targets of concern could be generated for each transect surveyed. Field logs were reviewed, and digital data were posted to a segment track map to determine if there were any data gaps not accounted for in the field notes.

The TSP coordinates recorded for discrete areas comprising adjacent survey transects were compared with a master listing to ensure that the collected data were accurately located within the project site. The field logs were reviewed each day to verify that data were collected following a continuous progression along individual transects. If the progression was interrupted or altered for a particular segment because of terrain or other considerations, the reviewer verified the reasons for the deviation and the actual mode of progression was fully described in the field notebook.

The field review ensured that the characterization was complete by verifying that the data volume for each receiver array was comparable (±1 percent) and that the spatial data density (measurements per unit distance) was representative of the mapping effort described in the field notebook. Field notes were compared to the downloaded digital data to assure correspondence between transects searched and transects recorded.

The percentage of instrument footprint coverage of the project site was tabulated. Significant lack of coverage (>2 percent missed) was flagged and annotated with the steps taken to resolve the missed portion. Unavoidable obstacles were mapped on the field sketches and resulted in direct correspondence with missing data. Data gaps or inexplicable shortages, if not detected during the field review and scheduled for reacquisition, were evaluated to identify the root problem and steps needed for corrective action.

Completeness was evaluated in terms of collecting 100 percent of the planned area coverage along a given transect, except for documented unavoidable obstacles (fences, waterways, etc.). An area was considered covered based on having EM data at least every 0.5 feet (0.15m) along the transect and GPS data with holidays (coverage dropouts) no longer than 3 seconds.

E.1.4 Geophysical Response Evaluation

To assess usefulness of the data for detecting and resolving MEC-sourced anomalies, noise levels in the data were analyzed to ensure that they were sufficiently low to allow adequate signal-to-noise (S/N) differentiation of pertinent anomalies. At a minimum, responses with S/N levels greater than 1.5:1 were identified for discrimination over the background level. Responses less

than 1.5:1 were individually considered for inclusion in the final target selection. Unusable or incomplete data delivered for any transect were reacquired. Any variations or results not compatible with prior results or expectations were reviewed with the Project Geophysicist to determine causative features that may have been present. These field contacts were summarized and included in the weekly QC summary report.

Additionally, 13 inert 20mm projectile rounds were buried within the 900-foot radius project site prior to the initial EM survey. The placement of these "seeds" was randomly determined using the TSP coordinates of the site. These "seeds" were for quality control checks of the geophysical survey performance. As such, they were placed within the area to be mapped. The performance requirement was that all seeded items (inert 20mm projectiles) be detected and mapped with sufficient resolution that the seed items were identified as geophysical anomalies and were recovered during the intrusive phase (Part 2) of the project field effort.

Each seed was buried in a horizontal orientation at a depth of not more than 8 inches (20 cm) bgs. The horizontal orientation was chosen because this geometry created the least detectable geophysical response. The purpose was to demonstrate that the field survey was sufficient and capable of detecting and mapping 20mm projectiles. Placing them in the least detectable geometry orientation provided the most positive demonstration of the detection performance.

The pass/fail criteria for these QC targets were 100 percent detection. If a given seed was not correctly discriminated, a 100- by 100-foot (30.5- by 30.5-meter) area surrounding it was resurveyed and the data reprocessed. The data were analyzed to determine why the item was missed. The results of this analysis were used to determine corrective measures, as necessary, to ensure subsurface detection of all Most Probable Munition (MPM) MEC.

To further help quantify and qualify the detection performance of the geophysical survey, additional 20mm projectiles were placed in the site Geophysical Prove-Out plot prior to the EM61 instrument being deployed to collect baseline responses for the Carswell OWSA EOD Range geophysical survey. Given the existing geological environment and prior land use of the project site, the recorded EM responses must reflect the physical properties of conductive materials in the near surface. Known sources must produce appropriate responses. Locations must match descriptions in field logs and independently located features. Data collected in the same direction over the same location must show repeatability.

E.1.5 Reporting

As an integral component of quality management, a continuous dialogue was maintained with AFCEE addressing and resolving issues pertaining to the performance of our work, as well as fundamental issues and concerns regarding the geophysical data.

A field notebook and daily field data sheets were maintained that details pertinent activities, site features, and field conditions encountered in the performance of the geophysical investigation. The daily log included sufficient detail to allow a future reader to reconstruct the progression of the work, issues encountered/resolved, lessons learned, and documentation of accomplishment of project goals. A field sketch map of surveyed areas was maintained as the data collection

progresses. A copy of the log and all field sketch maps was provided to the Project Manager upon completion of day's surveying activities.

A review and verification of 10 percent of the EM data was accomplished by personnel and software different from that utilized for the initial processing. Data were audited by discretely bounded survey lane segments using the Geosoft Oasis Montaj or Golden Software SURFER for Windows and OE Target Analysis to perform data quality checks, validate data, and make the required plots. Parallel processing in this fashion resulted in identification of similar anomalies.

The QC processing of the digital data included production of representative profiles. These profiles were used as a QC tool to compare visually discriminated anomalous locations with those identified by the automated (digital) target picking routines that were used to generate the anomaly "dig" lists. QC comprised the following activities:

- Review of daily field QC documentation (e.g., maps, field logs)
- Review of standardization results (instrument precision)
- Derivation of data statistics and measurement coordinates (positioning accuracy)
- Posting of data for each segment (survey/coverage completeness)
- Generation of contour/image/profile plots (representativeness/reasonableness)
- Comparison of field anomaly map, digital data image, and MEC sampling results for each area investigated (representativeness).

A table was developed and progressively updated that presents pertinent anomaly data (e.g., anomaly identifier, anomaly grade, maximum amplitude, estimated size, and estimated depth). The project and field geophysicists reviewed the intrusive investigation results to verify that the discovered sources are representative of the detected anomalous response. Any anomalies that were not adequately accounted for by the discovered source were reinvestigated by the field reacquisition crews.

The geophysical field teams submitted a weekly QC summary to the Earth Tech Site Manager that included:

- Precision – A mean deviation from the standard response was calculated for each EM system used. This was reported in a progressively updated table.
- Accuracy – Any discrepancies in positional accuracy of data noted during the field review were described, including steps taken to correct or resolve any such QC issues.
- Completeness – The percentage of coverage along each transect was tabulated. Significant lack of coverage (> 2 percent missed) was flagged and annotated with steps taken to resolve the missed coverage. Data gaps or inexplicable data shortages, if not detected

during field review, were discussed with personnel on site to identify the root problem and steps needed for corrective action.

- Reasonableness – Calculation of a standard deviation of the sum of all gates (recorded time decay values) and a dynamic response range for a mid-decay time gate for each survey "mission" (i.e., data file) completed. Variations or results not compatible with prior results or expectations were reviewed to determine causative features that may be present.

Copies of all field data were made and sent to the Earth Tech office in Colton, California (originals stayed in project files located on site) via parcel delivery service at the close of each field week. This weekly deliverable included:

Field notes (including copy of field maps)

- Standardization documentation
- Digital data
- Profile/contour
- Plots of the digitally recorded data
- Target anomaly listing.

Data tracking documentation was completed each day and included in the transmittal.

A weekly Quality Report was prepared and submitted to the PM that presented a summary of quality management activities, findings, recommendations, and/or corrective action notices.

E.1.6 Records Management

Processed field data were delivered to the Earth Tech Site Manager no later than 1 working day after data collection. Electronic copies of the downloaded (raw) and edited (processed) data files were delivered to the Earth Tech Site Manager within 2 and 4 working days, respectively, of date of collection. The identified anomalies were delivered to the Site Manager no later than 4 working days from the date of collection.

Digital data were archived to document the geophysical investigation, including thoroughness of the survey, detection efficiency, and locations of identified anomalies; to provide a means of quantifying the confidence that can be applied to the results; and to preserve and document the extent, precision, accuracy, and quality of the work. Geophysical data were transmitted to the AFCEE upon completion of the field activities.

E.1.7 Data Reporting

Each day's data collection and results of the intrusive investigation (during Part 2) were delivered in draft format to AFCEE via an FTP site or other approved method. These raw field data included:

- Field notes, including sketch map of surveyed area
- Standardization documentation
- Raw instrument dump files (GPS and EM data), including static and standardization measurements in binary format.

Data tracking documentation was completed for each day. On a weekly basis, QC documentation and progress to date maps were submitted via FTP or other approved methods.

E.2 MUNITIONS AND EXPLOSIVES OF CONCERN CLEARANCE

MEC Clearance QC Program included two primary segments:

- Field observation and
- QC inspection.

E.2.1 Quality Control Field Observation

The UXO QC specialist observed field operations during the removal action to assure that safety and quality objectives identified in the work plan were attained. The UXO QC specialist placed special emphasis on acquisition of anomalies to ensure that the entire project area was properly searched.

E.2.1.1 Unexploded Ordnance Quality Control Specialist Inspection

Following the removal of anomaly sources, the UXO QC specialist:

- Re-mapped a 6-foot diameter area centered on the anomaly source discovery positions.
- Determined absence/presence of residual or remaining anomaly sources
- Investigated residual anomalies.
- Documented and reported results of the QC inspection(s) to the Site Manager, Project Manager, and Project Quality Control Manager.
- If failed, notified Site Manager for rework and correction.
- If passed, forwarded to the Government for 2nd Party QA inspection.

E.2.1.2 Quality Control Pass/Fail Criteria

Although the munition with the greatest fragmentation distance (MGFD) was the 105mm projectile, the 20mm projectile was the MPM for the site. Additionally, the 20mm projectile was the most difficult potential MEC to detect at this site. To provide some quantification of the detection performance of the geophysical survey equipment used for the MEC removal/clearance subsurface investigation, 23 inert 20mm projectiles were buried at locations across the project site at depths ranging from 0.5 to 8 inches below ground surface. Ten inert 20mm projectiles were buried in known locations within the geophysical prove-out grid constructed for the 2004 survey. Thirteen inert 20mm projectiles were buried at random locations across the 900-foot radius mapped during the 2005 geophysical survey by a 2nd party quality assurance contractor. The locations of 11 of these seeds were not known until the Part 2 intrusive activities were completed. Two of the inert 20mm "seeds" planted in the survey area by the QA contractor were used to tie the 2nd party survey grid to the geophysical survey grid. An anomaly removal was failed if a

metallic object the shape and size of a 20mm projectile or larger was discovered. In the event of a QC failure, an area 100 feet by 100 feet square centered on the failed anomaly was reinvestigated and subjected to repeat QC inspections until it was determined to be devoid of metallic items the size and shape of a 20mm projectile.

E.2.2 Quality Assurance Investigation

An experienced MEC/geophysical survey firm (NAEVA Geophysics) was subcontracted to provide 30% 2nd Party QA and MEC clearance confirmation to the Government. This subcontractor reported directly to, and was responsible solely to, the AFCEE project manager. The QA subcontract geophysically mapped to detect subsurface anomalies within 30% of the project site(s). Subsurface anomalies were intrusively investigated and the results reported to AFCEE, the MEC clearance project manager, and the site manager. The MEC contractor consulted with AFCEE, the 2nd Party QA contractor, and the field teams to determine the cause for any clearance/remediation failures (MEC not removed from the sites); establish metrics for a full review of the collected data and procedures to ensure proper re-analysis of the data and/or field procedures; and identify and remove residual MEC from the project site.

E.2.2.1 2nd Party Quality Assurance

November 2005: NAEVA buried 13 inert 20mm projectiles at random locations within the former EOD range – all "seeds" were planted at 8 inches bgs

- August 2006: Results of the intrusive investigations were provided to NAEVA.
  - ***Evaluation of the data indicated that none of the QA seeds buried at 8 inches bgs were discovered during the geophysical survey.***
  - In accordance with the Work Plan and ESS, the consequence of not detecting a QC seed item was to require re-evaluation of the data, re-mapping, etc., as necessary to determine why the seed was not detected or recovered. At the Carswell OWSA EOD range, all inert 20mm QC seeds buried by NAEVA were at 8 inches bgs (as above, in conformance with USACE DID MR-005-05). The GPO results indicated that 8 inches was beyond the reliable depth of detection – i.e., depth at which all 20mm projectiles would be detected. The corrective action, per the ESS, was to reduce the pass/fail detection depth for 20mm projectiles to 6 inches bgs as was discussed above.
  - The Draft-Final ESS was revised to reflect actual detection capabilities of the deployed geophysical instrumentation – per Section 6.3.1 of the ESS: "The pass/fail criteria for these QC targets will be 100 percent detection of all inert MEC "seeds" buried at or shallower than 6 inches below ground surface."
  - Implicit in this is the recognition that (in accordance with Sections 6.3.2.3 and 6.3.3 of the ESS):
    - discovery of a 20mm projectile, or any other metal object with dimensions similar to a to 20mm projectile during the QC re-inspection of cleared anomaly locations would have constituted a QC failure

  - discovery of a 20mm projectile (or a "20mm-sized object) at 6 inches or less bgs in an anomaly location identified from the results of the 2nd Party QA confirmation survey over 30% of the site, would have constituted a Quality Assurance failure.

- August 2006: NAEVA deployed geophysical survey team to the site to conduct confirmation mapping over 30% of the site area to assure an appropriate ordnance clearance/removal had been accomplished
  - NAEVA employed appropriate QC tests to ensure collection of high quality data
  - NAEVA's geophysical arrayed was comprised of two slaved EM61 systems mounted on a sled that provides nominally a 6-foot wide transect swath as it is moved over the site
  - 24 acres were mapped over separate transects spaced to provide a mesh track over the entire EOD range (Plate 1 of the NAEVA QA Report)
  - Data was processed and target anomalies identified using automated picking routines supplemented with manual review of profiles
  - 970 anomalies were identified
- August 2006: Anomalies from target list provided by NAEVA intrusively investigated
  - Top 100 anomalies (with greater anomaly amplitudes) excavated
    - 3 anomalies yielded inert pieces of fuzes
    - 2 yielded small arms casings
    - 1 yielded a 7.62mm link
    - Remaining 94 yielded only fence parts, wire, bolts, nails, and small unidentified pieces of metal
  - ~300 additional anomalies were intrusively explored yielding only small pieces of metal scrap
- ***No 20mm's or 20mm-sized objects were found during intrusive exploration of QA-identified anomalies.***

Prior to demobilization, Earth Tech recovered and removed all 23 inert 20mm projectiles used as target seeds from the site.

The above efforts reflect the requirements of the Work Plan, changes to that plan, and the Explosive Safety Submission approved for this project by AFCEE, AFSC, and/or DDESB. The Data Quality Objectives (DQOs) developed for the OWSA EOD Range clearance project defined performance criteria and provided objective metrics for determining whether the data collected and work performed met the requirements to validate and justify issuance of a Certificate of MEC Clearance for the site. Adherence to the DQOs ensured the collection of high quality data. The DQOs are presented as Appendix D of this After Action Report.

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
2004 – 2014

This Integrated Natural Resources Management Plan (INRMP) supersedes all previous Natural Resources Plans. The Sikes Act Improvements Amendments of 1997 require that the proposed INRMP be prepared in cooperation with the U.S. Fish & Wildlife Service and the State Fish & Wildlife Agency and that the management of fish and wildlife in this INRMP reflect mutual agreement of the parties. Mutual agreement is required only with respect to those elements of this Plan that are subject to the otherwise applicable legal authority (i.e., authority derived from a source other than the Sikes Act, such as the Endangered Species Act) of the U. S. Fish & Wildlife Service and the state fish and wildlife agency to conserve, protect, and manage fish and wildlife resources.

To the extent that resources permit, the U.S. Fish & Wildlife Service, the Texas Parks and Wildlife Department, and NAS JRB Fort Worth by signature of their agency representative, do hereby agree to enter a cooperative program for the conservation, protection and management of fish and wildlife resources on NAS JRB Fort Worth. The intention of this agreement is to develop functioning, sustainable ecological communities on NAS JRB Fort Worth that integrates the interests and mission of the agencies charged with conservation, protection, and management of national heritage in the public interest. This agreement may be modified and amended by mutual agreement of the authorized representatives of the three agencies. The agreement will become effective upon the date subscribed by the last signatory and shall continue in full force for a period of ten years or until terminated by written notice to the other parties, in whole or in part, by any of the parties signing this agreement.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence and acceptance of the following document.

Approving Officials:

BY DIRECTION — 2.5.5
Installation Commanding Officer — Date

14 Oct 04
Installation Natural Resources Manager — Date

31 Jan 05
Environmental Programs Director, Navy Region South — Date

2/8/05
Natural Resources Manager – Southern Division — Date

8/18/04
U.S. Fish & Wildlife Service, SW Region — Date

10/8/04
Texas Parks and Wildlife Department — Date

TABLE OF CONTENTS

SECTION		PAGE
EXECUTIVE SUMMARY		i
Scope		i
Mission Statement of NAS JRB Fort Worth and the INRMP		ii
Current Conditions on NAS JRB Fort Worth		ii
Land Management Units		ii
Objectives and Projects of the INRMP		ii
Organization of the NAS JRB Fort Worth INRMP		vi
COMMON ACRONYMS USED IN THIS INRMP		xi
1.0	**INTRODUCTION**	
1.1	PURPOSE AND POLICY	1-1
1.2	LOCATION, HISTORY, AND MISSION OF THE INSTALLATION	1-2
1.3	MISSION NEEDS AND IMPACTS TO THE ENVIRONMENT	1-4
1.4	ACCESS	1-5
1.5	AGENCY COORDINATION	1-6
1.6	GOALS	1-6
1.7	ORGANIZATION OF THIS INRMP	1-7
2.0	**EXISTING CONDITIONS**	
2.1	CLIMATE	2-1
2.2	GEOLOGY, TOPOGRAPHY, AND SOILS	2-1
2.3	HYDROLOGY	2-3
2.4	FLORA	2-6
2.5	FAUNA	2-10
2.6	RARE, THREATENED, AND ENDANGERED SPECIES	2-16
2.7	CURRENT LAND USE	2-18
2.8	CURRENT NATURAL RESOURCE MANAGEMENT PLANS	2-20
2.9	STAKEHOLDERS OF NATURAL RESOURCES ON NAS JRB FORT WORTH	2-22
3.0	**NATURAL RESOURCES MANAGEMENT ISSUES**	
3.1	SURFACE WATER QUALITY ISSUES	3-1
3.2	WETLANDS AND FLOODPLAINS PROTECTION AND ENHANCEMENT	3-3
3.3	PROTECTION FOR THREATENED AND ENDANGERED SPECIES	3-4
3.4	FISH AND WILDLIFE MANAGEMENT ISSUES	3-5

3.5 OUTDOOR RECREATION, EDUCATION, AND OUTREACH ISSUES 3-14
3.6 GROUNDS MAINTENANCE 3-15

4.0 NATURAL RESOURCES MANAGEMENT ACTIONS

4.1 LAND MANAGEMENT UNITS 4-1
4.2 ECOLOGICAL PRESERVE MANAGEMENT UNIT 4-2
4.3 SHORELINE MANAGEMENT UNIT 4-10
4.4 UNIMPROVED LANDS MANAGEMENT UNIT 4-14
4.5 OPERATIONAL/URBAN LANDS MANAGEMENT UNIT 4-20

5.0 REFERENCES

6.0 LIST OF PREPARERS

APPENDICES

Appendix A Basic Maintenance Criteria
Appendix B BASH Plan
Appendix C Native Landscaping and Planting Guide
Appendix D Invasive/Exotic/Nuisance Species
Appendix E Construction and Placement of Bat Boxes and Birdhouses
Appendix F Internet Web Addresses
Appendix G Applicable Regulations and Public Laws
Appendix H Cooperative Agreement
Appendix I INRMP Update Correspondence

TABLES

Table 2-1 Vegetation that Occurs or Potentially Occurs on NAS JRB Fort Worth 2-8
Table 2-2 Amphibians and Terrestrial Reptiles that Occur or Potentially Occur on NAS JRB Fort Worth 2-10
Table 2-3 Birds Recorded from BASH Records on NAS JRB Fort Worth 2-13
Table 2-4 Birds Listed in the “Birds of Conservation Concern 2002” 2-14
Table 2-5 Mammals that Occur or Potentially Occur on NAS JRB Fort Worth 2-15
Table 2-6 Fish that Occur or Potentially Occur on or in the Vicinity of NAS JRB Fort Worth 2-16
Table 2-7 Federal- and State- Listed Threatened and Endangered Species that Could Potentially Occur on or in the Vicinity of NAS JRB Fort Worth 2-18
Table 2-8 Land Uses and Acreage on NAS JRB Fort Worth 2-19
Table 2-9 Stakeholders of Natural Resources on NAS JRB Fort Worth 2-23
Table 3-1 Invasive Species in Tarrant County 3-7
Table 3-2 Zoonosis Diseases for the State 3-8
Table 4-1 Area Covered by Each Land Management Unit on NAS JRB Fort Worth 4-2

Table 4-2	Management Actions for the Ecological Preserve Management Unit	4-4
Table 4-3	Management Actions for the Shoreline Management Unit	4-11
Table 4-4	Management Actions for Unimproved Lands Management Unit	4-15
Table 4-5	Management Actions for the Operational/Urban Lands Management Unit	4-21
Table 4-6	NAS JRB Fort Worth INRMP Projects Summary	4-29
Table 4-7	NAS JRB Fort Worth INRMP Project Cost by Fiscal Year	4-31

FIGURES

Figure 1-1	Vicinity Map	1-8
Figure 1-2	Site Location Map	1-9
Figure 2-1	West Fork Trinity River Segment 0806	2-24
Figure 2-2	Drainage Patterns, Surface Waters and Wetlands	2-25
Figure 2-3	Vegetative Units	2-26
Figure 2-4	Landuse Map	2-27
Figure 2-5	Mowing Schedule	2-28
Figure 4-1	Land Management Units	4-32
Figure 4-2	Land Management Units	4-33
Figure 4-3	Ecological Preserve and Shoreline Management Projects	4-34
Figure 4-4	Unimproved Land Management Projects	4-35
Figure 4-5	Operational Land Management Projects	4-36

EXECUTIVE SUMMARY

Scope

The Sikes Act Improvement Act of 1997 (SAIA [updated in 1997]) requires the Secretary of each military department to "prepare and implement an integrated natural resources management plan for each military Installation in the United States" (16 United States Code 670 a through o). Multiple use, protection and enhancement of natural resources, sustainable yield, and maintaining biological integrity are requirements under Department of Defense Instruction (DoDI) 4715.3 and the Department of the Navy's Environmental and Natural Resources Program Manual (OPNAVINST 5090.1B, Change 2). SAIA requires military Installations having significant natural resources to prepare an Integrated Natural Resource Management Plan (INRMP) for the conservation and rehabilitation of these resources. Under DoD Guidance and Navy Policy, the INRMP is to reflect cooperation and mutual agreement in an ecosystem management approach to natural resource management between the Department of the Navy, the U.S. Fish and Wildlife Service, and state fish and wildlife agencies. Naval Air Station Joint Reserve Base (NAS JRB) Fort Worth has prepared this INRMP in compliance with these laws and regulations.

The INRMP is to provide for integrated fish and wildlife management, land and forest management, wetland enhancement and protection, public access where possible, sustainable use of natural resources, and enforcement of natural resource laws and regulations without interfering with military readiness or mission of the Installation. This INRMP covers a 10-year period, but has flexibility to accommodate changes in the ecosystem and military mission. Annual updates to the management program and review and revision at five-year intervals will ensure that the INRMP integrates the latest scientific knowledge and evolves to meet the future requirements of the Installation's military mission and natural resources.

Mission Statement of NAS JRB Fort Worth and the INRMP

The mission of NAS JRB Fort Worth is to provide a quality training environment for Reserve components of all branches of the Armed Services, and to reduce redundancy and overhead by developing joint doctrine and operating procedures that create seamless functionality among host and tenant commands in base support service programs. Units stationed at NAS JRB Fort Worth that support this mission include Navy, Air Force, Marine and Texas Air National Guard Aviation organizations and all of the maintenance and logistical support to support these units for local and deployed operations. The Installation also provides transient services for other military aircraft.

Properly managed functional and resilient ecosystems are better able to support day-to-day military readiness and the long-term military mission. Preserving and enhancing those ecosystems that are important to training of personnel and day-to-day operations of the Installation is the primary mission of this INRMP, and of all natural resource management actions on NAS JRB Fort Worth. Other natural resources management projects to comply with SAIA will be conducted to the extent that they do not interfere with military mission or readiness.

Current Conditions on NAS JRB Fort Worth

NAS JRB Fort Worth consists of approximately 1,717 acres (695 hectares [ha]) in north central Texas. This Installation contains a limited variety of aquatic and terrestrial habitats. Most of the land within NAS JRB Fort Worth is devoted to supporting the flying mission and therefore has been developed or altered in some manner. Developed lands at the Installation have limited opportunities for natural resource management activities. There is one small seep wetland of approximately 1.3 acres (.5 ha), one relatively permanent creek that crosses the station through a confining culvert for most of its course, and an open shoreline associated with Lake Worth of approximately one mile in length (1.6 kilometers). The Installation also has approximately one mile (1.6 kilometers) of shoreline with the West Fork of the Trinity River. The West Fork of the Trinity River lies within containment levies immediately adjacent to the Installation.

The small quantity of aquatic and terrestrial habitat that exists on NAS JRB Fort Worth supports a limited variety of plants and animals. No threatened or endangered species are known to reside on the Installation. Within the NAS JRB Fort Worth boundaries there are 1.3 acres (0.53 ha) of jurisdictional wetlands, 20 acres (8 ha) of shoreline, 474 acres (183.5 ha) of unimproved land, and 1,243 acres (503 ha) of land associated with runways, taxiways, clear zone and buildings that directly support the operational flying mission.

Land Management Units (LMU)

Land management units (LMUs) are defined by operational constraints, current or proposed land uses, geographic location, or a combination of these factors. The four LMUs at NAS JRB Fort Worth are:

- Ecological Preserve Management Unit – areas of palustrine emergent jurisdictional wetland.
- Shoreline Management Unit – areas of the northern boundary of the Installation with the shoreline of Lake Worth and areas on the Installation bordering the fenced property line along the West Fork Trinity River.
- Unimproved Lands Management Unit – areas of NAS JRB Fort Worth that are currently undeveloped and covered by native or successional vegetation, and not currently being considered for improvement or development.
- Operational/Urban Lands Management Unit – those areas of NAS JRB Fort Worth that have been cleared of native vegetation in support of the military mission.

Objectives and Projects of the INRMP

The purpose of the INRMP is to provide for effective stewardship and management of the land and water resources, and to promote outdoor recreation and education under the requirements of SAIA, while meeting the needs of the military mission of NAS JRB Fort Worth. Four major Land Management Units and fifteen objectives are identified to guide natural resources management activities on NAS JRB Fort Worth. Each objective has at least one management project that can be used to measure the progress toward meeting each objective.

LAND MANAGEMENT UNIT: Ecological Preserve Management Unit

- **OBJECTIVE #1**: Continue to comply with the requirements of Section 404 of the Clean Water Act to prevent intervention and degradation of the existing wetland area.

    - **PROJECT #1**: Update data relating to wetlands and other sensitive habitat types (i.e. riparian corridors, streams, etc.) determined to be a part of the Ecological Preserve Management Unit. Mandatory, Level 1. Public Law 92-500; DoD Dir. 4715.3; and, EO 11990.

- **OBJECTIVE #2:** Identify critical species and sensitive habitats in order to promote sound management decisions.

    - **PROJECT #2**: Conduct biological (wildlife and vegetation) species inventories on NAS JRB Fort Worth every three to five years. Mandatory, Level 1. DoD Dir. 4700.4; and, EO 11990.

    - **PROJECT #3**: Develop a Geographic Information System (GIS) database tree inventory of NAS JRB Fort Worth. Mandatory, Level 1. 32 CFR 190 and DoD Dir. 4700.4.

- **OBJECTIVE #3:** Identify and contain invasive, nuisance and noxious species in order to develop an ecologically sound native environment.

    - **PROJECT #4:** Conduct a survey to identify invasive, nuisance and noxious plant and insect species on the Installation. Mandatory, Level 1. OPNAVINST 5090 1B; and, Sikes Act 16 USC 670a.

    - **PROJECT #5:** Develop a program to initiate the use of organic methods to curtail the growth and progression of invasive, nuisance and noxious plant and insect species on the Installation. Mandatory, Level 1. OPNAVINST 5090 1B; and, Sikes Act 16 USC 670a.

    - **PROJECT #6:** Develop roosting and nesting areas for bats and birds that can be used as bio-controls for insect pests. Provide these nesting areas in locations away from flight activities. Stewardship, Level 1. OPNAVINST 5090 1B; and, Sikes Act 16 USC 670a.

    - **PROJECT #7:** Update Integrated Pest Management Plan which should be used in conjunction with the INRMP. Mandatory, Level 1. OPNAVINST 5090 1B; and, Sikes Act 16 USC 670a.

- **OBJECTIVE #4:** Provide high quality, accessible outdoor recreational and educational opportunities that do not degrade the natural resources.

    - **PROJECT #8:** Design and install an educational gazebo and multi-use nature trail adjacent to the wetland. This gazebo should emphasize the unique character of the wetland and provide a sheltered location for bird watching. The multi-use nature trail

will incorporate the use of the existing roadway. Stewardship, Level 5. NAVFACINST 7110 and EO 11990.

LAND MANAGEMENT UNIT: Shoreline Management Unit

- **OBJECTIVE #5:** Control erosion while improving the natural values and aesthetic qualities of shoreline areas.
    - **PROJECT #9**: Identify and map sensitive habitats in the Shoreline Management Unit. Mandatory, Level 1. 16 USC 590a and NASJRBFWINST 3750.12.
    - **PROJECT #10:** Identify and control erosion along the shoreline of Lake Worth. Mandatory, Level 1. 16 USC 590a and NASJRBFWINST 3750.12.
- **OBJECTIVE #6:** Provide recreational access and opportunities, where appropriate, to assigned personnel.
    - **PROJECT #11(a)**: Determine the interest for and establish a fishing pier along Lake Worth. Stewardship, Level 5. 16 USC 670a and EO 12962.
    - **PROJECT #11(b):** Build the fishing pier, if sufficient interest exists in Project #11a. Stewardship, Level 5. 16 USC 670a and EO 12962.
    - **PROJECT #12:** Develop an outdoor learning program for children that focuses on fishing and aquatic ecology in conjunction with the fishing pier project. Stewardship, Level 5. 16 USC 670a and EO 12962.

LAND MANAGEMENT UNIT: Unimproved Lands Management Unit

- **OBJECTIVE #7:** Provide for the conservation and rehabilitation of land resources while supporting the military mission.
    - **PROJECT #13(a):** Identify unimproved lands within the ownership of NAS JRB Fort Worth for the purposes of controlling soil erosion. Mandatory, Level 1. Public Law 92-500; OPNAVINST 5090.1B; and, Executive Order 13148.
    - **PROJECT #13(b)**: Implement a program to control soil erosion throughout the unimproved lands of the Installation. Mandatory, Level 1. Public Law 92-500; OPNAVINST 5090.1B; and Executive Order 13148.
    - **PROJECT #14:** Update the BASH Plan. Mandatory, Level 1. OPNAVINST 3750.6R and NAVFAC P-73 VOL II.

- **OBJECTIVE #8:** Update and revise the planting sequences, mowing program and landscape plans to best support the Bird-Aircraft Strike Hazard (BASH) Plan.

    - **PROJECT #15:** Review effectiveness of the BASH Program, provide recommendations, and implement recommendations. Mandatory, Level 1. NASJRBFWINST 3750.12 and EO 11514.

- **OBJECTIVE #9:** Provide recreational opportunities and promote natural resource education to assigned military personnel.

    - **PROJECT #16:** Plant a wildflower and native vegetation viewing area and nature path through an unimproved land parcel to enhance aesthetic qualities of the Installation. Stewardship, Level 5. DoD Dir. 4715.3 and DoD Dir. 4700.4.

LAND MANAGEMENT UNIT: Operational/Urban Lands Management Unit

- **OBJECTIVE #10:** Minimize the pollutants in storm water runoff entering the waters surrounding NAS JRB Fort Worth and comply with the Installation Storm Water Pollution Prevention Plan (SWPPP).

    - **PROJECT #17:** Implement the best management practices in the SWPPP. Mandatory, Level 1. Public Law 92-500; Section 319; OPNAVINST 5090.1B; and, EO 13148.

- **OBJECTIVE #11:** Support the BASH Plan.

    - **PROJECT #18**: Develop a native vegetation planting plan to support the BASH Plan in coordination with local garden and nature clubs. Stewardship, Level 5. Public Law 86-797; NASJRBFWINST 3750.12; and, Presidential Memo 50737.

- **OBJECTIVE #12:** Improve the natural values and aesthetic qualities of Operational/Urban Lands.

    - **PROJECT #19:** Develop a plan for the revegetation of unnecessary impervious cover areas on the Installation. Stewardship, Level 5. Presidential Memo 50737 and 16 USC 2901.

    - **PROJECT #20:** Create native landscaping around existing drainage areas to enhance aesthetic value and reduce maintenance costs. Stewardship, Level 5. 16 USC 2901.

- **OBJECTIVE #13:** Foster and promote natural resource stewardship among military and civilian personnel.

    - **PROJECT #21:** Develop an educational program showcasing the Navy's efforts in Environmental Stewardship on NAS JRB Fort Worth. Stewardship, Level 5. OPNAVINST 5090.1B and EO 13148.

- **PROJECT #22:** Development of a multi-use nature trail. Stewardship, Level 5. OPNAVINST 5090.1B and EO 13148.

- **PROJECT #23:** Update this INRMP on a 5-year cycle in accordance with the Sikes Act Improvement Act Amendments. Mandatory, Level 1. OPNAVINST 5090.1B; and EO 13148.

- **PROJECT #24:** Provide annual training for the INRMP Manager. Mandatory, Level 1. OPNAVINST 5090.1B and EO 13148.

- **OBJECTIVE #14:** Implementation of best management practices to support NAS JRB Forth Worth's ongoing environmental efforts.

  - **PROJECT #25:** Identification and implementation of pervious pavement techniques as a demonstration program. Stewardship, Level 1. OPNAVINST 5090.1B and Sikes Act 16 USC 670.

  - **PROJECT #26:** Utilize low-maintenance/low input landscaping techniques to reduce water consumption, chemical applications and maintenance costs. Stewardship, Level 1. OPNAVINST 5090.1B and Sikes Act 16 USC 670.

- **OBJECTIVE #15:** Implementation of a Geographic Information System to support NAS JRB Fort Worth's ongoing environmental efforts.

  - **PROJECT #27:** Conduct GIS training workshops at NAS JRB Fort Worth. Mandatory, Level 1. OPNAVINST 5090.1B and EO 13112.

  - **PROJECT #28:** Development and implementation of an interactive intranet GIS website using ArcIMS for species surveying and monitoring aboard NAS JRB Fort Worth. Stewardship, Level 1. OPNAVINST 5090.1B and EO 13112.

Organization of the NAS JRB Fort Worth INRMP

Introduction. This section provides a discussion of the purpose of the INRMP and the policies that drive it, the goals of the INRMP, a brief history of the Installation, and its military mission.

Existing Conditions. This section describes the existing physical and biological conditions at NAS JRB Fort Worth. Included within this section are descriptions of the climate; geology; topography; soils; hydrology; flora; fauna; and rare, threatened, and endangered species of the area. A discussion of the current land use and classifications and natural resource management plans at NAS JRB Fort Worth are included. Stakeholders of the natural resources on and around the Installation are also included in this section.

Natural Resources Management Issues. This section provides a discussion of the current natural resources management issues relevant to NAS JRB Fort Worth to aid in identifying natural resource management opportunities and potential conflicts.

Management Actions. This section provides a discussion of the natural resources management actions for the four Land Management Units at NAS JRB Fort Worth.

References. This section contains a list of technical guidance, reference and survey documents that were used in the development of this INRMP.

Appendices. The appendices provide additional information and documents addressing the management issues, objectives, and actions discussed in this INRMP.

COMMON ACRONYMS USED IN THIS INRMP

AFB	Air Force Base
BASH	Bird-Aircraft Strike Hazard
BMP	Best Management Practice
BRAC	Defense Base Closure and Realignment Act
CA	Cooperative Agreement
CADD	Computer aided Drafting and Design
cm	Centimeter
COMNAVRESFOR	Commander Naval Reserve Forces
CWA	Clean Water Act
CZMP	Coastal Zone Management Program
DO	Dissolved Oxygen
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DoN	Department of the Navy
EFH	Essential Fish Habitat
EM	Executive Memorandum
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
F	Farenheit
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
ha	Hectares
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management Plan
JRB	Joint Reserve Base
km	Kilometer
LMU	Land Management Unit
m	Meters
MSL	Mean Sea Level
MWR	Morale, Welfare and Recreation Department
NAS	Naval Air Station
NASJRBFTWINST	Naval Air Station Joint Reserve Base Fort Worth Instruction
NAVFAC	Naval Facilities Engineering Command
NAVFACENGCOMINST	Naval Facilities Engineering Command Instruction
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NPDES	National Pollutant Discharge Elimination System
NPS	Non-Point Source (Pollution)

NRCS	Natural Resources Conservation Service
NRDA	Natural Resource Damage Assessments
NRMP	Natural Resources Management Plan
NRMU	Natural Resources Management Unit
OHS	Oil and Hazardous Substance
O&MNR	Operations & Maintenance Naval Reserve
OPNAVINST	Chief of Naval Operations Instruction
PCB	Polychlorobiphenols
PCS	Permanent Change of Station
PM	Presidential memorandum
PS	Point Source (Pollution)
PL	Public Law
PWO	Public Works Office
REDCOM	Readiness Command
SAC	Strategic Air Command
SAIA	Sikes Act Improvement Act of 1997
SECNAVINST	Secretary of the Navy Instruction
SOUTHDIV	Southern Division, Naval Facilities Engineering Command
SWPPP	Storm Water Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
TDH	Texas Department of Health
TDY	Temporary Duty
TMDL	Total Maximum Daily Load
TPWD	Texas Parks and Wildlife Department
TRA	Trinity River Authority
UST	Underground Storage Tank
TSWQS	Texas Surface Water Quality Survey
USACE	U.S. Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USDA	U. S. Department of Agriculture
U.S. EPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WSE	Water Surface Elevation

1.0 INTRODUCTION

1.1 PURPOSE AND POLICY

Department of the Navy installations are required to implement and maintain an integrated program to manage natural resources under their administration by Department of Defense Instruction (DoDI) 4715.3, the Environmental and Natural Resources Program Manual (OPNAVINST 5090.1B, Change 2), and the Sikes Act Improvement Act (SAIA [amended in 1997]) (16 United States Code 670 a through o). Multiple-use, protection and enhancement of natural resources, sustainable yield, and maintaining biological integrity are requirements under DoDI 4715.3 and OPNAVINST 5090.1B. SAIA requires military installations having significant natural resources to prepare an Integrated Natural Resources Management Plan (INRMP) for the conservation and rehabilitation of these resources. The INRMP is a planning tool for managing natural resources in a coordinated manner within the context of the operational mission of the military installation. The INRMP is to provide for integrated fish and wildlife management, land and forest management, wetland enhancement and protection, public access where permissible and sustainable use of the natural resources, and enforcement of natural resource laws and regulations without interfering with the military readiness or mission of the installation.

Under DoD and Navy Policy, the INRMP is to reflect cooperation and mutual agreement in an ecosystem management approach to natural resources management between the installation, the U.S. Fish and Wildlife Service (USFWS), and state fish and wildlife agencies, in this case the Texas Parks and Wildlife Department (TPWD). Naval Air Station Joint Reserve Base (NAS JRB) Fort Worth must prepare and implement an INRMP to facilitate the natural resources management program in compliance with these laws and regulations.

The management actions in this INRMP are intended to be carried out by the stakeholders listed at the end of *Section 2.0*; however, the primary responsibility for implementing this INRMP at NAS JRB Fort Worth falls upon the Installation's Public Works Department, Environmental Division. The Installation's Natural Resource Manager will be required to monitor, review and update, if necessary, the INRMP. As required by the SAIA, the INRMP shall be reviewed and re-approved at least every five years.

Funding for implementation of the INRMP will come from the Installation, Commander Naval Reserve Force (COMNAVRESFOR), or Naval Facilities Engineering Command (NAVFAC) natural resources fund sources. The natural resources programs and projects described in this INRMP are divided into mandatory and stewardship categories to reflect implementation priorities. Every effort will be made to acquire O&MNR Environmental, or other funding to implement DoD mandatory projects, in the most timely manner possible. Stewardship-type projects will be funded through forestry, agricultural outlease, fish and wildlife, Legacy, or other fund sources as funding and personnel resources become available.

1.2 LOCATION, HISTORY, AND MISSION OF THE INSTALLATION

NAS JRB Fort Worth consists of approximately 1,804 acres (730 hectares [ha]). NAS JRB Fort Worth is located in north-central Texas in Tarrant County, 8 miles (13 kilometers [km]) west of downtown Fort Worth *(Figure 1-1).* The majority of the Installation falls within the jurisdiction of the City of Fort Worth. The Installation is bordered by Lake Worth to the north, the West Fork of the Trinity River and Westworth Village to the east, Fort Worth to the northeast and southeast, White Settlement to the west and southwest, and the Lockheed Martin Air Force Plant 4 to the west. The northern portion of the NAS JRB Fort Worth borders approximately 1 mile of Lake Worth's shoreline.

NAS JRB Fort Worth occupies an area that has had a varied, but key part in the history of United States airpower. The area known as NAS JRB Fort Worth was originally a modest dirt runway built to serve an aircraft manufacturing plant located where Lockheed Martin Air Force Plant 4 is currently located. When it was established in 1942, the Installation was referred to as the Tarrant Field Aerodrome and originally was under the jurisdiction of the Gulf Coast Army Air Field Training Command. Its mission was to provide transition training for B-24 bomber pilots. The Strategic Air Command (SAC) assumed control of the Installation in 1946 and the base served as headquarters for Eighth Air Force. The base was renamed Carswell Air Force Base (AFB) in 1948 in honor of Fort Worth native, Major Horace S. Carswell. At that time, the 7th Bomb Wing became the host unit. In 1951, Headquarters 19th Air Division was located at Carswell AFB where it remained until September 1988, the longest tenure of any air division in SAC. The Air Combat Command assumed control of the base in 1992 with the disestablishment of SAC.

The Defense Base Closure and Realignment Act (BRAC) of 1990 established new procedures for closing or realigning military installations in the United States. DBCRA established a Base Closure and Realignment Commission to review the Secretary of Defense's base closure and realignment recommendations for 1991, 1993, and 1995. As a result of the Commissions decision, Carswell AFB was closed on September 30, 1993. The 1993 Commission recommendations specifically called for the realignment of several military reserve and guard units from Naval Air Station Dallas, Texas; Naval Air Station Glenview, Illinois; and, Naval Air Station Memphis, Tennessee to Carswell AFB. The Installation is now known as NAS JRB Fort Worth. A dedication ceremony marking the opening of NAS JRB Fort Worth was conducted on October 1, 1994. *Figure 1-2* illustrates the current boundaries of NAS JRB Fort Worth.

The mission of NAS JRB Fort Worth is to serve as a Naval Air Station with the primary task of providing a quality training environment for Reserve and Guard components of all branches of the Armed Services, and to reduce redundancy and overhead by developing joint doctrine and operating procedures that create seamless functionality among host and tenant commands in base support service programs. Units stationed at NAS JRB Fort Worth that support this mission include:

10th Air Force (Air Force Reserve)
136th Airlift Wing
14th Marines
301st Fighter Wing (Air Force Reserve)
301st Support Group
9th Naval Construction Regiment
Bureau of Prisons
Civil Air Patrol – USAF Southwest Liaison Region
Commander, Fleet Logistics Support Wing (Navy)
Commander, Naval Readiness Command, Region 11
Commander, Naval Reserve Intelligence Command
Defense Security Service
Fighter Squadron 201 (Navy)
Fleet Hospital 500 Combat Zone 21 HQ
Fleet Logistics Support Squadron 59 (Navy)
Marine Aerial Refueller Transport Squadron 234
Marine Air Control Squadron 24
Marine Aircraft Group 41
Marine Aviation Logistics Squadron 41
Marine Fighter Attack Squadron 112
Marine Prior Service Recruiting Detachment
Mobile Inshore Undersea Warfare Unit 109
Marine Wing Service 471
Naval Air Tactical Engineering Service Command, Detachment
Naval Air Warfare Center Weapons Division
Naval Aviation Engineering Service Unit Detachment
Naval Criminal Investigations
Naval Legal Services
Naval Mobile Construction Battalion 22
Naval Reserve Center
Naval Reserve Recruitment Command Detachment III
Naval Reserve Security Group
Naval Training Meteorology and Oceanography Detachment
Naval Computer and Telecommunications Area Master Station, Atlantic Detachment, Pensacola, Florida
Base Communications
Reserve Intelligence Program Office
Resident Officer In Charge of Construction
Strike Fighter Squadron 201
Texas Air National Guard

Functional and resilient ecosystems are better able to support day-to-day military readiness and the long-term military mission. Preserving and enhancing those ecosystem types that are important to the training of personnel and day-to-day operations of the Installation is the primary

purpose of this INRMP, and of all natural resource management actions on NAS JRB Fort Worth. Since the mission and land use of NAS JRB Fort Worth are subject to change over time as the military needs of the United States change, this INRMP must be flexible to accommodate these changes as they occur while still providing for the requirements of the SAIA, and Navy environmental regulations. Yearly reviews of activities within this INRMP, and a complete review of this INRMP every five years will provide the mechanism to positively respond to changes in the military mission of NAS JRB Fort Worth, and continue to meet the requirements of environmental laws and regulations.

1.3 MISSION NEEDS AND IMPACTS TO THE ENVIRONMENT

An INRMP is designed to support the military mission by protecting and enhancing the lands upon which the mission is critically dependent. To effectively integrate the INRMP with the operations that support the mission of the Installation, the INRMP must conform to the functional elements of the Installation. The functional elements of NAS JRB Fort Worth include flying operations, training, maintenance support, logistics support, administrative services, community services, recreation, health care, and housing (Department of the Navy, 1997). The activities associated with these functional elements are essential in accomplishing the military mission of NAS JRB Fort Worth. This INRMP will promote these activities and, where possible, incorporate and balance these activities with the protection and enhancement of the natural environment.

To carry out its mission, NAS JRB Fort Worth must build and maintain facilities to:

- Provide support to permanently and temporarily assigned Multi-Service aircraft and associated operational and maintenance personnel and facilities.

- Provide administrative and logistic support for operations of Multi-Service aircraft and the physical plant at NAS JRB Fort Worth.

- Provide for the morale, welfare, recreation, and training of Multi-Service Active Duty and Reserve Personnel assigned to the various commands at NAS JRB Fort Worth.

The facilities and infrastructure that are required to meet the mission needs of the many and varied commands and units assigned throughout the Installation's history have unavoidably removed a disproportionately large portion of the native plant communities on NAS JRB Fort Worth. During the base closure exercise much of the partially developed or undeveloped areas of the original Carswell AFB were released to civilian use and are no longer a part of the Installation. Construction of runways, taxiways, clear zones, buildings, roads, parking areas, and recreational areas has necessarily cleared large amounts of the native vegetation, which directly and indirectly affected soil, water and air resources. Some impacts are relatively minor and short-term in nature. Other aspects of the military's mission restrict land use in some areas of the Installation. For example, safety regulations do not permit buildings or sports recreational land use within the runway clear zones or taxiways. Because this area cannot be developed and must maintain unattractive characteristics to birds, the grass must be kept in a close mowed and

controlled state with a grass height of 7 to 12 inches (18 to 30 cm), consistent with the Bird-Aircraft Strike Hazard (BASH) Plan. Impacts on the natural environment are reduced in developed areas by implementing erosion control, reducing sources of nonpoint source pollution, using regionally native vegetation as part of the landscaping practices, and using biological resources in improving water quality of surface runoff from developed areas. Best management practices (BMPs) and careful planning of facilities to avoid impacts to water and wetland resources, where practicable, are other opportunities in which impacts to the environment are reduced.

The mission requires that the natural resources be controlled in some places so that the training and other missions of NAS JRB Fort Worth can be developed and pursued without damage to aircraft, personnel or wildlife to the maximum extent possible. Control and conservation of the natural resources also demands that items such as erosion, air pollution and water pollution be kept under control in order to support the foundation upon which the various aspects of the mission depend. Wildlife and native vegetation add to the aesthetic quality of the Installation and provide recreational and conservation opportunities that are supported by this INRMP.

Establishment of a program to minimize bird strikes to aircraft is required by OPNAVINST 3750.6P and OPNAVINST 4790.2D. Due to the location of NAS JRB Fort Worth within the Central North American Migratory Bird Flyway, issues related to the BASH program are of primary concern. The implementation of this INRMP will insure that efforts to enhance habitat do not increase attractiveness to wildlife to the extent that birds or mammals come into conflict with military aircraft operations. The BASH Plan for NAS JRB Fort Worth follows the procedures established in NASJRBFTWINST 3750.12 and is attached in *Appendix B.*

1.4 ACCESS

SAIA calls for the use of natural resources by the general public, including outdoor recreation, within military installations to the extent that it does not interfere with the military readiness or mission of the installation or degrade the natural resources found on the installation. Outdoor recreation can include educational programs to foster a sense of responsible stewardship in military personnel and the general public who use the wildlife recreational opportunities of an installation. The degree of public access for recreational purposes will be one of the following (NAVFAC P-73, Vol. II 4-A-6):

- Category A: Open to the general public, regardless of association with the military or other DoD agencies. Numbers of visitors or users will be regulated with manageable quotas based on resource capabilities, mission requirements, and management plans.

- Category B: Open to DoD employees and guests. This includes all military and civilian employees of DoD and their dependents, relatives, and guests, and retired employees. Guests must be accompanied by their sponsor when participating in activities when required by safety or security considerations as set forth in the base

regulation pertaining to use of the resource or facility. Dependents and retirees generally do not require accompaniment.

- Category C: Open to installation personnel and guests only. This includes personnel stationed or employed at the installation either PCS or official TDY, and their dependents, relatives and guests. It does not include retirees or DoD employees from other installations or military services not PCS or official TDY.

- Category D: Open to installation personnel only. This includes only those personnel assigned PCS or official TDY at the installation. Dependents, relatives, guests, retirees, and other DoD employees are not included.

- Category E: The installation is closed to participation in a particular activity or to the use of a particular resource (Note: The installation may be Category E for hunting and Category A for fishing or any other combination. The category restrictions apply to particular facets of the installation resources, not to the entire installation.).

All property contained within NAS JRB Fort Worth is identified as Category B.

Post September 11, 2001, military security has increased at the Installation. Changes in security measures are contained in the Anti-Terrorism Force Protection Instruction located in the Administration Building (Bldg. 1510).

1.5 AGENCY COORDINATION

During the planning process for Navy actions and projects that impact sensitive natural resources, the Installation will coordinate, as early as practical with the appropriate natural resource agencies. When the actions or projects are mission essential and severely time-constrained, this coordination may not occur except for resources such as wetlands and endangered species where the coordination is required by law or regulation.

Within this INRMP, no intent has been generated to disturb any of these habitats for non-priority mission activities. It is clearly understood that all efforts will be taken to avoid and minimize habitat impacts. Mitigation will be sought for unavoidable impacts.

1.6 GOALS

The implementation of this INRMP is intended to be a dynamic, multidisciplinary process. Four goals have been developed from the mission of NAS JRB Fort Worth to provide direction, recognize management actions, and construct the framework for measuring success of this INRMP. At no time will these four goals impede the security measures implemented post September 11, 2001. The goals of the NAS JRB Fort Worth INRMP are to:

- Provide for the conservation and rehabilitation of land and water resources while supporting the military mission. (Conservation Goal)

- Maintain or increase the diversity and populations of plants and animals under the stewardship of the Department of the Navy through habitat maintenance and enhancement activities on NAS JRB Fort Worth that do not detract from the military readiness of the Installation. This includes strict conformance to the BASH Program. (Diversity Goal)

- Enhance the quality of life of all assigned personnel by providing high-quality, accessible outdoor recreational opportunities that do not degrade the natural resources. (Recreation Goal)

- Foster and promote natural resources stewardship among all assigned personnel and the public by providing opportunities to participate in natural resource conservation and rehabilitation activities on NAS JRB Fort Worth. (Stewardship Goal)

From these goals, a variety of management actions specific to the needs of NAS JRB Fort Worth have been developed. These management actions, presented in *Section 4.0*, are components of the four goals listed above and represent measurable targets used to quantify the success of this INRMP. Ecosystems are dynamic systems, and may exhibit responses to management actions different than those expected. A process of adaptive management will be used to compare the responses exhibited by the natural resources to the management action against the desired response or objective for that management action. Modification of the management actions may be needed to reach the desired goal. For example, a change in management actions may become necessary because of an unforeseeable and large-scale disturbance (e.g., drought, tornado, etc.) to the natural resources. An adaptive management approach allows for changes in short- and long-term goals from such large-scale changes in the conditions of the natural resources to reach the goals of this INRMP. An adaptive management approach is used throughout this INRMP.

1.7 ORGANIZATION OF THIS INRMP

The outline and organization of this INRMP is consistent with SAIA requirements and Department of Navy guidelines. The purpose and background are presented in *Section 1.0*. *Section 2.0* presents the existing conditions of the natural resources at NAS JRB Fort Worth. *Section 3.0* describes the natural resources management issues and *Section 4.0* describes the natural resource management actions proposed for this Installation. *Section 5.0* contains the bibliography. *Section 6.0* lists the preparers of this INRMP. Supporting information is included in the *Appendices*.

Insert Figure 1-1 here – Vicinity Map

Insert Figure 1-2 here – Site Location Map

2.0 EXISTING CONDITIONS

2.1 CLIMATE

NAS JRB Fort Worth is located in western Fort Worth, immediately to the south of Lake Worth, in Tarrant County, Texas (*Figure 1-1*). The Installation is located 8 miles (13 km) west of downtown Fort Worth, and is surrounded by the Cities of Fort Worth, White Settlement, Westover Hills, Lake Worth, River Oaks, Sansom Park, and Westworth Village.

The climate of the NAS JRB Fort Worth Region is subtropical, with mild to moderate winters and hot, humid summers. Fort Worth has an average annual temperature of 66°F (19°C) with July being the hottest month and January being the coldest month, averaging at 86°F (30°C) and 45°F (7.2°C), respectively. Temperatures can fluctuate within a few hours by 20 to 30 degrees Fahrenheit (10 to 13 degrees Celsius) in the Fort Worth area, due to fast moving cold fronts, known locally as "northerners," that occur during the winter months. The area is humid, with an average annual relative humidity of 63 percent.

Winds primarily are out of the south from March to November, and out of the north from December to February. The average wind velocity is about 9 miles per hour (mph) (14.5 kilometers per hour [kph]).

The Fort Worth area receives about 31.5 inches (80 centimeters) of rainfall per year. The majority of this rainfall occurs between the months of April and October. Severe thunderstorms are common, sometimes accompanied by high winds and hail. The winds can reach velocities of 65 to 75 mph (105 to 121 kph) and hail damage at times is severe. During the summer months, climate conditions can develop such that tornadoes are formed. This condition is usually caused by warm moist air coming off of the Gulf of Mexico mixing with a cold front coming down from Canada and resulting in a very unstable air mass.

Fort Worth has a growing season of approximately 8 months. The average frost-free period is from March 22 to November 14. Periodic droughts, though, occur often throughout the year and may last for several years (Department of the Navy, 1994).

2.2 GEOLOGY, TOPOGRAPHY, AND SOILS

Geological Formations

NAS JRB Fort Worth lies in the Grand Prairie section of the central lowlands of north central Texas. This physiographic province of Texas is normally a broad, gently sloping terrace. The topography of the area surrounding the Installation consists of low relief plains that are broken by meandering courses of streams and rivers. The area is characterized by broad terraces sloping gently toward the east and interrupted by westward-facing escarpments. The terraced topography is thought to be the result of the weathering of the unconsolidated limestone and marl formations that lie beneath this portion of the Grand Prairie section. Elevations on NAS JRB Fort Worth range from 550 feet (ft [167.6 meters (m)]) mean sea level (MSL) to 690-ft (210.3 m) MSL, from east to the southwest.

The geologic formations in Tarrant County are of the Cretaceous age and lie in a north-north-easterly direction in parallel bands. The northwest corner of the county contains the oldest stratigraphic units, while the southeast corner of the county contains the youngest.

Undifferentiated Paleozoic rocks overlain with Lower Cretaceous sedimentary formations make up the surface geology in the vicinity of NAS JRB Fort Worth. The Lower Cretaceous formations are overlain with younger fluvial and alluvium terrace deposits. These fluvial and alluvial deposits are thought to be from the periodic flooding of the Trinity River, over the last one million years. There have been seven geological formations identified beneath the Installation. They are listed from youngest to oldest: Quaternary alluvium and fluvial terraces; five Lower Cretaceous formations (the Goodland Limestone, the Walnut Formation, Paluxy Formation, the Glen Rose Fromation, and Twin Mountain Formation); and, undifferentiated Palezoic rocks.

The Quaternary alluvium and fluvial terrace deposits are characterized as being unconsolidated with poorly sorted to well-sorted clay, silt, sand, and gravel. Flooding of the Trinity River is believed to have deposited the alluvium in the general area comprising the NAS JRB Fort Worth over the past million years.

The Goodland Limestone and the Walnut Formation are part of the Fredricksburg Group, which has a maximum thickness of 250-ft (76.2 m). Goodland Limestone is characterized as being chalky, fossiliferous, nonresistant limestone. Walnut Formation consists of fossiliferous limestone interbedded with brown sandy clay, thin-bedded fossiliferous clay, fissile shale, and iron stained earthy limestone.

The Paluxy, Glen Rose, and Twin Mountain formations collectively form the Trinity Group. This group has a maximum thickness of 2,500-ft (762 m). Fine to coarse-grained white quartz sandstone interbedded with sandy to silty, calcareous, waxy claystone and shale characterizes the Paluxy Formation. The Glen Rose Formation is characterized by limestone with sand, clay, sandy clay, and anhydrite. The Twin Mountain Formation ranges from a basal conglomerate of chert and quartz to a fine to coarse-grained sand with shale and clay. The bed of Lake Worth is formed from the Paluxy Formation.

The Paleozoic Formation is 6,000 to 7,000 ft (1,828 to 2,133 m) thick, and consists of shales, limestones, and sandstones. These are cemented tightly together.

The structural geology that lies beneath NAS JRB Fort Worth is termed the Texas Craton. This is a stable area that is located to the west of faults that are linked with the Ouachita Structural Belt. The Uniform Building Code has determined that the Installation lies within Seismic Zone 0. Areas within this zone have minimal risk from damages associated with large seismic events (Department of the Navy, 1994).

Soils

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), formerly the USDA Soil Conservation Service, has classified soil at the NAS JRB Fort Worth as 75 percent Urban land. Urban lands are areas that consist of 85 to 100 percent works and structures, including office buildings, airports, pavement, and concrete. Soil classified as Urban land has been altered to a state such that determination of the soil in the area can not be accomplished (USDA, 1981). This Urban land is interspersed with twenty-five percent of the area being fine loam that is montmorillonitic in nature.

Soils in the area of NAS JRB Fort Worth are usually clayey soils on nearly level to gently sloping uplands, or are deep loamy soils on level to sloping stream terraces. Permeability of the soil at the Installation has been determined to be slow, to moderately slow, allowing storm water runoff to occur rapidly, without significant infiltration. The soil is susceptible to some erosion. Additionally, the soils have a moderate to high potential to shrink or swell, which can be detrimental to the construction of structures. This risk of construction has been avoided however, by using engineering practices, such as stronger foundations.

Because the soil at NAS JRB Fort Worth is considered to be Urban land, prime farmland is no longer present. Furthermore, there is no unique farmland, important rangeland, or protected forests at this location (Department of the Navy, 1994).

2.3 HYDROLOGY

Watershed

Tarrant County, including NAS JRB Fort Worth, is located within the Trinity River Basin, which conveys storm water runoff from the region to the Gulf of Mexico via the Trinity River. Storm water runoff from the Installation is conveyed to the Trinity River by either collecting in Lake Worth from direct runoff or from storm drainage systems, or by flowing into Farmers Branch Creek and then being conveyed into the West Fork of the Trinity River or by being collected by the storm sewer systems throughout the Installation and being piped to outflows that empty directly into the West Fork of the Trinity River. The surface drainage pattern can be seen in *Figure 2-2*. This figure shows the watershed areas on the Installation and the direction in which the storm water flows.

According to the Flood Insurance Rate Map (FIRM) produced by the Federal Emergency Management Agency (FEMA), the 100-year water surface elevation (WSE) for Lake Worth is 600-ft (182.9 m) National Geodetic Vertical Datum of 1929 (NGVD). The 100-year WSE for the West Fork of the Trinity River ranges from 595-ft (181.4 m) NGVD to 556-ft (169.5 m) NGVD from the Lake Worth Dam to a point just upstream of Highway 183. Farmers Branch 100-year WSE ranges from 634-ft (193.2) NGVD to 556-ft (169.5 m) NGVD from the western boundary of the Installation to the confluence of the West Fork of the Trinity River. The 100-year WSE for Kings Branch ranges from 575-ft (175.3 m) NGVD to 556-ft (169.5 m) NGVD from a point just downstream of Roaring Springs Road to the confluence with the West Fork of the Trinity River. The majority of the Installation lies in an area that has been determined to be outside of the 500-year WSE (FIRM Panels 48439C 0265 H and 48439C 0270 H, 1995). The floodplains are presented in *Figure 2-2*.

Surface Water

Surface water on or adjacent to NAS JRB Fort Worth includes Lake Worth, Farmers Branch Creek, Kings Branch, and the West Fork of the Trinity River (*Figure 2-1*).

Lake Worth borders the northern part of the Installation. Lake Worth is a man-made reservoir used for public water supply and recreation. The lake is approximately 3,558 acres (ac) (1,441 hectares [ha]) in size, and 12 miles (19.31 kilometers [km]) long. Storm water runoff from the Upper West Fork of the Trinity River Basin contributes to the lake. The Upper West Fork watershed has an area of 17,929 square miles (mi^2) (46,436 square kilometers [km^2]) and extends into nine counties. This watershed includes the northwestern corner of the Installation (Camp Dresser & McKee, 1997). Lake Worth is classified as Segment 0807 of the Trinity River Basin according to the Texas Surface Water Quality Standards (TSWQS, 1996). This water has been frequently monitored and evaluated and it has been determined that this water is suitable for contact recreation, public water supply, and high quality aquatic life. This segment of the river has been determined to have a corresponding dissolved oxygen (DO) concentration of 5.0 milligrams per liter (mg/L). The area surrounding Lake Worth is heavily developed and solids, in the form of silt, have been conveyed into the Lake, reducing its original capacity. Coordination with the Texas Department of Health (TDH) and the Trinity River Authority (TRA) indicated the presence of polychlorinated biphenols (PCBs) in fish tissue from Lake Worth. Currently, there is a ban on fish consumption until further studies can be accomplished. This pollutant will be a consideration as total maximum daily load (TMDL) levels are determined for Lake Worth and the Trinity River. Currently, the source of the PCB contamination has not been determined.

A pollutant of additional concern in the lake is an elevated level of copper that is found in the sediment. In 1991, a diagnostic and feasibility study reported that nutrients and sediment were starting to impair recreational uses of the Lake. The waters of Lake Worth are being monitored closely for further involvement. Lake Worth is included in the National Clean Lake Program (Texas Commission on Environmental Quality [TCEQ], 1999). Although these physical problems exist with the Lake, the water quality remains sufficient to support the designated uses.

Farmers Branch Creek, an intermittent stream, conveys water from west of the Installation into the West Fork of the Trinity River. This creek runs beneath the runways and taxiways used for aircraft via a subsurface drainage culvert. Farmers Branch Creek is joined by another creek, Kings Branch, just southeast of the Installation (Department of the Navy, 1994). Farmers Branch Creek has a low aquatic diversity because of the low flow and periodic dryness (TCEQ, 1999).

Kings Branch Creek originates south of NAS JRB Fort Worth and flows in a northeastern direction until it combines with Farmers Branch Creek. Below the confluence of the two streams, the channel flows into the West Fork of the Trinity River (Department of the Navy, 1994).

The West Fork of the Trinity River, below Lake Worth Dam, is classified as Segment 0806 by the TSWQS. This segment has been designated for uses of contact recreation, public water supply and high aquatic life. Segment 0806 has a corresponding DO concentration of 5.0 mg/L and is a perennial river that borders the Installation to the east, flowing first south and then east. The majority of the storm water runoff from the Installation is conveyed to this segment of the river (Department of the Navy, 1994).

Segment 0806 is currently listed on the State of Texas Clean Water Act Section 303 (d) List of Threatened and Impaired Water Bodies. A part of this river segment, from a point past and below NAS JRB Fort Worth, has been noted to have bacteria concentrations that sometimes exceed the required levels established for contact recreation. The affected portion of this segment is 5 miles upstream and 12 miles downstream of Beach Street in Fort Worth. Additionally, elevated levels of chlordane in fish tissue caused the TDH to issue an aquatic-life closure through the lower 22 miles of this river segment, ending fish consumption, in this area. The levels of chlordane in the fish are believed to be caused by urban runoff from Fort Worth and other communities downstream from NAS JRB Fort Worth (TCEQ, 1999). *Figure 2-1* shows West Fork Trinity River Segment 0806 in this area and the point at which Beach Street crosses the River.

Wetlands

The U. S. Army Corp of Engineers (USACE) defines wetland areas as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The USACE Fort Worth District regulates fill activities within jurisdictional wetlands under Section 404 of the Clean Water Act. NAS JRB Fort Worth contains a 1.3 ac (0.53 ha) jurisdictional wetland, as determined by the USACE. The wetland is located along a fence that controls access between the Installation and the West Fork of the Trinity River, east of Knights Lake Road and the NAS JRB Fort Worth Chapel (*Figure 2-2*). This wetland is categorized as a palustrine emergent wetland, grading to a scrub-shrub palustrine wetland in the southern half. Water drains down from several points upland of the wetland, through a small stand of shrubs and low trees and then over a steep incline that runs through the wetland. From the wetland, the water then runs down to a floodplain area along the West Fork Trinity River. The seeping water ponds in several places, facilitating the wetland formation. Bisecting the upper portion of the wetland is what appears to be an old abandoned roadbed, approximately 10 feet wide, and elevated by a few inches above the surrounding wetland. This discontinuity does not seem to affect the wetlands on either side as water flows easily over the roadbed and down the incline in at least two places during periods of normal rainfall. The roadbed would not, therefore, be a significant upland "island" in the wetland from a conservation point of view. Permanence of the hydrology is suggested by the presence of Mosquito Fish (*Gambusia sp*.) and watercress (*Rorippa sp*.) in the drainage. Wetland vegetation at this site includes a preponderance of species that usually occur in wetlands, such as two types of cattails (*Typha sp*.), seedbox (*Ludwigia sp*.), marsh flatsedge (*Cyperus pseudovegetus*), and curly dock (*Rumex crispus*).

This wetland contains hydric soils with appropriate Munsell indicators and some slow moving water on occasion. The wetland appears to be very stable, and current plans provide for its protection and maintenance (USACE, 1996).

The surface waters identified above which include Lake Worth, Farmers Branch Creek, Kings Branch, and the West Fork of the Trinity River are all waters of the United States subject to USACE jurisdiction under Section 404 of the Clean Water Act.

Groundwater

There are five major hydrogeologic units located beneath NAS JRB Fort Worth. The units are described as an upper zone of perched water in alluvial terrace deposits; an aquitard in the Goodland,

Limestone, and Walnut Formations; an aquifer in the Paluxy Formation; an aquitard in the Glen Rose Formation; and, an aquifer in the Twin Mountain Formation.

Water was previously pumped from an alluvium strata that is close to the Trinity River and used for irrigation and residential purposes. However, because of pollution concerns caused by surface and storm water contamination, the development of this ground water source was uneconomical. Currently, NAS JRB Fort Worth receives all of its water from the City of Fort Worth.

The aquitard consisting of the Goodland, Limestone, and Walnut Formations primarily contains moist clay and shale layers. The aquitard is mostly dry, yet some water has been encountered while drilling.

The Paluxy aquifer is a major source of potable water for communities surrounding NAS JRB Fort Worth. White Settlement and Sansom Park rely on the aquifer as their main source of water. The Installation, however, has no active or open wells for potable water supplies.

The aquifer in the Glen Rose Formation provides some water to the City of Fort Worth. However, it is not an important source of water. The Twin Mountain Formation is another source of water for White Settlement. The water quality in this aquifer is satisfactory, but can contain large amounts of minerals.

Water is recharged to the Paluxy aquifer by infiltration from rainfall and Lake Worth. Recharge occurs in the Twin Mountain Formation from outcrops that receive precipitation and seepage from lakes and streams (Department of the Navy, 1994).

2.4 FLORA

NAS JRB Fort Worth lies within a transition zone between the Cross Timbers and Grand Prairie vegetational area of north-central Texas. The primary vegetation at the Installation is mowed grass. The majority of native species that were present on the Installation in the past has been replaced with non-native grasses and ornamental trees (*Figure 2-3*). Vegetation that occurs on or is found in the immediate vicinity of NAS JRB Fort Worth is listed in *Table 2-1*.

The grassland vegetation at NAS JRB Fort Worth covers about 43 percent of the Installation acreage. All areas are mowed periodically. Little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum avenaceum*), big bluestem (*Andropogon gerardi*), and buffalo grass (*Buchloe dactyloides*) are the most common species. As the mowing has impacted the regional grasses, early successional grasses such as Texas grama (*Bouteloua rigidis etoy*), Sideoats grama (*B. curtipendula*), and threeawn (*Aristida purpea*) have replaced the taller native grasses.

Approximately 27 percent (490 acres [198 ha]) of the Installation is developed with structures ranging from building to runways, while approximately 29 percent (525 acres [212.5 ha]) is landscaped. The landscaped areas include lawns, athletic facilities, and landscape plantings. Bermuda grass (*Cynodon dactylon*) and buffalo grass (*Buchloe dactyloides*) are the most common species in the lawns and athletic areas. Tree species in the landscaped areas include native varieties of cottonwoods (*Populus deltoides*), oaks (*Quercus* spp.), elms (*Ulmus* spp.), and pecan (*Carya illinoensis*), as well as, non-native catalpa (*Catalpa bignonioides*) and chinaberry (*Melia azedarach*).

Most of the trees on the Installation are found near streams and along the shoreline of Lake Worth. Post oak (*Quercus stellata*), blackjack oak (*Q. marilandica*), cedar elm (*Ulmus crassifolia*), American elm (*U. americana*), hackberry (*Celtis laevigata*), and sumac (*Rhus* spp.) are the most common species of trees. Near the edge of streams, there is a thick understory of trumpet vine (*Campsis radicans*) and honeysuckle (*Lonicera* spp.). There are some sparsely vegetated areas of rush species (*Juncus* spp.) near the shoreline of Lake Worth.

As previously described, the seep wetland on the Installation consists of cattails, seedbox, marsh flatsedge, curly dock, rushes, and black willows (*Salix nigra*).

At the present time, there are no listed rare or biologically important vegetation species present.

TABLE 2-1 VEGETATION THAT OCCURS OR POTENTIALLY OCCURS AT NAS JRB FORT WORTH

Scientific Name	Common Name
Grass	
Andropogon gerardi	Big Bluestem
Aristida spp.	Three-awn Grass
Bouteloua spp.	Grama Grass
Buchloe dactyloides	Buffalo Grass
Chloris verticillata	Windmill Fingergrass
Cynodon dactylon	Bermuda Grass
Eragrostis spp.	Lovegrass
Hordeum pusillum	Little Barley
Limnodea ardansana	Ozark Grass
Panicum spp.	Panic Grass
Paspalum dilatatum	Dallis Grass
Schedonnardus panicultus	Tumble Grass
Schizachyrium scoparium	Little Bluestem
Sorghastrum avenaceum	Indian Grass
Sorghum halepense	Johnson Grass
Sporobolus asper	Tall Dropseed
Stipa leucotricha	Texas Speargrass
Herbs and Shrubs	
Ambrosia spp.	Ragweed
Asclepias spp.	Milkweed
Campis radicans	Trumpet Creeper
Circuta spp.	Water Hemlock
Cirsium spp.	Thistle
Cirsium horridulum	Bull Thistle
Cooperia drummondi	Rain Lily, Cebollita
Cyperus pseudovegetus	Marsh Flatsedge
Dalicus carota	Queen Ann's Lace
Desmodium spp.	Beggar's Ticks
Echinochloa crusgalli	Barnyard Grass
Frelichia spp.	Snake Cotton
Gaillardia pulchella	Indian Blanket
Gaura spp.	Evening Primrose Family
Helenium spp.	Sneezeweed
Helianthus annuus	Sunflower
Heterotheca subaxillaris	Camphor Weed
Ipomoea purpurea	Common Morning Glory
Ipomoea tricholarpa	Wild Morning Glory
Iva annua	Annual Sumpweed
Juncus spp.	Rush
Lonicera spp.	Honeysuckle
Ludwigia spp.	Seedbox
Phlox spp.	Phlox
Pyrrhopappus hulticaulis	Texas Dandelion

TABLE 2-1 VEGETATION THAT OCCURS OR POTENTIALLY OCCURS AT NAS JRB FORT WORTH *(Continued)*

Herbs and Shrubs (continued)	
Ratibida columnaris	Mexican Hat
Rorippa spp.	Yellow Cress
Rumex crispus	Curly Dock
Thelesperma filifolium	Greenthread
Typha spp.	Cattail
Typha angustifolia	Narrow Leaf Cattail
Typha latifolia	Broad Leaf Cattail
Verbena bipinnatifida	Prairie Verbena
Xanthocephalum spp.	Broomweed
Trees	
Albizia julibrissin	Mimosa
Carya illinoensis	Pecan
Catalpa bignoniodes	Catalpa
Celtis laevigata	Hackberry
Cercis canadensis	Eastern Redbud
Chilopsis linearis	Desert Willow
Cornus drummondii	Roughleaf Dogwood
Cupressus sempervirens	Italian Cypress
Elaeagnus angustifolia	Russian Olive
Fagus grandifolia	Beech
Fraxinus americana	White Ash
Fraxinus pennsylvanica	Green Ash
Fraxinus velutina	Arizona Ash
Gleditsia triacanthos	Honeylocust
Ilex vomitoria	Yaupon Holly
Lagerstroemia indica	Crape Myrtle
Maclura pomifera	Bois D' Arc
Melia azedarach	Chinaberry
Morus spp.	Mulberry
Pistacia chinensis	Chinese Pistache
Platanus spp.	Sycamores
Populus spp.	Poplars
Prosopis spp.	Mesquite
Pyrus caaleryana	Callery Pear
Rhus spp.	Sumac
Sambucus canadensis	Elderberry
Sapindus drummondi	Western Soapberry
Ulmus americana	American Elm
Ulmus crassifolia	Cedar Elm
Quercus macrocarpa	Bur Oak
Quercus marilandica	Blackjack Oak
Quercus fusiformis	Plateau Live Oak
Quercus shumardii	Shumard Red Oak
Quercus stellata	Post Oak
Salix spp	Black Willow

Source: Dept. of the Navy, 2004; Morgan, D. L., Ph.D.; U.S. Army Corps of Engineers, 1996.

2.5 FAUNA

NAS JRB Fort Worth is located across the lake from the Allen Wildlife Sanctuary and is south of the Fort Worth Nature Center. Geographically, NAS JRB Fort Worth is located within the North American Central Migratory Bird Flyway. Consequently, there are numerous birds, reptiles and small mammals in the vicinity of the Installation. Birds, coyotes (*Canis latrans*), and black-tailed hares (*Lepus californicus*) are typically found in the upland grassy areas and along the runways of NAS JRB Fort Worth, while cottontail rabbits (*Sylvilagus floridanus*), fox squirrels (*Sciurus niger*), and opossums (*Didelphis virginiana*) inhabit the wooded lowlands adjacent to the Installation.

Amphibians and Reptiles

Reptiles and amphibians are collectively called herptiles, and *Table 2-2* contains a list of species that have been reported to occur on or near NAS JRB Fort Worth (Department of the Navy, 1994).

While the canebrake rattlesnake (*Crotalus horridus atricaudatus*) is a state listed threatened species, no individuals of this species are known to occur at NAS JRB Fort Worth. However, the critical habitat for this species could exist along the banks of the West Fork of the Trinity River.

TABLE 2-2 AMPHIBIANS AND TERRESTRIAL REPTILES THAT OCCUR OR POTENTIALLY OCCUR ON NAS JRB FORT WORTH

Scientific Name	Common Name
Amphibians	
Rana catesbeiana	Bullfrog
Siren intermedia	Lesser Siren
Ambystoma texanum	Small Mouth Salamander
Ambystoma tigrinum mavortium	Barred Tiger Salamander
Scaphiopus couchi	Couch's Spadefoot
Scaphropus hurteri	Hunter's Spadefoot
Acris crepitans blanchardi	Blanchard's Cricket Frog
Hyla chrysoscelis/versicolor	Cope's Gray Tree Frog
Pseudacris clarki	Spotted Chorus Frog
Pseudacris streckeri	Strecker's Chorus Frog
Bufo debilis debilis	Eastern Green Toad
Bufo punctatus	Red-Spotted Toad
Bufo speciosus	Texas Toad
Bufo valliceps valliceps	Gulf Coast Toad
Bufo woodhousii woodhousii	Woodhouse's Toad
Rana berlindieri	Rio Grande Leopard Frog
Rana sphenocephala	Southern Leopard Frog
Gastrophryne olivacea	Great Plains Narrowmouth Toad

TABLE 2-2 AMPHIBIANS AND TERRESTRIAL REPTILES THAT OCCUR OR POTENTIALLY OCCUR ON NAS JRB FORT WORTH (*Continued*)

Reptiles	
Agkistrodon contortrix laticinctus	Broad-banded Copperhead
Agkistrodon piscivorus leucostoma	Western Cottonmouth
Crotalus atrox	Western Diamondback Rattlesnake
Crotalus horridus atricaudatus	Cranebrake Rattlesnake
Lampropeltis triangulum gentilis	Western Milk Snake
Thamnophis proximus proximus	Western Ribbon Snake
Trionyx spp.	Softshell Turtle
Coluber constrictor flaviventris	Eastern Yellow-Gilled Racer
Diadophis punctatus arnyi	Prairie Ring-Necked Snake
Elephe guttata emoryi	Great Plains Ratsnake
Elephe obsoleta lindheimeri	Texas Rat Snake
Heterodon platirhinos	Eastern Hog-Nosed Snake
Hypsiglena torguata jani	Texas Night Snake
Lampropeltis calligaster calligaster	Prairie King Snake
Lampropeltis getula holbrooki	Speckled King Snake
Lampropeltis triangulum amaura	Louisiana Milk Snake
Masticophis flagellum testaceus	Western Coachwhip
Nerodia erythrogaster transversa	Blotched Water Snake
Nerodia fasciata confluens	Broad-Banded Water Snake
Nerodia rhombifer rhombifer	Diamondback Water Snake
Opheodrys aestivus	Rough Green Snake
Pituophis catenifer sayi	Bull Snake
Rhinocheilus lecontei tessellatus	Texas Long-Nosed Snake
Sonora semiannulata semiannulata	Gound Snake
Storeria dekayi tenana	Texas Brown Snake
Tantilla gracilis	Flatheaded Snake
Thanmophis sirtalis annectens	Texas Garter Snake
Tropidoclonion lineatum texanum	Texas Lined Snake
Virginia striatula	Rough Earth Snake
Micrurus fulvius tenere	Texas Coral Snake
Sistrurus catenatus tergeminus	Western Massasauga
Chelydra serpentina serpentina	Common Snapping Turtle
Kinasternon flavescens flavescens	Yellow Mud Turtle
Kinosternon subrubrum hippocrepis	Mississippi Mud Turtle
Sternotherus curinatus	Razorback Musk Turtle
Sternotherus odoratus	Stinkpot
Pseudemys concinna metteri	Metter's Rivercooter
Pseudemys texana	Texas River Cooter
Terrapene carolina triunguis	Tree-Toed Box Turtle
Trachemys scripta elegans	Red-Eared Slider Turtle
Trionyx spiniferus pallidus	Pallid Spiny Soft-Shelled Turtle

TABLE 2-2 AMPHIBIANS AND TERRESTRIAL REPTILES THAT OCCUR OR POTENTIALLY OCCUR ON NAS JRB FORT WORTH (*Continued*)

Reptiles	
Hemidactylus turcicus turcicus	Mediterranean Gecko
Anolis carolinensis	Green Anole
Cophosaurus texanus texanus	Texas Earless Lizard
Crotaphytus collaris collaris	Eastern Collared Lizard
Holbrookia maculata perspicua	Eastern Earless Lizard
Phrynosoma cornutum	Texas Horned Lizard
Sceloporus olivaceus	Texas Spiny Lizard
Sceloporus undulatus consobrinus	Southern Prairie Lizard
Eumeces fascratus	Five-Lined Skink
Eumeces laticeps	Broad-Headed Skink
Eumeces septentrionalis obtusirostris	Southern Prairie Skink
Scinella lateralis	Ground Skink
Cnemidophorus gularis gularis	Texas Spotted Whiptail
Cnemidophorus sexlineatus sexlineatus	Six-Lined Race Runner
Ophisaurus attenuatus	Western Slender Glass Lizard

Source: Department of the Navy, 2004 and *Amphibians and Reptiles of Texas, 2000.*

Birds

Although there are periodic disturbances due to aircraft operations, Lake Worth attracts numerous birds. Birds such as the wood duck (*Aix sponsa*), mallard (*Anas platphynchos*), pintail (*A. acuta*), golden eye (*Buchepala clangula*), and common merganser (*Mergus merganser*) rest upon Lake Worth awaiting favorable weather conditions during migration. The mourning dove (*Zenaidura macroura*), western meadowlark (*Sturnella neglecta*), common grackle (*Quiscalus quiscula*), and European starling (*Sturnus vulgaris*) are known to occur on the Installation in the vicinity of Lake Worth.

Other birds found on or near NAS JRB Fort Worth include raptors, such as the red-tailed hawk (*Buteo jamaicensis*) and wading birds, such as the great blue heron (*Ardea herodias*). The raptors nest outside the southeast corner of the Installation in large clusters of trees. The great blue heron nests near the Fort Worth Nature Center, about 4 miles (6.44 km) north of the Installation.

Although these birds occur at NAS JRB Fort Worth, a BASH Plan is in effect to help control birds so that they do not interfere with flight operations. This plan calls for the modification of areas surrounding the airfield, making the areas unattractive to birds, and thus resulting in less bird-aircraft collision potential. This practice includes maintaining the grass height and species composition, reducing the potential for standing water, and eliminating roosting sites (Department of the Navy, 1994). The BASH Plan for NAS JRB Fort Worth is contained in *Appendix B*. The BASH documentation contains procedures, maps and logs for conducting the BASH program. Directly behind the BASH documentation in *Appendix B* are several pages of bird counts and species documentation typical of the activity around NAS JRB Fort Worth.

Table 2-3 lists those birds that have been observed on or near NAS JRB Fort Worth and have been listed in the daily logs for the BASH program.

TABLE 2-3 BIRDS RECORDED FROM BASH RECORDS ON NAS JRB FORT WORTH

Scientific Name	Common Name	Habitat
Agelaius phoeniceus	Red-Winged Blackbird	P
Aix sponsa	Wood Duck	W
Anus acuta	Pintail Duck	W
Anas platyphynchos	Mallard	W
Ardea herodias	Great-blue Heron	S
Buchepala clangula	American Golden-eye	W
Buteo jamaicensis	Red-Tailed Hawk	O
Charadrius vociferus	Killdeer	S
Columba livia	Rock dove or Domestic Pigeon	O
Larus Philadelphia	Bonaparte's Gull	W
Mergus merganser	Common Merganser	W
Molothrus ater	Brown-Headed cowbird	O
Passer domesticus	House Sparrow	B
Quiscalus quiscula	Common Grackle	G
Cardinalis cardinalis	Northern Cardinal	P
Starnus vulgaris	European Starling	G
Sturnella neglecta	Western Meadowlark	G
Zenaidura macroura	Mourning Dove	B

Habitats: B = Oak Brush G = Grassland O = Overhead
P = Pond S = Shoreline W = Waterbirds

Source: Departments of the Air Force and Navy, 2004.

In addition to birds observed regularly within the Installation, there are also less widespread species that could potentially utilize the habitats found within and near the Installation. Twenty-three bird species listed in the "Birds of Conservation Concern," produced by the USFWS, require habitat that is common within the area of the Installation. Several projects listed in this INRMP are dedicated to improving the shoreline of the lake and creating more and improved grassland and wooded habitat. These improvements could have a positive impact on the species listed below since improved habitat provides for the growth of species

According to the USFWS, "the overall goal of the 'Birds of Conservation Concern 2002' is to accurately identify the migratory and non-migratory bird species (beyond those already designated as Federally threatened or endangered) that represent our highest conservation priorities and draw attention to species in need of conservation action." By including these species in the NAS JRB INRMP, the Installation can insure that these species and their habitats are considered during the development of any natural resource projects on Installation property. *Table 2-4* presents these birds and the habitat they utilize.

TABLE 2-4 BIRDS LISTED IN THE "BIRDS OF CONSERVATION CONCERN 2002"

Scientific Name	Common Name	Habitat
Egretta caerulea	Little Blue Heron	Inland marshes and ponds
Circus cyaneus	Northern Harrier	Marshes, prairies and savannas
Falco peregrinus	Peregrine Falcon	Generalist
Pluvialis dominica	American Golden-Plover	Prairies and savannas
Numenius americanus	Long-billed Curlew	Open water, prairies, and savannas
Limosa haemastica	Hudsonian Godwit	Inland marshes
Tryngites subruficollis	Buff-breasted Sandpiper	Prairies, margins of lakes
Lanius excubitor	Loggerhead Shrike	Open savanna and shrubland
Vireo bellii	Bell's Vireo	Dense thicket
Anthus spragueii	Sprague's Pipit	Short grass prairie
Protonotaria citrea	Prothonotary Warbler	Riparian woodland
Helmitheros vermivorus	Worm-eating Warbler	Woodlands
Limnothlypis swainsonii	Swainson's Warbler	Riparian woodland
Oporornis formosus	Kentucky Warbler	Riparian woodland
Spizella pusilla	Field Sparrow	Old fields, scrubland and forest edge
Ammodramus henslowii	Henslow's Sparrow	Grasslands with scattered shrub
Ammodramus caudacutus	Le Conte's Sparrow	Thick, damp grassy areas and wetlands
Zonotrichia querula	Harris' Sparrow	Scrub, undergrowth in open woodlands and savanna, thickets, brushy fields and hedgerows
Calcarius pictus	Smith's Longspur	Short grassland
Calcarius ornatus	Chestnut –collared Longspur	Shortgrass prairie, plowed field, and overgrazed pasture
Passerina ciris	Painted Bunting	Riparian and thorn forest, oak woodlands, savanna, brushy pastures, and hedgerows

Source: U.S. Fish & Wildlife Service, Arlington, Texas 2004.

Mammals

NAS JRB Fort Worth has limited habitat for supporting medium to large mammals. Smaller species of mammals, as previously mentioned, are relatively numerous on the Installation. The proximity of the West Fork of the Trinity River corridor allows some species to traverse the Installation for hunting or migration purposes. No endangered or threatened species of mammals are known to inhabit the Installation. No hunting or trapping is allowed on NAS JRB Fort Worth (Department of the Navy, 1994). *Table 2-5* lists those mammals common to the NAS JRB Fort Worth immediate area.

TABLE 2-5 MAMMALS THAT OCCUR OR POTENTIALLY OCCUR ON NAS JRB FORT WORTH

Scientific Name	Common Name
Canis latrans	Coyote
Dasypus novemcinctus	Nine-banded Armadillo
Didelphis virginiana	Opossum
Lepus californicus	Black-tailed Hare or Jackrabbit
Procyon lotor	Raccoon
Mephitis mephitis	Striped Skunk
Sylvilagus floridanus	Eastern Cottontail
Vulpes fulva	Red Fox
Sciurus niger	Fox squirrel
Spermaphilus tridecemlineatus	Thirteen-lined Ground Squirrel
Urocyon cinereoargenteus	Gray Fox
Cryototis parva	Least Shrew
Myocaster coypus	Nutria
Lynx rufus	Bobcat
Lepus californicus	California Jackrabbit
Tadarida brasiliensis	Mexican Freetailed Bat
Sigmodon hispudus	Hispid Cotton rat
Baiomys taylori	Northern Pigmy Mouse
Perognathus merriami	Merriam's Pocket Mouse

Source: Department of the Navy, 2004.

Marine Mammals

Special consideration shall be addressed to marine mammals in all INRMPs produced under Department of the Navy guidance. The taking, harassment, or importation of certain species and population stocks of marine mammals shall be prevented in accordance with the Marine Mammal Protection Act (Public Law 92-522). Efforts are to be made to protect the rookeries, mating grounds, and areas of similar significance for each species of marine mammals from the adverse effects of man's action. There are no marine mammals associated with NAS JRB Fort Worth.

Fish

Farmers Branch Creek is a moderately vegetated stream that during periods of drought will become intermittent. It has shallow pools to sustain limited aquatic life during moderately dry periods. The creek is vegetated and provides habitat for small native species of fish during most of the year. The majority of the fish species associated with NAS JRB Fort Worth inhabit Lake Worth. Lake Worth is included in the National Clean Lake Program. The West Fork of the Trinity River maintains an adequate flow to provide aquatic habitat for native species of fish and other aquatic life.

Although this portion of the river is relatively unpolluted, it does become less acceptable for aquatic uses downstream of Lake Worth Dam and the Installation boundary. The fish commonly found in Farmers Branch Creek, Lake Worth, and the West Fork of the Trinity River are listed in *Table 2-6*.

TABLE 2-6 FISH THAT OCCUR OR POTENTIALLY OCCUR AT NAS JRB FORT WORTH

Scientific Name	Common Name
Cyprinus carpio	Carp
Ictaluras punctatus	Channel Catfish
Lepomis macrochirus	Bluegill Sunfish
Micropterus spp.	Black Bass
Lepomis punctatus	Spotted Sunfish
Pomoxis annularis	White Crappie
Roccus chrysops	White Bass
Lepomis microlophus	Redear Sunfish
Lepomis gulosus	Warmouth
Lepomis auritus	Red Breast Sunfish
Pylodictus olivarus	Flathead Catfish
Ictalurus punctatus	Channel Catfish
Ictalurus furcatus	Blue Catfish
Ictiobus bubalus	Smallmouth Buffalo
Pimephales promelas	Fathead Minnow
Notropois venustus	Blacktail Shiner
Notemigonus crysoleucas	Golden Shiner
Cyprinella lutrensis	Red Shiner
Dorosoma petenense	Threadfin Shad
Dorosoma cepedianum	Gizzard Shad
Lepisosteus osseus	Longnose Gar
Morone saxatilisX Morone chrysops	Hybrid Striped Bass

Source: Dept. of the Navy, 2004; McClane's Fieldguide to Freshwater Fishes of North America, 2004.

Anadromous Fishes

Anadromous fishery resources shall be conserved, developed and enhanced in accordance with the Anadromous Fish Conservation Act (16 USC 755-7601). Anadromous fish are those that migrate from salt to fresh water for spawning. Since there are no anadromous fish in Lake Worth or the West Fork of the Trinity River this Act does not apply to NAS JRB Fort Worth.

2.6 RARE, THREATENED AND ENDANAGERED SPECIES

The U. S. Fish and Wildlife Service (USFWS) and the Texas Parks and Wildlife Department (TPWD) have identified eight birds, two mammals, three reptiles and two vascular plants as rare, threatened or endangered in Tarrant County (USFWS, 2003; TPWD, 2003). These species are listed in *Table 2-7*. There are no rare, threatened or endangered species found on the Installation.

Birds

According to the NAS JRB Natural Resource Study completed in November 2003, the following birds are known to occur in the vicinity of the Installation: bald eagle (*Haliaeetus leucocephalus*), interior least tern (*Sterna antillarum athalassos*), Arctic peregrine falcon (*Falco peregrinus*

tundrius), and whooping crane (*Grus americana*). All have been reported to use Lake Worth in their migration patterns. Due to the lack of suitable habitat, these species have extremely low to moderate potential occurrence in the vicinity of the Installation.

Reptiles

There is no suitable habitat or food source for the Texas horned lizard (*Phrynosoma cornutum*) on the Installation. The wide-spread use of pesticides in the 1970's and 80's to eradicate fire ants also eradicated the common harvester ant, the principal prey of the Texas horned lizard. There may be suitable habitats beyond the boundary of NAS JRB Fort Worth, but because certain levels of ground maintenance are required on the Installation, the required habitats remain nonexistent. The canebrake rattlesnake (*Crotalus horridus atricaudatus*) has some potential for existing on the Installation (TPWD, 1999). The canebrake rattlesnake has historically been observed in the vicinity of the Installation (FEIS, 1994). However, since this species prefers swamps, floodplains, upland pine and deciduous woodlands, riparian zones, and dense ground cover, it will most likely not inhabit the Installation since these habitats are not available.

Mammals

The black-tailed prairie dog (*Cynomys ludovicianus*) is a candidate for listing on the Federal Threatened and Endangered Species list for Tarrant County. However, because of the limited amount of open-space areas, the potential for a prairie dog town on the Installation is very low.

TABLE 2-7 FEDERAL AND STATE LISTED THREATENED AND ENDANGERED SPECIES THAT COULD POTENTIALLY OCCUR ON OR IN THE VICINITY OF NAS JRB FORT WORTH

Species			Status[2]	
Scientific Name	**Common Name**	**Resident Status[1]**	**USFWS[3]**	**TPWD[3]**
Reptiles and Amphibians				
Crotalus horridus	Timber/Canebrake Rattlesnake	UR		T
Phrynosoma cornutum	Texas Horned Lizard	UR		T
Thamnophis sirtalis annectens	Texas Garter Snake	PR		
Birds				
Falco peregrinus tundrius	Arctic Peregrine Falcon	PM		T
Ammodramus henslowii	Henslow's Sparrow	UR/UM		
Haliaeetus leucocephalus	Bald Eagle	PM	AD,T	T
Sterna antillarum	Interior Least Tern	UR	E	E
Lanius ludovicianus migrans	Migrant Loggerhead Shrike	UR		
Charadrius montanus	Mountain Plover	PM		
Athene cunicularia hypugaea	Western Burrowing Owl	UR		
Grus americana	Whooping Crane	PM	E	E
Mammals				
Cynomys ludovicianus	Black-tailed Prairie Dog	UR	C	
Spilogale putorius interrupta	Plains Spotted Skunk	PR/PM		
Plants				
Tomanthera auriculata	Auriculate false foxglove	UR		
Yucca necopina	Glen Rose Yucca	UR		
RESIDENT STATUS[1]		**STATUS[2]**		
CR = Confirmed Resident	**CM = Confirmed Migrant**	**E = Endangered**	**Blank = Rare**	
LR = Likely Resident	**LM = Likely Migrant/Visitor**	**T = Threatened**		
PR = Possible Resident	**PM = Possible Migrant**	**C = Candidate**		
UR = Unlikely Resident	**UM = Unlikely Migrant/Visitor**	**AD = Proposed Delisting**		
AGENCY[3]				
USFWS = U.S. Fish & Wildlife Service				
TPWD = Texas Parks and Wildlife Department				

Source: TPWD, 2004; USFWS, 2004.

2.7 CURRENT LAND USE

NAS JRB Fort Worth consists of approximately 1717 acres (695 ha) of land. Current land and water zoning at NAS JRB Fort Worth is for military, industrial, municipal, training, recreational, and residential uses.

Land uses on NAS JRB Fort Worth are grouped into four general categories based on operational needs and the level of maintenance required (Department of Navy, 1995). These categories include:

- **Improved Grounds (I)** Those areas in which development and maintenance primarily are conducted to obtain a pleasing appearance. Improved grounds include all manicured lawns, recreational fields, landscape planting, parade grounds, and areas kept mowed for reasons of security.

- **Semi-improved Grounds (SI)** Those areas on which development and maintenance are to provide erosion resistant vegetative cover, control weeds, brush, and other woody vegetation on the Installation, and to reduce fire. Airfield areas immediately adjacent to runways, taxiways, apron shoulders, clear zones, safety zones, and restricted areas are included in this category.

- **Unimproved Grounds (UI)** Those areas that are unpaved and not included in the aforementioned two categories. Areas beyond the safety and clear zones and similar areas requiring limited maintenance are included in this category. The perimeter fence line and the land immediately adjacent to it are also included in this category.

- **Other (O)** This includes areas occupied by buildings, parking areas, roads, and other hard surfaces that prevent growth of vegetation.

Four hundred twenty acres (170 ha) of land on the Installation are classified as Improved; 720 acres (291 ha) are categorized as Semi-improved; 50 acres (20 ha) of land are categorized as Unimproved; and, 796 acres (322 ha) are categorized as Other (Department of the Navy, 1995). About 400 acres (162 ha) of the Installation remain as native grassland (NRCS, 1999). *Table 2-8* presents the land use divided into different categories by acreage.

TABLE 2-8 LAND USES AND ACREAGE ON NAS JRB FORT WORTH

LOCATION	I (ac)	SI (ac)	UI (ac)	O (ac)	TOTAL ACRES
Navy Housing Common	252	0	0	0	252
MWR	20	0	0	0	20
Air Force	18	0	0	110	128
Offices	43	0	0	19	62
Airfield taxiways, buildings, etc.	0	538	0	485	1023
Perimeter Fence Line/ Wildflower Area	0	0	50	0	50
Leased acres	0	0	0	182	182
Total	**333**	**538**	**50**	**796**	**1717**

Notes
I = Improved Grounds UI = Unimproved Grounds
SI = Semi-Improved Grounds O = Other Areas

Source: Department of the Navy, 2004.

Figure 2-4 shows the current land cover types on NAS JRB Fort Worth.

2.8 CURRENT NATURAL RESOURCE MANAGEMENT PLANS

The current natural resource management plans for NAS JRB Fort Worth address fish and wildlife management, outdoor recreation, and land management. These plans are under the authority of the SAIA, DoDDIR 4700.1, SECNAVINST 6240.6E, and OPNAVINST 5090.1, Change 2. These references provide the Navy with the authority and responsibility to manage natural resources occurring upon their installations.

Natural Resources Law Enforcement

Enforcement of laws protecting or conserving natural resources is an integral part of an installation's natural resources program and shall be implemented in accordance with the natural resources management plan. On those installations with potential poaching problems, extended harvest seasons, high degree of public access, etc., the expansion of the fish and wildlife program coordinator's staff with one or more game wardens is recommended. NAS JRB Fort Worth does not have potential poaching problems, a high degree of public access or extended harvest seasons for any type of wildlife. The Installation’s Environmental Division administers all current natural resource management plans. A game warden is not currently required on the Installation since hunting or fishing programs are not included in the fish and wildlife management plan. The local state game wardens visit the facility periodically and meet with the Natural Resources Manager for consultation on conditions and activities.

Forest Management Plan

Naval Stations with the potential for commercial forest production should adhere to the forest management plan. Since NAS JRB Fort Worth does not have the potential for commercial timber production, there is no requirement for a forestry management plan. The requirement for a forest management plan was waived by letter from the Commander, Southern Division Naval Facilities Engineering Command dated January 30, 1998, finding no requirement for forest management, agricultural outleasing, or outdoor recreational management sections in the INRMP.

Coastal Zone Management Plan

The Coastal Zone Management Program (CZMP) is authorized by the Coastal Zone Management Act of 1972 and administered at the federal level by the Coastal Programs Division within the National Oceanic and Atmospheric Administration’s Office of Ocean and Coastal Resource Management. The CZMP will be a consideration in all INRMPs. NAS JRB Fort Worth is not within the area of consideration for the CZMP and therefore will not be required to develop CZMP plans within this INRMP.

Fish and Wildlife Management Plan

Bird-aircraft strike hazards, recreation, fish and wildlife habitats, and endangered and migratory species habitat management are the major concerns for the fish and wildlife management plan for NAS JRB Fort Worth. Limited opportunities for enhancement of habitat exist. No federally listed threatened or endangered plant or animal species are known to occur on NAS JRB Fort Worth. Suitable habitats for some species are available, but limited on the Installation.

Outdoor Recreation Plan

Currently, there is an active recreation program coordinated through the Morale, Welfare and Recreation Office (MWR) that provides recreation via picnic areas, softball fields and jogging trails to military personnel and family members. The size of NAS JRB Fort Worth and the lands required to meet its mission, however, limit the opportunities for outdoor recreation. Currently, there is no nature trail on the Installation. Joggers use the Perimeter Road and streets on the Installation for walking and jogging. Additional opportunities for land-based outdoor recreation, such as an extended nature trail, fishing, and wildlife viewing areas are available for development in a way that does not interfere with the mission of NAS JRB Fort Worth. These recreational opportunities would also provide abundant opportunities for outdoor education and the fostering of stewardship of natural resources. Additional information concerning outdoor recreation can be found in the recently completed NAS JRB Fort Worth Natural Resources Study (2003).

Land Management Plan

The current land management plans are designed for the balanced management and beneficial use of the natural resources of NAS JRB Fort Worth within the capability of those resources, and the potential and actual land use requirements of the Installation. The land management plans provide:

- Methods for achieving and maintaining an acceptable level of appearance at minimal expense while protecting investments in grounds improvements.

- Corrective actions for soil erosion, drainage, and sediment loading problems related to the vegetative cover.

- An inventory of present and future land areas requiring maintenance, and defining present and future land uses that are best for the Installation.

- Treatment programs to maintain aesthetically pleasing and healthy vegetative growth.

The current land management plan at NAS JRB Fort Worth consists of the following sub-plans: ground maintenance plan of operations; a reduction of ground maintenance expenditures; a ground maintenance management and plant problem diagnosis; and, basic maintenance criteria. These sub-plans are integrated to accomplish the land management plan.

Ground Maintenance Plan of Operations

The ground maintenance plan of operations (*Appendix A*) includes criteria for planning and annual inspection. This plan requires the annual production of maps that show maintained areas (I and SI); locations of problems that need to be corrected; areas that require attention; mowing frequencies and acreage; annual fertilization program; areas to eliminate from maintenance; and locations of potential soil erosion. *Figure 2-4* presents the current land cover types map. This figure displays areas that are currently maintained on the Installation. *Figure 2-5* shows the current schedule for mowing operations. The annual inspection is performed by the Environmental Department of the PWO.

Basic Maintenance Criteria

Basic maintenance criteria are requirements established by NAS JRB Fort Worth that are involved in the land management effort. These are presented in *Appendix A.*

2.9 STAKEHOLDERS OF NATURAL RESOURCES ON NAS JRB FORT WORTH

Stakeholders of natural resources on NAS JRB Fort Worth include federal and state natural resource agencies, local governments and landowners, civic and conservation groups, as well as the Department of Defense and the Department of the Navy. For this INRMP, a stakeholder is an individual, group, or agency that has the responsibility or mandate to preserve and manage natural resources on NAS JRB Fort Worth, that have a right or privilege to make use of the natural resources, or that may be affected directly or indirectly by natural resources management actions conducted on NAS JRB Fort Worth.

Five main groups of stakeholders exist for NAS JRB Fort Worth, defined by the primary function of the stakeholder with respect to the natural resources. One group is comprised of stakeholders who make use of the natural resources in the accomplishment of the military mission. These stakeholders are most interested that they accomplish the flying and support mission while complying with the BASH Program and that the military mission is supported by the natural resources. This group is composed of every military organization on the Installation.

A second group is comprised of stakeholders who make use of the natural resources available for economic or recreational purposes. Military members of this group include the Department of the Navy's MWR, as well as active and retired military personnel and their dependents.

A third group is comprised of stakeholders whose primary function is natural resources protection and preservation. Stakeholders of natural resources on NAS JRB Fort Worth within this category include the U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, U.S.D.A. Natural Resources Conservation Service, Texas Natural Resource Conservation Commission, U.S. Environmental Protection Agency, and U.S. Army Corps of Engineers.

A fourth group consists of those who are charged with management and protection of the natural resources of NAS JRB Fort Worth and who make use of those natural resources. These stakeholders include the Environmental Division, Navy contractors working on the Installation, and all the activities that are stationed at NAS JRB Fort Worth.

The fifth group of stakeholders consists of those municipalities surrounding the Installation. Little in the way of change or protection can be accomplished without a matching effort from the surrounding community. The cities of White Settlement and Fort Worth, as well as Westworth Village, River Oaks, Lake Worth, Sansom Park, and Westover Hills need to have an interest in preserving the natural resources surrounding the Installation. Most of these communities are shown on *Figures 1-1 and 1-2*. In addition, this group also contains organizations and groups of individuals that are interested in maintaining and rehabilitating the natural resources on the Installation. The current stakeholders for NAS JRB Fort Worth are summarized in *Table 2-9*.

TABLE 2-9 STAKEHOLDERS OF NATURAL RESOURCES ON NAS JRB FORT WORTH

Group 1 - Department of the Navy and Other Military Departments:	
Military Active Duty Personnel	Military Reservists - Participating Services
Commanding Officer	All Tenant Commands
Group 2 – Military Recreational Users and Managers	
Navy League	Facility Management Engineer Director
Housing Manager	MWR Director
Group 3 - Federal and State Agencies:	
U.S. Fish and Wildlife Service	Texas Parks and Wildlife Department
U.S.D.A. Natural Resources Conservation Service	Federal Medical Center
U.S. Environmental Protection Agency	Trinity River Authority
U.S. Army Corps of Engineers	Texas General Land Office
Texas Historical Commission	Bureau of Prisons
Texas Natural Resource Conservation Commission	
Group 4 – NAS JRB Fort Worth Management and Protection	
Environmental Division Director	Base Operated Contract (BOC) Employees
Public Works Officer	Facility Service Contract Manager
Maintenance Control Director	Natural Resources Manager
Group 5 - Other Governmental Organizations, Clubs and Individuals:	
City of Fort Worth	Carswell Garden Club
City of White Settlement	NAS JRB Marine Booster Club
City of Westworth Village	Fort Worth Solid Waste Department
City of Sansom Park	Fort Worth Water Department
City of Westover Hills	Military Retirees
City of Lake Worth	Dependents of Military Personnel
City of River Oaks	Youth Groups (The Boy/Girl Scouts of America, 4-H, etc.)
Institutions involved with the Installation (For Example "Adopt-A-School Program")	Industries Involved with the Installation (Lockheed Martin)

Source: Department of the Navy, 1999, Turner Collie & Braden Inc., 2000.

Insert 2-1 here – Trinity River Segment

Insert 2-2 – Drainage Patterns, Surface Waters and Wetlands

Insert 2-3 – Vegetative Units

Insert 2-4 – Landuse Map

Insert 2-5 – Mowing Schedule

3.0 NATURAL RESOURCES MANAGEMENT ISSUES

The Sikes Act Improvement Act (SAIA), amended in 1997, requires integration of, and consistency among, the various activities conducted under the INRMP developed for each military installation. This requirement of SAIA is met using an ecosystem management approach. The basic concept of ecosystem management is to address management issues within the context of the entire ecosystem and the interrelationships among individual components of the ecosystem while meeting the mission requirements of the installation. According to the SAIA, the INRMP is to provide for fish and wildlife management, land management, forest management, and fish and wildlife oriented recreation. Forest management, however, is not applicable to NAS JRB Fort Worth due to the absence of forestry resources, and is not discussed in this INRMP.

Addressing interrelated issues is a complex undertaking, and at times the management goals are at odds with each other or with the mission requirements. Through the process of integrating the management programs that traditionally have been separate, many of the issues can be more effectively addressed and the conflicts between management actions and military mission reduced. To help identify opportunities and potential conflicts in natural resources management, the primary natural resources issues for NAS JRB Fort Worth are identified and discussed within the context of legal and stewardship requirements. These management issues can be correlated with the objectives, projects and tasks discussed in *Section 4.0.* The management issues in this section include areas of concern where natural resource management actions would lead to improved overall management of the natural resources at NAS JRB Fort Worth.

3.1 SURFACE WATER QUALITY ISSUES

Public Law 92-500, commonly known as the Clean Water Act (CWA), legislates protection of the quality of surface and ground waters of the United States, and requires states to develop a program to identify and reduce nonpoint sources (NPS) of pollution to surface and ground water. Federal agencies, including the Department of the Navy, are required to be consistent with state NPS water pollution management programs under the CWA, Section 319. Surface waters on NAS JRB Fort Worth are limited to one jurisdictional wetland area; a section of the West Fork of the Trinity River just outside of the Installation boundary that receives storm water runoff; Farmers Branch Creek, a tributary of the West Fork that flows from the west, under the runways by way of a culvert, and into the West Fork of the Trinity River; and a portion of the shoreline of Lake Worth. The quality of these surface waters is affected by two major NPS of pollution, sediments from soil erosion and dissolved chemicals, carried in storm water runoff. Natural resources management actions of this INRMP are designed to address reductions of these nonpoint sources of water pollution in surface water runoff concurrent with other natural resource management actions. These actions are consistent with the goal of conservation and rehabilitation of land and water resources.

Erosion Control

Executive Orders 12088 and 13148 requires the heads of each Executive Agency to ensure that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to Federal facilities and activities under the control of the agency. Soil erosion is a source of water pollution (sediment loading and adsorbed pollutants), and under this Executive Order must be controlled. An unbroken cover of vegetation is the most effective way to control soil erosion and minimize impacts to the environment. Protection to vegetation on Federal lands is provided in part by Executive Order 11989, which restricts the use of off-road vehicles (which includes all vehicles used in hunting and other outdoor activities when off paved surfaces) away from paved roads or other designated hard surfaces. Several areas at NAS JRB Fort Worth are not vegetated adequately to prevent soil erosion, and are contributing to nonpoint source water pollution originating on Federal land. Most of these areas are on slopes where vegetation is missing because of disease, drought, construction or disturbance from human activity. In 2001, the Natural Resources Conservation Service (NRCS) completed a rehabilitation program which resulted in the terracing, filling and reseeding of 120 acres on the Installation. The efforts of the NRCS are concentrated around the runway and taxiway portions of the Installation. Steps to re-vegetate these areas continue to prevent soil erosion and to obtain and maintain compliance with applicable state water quality standards and Federal laws.

Storm Water Quality Improvement

The 1987 amendments to the Clean Water Act (33 USC 1251) created the National Pollutant Discharge Elimination System (NPDES) storm water program. This program regulates storm water discharges from certain industrial activities, including airport operations. NAS JRB Fort Worth has prepared a storm water pollution prevention plan (SWPPP) to comply with the multi-sector general permit issued by the U.S. Environmental Protection Agency (U.S. EPA) in September 1995. The major components of the SWPPP are storm water monitoring, development and implementation of best management practices and reporting requirements.

It should be noted that the state of Texas has been granted delegation of the NPDES program from the U.S. EPA and the state is currently phasing in the various aspects of that program. On August 20, 2001, under the provisions of Section 402 of the Clean Water Act and Chapter 26 of the Texas Water Code, TCEQ issued a statewide Texas Pollutant Discharge Elimination System general permit to dispose of wastes. This permit expires at midnight on August 20, 2006.

In addition to the NPDES storm water program, federal agencies, including the Department of the Navy, are required to be consistent with the state Nonpoint Source Management Programs under Section 319 of the Clean Water Act. In Texas, this is not a regulatory program but rather a program to provide technical assistance and funding. Guidance and funding from the Section 319 program is available to promote water pollution prevention programs and projects.

All of these issues related to water quality correlate to the management of storm water runoff and the implementation of best management practices to eliminate potential sources of storm water

pollution. These efforts are a part of the basis of the goal of conservation and rehabilitation of land and water resources.

As previously stated, the quality of storm water is affected by more than sediment loads. Water quality is affected by dissolved nutrients, pesticides, herbicides, and petroleum residues that find their way into storm waters falling onto and moving across natural and man-made surfaces. NAS JRB Fort Worth currently uses chemical fertilizers, herbicides, and pesticides that can be dissolved by surface water runoff and then carried into the wetland area, West Fork of the Trinity River, Farmers Branch Creek, or Lake Worth, thereby degrading the quality of these waters. These dissolved pollutants must be prevented from entering storm water runoff to the maximum extent practicable, and where possible must be removed from surface water runoff when they are present. Actions to improve storm water quality must bring and maintain surface water quality to State Water Quality Standards. The methods used to improve and maintain surface water quality must integrate with other natural resources management actions to provide the best balance between the military mission, natural resources protection, and cost.

Natural Resource Damage Assessment

Natural Resource Damage Assessments (NRDAs) are intended to assess natural resource damage in response to oil and hazardous substance (OHS) release within the ownership boundaries of NAS JRB Fort Worth and which may adversely effect the natural resources and/or services associated with these resources. In the event of an OHS release from NAS JRB Fort Worth, the facility response team is responsible for reporting whether such a release will affect natural resources and the extent to which natural resources have been exposed to an OHS. The current Natural Resource Damage Assessment was updated in July of 2003.

3.2 WETLANDS AND FLOODPLAINS PROTECTION AND ENHANCEMENT

Executive Orders (EO) 11990 and 11988 and OPNAVINST 5090.1B (Change 2), as well as the Clean Water Act (PL 92-500) instruct Naval facilities to manage lands with the goal of no net loss of wetlands. All Federal agencies are required by EOs 11990 and 11988 to use reasonable efforts to preserve and enhance the natural and beneficial values of wetlands under stewardship of that agency. The U. S. Army Corps of Engineers conducted a study of NAS JRB Fort Worth in 1996 and determined that on the Installation proper there was a 1.3 acre (0.53 ha) jurisdictional wetland located on the Installation *(Figure 2-2)*. Any development activities in the wetland area would be subject to regulatory authority under Section 404 of the Clean Water Act. There are currently no plans for development within the wetland area.

Impacts to the functions of jurisdictional wetlands on NAS JRB Fort Worth must be minimized or eliminated under EOs 11990 and 11988, as well as current Navy regulations. Impacts to the jurisdictional wetlands can occur from directly altering these areas (fill, drain, increases in hydrology) or indirectly from changes in the upland areas surrounding the wetlands. Loss or degradation of jurisdictional wetlands can occur because of the high degree of interaction between the wetlands and the surrounding land uses. Minimizing the loss or degradation of

wetlands on NAS JRB Fort Worth in compliance with the CWA and EOs 11990 and 11988 is possible. Executive Order 11990 instructs Federal agencies to enhance wetlands in support of wetland plants and wildlife, when practicable. According to the Department of Defense Environmental Conservation Program, military installations are required to inventory and manage significant or sensitive environmental features, including wetlands (DoD DIR 4715.3). Current plans call for protection and maintenance of this wetland in order to promote an awareness of this site as a unique natural resource. Wetlands are instruments of multiple use by resident and migrant species of animals as well as having a storm water purification role. These valuable assets have an impact on all goals of this INRMP from conservation efforts to education and stewardship.

3.3 PROTECTION FOR THREATENED AND ENDANGERED SPECIES

The Endangered Species Act (ESA) (Public Law 92-205 and 50 CFR, Part 402) is legislation providing a means to conserve endangered and threatened species and the ecosystems on which these species depend. The ESA provides for conservation programs for endangered and threatened species, and to take steps as may be appropriate for achieving the purposes of conserving species of fish and wildlife protected by international treaty. Federal agencies are required to ensure that no actions that the agency will undertake will jeopardize the continued existence of any endangered or threatened species, except as provided within the ESA. Whenever an endangered species may be present in an area affected by an action of a Federal agency, that agency is required to conduct a biological assessment within the affected area to document the presence or absence of endangered or threatened species. If such species are found, the Federal agency must make reasonable efforts to avoid actions that would have a detrimental impact on the endangered or threatened species.

Biological surveys and informal consultations with the USFWS and the Texas Parks and Wildlife Department (TPWD) have been conducted on NAS JRB Fort Worth in an effort to determine the presence or absence of endangered or threatened species or habitat for these species. During the biological surveys, no threatened or endangered species were identified. These two agencies identified four birds, two reptiles, and one mammal species in classifications from rare to endangered that potentially occur in Tarrant County although not directly associated with NAS JRB Fort Worth. It is important that accurate and up-to-date information regarding endangered and threatened species be available to assist in planning for future land use and facilities in support of the military mission while staying in compliance with the ESA and maintaining the highest level of stewardship possible. Protection of threatened and endangered species supports the goals of increasing the diversity of plants and animals while also supporting the stewardship goal. Future surveys for threatened and endangered species of plants and animals, as well as surveys to determine the changes in the flora and fauna of the Installation are necessary in order to make sound resource management decisions.

None of the federally listed threatened and endangered plant species for Texas are known to occur within 100 miles of Tarrant County. Of the listed bird species that may occur in Tarrant County, the bald eagle and arctic peregrine falcon, are migrants that are only occasionally

attracted by Lake Worth. There are a few resident bald eagles around Lake Worth, but none on Installation property. The interior least tern and whooping crane require specific habitats for breeding that are not present on the Installation property. Suitable habitat for the one listed mammal species does not exist on the Installation property. The two listed reptile species may occur in Tarrant County. These two reptiles were once common to the area surrounding NAS JRB Fort Worth, but changes in habitat and landscape maintenance on the Installation have removed most of the preferred habitat for these species.

3.4 FISH AND WILDLIFE MANAGEMENT ISSUES

The SAIA directs military installations to provide for sustainable use of natural resources, including wildlife, consistent with the military mission of the installation. These uses can be consumptive (hunting, fishing) or non-consumptive (wildlife viewing, nature education), as long as such uses do not cause conflict with the military readiness of the installation or adversely affect the natural resources under the stewardship of the Department of Defense. SAIA also requires that, to the extent appropriate and applicable, military installations shall provide for fish and wildlife management; fish and wildlife habitat enhancements or modifications; and, for wetland protection, enhancement, and restoration where necessary for support of fish, wildlife, or plants. While there is no opportunity for hunting on NAS JRB Fort Worth, opportunities exist for sustainable uses and stewardship of non-game wildlife populations as provided in SAIA. Fishery resources on NAS JRB Fort Worth are found in the waters of Lake Worth where the state of Texas has regulatory authority. Fish and wildlife management issues encompass all of the goals described in this INRMP.

Habitat Enhancement for Wildlife

Many of the mammals, birds and reptiles found on or near the Installation benefit from the diversity of field, wetland, and edge habitats found across the Installation. Proper stewardship requires that this diversity be maintained on NAS JRB Fort Worth in a manner consistent with both the SAIA and the military mission. The fringe areas along the borders of the Installation provide important habitat to migratory songbirds, migratory waterfowl, small mammals, reptiles, and amphibians, but are sensitive to disturbances. Management activities must be conducted with this sensitivity in mind. Jurisdictional wetlands can be enhanced to attract more wildlife, however, the enhancements that are carried out cannot attract such large numbers of predators or prey as to create conflict with the military mission or become a nuisance.

Ecologically Sensitive Areas

Protection of ecologically sensitive areas is provided by SAIA, under the provisions of wildlife and fish habitat enhancement in support of managing these populations. Texas is world renown for the variety of bird species that reside or migrate through the state to spend the winters in Central and South America. Grasslands, marshes, shorelines and wetlands are valuable feeding, nesting and resting areas for passerines, waterfowl, wading birds and shorebirds, and are used by both resident and migrant species throughout the year. The diversity of habitats is extremely

important to migratory birds because these habitats provide the necessary food and resting sites needed by migratory birds to replenish energy stores before continuing their migration.

The northern shore of NAS JRB Fort Worth with Lake Worth provides a convenient resting and feeding area for migratory waterfowl. While there is not an abundance of vegetation in this area suitable to the migratory waterfowl, they can rest in this area relatively undisturbed. The small seep wetland can provide wading birds with some minimal insect and small vertebrate selection for feeding before continuing their migration. These areas mentioned are sensitive to human activities and will be carefully managed to prevent degradation or loss of this extremely valuable ecosystem. Management efforts in this area support both the diversity and stewardship goals.

Nuisance, Exotic and Invasive Species

Nuisance wildlife is that wildlife which causes inconvenience, annoyance, or irritation to the general human population or damage to property. The level of inconvenience or annoyance can range from relatively minor, such as reducing the aesthetic quality of an area, to causing actual physical or economic damage to buildings, landscaped areas, and other structures. Nuisance wildlife also may act as a vector for human disease. With some exceptions, species that may become a nuisance at NAS JRB Fort Worth usually do not create a major threat to human health or cause extensive damage to buildings or landscaping. The impact these species exert is usually on the aesthetic quality of life. Several introduced, as well as native species, may be considered nuisance wildlife in an urban setting such as NAS JRB Fort Worth. These include mosquitoes, cockroaches, termites, red imported fire ants (*Solenopsis invicta*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), feral cats, and feral dogs.

DoD Dir. 4715.3 calls for the control and removal of exotic species where appropriate and defines exotic species as "species that occur in a given place, area, or region as the result of direct or indirect, deliberate or accidental introduction of the species by human activity." Exotic plants and animals are those species that are brought into an area from outside the immediate area and have adapted or are managed to insure their survival in the area. Exotics can become a nuisance or they can be viewed as a sought after landscaping plant. Examples of common local exotics are the aquarium plant *Hydrilla verticillata* that once released into the local waterways reproduces in such proportions as to exclude other species. On the other hand, the mimosa tree (*Albizia julibrissin*) was introduced from tropical Asia and Africa and is an exotic plant that is often visited by hummingbirds. This tree is used as an ornamental tree for landscaping and is well adapted to local drought conditions.

Invasive wildlife is that wildlife composed of species of non-native plants and animals that may move into an area and disturb the habitat for a similar native species or a non-similar species that depends upon the territory claimed by the invasive species. A good example of an invasive species is the red fire ant. This ant invades an area and immediately drives out other ant species while making itself a nuisance and potential health hazard for humans and animals (dogs, cats, and wildlife) that may be involved in activities in the same area. In driving out the other ant species it removes the food source for the Texas Horned Lizard. Plants and animals considered

by the U.S. Fish and Wildlife Service to be invasive species in Tarrant County are listed in *Table 3-1*.

TABLE 3-1 INVASIVE SPECIES IN TARRANT COUNTY

Common Name	Common Name	Common Name
Feral Pig	European Starling	Water Hyacinth
Nutria	Hydrilla	Fire Ant
House Sparrow	King Ranch Bluestem	Asian Clam
Rock Dove (Pigeon)	Bermuda Grass	Johnson Grass
African Honey Bees	Feral Cat	Feral Dog
Chinaberry	Chinese Tallow	Japanese Honeysuckle
Poverty Weed	Privet	Heavenly Bamboo

Source: U.S. Fish and Wildlife Service, 1999; NAS JRB Natural Resources Study, 2003.

The list of invasive species will continue to increase as more and more exotic plants and animals are introduced into the environment. Several of the species listed in *Table 3-1* already reside or traverse NAS JRB Fort Worth and represent both a nuisance, as well as an invasive species. Fire ants, house sparrows and rock doves (Pigeons) are examples of common invasive species that present both aesthetic and health problems. The African Honey Bee was recently reported as having established its first colonies in Tarrant County. A small number of Chinese Tallow trees are located west of the flight zone. It is possible that these few species could multiply quickly and become a problem in the flight zone.

Zoonoses

The Texas Health Department's Zoonosis Control division (http://www.tdh.state.tx.us/zoonosis/) monitors zoonoses throughout the state of Texas. Zoonoses are diseases communicable from animals to humans under natural conditions. Those diseases considered in this category for the state of Texas are shown in *Table 3-2*. Dr. James A. Zoretic, MD and Ms. Jan Buck (telephone conversation of July 25, 2000) of the Zoonosis Control Division Office in Arlington, Texas indicated that the zoonosis concerns for NAS JRB Fort Worth include St. Louis and Western Equine Encephalitis, Murine Typhus, Rocky Mountain Spotted Fever, Toxoplasmosis, Chagas Disease, Histoplasmosis, Lyme Disease, Tularemia, Rabies, Plague, Hantavirus and West Nile Virus. In addition, although not state-listed, Salmonella is a continuing concern for the Zoonosis Division. None of these diseases are of epidemic proportions and the concern for Tarrant County may be based on a very limited number of occurrences. There are a number of preventative measures which can, and should, be taken to minimize the possibility of disease transmission.

TABLE 3-2 ZOONOSIS DISEASES FOR THE STATE

Disease	Disease	Disease
Anthrax	Leptospirosis	Rabies*
Brucellosis (Canine)	Lyme Disease*	Rocky Mountain Spotted Fever
Chagas Disease*	Murine Typhus*	Toxoplasmosis*
Encephalitis*	Plague*	Tularemia*
Hantavirus*	Psittacosis	West Nile Virus*
Leishmaniasis	Q-Fever	Histoplasmosis*

Source: Texas Department of Health, 2000.
* Indicates a concern for the Tarrant County area.

Encephalitis

Mosquito-born encephalitis is an infection of the central nervous system that may be caused by one of several viruses (Eastern equine, Western equine, Venezuelan equine, St. Louis, and California group). Human infection depends on a bird-mosquito cycle. Mosquitoes spread the disease to humans and horses after feeding on infected birds. Over 75 species of birds, including sparrows, blackbirds, chickens and pigeons may carry the virus without actually developing the illness when infected. The control of mosquito-borne encephalitis can be achieved through effective mosquito control measures such as removal of standing water where mosquitoes may develop/breed (tires, cans, puddles, etc.), screening of residences, and personal protection against mosquito bites. Vaccines are available for prevention of the disease in horses.

Hanta virus

Hantavirus pulmonary syndrome (HPS) is a deadly disease transmitted by infected rodents (wild mice and rats). The disease is contracted through interaction with an infected animal's urine, droppings or nesting area. Symptoms usually appear 1 to 3 weeks after contact with the virus. They include: fever, muscle pain, being tired, headaches, dizziness, vomiting and diarrhea. HPS was first recognized in 1993 and has since been identified throughout the United States. Although rare, HPS is potentially deadly. In order to prevent HPS, keep the home, especially the kitchen, clean with food stored in rodent-proof containers and a tight-fitting lid on the garbage. Uneaten pet food should be thrown out at the end of the day. Seal all entry holes and set EPA-approved rodent traps under plywood or plastic baseboard covers.

Histoplasmosis

Histoplasmosis is a fungal infection. The disease has been found in the droppings of domestic birds, with the main carriers in this area being domestic fowls, starlings, pigeons and other birds which often nest around houses. To humans this microscopic fungus is potentially fatal if the infection is not treated. The disease is transmitted to humans by inhalation of an aerosol of soil, dust or guano (bat droppings) which contains fungal spores. The degree of infection in humans depends on the individual's immune status and degree of exposure to the fungal spores. Symptoms range from none, to a mild influenza infection, to a condition where the yeast cells have spread throughout the blood stream. This disease appears to infect males over 40 and often

results in death. Most cases recover without any specific treatment. HIV positive sufferers have little chance of overcoming this fungal infection if contracted. A good fitting dust mask gives some protection when cleaning dry bird and bat droppings.

Lyme Disease

Named for the town in Connecticut where it was first described, Lyme disease was found to be present in Texas in 1984 and is now the most frequently diagnosed tick/insect-borne disease in the country. Specialists in this area believe that the organism found in Texas is a similar organism to that causing Lyme disease but may be a Texas variety. Like the Connecticut Lyme disease, illness usually begins in the spring and is typically divided into three different stages. It is caused by a spirochete and is usually transmitted by the bite of an infected tick or flea. Symptoms include skin lesions and associated flu-like symptoms as well as fever and chills, stiff neck, joint pain, sore throat, enlarged lymph nodes, nausea, vomiting, dizziness, and non-productive cough. During later stages of the disease, the nervous system and heart are involved; and in the final stage, the patient may develop arthritis symptoms and, in some cases, the neurological symptoms range from chronic fatigue to multiple sclerosis-like illness. Treatment is more successful when initiated early. Prevention is tied to the control of ticks and fleas.

Murine Typhus

Murine, endemic, or flea-borne typhus is a rickettsial disease caused by *Rickettsia typhi*, a type of bacteria. The disease is contacted when a flea bite wound is contaminated with infected fecal material shed while a flea feeds. The Corpus Christi area has the highest incidence of murine typhus in Texas, but a few cases are reported in other parts of the state each year. Symptoms include severe headache, fever, fatigue, muscle aches and in about half of the cases, a rash. This disease is endemic in south Texas. Prevention of murine typhus is maintained through an effective flea control program. Pets should be regularly and routinely treated for fleas.

Plague

Plague is an infectious disease of animals and humans caused by the *Yersinia pestis* bacterium, found in rodents and their fleas. Two types of plague exist: bubonic and pneumonic. Bubonic plague is transmitted through the bite of an infected flea or exposure to an infected material through an open sore on the skin. Pneumonic plague is transferred from person to person and infects the lungs. Bubonic plague is most common, although only 5 to 15 cases are reported each year in the United States. Symptoms of bubonic plague include swollen, tender lymph glands called buboes. If not treated, the *Y. pestis* bacteria can travel through the bloodstream to the lungs and cause a secondary case of pneumonic plague. Symptoms include fever, weakness, and rapidly developing pneumonia with shortness of breath, chest pain, cough, and sometimes bloody or watery sputum. Nausea, vomiting, and abdominal pain may also occur. Without early treatment, pneumonic plague usually leads to respiratory failure, shock, and rapid death.

Although infection through the release of *Y. pestis* as a bioweapon is possible, it is highly unlikely. In the United States, state and national agencies are equipped with the antibiotics

needed to treat an abnormal amount of infected persons. No vaccine exists to eradicate either type of plague, but numerous antibiotics are available and with early treatment, can effectively heal the infected person.

Rabies

Rabies is a viral infection of the nervous system that may affect most any warm-blooded animal. This disease is present in many wild animal populations in Texas, especially skunks, bats, coyotes, and foxes. Humans are usually exposed to rabies by direct contact (bites) with rabid wildlife or, more commonly, by contact with dogs or cats which have acquired the infection from rabid wildlife. Although rabies is almost always fatal, vaccination is highly effective in preventing it. Control of rabies depends on public awareness of the signs and hazards of the disease, stringent enforcement of animal control regulations, and upon immunization of dogs and cats. Infected bats have recently been discovered in Tarrant County.

Rocky Mountain Spotted Fever

Rocky Mountain Spotted Fever is another serious rickettsial disease that is transmitted by several different species of ticks. Humans usually contract the illness from the bite of an infected tick or by crushing infected ticks between fingers. The initial symptoms of Rocky Mountain Spotted Fever are flu-like headaches, high fever, chills, and muscle aches. A rash often appears in a few days. This rash spreads over the entire body and may even be seen on the palms of the hands and soles of the feet. This disease can be fatal, so prompt medical care is important. Prevention includes avoiding tick bites and keeping pets free of ticks. Prompt removal of attached ticks, using tweezers, may prevent disease transmission. The illness can be cured with antibiotics.

Salmonella

Salmonella is a rod-shaped, motile bacterium that is non-spore forming. There is a widespread occurrence in animals, especially in poultry and swine. Environmental sources of the organism include water, soil, insects, factory surfaces, kitchen surfaces, animal feces, raw meat, raw poultry, and raw seafoods. Acute symptoms include nausea, vomiting, abdominal cramps, diarrhea, fever and headache. Arthritic symptoms may follow after onset of acute symptoms. An estimated 4 million cases of salmonellosis occur in the U.S. annually. Food safety and cleanliness in the kitchen are the main preventative measures for the average consumer.

Toxoplasmosis

Toxoplasmosis is a disease caused by the protozoan parasite, *Toxoplasma gondii*. This disease is widespread in humans and many other warm-blooded animals. It is estimated that 30 – 40 percent of all Americans have been infected with the parasite. Cats, including wild species, are the only animals which harbor the adult parasite in their intestinal tract. These adult parasites produce oocysts (eggs) that are passed in the cat's feces. When other animals and humans become infected with this parasite, cysts are formed in their tissues, but no adult parasites develop in their intestinal tract. The disease can spread by: transplacental movement, ingestion

of infected cysts in tissues or ingestion of food or water contaminated with infective eggs from feces. Toxoplasmosis in immunocompromised people usually results from reactivation of previous infections. There is no additional danger of transmission of the parasite from a cat. Toxoplasmosis in the immunocompromised is a more serious disease, with the most common manifestation being encephalitis.

To prevent infection, keep cats indoors to prevent them from hunting and eating wild rodents and birds. Feed cats only commercially prepared food or well-cooked meat, never raw meat or raw meat products. Wash hands thoroughly with soap and water after handling undercooked meat and before eating. Cook meat thoroughly to 151° F to destroy any parasites that might be present. Dispose of cat litter before eggs have time to become infective.

Tularemia

Tularemia or rabbit fever is an acute infectious disease caused by *Pasteurella tularensis*. The greatest incidence is among people who handle infected wild rabbits. Tularemia may also be transmitted by other infected animals, ticks, or contaminated food or water. Symptoms occur within 10 days and begin suddenly with high fever and severe constitutional symptoms. Ulcerated lesions develop at the site of infection. The regional lymph nodes enlarge and drain. The infection may be complicated by pneumonia, meningitis, or peritonitis and the mortality rate is about 6 percent. Treatment is with antibiotics. Care in the handling of wild rabbits usually eliminates the cause of the infection.

West Nile Virus

In the summer of 2002, the first case of West Nile Virus (WNV) was documented in Texas. The disease was introduced to the United States in 1999 and has spread rapidly across the country. This mosquito-borne disease is a seasonal epidemic that flares up in the summer months and dies down in the fall. Mosquitoes spread the disease to humans and other mammals after biting an infected bird. WNV is a potentially fatal disease that attacks the nervous system; however, eighty percent of people affected with the virus will not show any symptoms at all. Twenty percent will develop mild symptoms, including fever, headache, body aches, nausea, vomiting, swollen lymph glands and a rash. According to the Center for Disease Control, less than one percent of the people infected with WNV will develop serious symptoms, which could include high fever, vision loss and paralysis.

In order to lessen the likelihood of contracting WNV, people should wear long sleeves and pants when outside for extended periods of time. Remaining indoors during peak mosquito times, such as dawn or dusk, is highly recommended. Also, flower pots, children's wading pools or other containers with standing water should be emptied regularly to rid the home or office of possible mosquito breeding sites.

Fishery and Wildlife Management

Fishery resources on NAS JRB Fort Worth are found primarily along the northern boundary of the Installation with the Lake Worth shoreline. Managing the fishery resources within the lake is not within the scope of this document except to the extent that protecting water quality while protecting against invasive species maintains fish habitat. There is currently no fishing pier or marina with boat rentals that supports fishing on NAS JRB Fort Worth.

Wildlife management opportunities at NAS JRB Fort Worth are limited by the size of the Installation. Maintaining open water along the northern shoreline is important in attracting and managing waterfowl migrating over the Installation. Maintaining habitat diversity in the unimproved areas is important to management of native songbirds as well as maintaining diversity of native plant species. Stewardship management of wildlife has high public relations value, and provides educational and partnership opportunities to local civic, conservation, and youth groups. In order to monitor the effectiveness of management activities in reaching management goals, regularly scheduled censuses of the wildlife populations, as well as the locations of occurrence, will be conducted. These surveys will document relative abundance of selected species that are good indicators of a healthy, self-sustaining ecosystem, as well as document the existence of invasive species that may be damaging the ecosystem.

Bird-Animal Aircraft Strike Hazard (BASH)

As directed by SAIA, natural resource use will not conflict with the installation's military mission. A major goal of this INRMP is to provide a plan for enhancement of the natural resources on NAS JRB Fort Worth. Many options exist for this enhancement, but many of the techniques, if done without consideration of aircraft operations could increase the potential for BASH. Birds may flock to airfields or cause hazards en route; hazards may be seasonal or year round; bird activity may change as area crop production changes, as sanitary landfills are opened or expanded, or as wildlife refuges expand their programs.

Each year military aircraft experience hundreds of collisions with birds and animals, causing millions of dollars in damages, injuries, and hundreds of aborted or delayed missions. The objective of the BASH program is to reduce the potential for collisions, and encompass all actions that may identify, reduce, or eliminate bird and animal hazards to aviation. NAVFAC P-73, OPNAVINST 3750.6Q, (The Naval Aviation Safety Program), Federal Aviation Administration Regulations and NAS JRB Fort Worth Instruction 3710.1B (*Appendix B*) all direct that every effort be taken to reduce or eliminate interaction between birds and aircraft.

The potential for a bird strike in the vicinity of NAS JRB Fort Worth is very high due to proximity to area lakes, area landfills, a wildlife refuge/sanctuary, natural habitats, and the North American Central Flyway. The main groups of birds posing BASH hazards are gulls, waterfowl, vultures and raptors in descending order. The Lake Worth area hosts a large population of gulls year-round and large populations of waterfowl during winter months. An example of the Daily Bird Count documentation is contained in *Appendix B.* Daily and seasonal movements of resident and migratory bird species create various hazardous conditions to both birds and aircraft

(*http://birdsource.cornell.edu/cbc/index.html*). The high number of birds in the NAS JRB Fort Worth/Lake Worth area is a clear indication of the attractiveness and importance of this area to bird populations. This also demonstrates the potential for conflict between aircraft and wildlife.

It may initially appear that the BASH program is in direct conflict with environmental stewardship as required by the Sikes Act, as well as other environmental laws and regulations. The BASH program must decrease the airfield's attractiveness to birds that would have the potential for becoming involved in an aircraft strike. There are responsible measures that can be taken to remove the attractiveness of the airfield to birds while directing these same birds and other animals into habitat that would help keep them away from the aerodrome portion of the Installation. Actions such as: broad-leafed weed control; re-vegetation of bare areas; selective fertilizing; removal of brush and brush piles; elimination of standing water; and planting of native species of plants that are not attractive to birds are all techniques that support the mission and add to the aesthetic quality of the Installation while directing the attention of birds and animals away from the primary flight operations area. Actions to achieve BASH program objectives are addressed in *Section 4.0.* Efforts in support of the BASH program support both the diversity and stewardship goals.

Wildlife Hazard Assessment

In order to fulfill the requirements of the BASH and INRMP, a Wildlife Hazard Assessment Survey has been performed to identify potentially hazardous wildlife that has been constantly monitored aboard NAS JRB Fort Worth. A wide variety of avian and mammalian species have been observed on the Installation and their presence recorded as a potential hazard to the aircraft present at NAS JRB. Species recently observed include: gulls, waterfowl, loons, cormorants, herons, egrets, raptors, shorebirds, owls, swallows, crows, ravens, blackbirds, grackles, meadowlarks, house sparrows, doves, flycatchers, shrikes, rabbits, rodents, coyotes and deer.

There are a variety of preventative measures that can be taken to lessen the likelihood of avian and mammalian interference in the flight line. Many bird species are attracted by the food sources made available by Lake Worth and other water locales. Bioacoustics, pyrotechnics, steep shorelines and the removal of emergent water vegetation create a less attractive feeding ground for birds dependent on the water. Raptors are attracted by dead animals and trees that may occasionally occur on the Installation. Removal of these food sources and perching sites would keep the skies clear during the raptors daylight feeding hours. Some birds are attracted by the insects and others by the small rodents found in the grass along the runways. Pest control and constant monitoring of likely rodent breeding areas would control the level of insects and rodents. Also, maintaining a grass height between 7 and 14 inches would contribute to the elimination of the mammalian threat from small rodents, coyotes and deer. Finally, removing nests located in aircraft hangars should curtail the annoyances created by smaller birds seeking shelter on the Installation.

Cooperative Agreements

Appendix H contains the Cooperative Agreement (CA) between the U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department and NAS JRB Fort Worth. This CA is for the protection, development and management of fish and wildlife resources at NAS JRB Fort Worth.

3.5 OUTDOOR RECREATION, EDUCATION, AND OUTREACH ISSUES

Outdoor Recreation

Opportunities for outdoor recreation on NAS JRB Fort Worth are limited by the relatively small size of the Installation and the current land uses on the Installation. Hunting is not feasible, and fishing is limited by restricted access to Lake Worth and a lack of freshwater fish ponds within the Installation. Opportunities for outdoor recreation exist, and will be developed in conjunction with wildlife management activities. These outdoor recreational opportunities would be an enhancement to the quality of life for all military personnel and their dependents living in the area, and would help to foster a sense of stewardship in those that participate in these recreational activities. Facilities to further develop an understanding and appreciation of the natural features of NAS JRB Fort Worth will include such amenities as nature trails and interpretive gazebo. The costs associated with these facilities must be weighed against the potential level of use of the facilities before the facilities are planned or developed. Efforts in this area support the recreation and stewardship goals.

Areas within the Installation can be used for multi-purpose trails and other forms of low-intensity outdoor recreation. Preferred placement of nature trails and recreational facilities will need to be outside of the flight line area for reasons of both safety and security. This limitation reduces the available areas for outdoor recreation to those undeveloped tracts found along the eastern, northern and southern boundaries of the Installation. While much of this undeveloped area is suitable for development of new structures and facilities in support of the military mission, and may be utilized for this purpose in the future, it can be used in the interim for temporary, low-cost, and low-impact recreational activities.

The NAS JRB Natural Resources Study, 2003, outlines specific requirements and standards for implementing a nature trail throughout the Installation. The goals for a multi-purpose trail include separating fitness training and nature walks from vehicular traffic; providing several starting points; providing access to various natural destinations within the Installation; emphasizing natural areas and good views within the Installation; and, serving as a unique area available for fitness training, walkathons and Special Olympics activities. Initial trail planning places the trail within the eastern portion of the Installation, connecting various points of interest, including the lake and marina, wetland habitat and picnic areas, as well as other locations such as the main gate, gym and housing. The multi-purpose trail would not interfere with the mission of the Installation and would be Americans with Disabilities Act compliant.

Outdoor Education

An active outdoor education program is important in fostering, in the general public, an appreciation and sense of stewardship for the plants, animals, and ecosystems of a region. Outdoor education and recreation are complementary; activities that create or enhance recreational opportunities can also create and enhance educational opportunities. An outdoor education program will be implemented at NAS JRB Fort Worth to showcase the Navy's stewardship of natural resources and to point out why this stewardship is important to both the military mission and habitat conservation. Training an outdoor educator must be considered in order to maintain the highest level of quality in any outdoor education program developed. Outdoor education supports the stewardship goal.

The multi-purpose nature trail provides an opportunity for outdoor education. Trail signs and kiosks located along the trail would provide site-specific environmental information to enhance inhabitants' knowledge and appreciation of the Installation and its environmental features.

Outreach Issues

Cooperative agreements with local or regional fish and wildlife agencies, conservation organizations, and education organizations will be initiated to develop materials for self-guided educational programs, as well as guided instruction on nature viewing areas of the Installation. Development of an education program and supporting materials is an excellent opportunity to form cooperative relationships with the local offices of federal, state and county natural resource agencies, outdoor clubs, private conservation organizations, academic, and research institutions. These agencies and organizations have knowledge in specific areas that, when combined, provides a strong, integrated information pool to support natural resource education and management efforts on NAS JRB Fort Worth. These agencies include, but are not limited to the USFWS, TPWD, Natural Resources Conservation Service, Texas Natural Resource Conservation Commission, Texas Christian University, Texas Ornithological Society, Texas Audubon Society and local marina and garden clubs.

3.6 GROUNDS MAINTENANCE

As stated in the Department of Defense Environmental Conservation Program, military installations are required to incorporate environmentally and economically beneficial landscaping practices on military installations (DoD DIR 4715.3). Management issues related to grounds maintenance are in two main areas: reduction of expenditures on grounds maintenance activities, and reduction of NPS water pollution. The soils on NAS JRB Fort Worth are either clayey soils on nearly level or gently sloping uplands, or deep loamy soils on level to sloping stream terraces. In many instances, large areas of top soil have been removed from both of these soil types to support the needed construction activities of aerodrome facilities. Under the best of conditions, these soils are moderately susceptible to erosion by wind and water. Under conditions of abuse, these soils are highly susceptible to erosion loss. Either of these soil categories can have

moderately low availability of plant nutrients, requiring occasional and moderate additions of chemical or organic fertilizers to maintain an acceptable cover of ornamental vegetation.

Chemical Fertilizers

When chemical fertilizers are applied to plants, the ground is flooded with soluble nitrogen. Since the concentration of nitrogen in plants is less than that within the soil, osmotic pressure forces plants to absorb high amounts of synthetic nitrogen. Synthetic nitrogen fertilizer will "force-feed" plants whether they need it or not. In a well-balanced ecology, plants secrete substances through their root system, which they exchange for nutrients. In the force-feeding process, this exchange is interrupted. Plants will readily absorb synthetic nitrogen until it burns them to death. If excessive synthetic nitrogen does not kill a plant, it will invite insects and diseases. The majority of the turf grass and plant diseases on NAS JRB Fort Worth are caused by excessive synthetic nitrogen use. Further, forced-feeding and growth is not structurally and environmentally sound. Ill-timed applications of synthetic nitrogen can trigger excessive levels of nitrites in plant tissue. These substances are highly toxic, and have been suspected of producing a form of anemia in animals. Also, excessive amounts of synthetic nitrogen is leached into the soil and creates contaminant run-off to the lakes and streams, thereby contaminating the drinking water supply.

Organic Fertilizers

It is the policy of the Installation to use organic fertilizers as much as possible within the Installation. In the natural/organic approach, soil amendments are used to provide a balanced source of carbon and nitrogen to the soil microbes (the soil is fed, not the plant). Amendments are used to supply the soil with minerals, which will slowly be released by the activity of the soil microbes, which will be consumed by the plant. The goal is to promote healthy soil, which produces healthy plants. The organic approach will supply nitrogen and minerals to the soil evenly and gradually, thereby eliminating the violent "feast to famine" process, eliminating rapid growth followed by rapid decline. Since the nutrients are supplied evenly and gradually, mineral deficiencies do not develop and the turf maintains its natural resistance to diseases and insects. Finally, using the organic approach, weeds become less of a problem since the conditions that favor them do not exist. Fewer weeds mean less mowing. NAS JRB Fort Worth can save money while protecting the environment by using organic fertilizer.

Native Landscaping

Presidential Memorandum 50737 and 60 Federal Register 40837 direct that each installation use regionally native plants for landscaping and other beneficial techniques, to the extent practical. The choice of plants used in landscaping has a direct affect on expenditures for grounds maintenance. Using ornamental plants that are not adapted to the climate requires increased irrigation to prevent the loss of plants to water stress. Regionally native plants are better able to survive the extremes in rainfall and temperature of the region while maintaining an acceptable appearance during those extremes. Regionally native plants are less likely to be nutrient limited, leading to a reduction in the application of chemical fertilizers and an associated reduction in

expenditures and NPS water pollution. Regionally native plants also are more resistant to diseases and pests found in the area, and use of these plants can reduce costs in pest management and replacement of dead or dying ornamental vegetation.

The present landscaping scheme on NAS JRB Fort Worth is dominated by large expanses of frequently mown lawns and landscaped areas dotted with a few species of native hardwood trees, native and non-native ornamental shrubs and a few areas where native grasses have been allowed to establish. There are also areas where native wildflowers have been sown. Native species will be used in the landscaping program for the Installation. A list of native landscaping plants is presented in *Appendix C.*

4.0 NATURAL RESOURCES MANAGEMENT ACTIONS

In order to meet the requirements of the SAIA and to accomplish the goals listed in *Section 1.0*, this INRMP establishes specific management actions (projects) to be accomplished within a specified timeframe. The actions are also summarized in *Table 4-6* and *Figures 4-3* through *4-5* at the end of this section. *Table 4-7* provides a breakdown of the estimated project costs by fiscal year. The objectives and actions correspond to the different assigned Land Management Units (LMUs) for NAS JRB Fort Worth.

The natural resources programs and projects described in this INRMP are divided into compliance (mandatory) and stewardship categories to reflect implementation priorities. Funding for implementation of the INRMP will come from the Commander, Naval Reserve Force, or Naval Facilities Engineering Command natural resources fund sources. Every effort will be made to acquire O&MNR Environmental, or other funding to implement DoD mandatory projects, in the most timely manner possible. Stewardship-type projects will be funded through forestry, agricultural outlease, fish and wildlife, Legacy, or other fund sources as funding and personnel resources become available.

4.1 LAND MANAGEMENT UNITS

In this INRMP, NAS JRB Fort Worth is divided into four land management units (LMUs) that can cover all or part of a parcel, or be disjunct across more than one parcel (*Figures 4-1 and 4-2*). These units are defined by operational constraints, current or proposed land uses, geographic location, or a combination of these factors. The small size, limited amount of undisturbed natural resources, and limitations set by the types of habitats found on the Installation and land uses prevents definition of management units by proposed management actions. The acreage of each LMU is summarized in *Table 4-1*. The four LMUs are:

- **Ecological Preserve Management Unit** – area of palustrine emergent jurisdictional wetland.

- **Shoreline Management Unit** – areas of northern boundary of the Installation with the shoreline of Lake Worth and areas bordering the West Fork of the Trinity River. The latter area does not include any portion of the Trinity River shoreline beyond the top of the levee at the boundary fence.

- **Unimproved Lands Management Unit** – areas of NAS JRB Fort Worth that are currently undeveloped and covered by native or successional vegetation, and not currently being considered for improvement or development during the lifespan of this INRMP. This unit includes land adjacent to, but outside the area of the clear zone down to and including the fence line.

- **Operational/Urban Lands Management Unit** – those areas of NAS JRB Fort Worth that have been cleared of native vegetation for actual or planned development

in support of the military mission. These areas are generally considered to be improved areas. These areas include runways, taxiways, clear zones, grounds supporting buildings, roads, parking lots, sidewalks, landscaped areas, recreational fields, and surface drainage systems that may or may not have potential to be enhanced for wildlife habitat values.

TABLE 4-1 AREA COVERED BY EACH LAND MANAGEMENT UNIT ON NAS JRB FORT WORTH

Land Management Unit	Area in Acres	Area in Hectares
Ecological Preserve Management Unit	1.3	0.5
Shoreline Management Unit	20	8.1
Unimproved Land Management Unit	452.7	183.4
Operational/Urban Lands Management Unit	1,243	503
Total Area	**1,717**	**695**

Natural resource management actions are integrated with land uses within each LMU, and in some instances are integrated across LMUs. Management actions often address more than one management issue, and integrate two or more of the main goals of this INRMP within a single action to increase the rate of return of invested money and labor. For example, wetland preservation could address the issue of surface water quality to comply with state water quality standards, as well as addressing issues and realizing goals of managing wildlife (habitat preservation), creating opportunities for outdoor recreation (bird watching), and outdoor education (wetland study). The LMUs use an ecosystem approach in that no one unit is managed exclusively for the benefit of only one species of plant or animal, or one activity, and actions consider institutional uses of the natural resources within each LMU.

The natural resources management issues, introduced in *Section 3.0*, that are relevant to each LMU are discussed in the following sections. A list of management objectives, their priority (mandatory or stewardship), and the legal requirements behind the assignment of priority are represented at the beginning of the discussion for each LMU. A summary (*Table 4-6*) of all projects identified for NAS JRB Fort Worth is contained at the end of this section. This summary contains funding and budget criteria as well as other information required by the "Guidelines for Preparation of the Integrated Natural Resources Management Plan." In addition, *Table 4-7* provides the budget breakdown by fiscal year for each identified project.

4.2 ECOLOGICAL PRESERVE MANAGEMENT UNIT

NAS JRB Fort Worth has a small jurisdictional wetland area that fits into this particular LMU. While small in size, it has a high degree of importance in that it represents diminishing sensitive habitat that can be observed and studied while it provides a necessary niche to the wildlife of the surrounding area. Preservation and regular monitoring of this management unit will provide useful data regarding complex trends in wildlife populations that can be used to make decisions related to wildlife and habitat management goals elsewhere on NAS JRB Fort Worth. Natural

resource management within the Ecological Preserve Management Unit will realize the following goals of this INRMP:

- Provide for the conservation and rehabilitation of land and water resources while supporting the military mission.

- Maintain or increase the diversity and populations of plants and animals under the stewardship of the Navy through habitat maintenance or enhancement activities on the Installation that do not detract from the military readiness of the Installation.

- Enhance the quality of life of all assigned personnel and the public by providing high-quality, accessible outdoor recreational and educational opportunities that do not degrade the natural resources.

Management issues addressed within the Ecological Preserve Management Unit are:

- Protection and management of unique and sensitive ecosystems

- Fish and wildlife management

- Species inventory and monitoring

- Enhancement of educational opportunities

TABLE 4-2 MANAGEMENT ACTIONS FOR THE ECOLOGICAL PRESERVE MANAGEMENT UNIT

Objective		Project #	Priority [1, 2]	Legal Requirements
#1	Continue to comply with the requirements of Section 404 of the Clean Water Act to prevent intervention and degradation of the existing wetland area.	1	Mandatory Level 1	Public Law 92-500, DoD Dir. 4715.3 33 USC 1251 EO 11990
#2	Identify critical species and sensitive habitats in order to promote sound management decisions.	2 and 3	Mandatory Level 1	7 USC 2814 Public Law 92-205, Public Law 89-669, 32 CFR 190, DoD Dir. 4700.4, EO 11990
#3	Identify and contain invasive, nuisance and noxious species on the Installation.	4, 5, 6 and 7	Stewardship Level 5	EO13112, EO 12962 7 USC 150aa-150jj and 2801-2814, 16 USC 4408, 43 USC1241 OPNAVINST 5090 1B, Sikes Act 16 USC 670a
#4	Provide high quality, accessible outdoor recreational and educational opportunities that do not degrade the natural resources.	8	Stewardship Level 5	EO 11990, 32 CFR 190, NAVFACINST 7110, NAVFACINST MO-110.1 - .4

[1] Chief of Naval Operations PR-03 Environmental Requirements Guidebook (2000 Update)
[2] Priority is either mandatory or stewardship. Mandatory activities are those required to comply with the listed Federal or State environmental laws, Executive Orders, or Federal Regulations. Stewardship activities are those that are provided for, but not specifically required by, the listed Federal or State environmental laws, Executive Orders, or Federal Regulations in support of stewardship of natural resources on Federal lands. Level refers to the rating from the Environmental Requirements Guidelines.

Objective #1: Continue to comply with the requirements of Section 404 of the Clean Water Act to prevent intervention and degradation of the existing wetland area.

The Ecological Preserve Management Unit currently contains a 1.3 acre (0.5 ha) wetland along the eastern boundary of the Installation. This wetland was identified in a U.S. Army Corps of Engineers Wetland Inventory conducted in December, 1996. The fieldwork, analysis and documentation for a Section 404 waters of the U.S./wetland determination update was

conducted in June, 2003 and was performed in accordance with 1987 U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual and supplemental updates. The Installation is presently coordinating with the USACE Fort Worth District for concurrence on this update. Since preservation is the only reasonable land use within the immediate boundary of this LMU, management actions are directed toward preserving habitat in support of fish and wildlife management, monitoring of wildlife populations, and educational opportunities available in the study and preservation of this unit.

Preservation of wetland vegetation in the Ecological Preserve Management Unit maintains excellent habitat for a variety of birds, mammals, reptiles, and insects. Strict compliance with the requirements of the Clean Water Act and especially Section 404 of that act, dealing with wetlands and any infringement thereto is mandatory.

- **Project #1:** Update data relating to wetlands and other sensitive habitat types (i.e. riparian corridors, streams, etc.) determined to be a part of the Ecological Preserve Management Unit.

- Task: Using existing data, aerial photography and field surveys provided by the U.S. Army Corps of Engineers, define and map the various wetland and other sensitive habitats at NAS JRB Fort Worth.

- Task: Develop a GIS database of the sensitive habitats (defined above) for integration into this INRMP and to be used for future development at the Installation.

- Task: Design and produce signage to indicate the location and limits of the existing wetland and other sensitive habitats.

Estimated Cost: $10,000 per update

Implementation Date (FY): 2006, 2011

Objective #2: Identify critical species and sensitive habitats in order to promote sound management decisions.

To aid in managing wildlife populations using the wetland habitat, species inventories that estimate relative abundance of rare, threatened, endangered, nuisance and invasive species, as

well as indicator species of plants and animals within this LMU will be conducted in, 2008. Regular species monitoring provides information on the condition of ecosystems under the stewardship of Natural Resource Managers, and aids in fish and wildlife management.

Biological surveys and monitoring are effort intensive, and are best conducted by persons having experience with biological surveys and familiarity with the ecosystems in and surrounding NAS JRB Fort Worth.

- **Project #2:** Conduct biological (wildlife and vegetation) species inventories on NAS JRB Fort Worth every five years.

- Task: Review existing biological species inventories for data gaps or needed information.

- Task: Conduct an inventory of existing vegetative types within the Installation that will update previously existing surveys of woody plants.

- Task: Perform biological surveys to update/add to the existing inventories provided in GIS databases.

- Task: Build a database for species inventories.

- Task: Incorporate information from periodic BASH bird surveys.

Estimated Cost: $60,000 per designated implementation years

Implementation Date (FY): 2008

- **Project #3:** Develop a GIS database tree inventory of NAS JRB Fort Worth.

- Task: Review existing tree species inventories and aerial photography.

- Task: Perform oral survey to identify the Installation's tree database requirements (tree common name, scientific name, tree digital picture, hyperlink pictures to tree location, tree dbh, etc).

- Task: Conduct a global positioning survey using ArcPAD to develop GIS database tree inventory within the Installation.

Estimated Cost: $100,000

Implementation Date (FY): 2005

Objective #3: Identify and contain invasive, nuisance and noxious species in order to develop an ecologically sound native environment.

Nuisance wildlife are those forms which cause inconvenience, annoyance, or irritation to the general human population or physical damage to structures or landscaped areas. In order to take effective and appropriate actions against wildlife that may become a nuisance or that may be displacing other wildlife or adversely affecting the aesthetic qualities of the environment (invasive wildlife) because of their invasive nature, the population size and distribution of these wildlife species on the Installation will be included in the biological survey to be conducted in 2008. By monitoring the sizes and distributions of the populations of potentially nuisance species, early action can be initiated to prevent damages to facilities and landscaped grounds.

Control of nuisance and invasive species is problematic. Poisons used to control these species can be ingested by non-target species, and are not viewed favorably by the general public. To control numbers of nuisance species, actions focus on making this LMU unattractive to potential species. Continued proper storage and disposal of garbage will be strictly enforced to prevent scavengers from becoming nuisances. Areas (i.e. buildings, trees, etc.) that are preferred by nuisance wildlife species will be evaluated and appropriate actions will be determined in order to make these areas unattractive to the nuisance wildlife.

Mosquitoes and other insect pests reduce the quality of life and pose a potential risk to human health by their ability to spread disease. Large-scale spraying of insecticides is impractical because of the cost, non-specificity of its effects, and because it creates a nonpoint source of water pollution. The use of natural predators of insect pests can be a better solution because it does not pose additional risks to the environment, human health or quality of life in most instances. By December 2006, structures that encourage bats and insectivorous birds to take up residence on or near the inhabited areas of the Installation will be built and installed as part of a pest management program. Targeted applications of insecticides will be accomplished only when these predators cannot maintain an adequate level of control. Insecticides will be applied sparingly, in accordance with the Pest Management Plan to avoid unintended impacts to non-targeted species and increases to nonpoint source water pollution.

- **Project #4:** Conduct a survey to identify invasive, nuisance and noxious plant and insect species on the Installation.

Estimated Cost: $10,000

Implementation Date (FY): 2007

- **Project #5:** Develop a program to initiate the use of organic methods to curtail the growth and progression of invasive, nuisance and noxious plant and insect species on the Installation.

Estimated Cost: $25,000

Implementation Date (FY): 2008

- **Project #6:** Develop roosting and nesting areas for bats and birds that can be used as bio-controls for insect pests. Provide these nesting areas in locations away from flight activities.

- Task: Using field reconnaissance and GIS maps, determine and designate areas for potential bird roosts and bat box locations.

- Task: Develop a plan to locate and build the bat boxes and bird houses within the appropriate areas.

- Task: Incorporate local youth groups and service organizations in building and installing the bat boxes and bird houses.

- Task: Develop a management plan for controlling nuisance species.

Estimated Cost: $10,000

Implementation Date (FY): 2006

- **Project #7:** Update Integrated Pest Management Plan which should be used in conjunction with the INRMP.

Estimated Cost: $80,000

Implementation Date (FY): 2005

Objective #4: Provide high quality, accessible outdoor recreational and educational opportunities that do not degrade the natural resources.

Since the previously described wetland is contained in a small pocket and has been relatively undisturbed for a lengthy period of time, there exists a unique opportunity to study the wetland and its interactions with the surrounding habitat. An educational gazebo and viewing area can be constructed adjacent to the wetland and not infringe upon its boundary. This facility will allow both survey, monitoring and educational exploitation of the wetland while providing opportunities for bird watching and nature study without adversely affecting the habitat. Since

this wetland has an old roadbed that traverses its boundaries, a nature trail should be established that allows visitors to enter the wetland without causing stress to the habitat. The trail and gazebo will allow monitoring and educational opportunities in somewhat of a microcosm without impacting the wetland.

The educational gazebo will fulfill the intent of the SAIA to support public involvement by providing the opportunity of educational field trips by small classes of students to study the wetland and surrounding habitat. An educational gazebo and viewing area will have to be constructed in an opportune position and the location of typical wetland plants identified with placards. No Navy personnel would be required to man the facility.

- **Project #8:** Design and install an educational gazebo and multi-use nature trail adjacent to the wetland. This gazebo should emphasize the unique character of the wetland and provide a sheltered location for bird watching. The multi-use nature trail will incorporate the use of the existing roadway.

- Task: Determine best viewing location for positioning the gazebo.

- Task: Determine the least invasive position for the viewing path.

- Task: Determine, design and install educational placards for viewing of the wetland.

- Task: Build and install the educational gazebo.

- Task: Advertise the presence of the wetland and that it can be made available for sponsored and properly escorted groups of students to visit for viewing and study.

Estimated Cost: $50,000

Implementation Date (FY): 2009

4.3 SHORELINE MANAGEMENT UNIT

The Shoreline Management Unit contains several habitat types. While the actual property boundary of the Installation stops at the fence line along the West Fork of the Trinity River, the impact of storm water runoff on the river water quality must be considered. In addition, the shoreline along the northern border of the Installation with Lake Worth is especially important to the interaction of migratory waterfowl and operational flying activities. Both the river and lake shorelines are sensitive to disturbances from human activity, including changes in the quality of waters entering these ecosystems, as well as physical disturbances. Effective management and conservation of these areas requires an integrated approach to minimize the potential impacts to these environments from actions in and adjacent to them.

Management issues regarding surface water quality, habitat protection, and recreational opportunities to enhance the quality of life for military personnel stationed at NAS JRB Fort Worth are addressed within this LMU. Natural resources management projects within the Shoreline Management Unit are designed to realize the following goals of this INRMP.

- Provide for the conservation and rehabilitation of land and water resources while supporting the military mission.

- Maintain or increase the diversity and populations of plants and animals under the stewardship of the Navy through habitat maintenance or enhancement activities on NAS JRB Fort Worth that do not detract from the military readiness of the Installation.

- Enhance the quality of life of military personnel by providing quality, accessible outdoor recreational opportunities that do not degrade the natural resources or mission readiness.

Management issues addressed within the Shoreline Management Unit are:

- Prevention of soil erosion

- Protection of sensitive habitats

- Support of the BASH Program

- Surface water quality improvement

- Enhancement of water-related recreation and opportunities

TABLE 4-3 MANAGEMENT ACTIONS FOR THE SHORELINE MANAGEMENT UNIT

Objective	Project #	Priority[1, 2]	Legal Requirements
#5 Control erosion while improving the natural values and aesthetic qualities of shoreline areas.	9 and 10	Mandatory Level 1	16 USC 590a; 16 USC 1451; 33 USC 426e-h; OPNAVINST 5090.1B; NASJRBFWINST 3750.12
#6 Provide recreational access and opportunities, where appropriate, to assigned military personnel and their dependents.	11(a), 11(b) and 12	Stewardship Level 5	16 USC 670; Executive Order 12962

[1] Chief of Naval Operations PR-03 Environmental Requirements Guidebook (2000 Update)

[2] Priority is either mandatory or stewardship. Mandatory activities are those required to comply with the listed Federal or State environmental laws, Executive Orders, or Federal Regulations. Stewardship activities are those that are provided for, but not required by, the listed Federal or State environmental laws, Executive Orders, or Federal Regulations in support of stewardship of natural resources on Federal lands. Level refers to the rating from the Environmental Requirements Guidelines.

Two interrelated management issues within this LMU are soil erosion and surface water quality improvement. Soil that becomes suspended in surface runoff degrades the water quality of the water bodies that receive the runoff, whether it is a pond, river or lake. Federal agencies, including military installations, are required to use soil conservation practices to prevent the loss of soil from federal lands, and are required to comply with state water quality standards by reducing the amounts of nonpoint source water pollution originating from within federal lands. Reduction of soil erosion within NAS JRB Fort Worth is a mandatory management activity to comply with 16 USC 590a (Soil Conservation Act) and Public Law 92-500 (Clean Water Act, as amended), as well as provisions in 16 USC 1451, 33 USC 426e-h, Executive Order 12088 and Executive Order 13148.

The shoreline of Lake Worth is considered sensitive habitat due to its importance to migratory birds, including state and federally listed species. The Great Blue Heron rookeries, near the Fort Worth Nature Center, are sensitive nesting areas to the north of the Installation. The birds are especially vulnerable to human intrusion during the mating and nesting season. These rookeries have been designated as important wildlife habitat by the U.S. Fish and Wildlife Service (USFWS) and are protected as sensitive wildlife areas by the Texas Parks and Wildlife Department (TXPD). Great Blue Herons frequent the shallow waters along the northern border of the Installation for feeding purposes. Maintaining water quality and sediment free breeding beds for small fish and invertebrates are important considerations in providing a proper diet for these birds.

Objective #5: Control erosion while improving the natural values and aesthetic qualities of shoreline areas.

The northern boundary of the Installation along the Lake Worth shoreline is a family recreational area and picnic facilities. There are areas where severe erosion has removed the topsoil from around the trees and no vegetation can be maintained without extensive control work. Some of the more eroded areas will require reworking the existing terrain and placing six inches of topsoil on the areas prior to planting with native vegetation. The conditions at several of the shoreline areas will require the use of soil holding mats in addition to native vegetation. The mats selected will allow the growth of plants through the mat so that native vegetation can become established in support of stewardship of the native plants in the region.

- **Project #9:** Identify and map sensitive habitats in the Shoreline Management Unit.

- Task: Using existing data, aerial photographs, vegetative surveys and field investigations, define and map the various habitats along the shoreline of NAS JRB Fort Worth with Lake Worth and the West Fork of the Trinity River.

- Task: Develop a GIS database of the sensitive habitats (defined above) for integration into this INRMP and to be used for future development at the Installation.

Estimated Cost: $50,000, $15,000

Implementation Date (FY): 2009, 2011

- **Project #10:** Identify and control erosion along the shoreline of Lake Worth.

- Task: Using ground reconnaissance, determine the areas of greatest erosion.

- Task: Determine the amount of erosion and prioritize the sequence of erosion control efforts.

- Task: Reconstruct the shoreline using the sequence developed above.

- Task: Provide bio-mats in the area of new topsoil in an effort to control erosion.

- Task: Re-seed the erosion control areas with native plants.

- Task: Develop a monitoring program to monitor the reconstructed areas and potential future erosion.

Estimated Cost: $250,000

Implementation Date (FY): 2009

Objective #6: Provide recreational access and opportunities, where appropriate, to assigned personnel.

Recreational activities within the Shoreline Management Unit are limited by the currently constrained access to Lake Worth. Fishing is a pastime popular with many people. Fishing activities are possible along the northern boundary of the Installation, if adequate and controlled access is provided. By July 2006, a survey will be conducted by the Public Works Department, the Environmental Department and the MWR Office of NAS JRB Fort Worth to determine the need and utilization of a permanent fishing pier on the Installation. If demand is sufficient, a permanent fishing pier into Lake Worth for freshwater fishing will be constructed to increase the quality of life for personnel stationed at the Installation. An interim floating fishing pier has been established along the shore of Lake Worth until a permanent pier can be constructed.

Coordination with the Texas Department of Health (TDH) and the Trinity River Authority (TRA) indicated the presence of polychlorinated biphenols (PCBs) in fish tissue from Lake Worth. Currently, there is a ban on fish consumption until further studies can be accomplished. This pollutant will be a consideration as total maximum daily load (TMDL) levels are determined for Lake Worth and the Trinity River. Currently, the source of the PCB contamination has not been determined.

- **Project #11(a)**: Determine the interest for a permanent fishing pier along Lake Worth.

- Task: Determine if local, state and U.S. Army Corps of Engineers regulations allow the placement of a fishing pier.

- Task: Conduct a survey of need and utilization by military personnel, dependents and retired military of a fishing pier.

- Task: If sufficient interest exists, identify the appropriate location for the fishing pier.

- Task: Check with THD on impacts/restrictions of fishing in Lake Worth.

Estimated Cost: *Need Determination - $10,000*

Implementation Date (FY): 2006

- **Project #11(b):** Build the fishing pier, if sufficient interest exists in Project #11(a).

Estimated Cost: *Construction – $150,000*

Implementation Date (FY): 2008

- **Project #12:** Develop an outdoor learning program for children that focuses on fishing and aquatic ecology in conjunction with the fishing pier project.

- Task: Evaluate ability of the Installation to provide sufficient volunteers to educate children on fishing practices and aquatic ecology.

- Task: In coordination with the City of Fort Worth, TPWD, USFWS, and the Kidfish Foundation, determine the best course of action for providing education to both children on the base and visiting school groups.

Estimated Cost: $10,000

Implementation Date (FY): 2009

4.4 UNIMPROVED LANDS MANAGEMENT UNIT

This LMU is composed of the land surrounding the airfield runways, taxiways, clear zones, associated instrument landing facilities and overrun areas. Although these lands are outside the immediate aircraft operations areas, by their very location, these areas must stay unattractive to birds, both migratory and indigenous. While efforts must be made to remove the attractiveness of this area for birds due to the dangers involved with bird and aircraft interaction, this area can provide a platform for vegetative cover that is both functional and aesthetically pleasing. The Unimproved Lands Management Unit provides management opportunities supporting the following goals of this INRMP.

- Provide for the conservation and rehabilitation of land and water resources while supporting the military mission.

- Maintain or increase the diversity and populations of plants under the stewardship of the Navy through habitat maintenance or enhancement activities.

Management issues within the Unimproved Lands Management Unit to be addressed are:

- BASH program

- Storm water quality improvement
- Soil conservation
- Outdoor recreation, education and outreach
- Fish and wildlife management

This area of Texas once supported grasses common to the Tall Grass Prairie. Under the influence of heavy grazing from livestock the tall grasses were replaced by less productive grasses. As these secondary grasses were continually grazed they were replaced by early successional species such as Buffalo Grass, Texas Grama and Three-awns. These grasses have small seedheads and are not attractive to wildlife of many forms. Management of the vegetation on NAS JRB Fort Worth is a complex problem. It is necessary for the Installation to protect their resource base and also reduce erosion rates.

TABLE 4-4 MANAGEMENT ACTIONS FOR UNIMPROVED LANDS MANAGEMENT UNIT

Objective	Project #	Priority[1, 2]	Legal Requirements
#7 Provide for the conservation and rehabilitation of land resources while supporting the military mission.	13(a), 13(b) and 14	Mandatory Level 1	16 USC 590a; Public Law 92-500; 33 USC 426e-h; Executive Orders 11514, 12088 and 13148; OPNAVINST 5090.1B, NASJRBFWINST 3750.12
#8 Update and revise the planting sequences, mowing program and landscape plans to best support the BASH Plan.	15	Mandatory Level 1	16 USC 670(1); Executive Order 11514; NASJRBFWINST 3750.12
#9 Provide recreational opportunities and promote natural resource education to assigned military personnel and the general public.	16	Stewardship Level 5	DoD Dir 4715.3; DoD Dir 4700.4

[1] Chief of Naval Operations PR-03 Environmental Requirements Guidebook (2000 Update)

[2] Priority is either mandatory or stewardship. Mandatory activities are those required to comply with the listed Federal or State environmental laws, Executive Orders, or Federal Regulations. Stewardship activities are those that are provided for, but not required by, the listed Federal or State environmental laws, Executive Orders, or Federal Regulations in support of stewardship of natural resources on Federal lands. Level refers to the rating from the Environmental Requirements Guidelines.

Soil erosion from wind and surface runoff is likely to occur in areas that lack vegetation. Planting vegetation in areas that are unvegetated or only sparsely vegetated is a cost effective means to prevent soil erosion and support habitat conservation efforts. Re-vegetating denuded areas with native wildflowers will be used to reduce soil erosion and benefit the outdoor education program. Encouraging wildflowers to grow will enhance aesthetic qualities of these areas not only by providing a variety of color, but by attracting butterflies and other animals that are considered to have aesthetic qualities. Wildflowers increase the habitat diversity within the Installation and provide food and cover for a variety of insects, small birds and mammals in support of wildlife management. Information on suggested wildflower seed mixes and planting tips is available in *Appendix C*.

Controlling erosion will reduce the sediment runoff that currently washes into Farmers Branch Creek in the southwestern portion of the Installation. This creek also has a damaged weir that requires replacement. The soil has eroded under and around the structure and is causing more erosion in a lateral pattern extending from the existing structure. Erosion control in this area will need to account for the volatile storm water flows.

Allowing wildflowers to grow along the southwestern border of the Installation will increase the habitat diversity within the Installation; provide food and cover for a variety of insects, song birds and small mammals in support of wildlife management activities; and, adds aesthetic appeal to the Installation overall. After erosion control is established along Farmers Branch Creek this area will be planted with native grasses and wildflowers to control species and habitat diversity as well as erosion. Information on suggested wildflower seed mixes and planting guidance is available in *Appendix C*.

Objective #7: Provide for the conservation and rehabilitation of land resources while supporting the military mission.

Natural resource management enhancements in conjunction with educational tools are possible within this LMU and will provide opportunities to foster stewardship in Navy personnel and the general public. These parcels will be included in an effective wildlife management program. Low-cost enhancements will be obtained by allowing native herbaceous vegetation to flower. These plantings will provide an aesthetically pleasing appearance, hold the soil in place and will cause a visual break in the view.

- **Project #13(a):** Identify unimproved lands within the ownership of NAS JRB Fort Worth for the purposes of controlling soil erosion.

- Task: Using photography, GIS databases, construction plans and field reconnaissance identify individual parcels of land that can be considered unimproved. Coordinate with Installation planners and engineers.

- Task: Develop prioritization of the parcels.

- Task: Determine the condition of erosion and storm water runoff on these lands.

Estimated Cost: $1,000 each year

Implementation Date (FY): 2005 - 2011

- **Project #13(b)**: Implement a program to control soil erosion throughout the unimproved lands of the Installation.

- Task: Identify those areas in need of erosion control and prioritize rehabilitation.

- Task: Develop a program to rebuild and re-vegetate slopes and eroded areas where erosion has destroyed the top soil.

- Task: Re-establish native vegetation on the eroded and barren landscape along the western boundary of the Installation.

- Task: Develop a planting schedule to provide coverage of these lands for soil conservation purposes.

- Task: Determine the best mix of native grasses, wildflowers and trees for control of soil erosion on the identified lands.

- Task: Plant wildflowers, native grasses and trees as appropriate.

- Task: Re-establish native vegetation and wildflowers on the eroded and barren landscape along the southern boundary of the Installation.

Estimated Cost: $40,000

Implementation Date (FY): 2007

- **Project #14:** Update the BASH Plan.

Estimated Cost: $15,000

Implementation Date (FY): 2008

Objective #8: Update and revise the planting sequences, mowing program and landscape plans to best support the BASH Plan.

- **Project #15:** Review effectiveness of the BASH Program, provide recommendations, and implement recommendations.

- Task: Use periodic bird surveys, conducted by the Natural Resources Manager, to determine if the wildflower and native vegetation planted areas are less attractive to birds than areas planted with other grasses.

- Task: Based on the results of these surveys, prepare a planting plan to seed the unimproved areas of the Installation with the most appropriate type and level of seeding.

- Task: Review the Installation mowing and maintenance schedule to facilitate blending with the above results and seeding plan.

Estimated Cost: $5,000

Implementation Date (FY): 2005

Objective #9: Provide recreational opportunities and promote natural resource education to assigned military personnel.

Unimproved land parcels are typically areas where the planting of native vegetation and wildflowers can be arranged so that jogging routes and nature trails traverse the borders of these plantings. Appropriate signage can indicate the plant species and provide an educational, as well as aesthetic value. As popularity increases, benches and trash barrels can be added to help meet the needs of an outdoor classroom while informational signage along nature trails through the area will provide educational opportunities for individuals and groups. These viewing areas and trails can be used as educational tools for emphasizing the importance and functions of vegetative cover, as well as the varieties and capabilities of natural vegetation.

An area that is prime for scenic and educational development for the general public as well as for military personnel is a triangular shaped parcel of land located on the southern portion of the Installation and bordered by Roaring Springs Road, Perimeter Road and Boyington Drive *(Figure 4-1)*. This area is currently lying fallow and volunteer cottonwood trees have begun invading the

area. A wildflower planting schedule for various blooming times will be arranged in order to allow aesthetic attraction throughout the growing season. Benches, signage and waste containers will be located throughout this area.

- **Project #16:** Plant a wildflower and native vegetation viewing area and nature path through an unimproved land parcel to enhance aesthetic qualities of the Installation.

- Task: Determine the availability of the parcel identified between Roaring Springs Road, Perimeter Road and Boyington Drive.

- Task: Develop a planting schedule and select a variety of wildflowers to be planted in this area.

- Task: Determine the most appropriate wildflower species to plant for attracting native butterflies and bees to the area.

- Task: Develop a site plan to determine areas for plantings, viewing, benches and trash receptacles.

- Task: Advertise this site in local papers and develop flyers for local garden and nature clubs.

- Task: Adjust mowing schedule to benefit from the most color and variety of wildflowers to help reduce mowing costs.

- Task: Biannually review the conditions of the planted area to determine the need to reseed native flowers.

Estimated Cost: $8,000
$500 – yearly monitoring

Implementation Date (FY): 2005

4.5 OPERATIONAL/URBAN LANDS MANAGEMENT UNIT

The Operational/Urban Lands Management Unit has only small fragments of native vegetation remaining; the majority of this LMU is a man-made environment. Current land uses within this LMU limit and restrict the possible projects for natural resource management. Management actions designed for the propagation and expansion of wildlife populations are not feasible because of the conflicts to the military mission that would result from attracting some species of wildlife to the operational and urbanized areas of NAS JRB Fort Worth. This does not, however, preclude actions that can benefit small populations of unobtrusive wildlife, such as songbirds or butterflies, within the urbanized areas. In addition, this LMU has a high potential for the use of native plants for landscaping. Even with the constraints created by the current land use, natural resource management actions on the Operational/Urban Lands Management Unit can realize the following goals of this INRMP:

- Provide for the conservation and rehabilitation of land and water resources while supporting the military mission.

- Enhance the quality of life of military personnel and their dependents by providing quality, accessible outdoor recreational opportunities that do not degrade the natural resources.

- Foster and promote natural resource stewardship among military personnel and the public by providing opportunities to participate in natural resource conservation and rehabilitation activities on NAS JRB Fort Worth.

Management issues within the Operational/Urban Lands Management Unit to be addressed are:

- Reduction and prevention of nonpoint source water pollution.

- Creation of outdoor recreation and education opportunities.

- Reduction of grounds maintenance expenses.

- Support of the BASH program.

TABLE 4-5 MANAGEMENT ACTIONS FOR THE OPERATIONAL/URBAN LANDS MANAGEMENT UNIT

Objective		Project #	Priority[1, 2]	Legal Requirements
#10	Minimize the pollutants in storm water runoff entering the waters surrounding NAS JRB Fort Worth and comply with the SWPPP.	17	Mandatory Level 1	Public Law 92-500, Section 319; 16 USC 1451; Executive Order 13148; OPNAVINST 5090.1B
#11	Support the BASH Plan.	18	Mandatory Level 5	Public Law 86-797; Presidential Memo 50737, NASJRBFWINST 3750.12
#12	Improve the natural values and aesthetic qualities of Operational/Urban Lands.	19 and 20	Stewardship Level 5	16 USC 2901
#13	Foster and promote natural resource stewardship among military and civilian personnel.	21, 22, 23 and 24	Stewardship Level 5	32 CFR 190 OPNAVINST 5090.1B, EO 13148, DOD INST 4715.3
#14	Implementation of best management practices to support NAS JRB Fort Worth's ongoing environmental efforts.	25 and 26	Stewardship Level 1	Sikes Act 16 USC 670, 32 CFR 190, EO 13148, EO 11990, EO 13112, OPNAVINST 5090.1B, 16 USC 1531, 16 USC 703
#15	Implementation of a Geographic Information System to support NAS JRB Fort Worth's ongoing environmental efforts.	27 and 28	Mandatory Level 1	Endangered Species Act of 1973, 16 USC 1531, 16 USC 1361, 7 USC 2814 Migratory Bird Treaty Act, as amended, 50 CFR 402, EO 13112, Invasive Species; EO 12962, OPNAVINST 5090.1B, Sikes Act 16 USC 22-2.5

[1] Chief of Naval Operations PR-03 Environmental Requirements Guidebook (2000 Update)

[2] Priority is either mandatory or stewardship. Mandatory activities are those required to comply with the listed Federal or State environmental laws, Executive Orders, or Federal Regulations. Stewardship activities are those that are provided for, but not required by, the listed Federal or State environmental laws, Executive Orders, or Federal Regulations in support of stewardship of natural resources on Federal lands. Level refers to the rating from the Environmental Requirements Guidelines.

Objective #10: Minimize the pollutants in storm water runoff entering the waters surrounding NAS JRB Fort Worth and comply with the Installation SWPPP.

Nonpoint source water pollution within the Urban Lands Management Unit has several origins. Soil erosion is one source, and its prevention is required under various laws and Executive Orders (Public Law 92-500, 16 USC 590a, 16 USC 1451, Executive Orders 11989 and 12608). Soil erosion from inadequately vegetated or un-vegetated areas contributes sediment to surface water runoff that in turn degrades the water quality of Lake Worth or the West Fork of the Trinity River. Prevention of soil erosion is mandated by law, and is a high priority because it contributes to increased grounds maintenance expenses. To reduce soil erosion as a nonpoint source of water pollution a program to regularly monitor and re-vegetate areas within this LMU will be established. A ban on parking unauthorized vehicles off of hard surfaces anywhere on the Installation (with the exception of adequately maintained dirt roads) will be enforced to prevent breaks in vegetative cover.

Recent changes to Section 402 of the Clean Water Act incorporate new requirements under the section identified as "Phase II". These new changes establish the requirement for all construction projects of one acre or more to have in place BMPs that will control on site erosion and sediment transport problems associated with construction activities. Beginning in Fiscal Year 2003, temporary BMP for controlling soil erosion on construction sites of one acre or greater will be required and rigorously maintained to prevent accidental sediment discharges from these areas. Permanent BMPs will be required and incorporated into all new construction to remove or reduce nonpoint source water pollutants prior to their entry into surface waters (refer to TCEQ [1999] and Texas Water Commission [1991] for descriptions of BMPs for nonpoint source water pollution).

Chemical nonpoint source water pollutants commonly found within urbanized areas are chemical fertilizers, pesticides, herbicides, and petroleum residues from parking lots and roads. The amount of many of these pollutants, such as fertilizers and pesticides, can be controlled through changes in application rates and techniques. Although there is currently an active program involved with decreasing the amount of fertilizers and pesticides applied to lawns and other landscaped areas on the Installation, this effort will be reviewed and adjusted as necessary beginning in January 2004.

- **Project #17:** Implement the best management practices in the SWPPP.

- Task: Review the current SWPPP for availability and applicability of BMPs for the Operational/Urban Land Management Unit.

- Task: Determine those BMPs that can be incorporated as additional measures to remove sediment and other pollutants from storm water runoff.

- Task: Review Installation vehicle regulations to determine the most appropriate method of controlling vehicles driving off the established roadways.

- Task: Review Installation's use of chemical pesticides, herbicides and fertilizers to determine the best methods to reduce their use.

Estimated Cost: Task not funded under the INRMP, but programmed annually in the amount of $10,000 under NAS JRB Fort Worth ERMS Project # 83447B0094 to address CWA requirements under Navy Guidebook 08005, Design/Construction of BMP and Storm Water Management Structures.

Implementation Date (FY): 2005 - 2011

Objective #11: Support the BASH Plan.

Some portions of the Installation have had all of the trees removed for various reasons. An active effort is underway to replant many of these areas with native trees that are of the hard mast variety. This planting has, and will continue to be, coordinated with the local Carswell Garden Club. This civic organization has shown an interest in providing the supplies and planting recommendations necessary to periodically plant native trees throughout portions of the Installation. These trees will provide shade and help to complement the aesthetic views of some of the more open areas of the populated portion of the Installation while helping to screen such structures as storage sheds, refuse containers and parking lots. In consideration for avoiding conflicts with the Installations BASH Program, hard mast trees that provide minimal benefit to birds and other animals will be selected and located away from air operations areas.

- **Project #18**: Develop a native vegetation planting plan to support the BASH Plan in coordination with local garden and nature clubs.

- Task: Using photographs, GIS and field reconnaissance, select areas for the planting of native trees and shrubs.

- Task: Determine and select a menu of hard mast native trees and appropriate shrubs.

- Task: Develop planting plan and sequence of planting.

- Task: Brief local Carswell Garden Club, local nature clubs and other stakeholders in the plan and solicit their support.

- Task: Provide escort and assistance to club members in the planting of hard mast trees and shrubs away from flight operations.

- Task: Using local volunteers and minimal military personnel, conduct a Bird Assessment of the various bird species seen on the Installation throughout the year.

Estimated Cost: $5,000

Implementation Date (FY): 2005

Objective #12: Improve the natural values and aesthetic qualities of Operational/Urban Lands.

Educational opportunities can be incorporated with other natural resources management activities within the Operational/Urban Lands Management Unit. An educational program that showcases the Navy's efforts in stewardship will be developed through the MWR office of NAS JRB Fort Worth. The main focus of the program will be to provide positive public relations and foster a sense of stewardship in participants. This educational program will enlist the assistance of local educational institutions and conservation groups, and will emphasize the importance of natural resources management and conservation, and the way in which NAS JRB Fort Worth is managing and conserving natural resources. Such a program will be flexible enough to cover multiple age groups, and be of interest to military personnel and their dependents stationed at NAS JRB Fort Worth and the civilian population surrounding the Installation.

Another program component that can be developed on the Installation is an urban multi-use nature trail, complete with signs printed with information regarding examples of successful natural resources management activities, such as wetlands, use of native vegetation in landscaping and wildflower vegetated areas. An outreach program will be developed to present this information to communities neighboring NAS JRB Fort Worth and to provide positive public relations for natural resources management and community support for management activities on the Installation. This educational program will include providing a multimedia presentation to interested civic and conservation groups, local schools, and the general public.

- **Project #19:** Develop a plan for the revegetation of unnecessary impervious cover areas on the Installation.

- Task: Using GIS capabilities, identify all areas of impervious cover on the Installation.

- Task: Determine unnecessary areas of impervious cover.

- Task: Develop cost analysis for impervious cover reduction.

- Task: Research viable alternatives to reduce impervious cover that would not negatively impact the military mission of the Installation.

- Task: Implement authorized impervious cover reduction on a priority basis.

Estimated Cost: $35,000

Implementation Date (FY): 2007

- **Project #20:** Create native landscaping around existing drainage areas to enhance aesthetic value and reduce maintenance costs.

- Task: Identify existing areas within the Installation that would benefit from native landscaping enhancement.

- Task: Utilize native vegetation accustomed to slightly wetter environments.

Estimated Cost: $25,000

Implementation Date (FY): 2008

Objective #13: Foster and promote natural resource stewardship among military and civilian personnel.

- **Project #21:** Develop an educational program showcasing the Navy's efforts in Environmental Stewardship on NAS JRB Fort Worth.

- Task: Develop an educational briefing that can later be developed as a video presentation illustrating the Installation's efforts in:

  1. Conservation and rehabilitation of land resources.
  2. Protection of environmentally sensitive areas on the Installation.
  3. The use of native plants for landscaping and cost savings.
  4. The use of organic pesticides, herbicides, and fertilizers to promote a healthy, safe environment.
  5. Problem areas and solutions – BASH vs. Sensitive Bird Areas.
  6. Future plans for the incorporation of natural resource protection.
  7. Location and age of natural resource projects.
  8. List of stakeholders and those participating in Environmental Stewardship.

- Task: Incorporate the above briefing in the orientation of new personnel and in occasional briefings to local nature and service clubs.

Estimated Cost: $16,000

Implementation Date (FY): 2005 - 2007, and 2009 - 2011

Estimated Cost: $10,000 video update

Implementation Date (FY): 2008

- **Project #22**: Development of a multi-use nature trail.

- Task: Using photography, GIS Databases, the NAS JRB Fort Worth Natural Resources Study, field reconnaissance and the planning in the various portions of this INRMP, determine the best route for a multi-use walking, jogging, and nature study trail to best illustrate the Navy stewardship in natural resource management activities.
- Task: Determine the most natural supportive surface for the trail, incorporating the natural resources where possible and having the trail designed to show the best uses of native plants typical of the various areas of the Installation.

- Task: Develop signage that indicates type of vegetation, sensitivity of the resource, planted by whom and when. Example: "Honey Locust Tree, rugged native to northern Texas, food for deer, rabbits and quail, planted by the Carswell Garden Club, 2003."

- Task: Seek assistance of local service organizations for the building and maintenance of the multi-use nature trail.

Estimated Cost: $50,000

Implementation Date (FY): 2005 - 2011

- **Project #23:** Update this INRMP on a 5-year cycle in accordance with the Sikes Act Improvement Act Amendments.

Estimated Cost: Update $45,500

Implementation Date (FY): 2010

Estimated Cost: Re-write $115,000

Implementation Date (FY): 2015

- **Project #24:** Provide annual training for INRMP Manager.

Estimated Cost: $5,000 per year

Implementation Date (FY): 2005 - 2011

Objective #14: Implementation of best management practices to support NAS JRB Fort Worth's ongoing environmental efforts.

- **Project #25:** Identification and implementation of pervious pavement techniques as a demonstration program.

- Task: Using GIS data, identify areas where pervious pavement could be utilized.

- Task: Identify feasible pervious pavement techniques that would not detract from the military mission.

- Task: Based on the success of the demonstration program, implement the use of pervious pavement techniques in conjunction with future developments.

Estimated Cost: $5,000

Implementation Date (FY): 2007

- **Project #26:** Utilize low-maintenance/low input landscaping techniques to reduce water consumption, chemical applications and maintenance costs.

- Task: Plant native species when existing landscaped vegetation needs to be replaced.

- Task: Plant new landscaped areas with native vegetation.

- Task: Introduce the use of organic fertilizer, pesticides and herbicides in native and ornamental landscaped areas.

Estimated Cost: $3,000 per year

Implementation Date (FY): 2005 - 2011

The landscaping program will be supplemented by using native ornamental plants that do not require as much fertilizers or pesticide use as non-native ornamental plants. County Extension Agents and local native plant societies can provide advice on which plants are suitable for specific tasks, and will be consulted as plantings of native vegetation are initiated. *Appendix C* lists native plants commonly used in the local area for landscaping and ground cover. The reduction in use of chemicals also reduces expenses associated with materials and the labor required to apply the chemicals.

Objective #15: Implementation of a Geographic Information System to support NAS JRB Fort Worth's ongoing environmental efforts.

- **Project #27:** Conduct GIS training workshops at NAS JRB Fort Worth.

- Task: Fundamental and advanced training on ArcGIS to GIS Users Group.

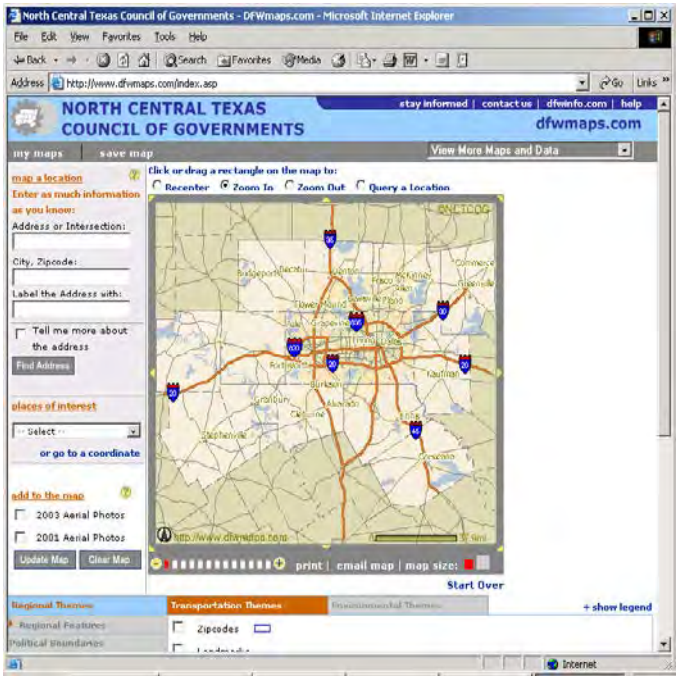
- Task: Identify feasible day and location for an annual event on GIS awareness at NAS JRB Fort Worth.

- Task: Prepare operating plan to establish quarterly GIS meetings at the Installation that update users.

Estimated Cost: $35,000

Implementation Date (FY): 2005-2011

- **Project #28:** Development and implementation of an interactive intranet GIS website using ArcIMS for species surveying and monitoring aboard NAS JRB Fort Worth.



- Task: Using existing GIS data, identify Installation user groups that could benefit from an interactive intranet GIS website.

- Task: Identify routine daily functions and queries where a GIS intranet website could benefit everyday activities.

- Task: Obtain and install necessary software and hardware.

- Task: Develop and Implement ArcIMS intranet website.

- Task: Conduct ArcIMS demonstrations at the Installation using ArcIMS intranet website.

Estimated Cost: $100,000 (cost dependent on acquisition of 3 or 4 licenses)

Implementation Date (FY): 2008

TABLE 4-6
NAS JRB FORT WORTH INRMP PROJECTS SUMMARY

Project #	Project Description	Scheduled Implementation (FY)	Prime Legal Driver	Navy Assessment Level (*2)	Budget Priority (*1)	Budget Criteria (*3)	Cost Estimate $$	Source of Funds	NEPA Requirement (*4)	Status/Comments
1	Update data relating to wetlands and other sensitive habitat types determined to be a part of the Ecological Preserve Land Management Unit.	2006, 2011	15, 5, 14, 10	1	M	12016	10,000	ENV, STA, AO, NRR	No	
2	Conduct biological species inventories on NAS JRB Forth Worth every five years.	2008,	1, 9, 14	1	M	12025	60,000	ENV, STA, AO, NRR	No	
3	Develop a GIS database tree inventory of NAS JRB Fort Worth.	2005	1, 4, 9, 14, 16	1	M	12025	100,000	AO, ENV, NRR, STA	No	
4	Conduct a survey to identify invasive, nuisance and noxious plant and insect species on the Installation.	2007	1, 9, 11, 14, 16	1	M	12025	10,000	AO, ENV, NRR, STA	No	
5	Develop a program to initiate the use of organic methods to curtail the growth and progression of invasive, nuisance and noxious plant and insect species on the Installation.	2008	1, 4, 9, 10, 11, 16	1	M	12025	25,000	AO, ENV, FOR, NRR, STA,	No	
6	Develop roosting and nesting areas for bats and birds that can be used as bio-controls for insect pests.	2006	15	5	S	12018 12016	10,000	STA. NRR, AO	Yes	
7	Update Integrated Pest Management Plan which should be used in conjunction with the INRMP.	2005	1, 4, 9, 10, 11, 16, 17, 18, 19	1	M	10993	80,000	ENV, STA, NRR	No	
8	Design and install an educational gazebo and multi-use nature trail adjacent to the wetland.	2009	9, 14	5	S	12018	50,000	STA, AO, NRR, MWR, LY	Yes	
9	Identify and map sensitive habitats in the Shoreline Management Unit.	2009, 2011	5, 14, 9	1	M	12028	65,000	ENV, STA, AO, NRR	No	
10	Identify and control erosion along the shoreline of Lake Worth	2009	5, 15	1	M	12035	250,000	ENV, STA, AO, NRR	No	
11(a)	Determine the interest for a fishing pier along Lake Worth.	2006	13	5	S	12038	10,000	STA, NRR, MWR	No	
11(b)	Build the fishing pier, if sufficient interest exists in Project #11(a).	2008	13	5	S	12038	150,000	STA, NRR, MWR	Yes	
12	Develop an outdoor learning program for children that focuses on fishing and aquatic ecology in conjunction with the fishing pier project.	2009	9, 15	5	S	12018	10,000	ENV, STA, MWR, NRR	No	
13(a)	Identify unimproved lands within the ownership of NAS JRB Fort Worth for the purposes of controlling soil erosion.	2005 - 2011	5, 15	1	M	12028	8,000	ENV, STA, LY	No	
13(b)	Implement a program to control soil erosion throughout the unimproved lands of the Installation.	2007	5, 15	1	M	12035	40,000	ENV	No	
14	Update the BASH Plan.	2008	5,15	1	M		15,000		No	
15	Review effectiveness of the BASH Program, provide recommendations, and implement recommendations.	2005	2	1	M	12019	5,000	ENV, STA, LY	No	
16	Plant a wildflower and native vegetation viewing area and nature path through an unimproved land parcel to enhance aesthetic qualities of the Installation.	2005	5, 15	5	S	12018	11,500	ENV, STA, MWR, NRR	No	
17	Implement the best management practices in the SWPPP.	2005-2011	5, 16	1	M	08005	*	ENV, STA	No	
18	Develop a native vegetation planting plan to support the BASH Plan in coordination with local garden and nature clubs.	2005	9, 15	5	S	12015	5,000	ENV, STA, AO, NRR, FR	No	
19	Develop a plan for the reduction of impervious cover on the Installation.	2007	25, 10, 14, 15, 16	5	S	12015	35,000	ENV, STA, AO, NRR	No	
20	Create native landscaping around existing drainage areas to enhance aesthetic value and reduce maintenance costs.	2008	5, 10, 14, 15, 16,	5	S	12015	25,000	ENV, STA, NRR	No	
21	Develop an educational program showcasing the Navy's efforts in environmental stewardship on NAS JRB Fort Worth.	2005 - 2011	15	5	S	12018	26,000	STA, NRR, MWR	No	
22	Development of a multi-use nature trail.	2005 - 2011	15	5	S	12018	50,000	STA, NRR, AOL, MWR	Yes	
23	Update this INRMP on a 5-year cycle in accordance with the Sikes Act Improvement Act Amendments.	2010	2	1	M	12026	136,500	STA, ENV, AO, NRR, FR	Yes	
24	Provide yearly training for INRMP Manager.	2005 - 2011	9	5	M	12941	35,000	ENV	No	
25	Identification and implementation of pervious pavement techniques.	2007	2, 5, 10, 14, 15, 16	5	S	12015	5,000	ENV, STA, NRR, MWR	No	
26	Utilize low-maintenance/low input landscaping techniques to reduce water consumption, chemical applications and maintenance costs.	2005 - 2011	2, 5, 9, 10, 15, 16	2	S	12015	21,000	ENV, STA, MWR, NRR	No	
27	Conduct GIS training workshops at NAS JRB Fort Worth.	2005 - 2011	2, 15, 16	2	M	12940	35,000	ENV	No	
28	Development and implementation of an interactive intranet GIS website using ArcIMS for species surveying and monitoring aboard NAS JRB Fort Worth	2008	2, 15, 16	2	S	12025	100,000	ENV, STA, NRR	No	

(*1) M – Mandatory; S – Stewardship
(*2) Chief of Naval Operations PR-03 Environmental Requirements Guidebook (2000 Update)
(*3) "Guidebook Number" from Chap. 12 of EPR Guidebook (Cookbook)
(*4) NEPA requirements may be addressed by the INRMP Programmatic Environmental Assessment, as appropriate.
(*) Funded Under A Separate Program

Source of Funds

STA	Station O&MNR	LY	Legacy
FOR	Forestry	ENV	Environmental O&MNR
AO	Agricultural Outleasing	MWR	Morale, Welfare & Recreation
NRR	Natural Resources Reserve	UF	User Fee
FR	Forestry Reserve		

Navy Assessment Levels

1	Legal Requirement
2	Navy Policy
3	Pending Regulations
4	Future Requirement
5	Leadership Initiative

Primary Legal Drivers

(1)	7 USC 2814	Management of Undesirable Plants on Federal Lands
(2)	16 USC 670a-f	Sikes Act Improvement Act
(3)	16 USC 1456	Coastal Zone Management Act
(4)	16 USC 1531 & 1536	Endangered Species Act
(5)	33 USC 1251	Clean Water Act
(6)	16 USC 1955	Magnuson Stevenson Fisheries Management Act
(7)	6 USC 703	Migratory Bird Treaty Act
(8)	16 USC 4408	North American Wetland Conservation Act
(9)	32 CFR 190	Natural Resources Management Program
(10)	EO 13148	Greening the Government Through Environmental Management
(11)	EO 13112	Invasive Species
(12)	EO 13089	Coral Reef Protection
(13)	EO 12962	Recreational Fisheries
(14)	EO 11990	Protection of Wetlands
(15)	DOD INST 4715.3	Environmental Conservation Program
(16)	OPNAVINST 5090.1B	Navy Instruction For Managing Natural Resources
(17)	DODINST 4150.7	DOD Instruction For Managing Pest Management Programs
(18)	OPNAVINST 6250.4C-5B	Navy Instruction For Managing Pest Management Plans/Programs
(19)	MOA May 6, 1986	Memorandum of Agreement between the Texas Department of Agriculture/Commerce and Department of Defense signed May 6, 1986

TABLE 4-7
NAS JRB FORT WORTH INRMP PROJECT COST BY FISCAL YEAR

Project #	Funding	2005	2006	2007	2008	2009	2010	2011	Total
1	M		$ 10,000					$ 10,000	$ 20,000
2	M				$ 60,000				$ 60,000
3	S	$100,000							$ 100,000
4	S			$ 10,000					$ 10,000
5	M				$ 25,000				$ 25,000
6	S		$ 10,000						$ 10,000
7	M	$ 80,000							$ 80,000
8	S					$ 50,000			$ 50,000
9	M					$ 50,000		$ 15,000	$ 65,000
10	M					$250,000			$ 250,000
11(a)	S		$ 10,000						$ 10,000
11(b)	S				$150,000				$ 150,000
12	S					$ 10,000			$ 10,000
13(a)	M	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1.000	$ 7,000
13(b)	M			$ 40,000					$ 40,000
14	M				$ 15,000				$ 20,000
15	M	$ 5,000							$ 5,000
16	S	$ 8,000	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 11,000
17	M	*	*	*	*	*	*	*	*
18	S	$ 5,000							$ 5,000
19	S			$ 35,000					$ 35,000
20	S				$ 25,000				$ 25,000
21	S	$ 16,000			$ 10,000				$ 26,000
22	S	$ 50,000							$ 50,000
23	M						$ 45,500		$ 136,500
24	M	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 35,000
25	S			$ 5,000					$ 5,000
26	S	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 21,000
27	M	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 35,000
28	S				$100,000				$ 100,000
Total M		$ 96,000	$ 21,000	$ 51,000	$111,000	$311,000	$ 56,500	$ 36,000	$ 682,500
Total S		$182,000	$ 23,500	$ 53,500	$288,500	$ 63,500	$ 3,500	$ 3,500	$ 618,000
Total All		$278,000	$ 44,500	$ 104,500	$399,500	$374,500	$ 60,000	$ 39,500	**$1,300,500**

* Funded Under ERMS Project 83447B0094

5.0 REFERENCES

Buck, Jan. Zoonosis Control Center, Arlington District, Phone conversation 25 July 2000.

Buck, Jan. Zoonosis Control Center. Arlington District. Email 12 November 2003.

Bureau of Economic Geology. 1983. Geological Atlas of Texas, Dallas Sheet, Austin, Texas.

Davis, J.D. Natural Resource Damage Assessment Pre-Incident Planning and Information Document, Naval Air Station Joint Reserve Base, Fort Worth, 1999. 21 pp.

Dixon, J. R. Amphibians and Reptiles of Texas. 2000 Texas A&M University Press, College Station, Texas. 421 pp.

Foote, L. E. and S. B. Jones, Jr. Native Shrubs and Woody Vines of the Southeast. 1998. Timber Press, Portland, Oregon. 199 pp.

Garrett, J. H. Plants of the Metroplex. 2000 University of Texas Press, Austin, Texas. 90 pp.

Gould, F. W. 1975. The Grasses of Texas. 1996 Texas A&M University Press, College Station, Texas. 653 pp.

Hatch, S. L. and J. Pluhar Texas Range Plants. 1995 Texas A&M University Press, College Station, Texas. 326 pp.

Morgan, D. L. An Inventory of the Woody Plants at Carswell AFB, Texas. Undated. Texas Tech University, Lubbock, Texas. 36 pp.

Natural Resources Conservation Service, 1999. Soil Erosion and Management Plan, Joint Reserve Base, Ft. Worth, Texas, U.S. Dept of Agriculture, 24 pp

Naval Air Station – Joint Reserve Base. Base Exterior Architectural Plan. Undated. 44 pp.

Naval Facilities Engineering Command (NAVFAC) P-73. Procedural Manual, Natural Resources Management, Volume II.

Peterson, R.T. A Field Guide to the Birds of Texas and Adjacent States. Sponsored by the Texas Parks and Wildlife Department and the National Audubon Society. 1995 Houghton Mifflin Company, Boston, Mass. 304 pp.

Soil Conservation Service. 1979. Soil Survey of Tarrant County, Texas. U.S. Dept. of Agriculture, Soil Conservation Service.

Tennant, A. A Field Guide to Texas Snakes, Second Edition, 1998. Gulf Publishing Co., Houston, Texas. 291 pp.

Texas Natural Resource Conservation Commission (TCEQ) and Texas State Soil and Water Conservation Board. 1999. Draft Texas Nonpoint Source Pollution Assessment Report and Management Program (August 1999). Austin, Texas.

Texas Natural Resource Conservation Commission (TCEQ) 1996. The State of Texas Water Quality Inventory and Surface Water Quality Monitoring Program – Trinity River Basin. 758 pp.

Texas Parks and Wildlife. 1991. Endangered Resources Annual Status Report, Resource Protection Division. 250 pp.

Texas Parks and Wildlife. 2000. Threatened and Endangered Species for Tarrant County, Texas

Texas Tech University, Carswell Air Force Base Landscape Study, 1990. Texas Tech. Department of Park Administration and Landscape Architecture, Lubbock, Texas. 121 pp.

Texas Water Commission and Texas State Soil and Water Conservation Board. 1991. Update to the Nonpoint Source Water Pollution Management Report for the State of Texas. Austin, Texas.

U.S. Air Force. Basewide Environmental Baseline Survey Carswell Air Force Base, Texas, December, 1993. 145 pp.

U.S. Air Force. Final Environmental Impact Statement Disposal and Reuse of Carswell Air Force Base, Texas. 1994. Air Force Center for Environmental Excellence, Brooks Air Force Base, Texas. 426 pp.

U.S. Army Corps of Engineers. Wetland Inventory Naval Air Station Fort Worth Joint Reserve Base. 20 December, 1996. 23 pp.

U.S. Fish and Wildlife Service, 1991. Revised June, 1995. Threatened and Endangered Species of Texas. 200 pp.

U.S. Fish and Wildlife Service, 1995. Revised June, 2000. Threatened and Endangered Species of Tarrant County, Texas.

U.S. Fish and Wildlife Service, 2003. Revised October, 2003. Threatened and Endangered Species of Tarrant County, Texas.

U.S. Navy. Naval Air Station Joint Reserve Base at Carswell Field Ft. Worth, Master Plan, September 1994. 39 pp.

Zoretic, Dr. James A., MD. Zoonosis Control Center, Arlington District, Phone conversation 25 July 2000.

6.0 LIST OF PREPARERS

The Navy liaisons associated with the preparation of this document are:

Mr. William Drawdy & Mr. Gary Herndon
Southern Division, Naval Facilities Engineering Command
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Mr. John Davis
Naval Air Station Joint Reserve Base
Fort Worth, Texas 76127

The contractor responsible for preparing this document is:

Turner Collie & Braden Inc.
17300 Dallas Parkway
Suite 1010
Dallas, Texas 75248

The following individuals contributed to this Integrated Natural Resource Management Plan:

Name and Document Contribution	**Associated Professional Expertise**
Robert C. Esenwein, C.E.P. Certified Environmental Professional Associate Vice President, Principal	Technical Director, Environmental Planning. Over twenty years of experience in preparing and managing interdisciplinary environmental studies and environmental assessments and impact statements, and coordinating permitting activities.
Jimmy L. Kosclski, P.E. Project Engineer	Senior Engineer. Twenty-five years of experience in water resource planning and environmental planning studies.
Daniel J. Murphy Senior Project Manager	Quality Control. Nineteen years of experience in environmental planning, regulatory compliance, habitat assessment, wetlands and threatened and endangered species reviews.
Jonathan M. Stewart Project Manager	Project Manager. Eighteen years of experience in environmental planning, regulatory compliance, habitat assessment, wetlands and threatened and endangered species reviews.

Steven S. Peacock, C.E.A.C Certified Environmental Assessment Consultant	Staff Environmental Specialist. Four years of experience in storm water monitoring and management, forest and grasslands mitigation and restoration, habitat assessment, threatened and endangered species reviews and environmental studies.
J. Moss Fennell Environmental Specialist	Staff Environmental Specialist. Seven years of experience in preparing environmental assessments, environmental impact statements, and related studies, habitat assessment, wetland reviews, threatened and endangered species reviews and environmental studies.
Teresa C. Barlow Environmental Specialist	Staff Environmental Specialist. One year of experience in preparing environmental assessments and categorical exclusions, and related studies, habitat assessment, wetland reviews, threatened and endangered species reviews and environmental studies.
Linda Hensell Planner	Environmental Specialist. Five years of experience in preparing environmental assessments and environmental impact statements, and related studies.
Matthew L. Abbe Engineer-In-Training	Graduate Engineer – Two years of experience in hydraulic and hydrology studies, habitat assessments and environmental studies.
Angely M. Aguilar Graphic Design	CAD Technician. Seven years of experience in drafting and technical graphic design.
Gayl L. Tobias Document Production	Administrative Assistant. Seventeen years of experience in preparation of NEPA documents.

Appendix C contains information that is not available in an electronic format. Copies were made from the original INRMP to include in the INRMP Update.

Appendix H includes copies of letters which have not been scanned into the computer and therefore no electronic copies are available. Copies were made from the original INRMP to include in the INRMP Update.

Most of the information contained in Appendix I is not in electronic form. One letter is available electronically and is found on this CD. All other components of this appendix are copies of the original documents that are on file with the Navy.

APPENDIX A

BASIC MAINTENANCE CRITERIA

APPENDIX A

Basic Maintenance Criteria

The basic maintenance criteria include mowing, grass establishment; fertilizer application; landscaping; pruning and trimming; weed control; disease, insects, and other plant pest treatment; erosion repair; protection of natural vegetation; the correction of ground maintenance deficiencies; and, mitigation for tree species removed from the Installation. These criteria have been determined to be the best and most economical for NAS JRB Fort Worth.

Mowing

Mowing the grass too low or too high can cause deterioration to many vegetative areas. Mowing the grass too low can cause disease, susceptibility to drought, invasion by weeds, compaction, and heat damage, while mowing too high encourages disease and insects. Therefore the grass should be mowed in the appropriate areas on the Installation as follows:

I	2 to 4 inches
SI	3 to 6 inches
U	7 to 14 inches
O	3 to 5 inches
BASH	7 to 14 inches

Grass Establishment

Grass should be established by seeding with the desired species. Little bluestem, silver bluestem, sand lovegrass, three-awn, spangle-grass, beaked panicum, buffalo grass, blue gram and sideoats grama are some of the recommended native grasses that could be used for landscaped areas of the Installation. St. Augustine and bermuda grasses are non-native species that are commonly used for landscaping in the areas around the Installation. Sodding, sprigging, and plugging are methods that can be used to establish the grass.

Fertilizer Application

Only organic fertilizers are to be used on the Installation. Whenever lawns are to be fertilized, a soil test should be performed to determine the amount of fertilizer to utilize. If a soil test is not performed, then apply 150 pounds per acre (lb/ac) between March 15 and April 15, and also between August 15 and September 15. Trees should be fertilized as needed, but is not recommended. Consult the NAS JRB Environmental Department for advice and technical assistance in maintaining and replacement of all trees.

Landscaping

Proper landscaping methods should be used to ensure that basic maintenance criteria are met. These methods include the selection of quality plant materials, proper planting techniques, and proper maintenance. Trees are to be planted during the fall, winter, or early spring, and should be planted 20 feet (ft) away from buildings (3 ft for shrubs), and 10 ft away from

sidewalks or paved areas. Trees should be planted so that they do not grow into power lines or obstruct the view at intersections. Consult the NAS JRB Fort Worth Environmental Department for technical assistance and guidance in this area.

Pruning and Trimming

Pruning and trimming of trees shall be performed as basic maintenance to remove old limbs, injured, diseased or dead limbs, and limbs that interfere with other limbs so that new growth can occur. Shrubs should be trimmed while the shrub is dormant or immediately after blooming to produce attractive plants. Evergreens should be trimmed just before growth begins in the spring.

Weed Control

Proper maintenance through mowing and fertilization should control the growth of weeds. To eliminate weeds, herbicides should be applied on Improved areas. Semi-Improved areas should apply the same method for Improved areas, with the exception of areas that cannot be reached by mowing or brush hogging. In these areas, use a herbicide to remove the undesired growth. All other areas should be controlled with trimming and herbicide. The herbicide should be applied by a trained professional and should not be placed on St. Augustine lawns or within 75 ft of the dripline of trees and shrubs.

Disease, Insects, and Other Plant Pest Treatment

The NAS JRB Environmental Department should be contacted for information or treatment or disease, insects, and other plant pest treatments. If pesticides are used to eradicate a problem, then proper usage of the pesticide must be followed.

Erosion Repair

Erosion repair is recommended by NAS JRB Fort Worth to be executed by refilling the topsoil with 6 to 12 in of topsoil and then using an erosion control fabric to hold the soil in place until the soil is revegetated. Jute mesh or Enkamat are the suggested fabrics.

Protection of Natural Vegetation

Vegetation should be protected whenever there are construction activities at the Installation. Any construction must be coordinated and reviewed by the NAS JRB Fort Worth Environmental Department, Natural Resource Manager to ensure proper methods are utilized.

Correction of Ground Maintenance Deficiencies

The Grounds Maintenance Manager should review these deficiencies so that he/she can aid the Public Works Officer in creating a quality control plan for the maintenance program. Reviewing and then correcting these deficiencies can help to maintain the appearance of the Installation.

Mitigation for Tree Species Removed from the Installation

If possible, mature trees (greater than 20 in diameter at breast height) should not be removed from the Installation unless they cause interference with the BASH plan. However, if removal is necessary due to new development or BASH purposes, mitigation would be required. The following criteria should be adhered to for tree replacement: 1) two trees will be planted for each tree removed; 2) 30, 40 or 50 gallon trees will be used to replace the removed trees; 3) only containerized stock can be used for replacement; 4) planting time and location will be specified by Installation Environmental staff; and, 5) only native species will be used in accordance with the BASH plan. Appendices C and D provide more information pertaining to native tree planting.

APPENDIX B

NAS JRB FORT WORTH INSTRUCTION 3750.12

BIRD/ANIMAL AIRCRAFT STRIKE HAZARD

(BASH) PLAN

Naval Air Station Joint Reserve Base Fort Worth

BIRD AIRCRAFT STRIKE HAZARD (BASH) REDUCTION PLAN

SEPTEMBER 2003

DRAFT BIRD AIRCRAFT STRIKE HAZARD (BASH) 4
REDUCTION PLAN 4
Naval Air Station – Joint Reserve Base 4
Fort Worth, Texas 4
1 SITUATION 6
1.1 General 6
1.1.1 Background 6
1.1.2 General Topography 7
1.1.3 Developed Area 7
1.1.4 Vegetation Cover Types 7
1.1.5 Landfills 7
1.1.6 Habitats 7
1.2 Species 8
1.3 Explanation of Terms 8
1.3.1 Active Bird Dispersal 8
1.3.2 BASH (Bird-Aircraft-Strike-Hazard) 8
1.3.3 BASH Advisory 8
1.3.4 BASH Detection and Dispersal Team (BDDT) 8
1.3.5 BASH Phase 8
1.3.6 Bioacoustics 8
1.3.7 Bird Exclusion Zone 8
1.3.8 Bird Strike 8
1.3.9 BHC (Bird Hazard Condition) 8
1.3.10 BHC Moderate 8
1.3.11 BHC Severe 9
1.3.12 BHWG (Bird Hazard Working Group) 9
1.3.13 Depredation 9
1.3.14 Falconry 9
1.3.15 Hazing Dogs 9
1.3.16 Models/Decoys 9
1.3.17 Propane Cannons 9
1.3.18 Pyrotechnics 9
1.3.19 Wildlife Services (WS) 9
2 ORGANIZATIONAL TASKS AND RESPONSIBILITIES 10
BIRD HAZARD WORKING GROUP (BHWG) 10
2.1 General 10
2.1.1 Composition 10
As a minimum, the group shall have a representative assigned from the following specialties: 10
2.1.2 Authority 10
The Commanding Officer is responsible for the BASH Program and is approval authority for all BHWG recommendations. BHWG Co-Chairpersons shall be appointed, normally one representative each from Operations and Environmental Departments since the majority of BASH actions are coordinated through these departments. The BASH Program is a part of the Aviation Safety Program, and as such, the Aviation Safety Officer shall monitor the effectiveness of the program… 10

2.1.3 BHWG Meeting Schedule 10
BHWG meetings will follow the quarterly Aviation Safety meeting. Additionally, the BHWG will meet as often as necessary to stay current on bird hazards and to discuss solutions, results, and effectiveness of the program. An important concept is that the BHWG address problems as they develop, before they create a serious safety hazard. 10
2.1.4 BHWG Function 10
7. Identify and recommend actions to reduce hazards. 11
2.2 Aviation Safety Officer (ASO) 11
2.3 Assistant Aviation Safety Officer (AASO) 12
2.4 Air Traffic Control Officer (ATCO) 12
2.5 Public Works Officer (PWC) 12
2.6 Security Officer (SO) 13
2.7 Environmental Department (ED) 13
2.8 Public Affairs (PA) 14
2.9 Naval Training Meteorological Detachment NAVTRAMETODET 14
3 CONCEPT OF OPERATIONS 15
3.1 General 15
3.2 Bird Hazard Warning System 15
3.2.1 BHC (Severe) 15
3.2.2 BHC (Moderate) 15
3.2.3 BASH Phase 16
3.3 Aircrew Reporting 16
3.4 Downgrading BHC 16
3.5 Bird Hazard Communication 16
3.5.1 Control Tower Communications (CTC) 16
3.5.2 Base Operations Communications (BOC) 17
3.5.3 Meteorological and Oceanographic Office Communications 17
3.5.4 Bird Dispersal Team Procedures 17
3.6 BASH Dispersal Equipment (BDE) 17
3.6.1 General 17
3.6.2 Static Deterrent Devices 17
3.6.3 Propane Cannons 18
3.6.4 Bioacoustics 18
3.6.5 Lethal Control (Depredation) 18
3.6.6 Record keeping 18
3.7 Land Management Procedures 18
3.7.1 Managing Grass Height 18
3.7.2 Controlling Broad-leafed Weeds 19
3.7.3 Planting Bare Areas 19
3.7.4 Fertilizing 19
3.7.5 Removing Edge Effect 19
3.7.6 Leveling of Airfield 19
3.7.7 Removing Dead Vegetation 19
3.7.8 Remove Bird and Animal Carcasses from the Airfield 20
3.7.9 Pest Control 20

3.7.10 Maintaining Drainage Ditches 20
3.7.11 Employing Erosion Control Vegetation 20
3.7.12 Controlling Waste Disposal 20
3.7.13 Eliminate Roosting Sites 20
3.7.14 Bird Proof Buildings and Hangars 20
3.8 Managing Off-Base Land Use 21
4 AIRCREW INFORMATION 22
4.1 Planning the Flight 22
4.2 At the Aerodrome 22
4.3 Bird Strike Reporting 23
4.4 Bird Identification 23
4.5 Operational Limits and Go/No-Go Criteria 24
5 chapter 5 LOCAL SPECIES 25
5.1 General 25
5.1.1 Avian Species 25
5.1.1.2 Gulls 25
5.1.1.3 Waterfowl 25
5.1.1.4 Loon, Grebes, Cormorants, Mergansers 26
5.1.1.5 Long-legged Waders (Herons and Egrets) 26
5.1.1.6 Raptors (Hawks, Falcons, Kites, Eagles, Vultures) 26
5.1.1.7 Sandpipers/Shorebirds 26
5.1.1.8 Owls 26
5.1.1.9 Swallows and Swifts 26
5.1.1.10 Crows and Ravens 26
5.1.1.11 Blackbirds, Grackles, Cowbirds, and Starlings 27
5.1.1.12 Meadowlarks 27
5.1.1.13 House Sparrows 27
5.1.1.14 Dove (Mourning and White-winged) 27
5.1.1.15 Flycatchers 27
5.1.1.16 Shrikes 28
5.2 Mammalian Species 28
5.2.1 Rabbits 28
5.2.2 Rodents 28
chapter 6 RECOMMENDATIONS 29
APPENDICES 30
6 APPENDIX C 33

BIRD AIRCRAFT STRIKE HAZARD (BASH) REDUCTION PLAN

NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH, TEXAS

SUMMARY

I. **Purpose:** The purpose of this plan is to significantly reduce the Bird Aircraft Strike Hazard (BASH) at Naval Air Station – Joint Reserve Base (NAS JRB) Fort Worth, Texas. Aircraft-bird strikes cannot and will not be accepted as unavoidable.

II. **Implementation:** This plan will be implemented upon receipt and remain active year round.

III. **References:**

(a) OPNAVINST 3750.6R

(b) OPNAVINST 5090.1B, Change 2.

(c) NAVFAC P-73 VOL II

(d) COMNAVAIRESFORINST 3750.1D

(e) Naval Safety Center BASH Guidance Package

(f) Federal Aviation Administration Order 5200.5B

(g) Federal Aviation Regulations (FAR) 77.28

(h) NASJRBFWINST 3710.1B

(i) Peterson, Roger T., Birds of Texas

(j) Integrated Natural Resources Management Plan for NAS JRB Fort Worth

(k) OPNAVINST 3710.7S

(l) Shrikes (Laniidae) of the World: Biology and Conservation. 1995. R. Yosef and F.E. Lohrer, Editors. Proc. Of the Western Foundation of Vertebrate Zoology 6(1). 343 pp.

(m) Migratory Shore and Upland Game Bird Management in North America. 1994. T.C. Tacha and C.E. Braun, Editors. International Association of Fish and Wildlife Agencies. 223 pp.

1 SITUATION

1.1 General

NAS JRB Fort Worth is located in north-central Texas in Tarrant County, 8 miles west of downtown Fort Worth (Appendix B) and encompasses 1,804 acres of land that is 650 feet above mean sea level. The station maintains one 12,000-foot main runway, and Taxiway Foxtrot (F) that is 3,400 feet long. Approximately one mile of Lake Worth's shoreline surrounds the north end of the main runway. The West Fork of the Trinity River and Westworth Village border the base to the east; the city of Fort Worth borders NAS JRB to the northeast and southeast, White Settlement to the west and southwest, Lockheed Martin Air Force Plant 4 to the west. The proximity of the station to water sources, landfills, a wildlife sanctuary and the central flyway creates a high potential for hazardous encounters between wildlife and aircraft on the NAS JRB flight line. Daily and seasonal movements of resident and migratory bird species create various levels of hazardous flight conditions, therefore the use of various techniques and organizations must be involved in the overall program. This plan is designed to:

a. Establish a Bird Hazard Working Group and designate responsibilities to its members.
b. Establish training for all base members concerning responsibilities and actions.
c. Establish procedures to identify high hazard situations and to aid supervisors and aircrews in alerting/discontinuing flight operations when required.
d. Establish aircraft and airfield operating procedures to avoid high hazard situations.
e. Provide a method for disseminating information to all tenant and transient aircrews on bird hazards and procedures for bird avoidance.
f. Establish passive techniques to decrease airfield attractiveness to birds.
g. Establish active/static techniques to disperse birds from the airfield.
h. Establish local procedures for reporting damaging/non-damaging bird strikes.
i. Establish procedures for collecting bird strike remains.

1.1.1 Background

Bird strikes have plagued naval aviation since its early beginnings. The Navy's first loss of life due to a bird strike occurred in 1914. From March 1995 to March 1997, naval aviators reported 1,420 bird strikes that resulted in 107 aircraft mishaps, 32 FODed engines and over 108 million dollars in damages.
Naval Safety Center data shows that 65 percent of all bird strikes occur within the airfield environment. The Safety Center also estimates that only 1 of 4 bird strikes is reported, suggesting that an even larger hazard exists.

While severe mishaps are rare events, it is difficult to estimate the absolute risk of a bird strike causing a crash. In aviation, it is customary to examine leading indicators that are correlated with mishap risk but occur much more often, i.e., bird populations, near-misses, engine damage and reported strikes. Increases in these factors are considered to show deterioration in the margin of safety, even if no mishaps take place. Historically, rises in leading indicators were a prelude to major mishaps.

1.1.2 General Topography

NAS JRB Fort Worth lies in the Grand Prairie section of the central lowlands of north central Texas. This physiographic province of Texas is normally a broad, gently sloping terrace. The topography of the area surrounding the installation consists of low relief plains that are broken by meandering courses of streams and rivers. The area is characterized by broad terraces sloping gently toward the east and interrupted by westward-facing escarpments. Elevations on NAS JRB Fort Worth range from 550 feet to 690 feet above MSL, from east to southwest. NAS JRB Fort Worth includes predominantly flat terrain with some hills, the Trinity River and Lake Worth.

1.1.3 Developed Area

NAS JRB Ft. Worth is comprised of approximately 1804 acres, of which 1754 acres or approximately 97% is developed. One thousand thirty-nine acres, or about 58% of the total acreage is occupied by buildings, parking areas, roads and other hard surfaces that prevent growth of vegetation, 715 acres are landscaped areas. The area surrounding NAS JRB is a mixture of commercial and residential communities with maintained vegetation.

1.1.4 Vegetation Cover Types

Forty-three percent of the installation is grassland. Little bluestem, big bluestem, Indian grass and buffalo grass are the most common species of grasses occurring in the non-landscaped areas, while the landscaped areas contain Bermuda grass and buffalo grass. Tree species include oaks, elms, poplars, willows, pecan, catalpa, and chinaberry. Shrubs and herbs include broad leaf weeds, wildflowers, rushes, cattails, etc.

1.1.5 Landfills

There are no active landfills on the Installation.

1.1.6 Habitats

Avian habitats on the Installation include wetlands, grasslands, Oak brush, Open water, and Shoreline. Waterfowl, wading birds, shorebirds, gulls, pigeons, grackles, raptors, doves, starlings, songbirds, meadowlarks, and sparrows are regular visitors to the installation.

1.2 Species

Chapter 5 contains a list of species regularly observed in the airfield area from BASH logs. During migration, other species are occasionally sighted on the flight line.

1.3 Explanation of Terms

1.3.1 Active Bird Dispersal

Harassment techniques employed to disperse birds from airfield and surrounding areas. Methods may include chase, pyrotechnics, bioacoustics, and depredation.

1.3.2 BASH (Bird-Aircraft-Strike-Hazard)

General term to describe bird hazards and bird hazard programs.

1.3.3 BASH Advisory

A radio transmission from ATC or aircrew reporting specific bird hazard information. May be real time or disseminated in ATIS broadcasts.

1.3.4 BASH Detection and Dispersal Team (BDDT)

Roving airport patrol that reports BHCs and disperses problem birds via chase, bioacoustics, depredation and other methods.

1.3.5 BASH Phase

Known periods of severe bird activity where restrictions to flight operations may be automatically imposed.

1.3.6 Bioacoustics

Recorded tapes of bird distress and predator calls used by BDDT to disperse birds off runways and airport areas.

1.3.7 Bird Exclusion Zone

The designated area surrounding the airfield where bird habitation is discouraged.

1.3.8 Bird Strike

Any contact between a bird or other animal and an aircraft, whether or not damage occurred.

1.3.9 BHC (Bird Hazard Condition)

A bird hazard alert condition used to warn aircrew of bird activity.

1.3.10 BHC Moderate

A BHC that indicates moderate concentrations of birds present in a location represents a probable hazard to flight operations.

1.3.11 BHC Severe
A severe BHC indicating high concentrations of birds on or immediately adjacent to the runway which presents an immediate hazard to flight operations; or any concentration of birds that presents a danger to aircraft.

1.3.12 BHWG (Bird Hazard Working Group)
Local committee of base and unit offices concerned with bird hazards. Develops modifications and monitors procedural execution of the BASH Plan. Evaluates program effectiveness and recommends program modifications to the Commanding Officer when necessary.

1.3.13 Depredation
Technique used to remove problem birds permanently from the airfield and hangars when other scare tactics are ineffective. Permits for some species are required

1.3.14 Falconry
Active dispersal of problem birds using trained falcons.

1.3.15 Hazing Dogs
Trained dogs used to scare birds/animals off the runway.

1.3.16 Models/Decoys
Various static devices used to disperse birds from airport areas. May include scarecrows, decoys, Mylar tape, and eye spots.

1.3.17 Propane Cannons
Stationary non-projectile sound producing device used to disperse birds from airport areas.

1.3.18 Pyrotechnics
Noise producing devices fired from pistol or shotgun. Used by BDDT to scare birds away from runways and airport areas. Pyrotechnics are Class 1.4 explosives. Pyrotechnics are not used at NAS JRB Ft Worth.

1.3.19 Wildlife Services (WS)
An office of the USDA Animal and Plant Health Inspection Service which may be under contract at installations to provide BASH assistance.

2 ORGANIZATIONAL TASKS AND RESPONSIBILITIES

BIRD HAZARD WORKING GROUP (BHWG)

2.1 General

The Bird Hazard Working Group is organized to implement and monitor the BASH Plan. It allows base offices affected by bird problems the opportunity to meet and discuss possible solutions. The BHWG shall meet regularly with representatives from each organization concerned with bird hazards.

2.1.1 Composition

As a minimum, the group shall have a representative assigned from the following specialties:

a. Aviation Safety
b. Operations Department
c. Environmental Department (Co-Chairman)
d. Air Traffic Control (Co-Chairman)
e. Public Works/Contract
f. Station Security (as required)
g. Naval Training Meteorological and Oceanographic Detachment (NAVTRAMETOCD) (as required)
h. Tenant aviation units

2.1.2 Authority

The Commanding Officer is responsible for the BASH Program and is approval authority for all BHWG recommendations. BHWG Co-Chairpersons shall be appointed, normally one representative each from Operations and Environmental Departments since the majority of BASH actions are coordinated through these departments. The BASH Program is a part of the Aviation Safety Program, and as such, the Aviation Safety Officer shall monitor the effectiveness of the program.

2.1.3 BHWG Meeting Schedule

BHWG meetings will follow the quarterly Aviation Safety meeting. Additionally, the BHWG will meet as often as necessary to stay current on bird hazards and to discuss solutions, results, and effectiveness of the program. An important concept is that the BHWG address problems as they develop, before they create a serious safety hazard.

2.1.4 BHWG Function

1. Execute and update the BASH Plan.
2. Monitor base-wide compliance with BASH Plan.

3. Collect, compile, and review data on all bird strikes.
4. Identify and recommend actions to reduce bird hazards.
5. Recommend changes in operational procedures.
6. Prepare informational programs and safety briefings for aircrews.
7. Identify and recommend actions to reduce hazards.

2.2 Aviation Safety Officer (ASO)

1. Monitor the status of the bird hazard reduction plan and ensure compliance of all organizations at NAS JRB Fort Worth. Provide training for assigned personnel.
2. Attend BHWG meetings.
3. Implement and monitor the effectiveness of the BASH program.
4. Conduct periodic reviews of the BASH program using the self-inspection checklist contained in Appendix I.
5. Ensure BASH program is a part of safety review conducted by the Naval Safety Center.
6. Identify high-risk areas such as landfills, lakes, sewage treatment facilities, and roosting areas, and propose solutions to the ASC to eliminate/reduce these hazards.
7. Provide information to BHWG for dissemination to aviation units on migratory, local and seasonal bird activities through contact with the U.S. Fish and Wildlife Service, Audubon Society, local ornithologists, and the station Natural Resources Manager.
8. Maintain close liaison with the following military/civilian agencies for information and guidance in implementing an effective BASH program:
a. Commander, Southern Division Naval Facilities Engineering Command, Natural Resources Wildlife Biologist (Code ES13). DSN 583-5590 or commercial 843-820-5590.
b. Navy BASH Coordinator, NAS Whidbey Island, DSN 820-1468, or commercial 360-257-1468.
c. USAF Bash Team HQ AFSC/SEFW, 9700 Ave G, SE Bldg. 24499 Kirtland AFB, NM 87117-5617. DSN 246-1440/2864. or comm. 505-846-1440.
d. Bird Strike USA Committee, Dept of Agriculture/Wildlife Services, 6100 Columbus Ave, Sandusky, OH 44870. Commercial 419-625-0242, or Internet at http://www.birdstrike.org.
9. Ensure key personnel attend BASH committee conferences to keep abreast of current bird/animal control techniques and equipment.
10 Report all bird strikes involving station aircraft by contacting Naval Safety Center via internet site: http://safetycenter.navy.mil. Phone the NAVSAFECEN BASH representative for information and assistance if needed at DSN 564-3520 ext.7281 (Code 114).
11. Compile bird strike statistics involving all station, tenant command, and transient aircraft. Report this status to Aviation Safety.

12. Plot reported bird strikes on maps depicting low-level routes and training areas used by NAS JRB Fort Worth based aircraft and disseminate this data to flying units.

2.3 Assistant Aviation Safety Officer (AASO)

1. Assist the ASO in the implementation and administration of the station's BASH program.
2. Assist assigned personnel (Operations, Transient-Line, Security) in bird scare tactics training utilizing bioacoustics, pyrotechnics, depredation and abatement techniques and use of equipment/pyrotechnic devices for optimum effect.
3. With the assistance of the Environmental Department, identify bird remains for all bird strikes involving NAS JRB Fort Worth aircraft and record data with the use of Appendix D.
4. When directed by the Naval Safety Center BASH Program Manager, send any unidentifiable remains to the Forensic Ornithologist, Research Associate, Smithsonian Institute, via NAVY BASH Program Manager ROICC Office, NAS Whidbey Island 1115 W. Lexington St. Bldg. 103 Oak Harbor, WA 98278-2400.
5. Evaluate new commercial equipment and techniques as they become available.
6. During the growing season, survey and record bi-weekly the grass/vegetation heights using Appendix F. Forward a copy to the Public Works Officer (PWO) via the ASO.
7. Survey and record bi-weekly live bird/animal activity using Appendix E.
8. When directed by the ASO, represent the command at the annual US BASH committee conference.

2.4 Air Traffic Control Officer (ATCO)

1. In the absence of BDDT, declare BHCs based on reported sightings or BHC criteria.
2. Pass BHC information to flight crews and NAVTRAMETOCDET.
3. Allow BDDT priority movement on the airfield to disperse birds on or near active runways.
4. Include BHC and bird advisory information in ATIS broadcasts.
5. Issue bird advisory information to aircraft over air traffic control frequencies per FAA Orders 7110.65 and 7210.3.
6. Make hourly bird activity observations. Relay activity level in plain language on ATIS broadcasts and to NAVTRAMETOCDET for inclusion in aircrew weather briefings.

2.5 Public Works Officer (PWC)

1. Serve as point of contact for off-base BASH issues (e.g. sanitary landfill sites/operation, land use).
2. Provide representation to BHWG.
3. Based upon the direction of the BHWG, maintain runway lateral and approach zones in a manner that is least attractive to birds.
4. Ensure training is conducted for all Public Works/Base Operating Support Contract personnel (sweepers, etc) covering responsibilities, actions, and techniques applied under this instruction.

5. Manufacture signs to discourage wildlife feeding. Signs should be placed in sensitive areas to educate the public to the hazard posed by feeding any wildlife, particularly waterfowl and gulls.
6. Ensure all trash receptacles in Bird Exclusion Zone have covers that prevent bird access and are emptied on a timely basis to prevent overflowing. Trash is a bird attractor.
7. Obtain and maintain depredation permits for protected species from the U.S. Fish and Wildlife Service, and state and local authorities.
8. When available, provide recycled propane gas for BASH cannons.
9. Control birds and their food sources in hangars and other structures.
10. Contract and coordinate activities of professional pest control agencies to minimize animal hazards to aircraft.
11. Coordinate the airfield habitat management plan.

2.6 Security Officer (SO)

1. Provide representation to BHWG when required.
2. Ensure that quarterly training is conducted for all security and gate personnel concerning BDDT procedures as applied under this instruction.
3. Enforce base regulations that prohibit the feeding of wildlife in BASH sensitive areas.
4. Ensure that a designated BASH patrol vehicle is available at the request of the ATCO/ASO.
5. Ensure that personnel assigned to the BASH vehicle respond immediately to ATCO/ASO requests for bird control action.

2.7 Environmental Department (ED)

1. Funding is being supplied by Base Operations and support of the BASH program.
2. Provide co-chairperson for BHWG.
3. Recommend changes to environmental conditions and management practices to reduce bird strike potential. These changes will be presented to the BHWG for consideration.
4. Initiate necessary environmental documentation for airfield modifications as required by law.
5. Conduct periodic avian/airfield surveys.
6. Maintain and review a file of all bird strikes occurring at NAS JRB Fort Worth.
7. Provide Natural Resources/WS support as outlined below:
a. Assist the ASO/AASO in training. This training will focus on the use and techniques of active scare methods, as well as placement of static deterrent devices.
b. Alert airfield management of migration seasons and unusual bird activity.
c. Coordinate wildlife studies as necessary to improve wildlife hazard control, assess the potential impacts of control activities on wildlife populations and distribution, and evaluate the potential effects of wildlife displacement.

2.8 Public Affairs (PA)

Public Affairs will provide a public information program designed to inform base personnel, dependents and the general public on the hazards of uncontrolled bird activity and the measures being taken to minimize the danger.

2.9 Naval Training Meteorological Detachment NAVTRAMETODET (Weather)

1. When required, provide representation at BHWG meetings.
2. Upon request, provide weather information such as frontal movements that may indicate a change in bird activity levels.
3. Assist in BHC reporting to aircrews.

3 CONCEPT OF OPERATIONS

3.1 General

The BASH program is an ongoing process that includes both information dissemination and active/passive bird control techniques. Of these processes, the most critical is the aircrew notification and warning system. This system establishes procedures for the immediate exchange of information between ground agencies and aircrews concerning the existence and location of birds that pose a hazard to flight safety. Additionally, a cautionary advisory is published in the DOD Flight Information Publication AP/1 under Supplementary Aerodrome Remarks.

3.2 Bird Hazard Warning System

The following standardized BHCs will be used at NAS JRB Fort Worth to warn aircrew and support personnel of the current bird threat to operations. These codes are identical to the USAF codes in section B of the DOD FLIP Flight Information Handbook. Bird locations should be given with the condition code.

3.2.1 BHC (Severe)

Generally defined as high concentrations of birds (more than 15 large or 30 small) on or immediately adjacent to the active runway or other specific locations that present an immediate hazard to flight operations. Active dispersal will be initiated during this condition and applicable Go/No-go restrictions applied.

WARNING

Landing or departing in condition SEVERE may result in aircraft damage from a bird strike. SEVERE may also be declared when birds of any size or quantity present an immediate hazard.

3.2.2 BHC (Moderate)

Generally defined as moderate (concentrations of 5-15 large or 15-30 small) birds observable in locations that represent a probable hazard to flying operations. Positive actions should be taken to disperse the birds that are causing the hazard.

Table 3-1. NAS JRB FORT WORTH BIRD HAZARD CONDITIONS

BHC	MODIFIER	BIRD ACTIVITY
	SEVERE	15+ large birds, or 30+ small birds
	MODERATE	5-15 large, or 15-30 small

The Air Traffic Control Tower may determine if bird activity away from the primary runway constitutes a threat to flying operations. If it does not, the Tower may lower the BHC for the primary runway while keeping the higher BHC for the other area.

BHC descriptions will be reported using the modifiers severe and moderate. Until DOD standardizes this system, the terms red (severe) and yellow (moderate) may be encountered at other military airfields. While each base may have a slightly different definition for its hazard conditions, an associated level of danger can reasonably be ascertained from either reporting standard. Requests for clarification from ATC or airport management are recommended when confusion or doubt exists.

3.2.3 BASH Phase

BASH phases are based on historical birds survey data that show specific times when a hazard is known to exist, i.e., dawn gull movements, etc. When BASH phases are set, aircraft operations during these time frames are not recommended. Squadron flight schedulers should avoid scheduling operations during BASH phases.

3.3 Aircrew Reporting

Aircrews should report significant bird activity to the Air Traffic Control Tower.

3.4 Downgrading BHC

Once a BHC has been declared, it shall be downgraded commensurate with updated information. The Air Traffic Control Tower will make the final determination on BHCs.

3.5 Bird Hazard Communication

Disseminating BHCs is critical to BASH effectiveness. The agencies below will disseminate the BHC by the following means:

3.5.1 Control Tower

1. Include BHC on ATIS Broadcasts.
2. Notify inbound/departing aircraft of BHC if aircraft has received ATIS and the BHC has changed.
3. Provide additional bird advisories.
4. The Tower Supervisor will direct the BDDT to the location where the wildlife is posing a problem.
5. Pass BHC to Base Operations/Flight Planning.
6. For rapidly changing BHCs place a statement on ATIS advising aircrews to contact Air Traffic Control Tower for the latest BHC.
7. Notify other area airfields via ATC direct lines of all sightings of large flocks or migratory movements.

3.5.2 Base Operations

1. Notify the Base Operations Officer when the BHC is changed to Severe.
2. Notify METOC of BHC reports for inclusion on aircrew briefings.
3. Complete call sheet, notifying all flying units of BHC moderate or severe.

3.5.3 Meteorological and Oceanographic Office Communications (METOCOC)

1. NAVMETOCDET NAS JRB Fort Worth will brief aircrews on BHC
2. Notify operations of birds detected by radar.

3.5.4 Bird Dispersal Team Procedures

a. Prior to initiation of dispersal actions the BDDT leader will coordinate the location and methods with the Tower Supervisor and ensure that a BHC of SEVERE has been declared prior to dispersal activities on the active runway.
b. Horns and bioacoustics distress calls should be used before pyrotechnics are used.
c. Pyrotechnics can be used in conjunction with distress tapes. These consist of screamer, whistle banger, and cracker shells.
d. Propane sound cannons will be placed around the airfield and moved periodically to prevent habituation.
e. If the methods above do not work or the birds become accustomed to the hazing, it may become necessary to remove several birds via lethal methods to reinforce the dispersal methods.
f. When the target flock or problem birds are dispersed, ATCT shall be notified so the BHC can be lowered.
g. Lethal control shall be within depredation permit guidelines.

3.6 BASH Dispersal Equipment (BDE)

3.6.1 General

There are a variety of methods for dispersing birds using static, pyrotechnic, bioacoustics, and depredation equipment. Any or all of these may be used at NAS JRB Fort Worth to control bird populations.

3.6.2 Static Deterrent Devices

Static deterrent devices include, but are not limited to propane cannons, scarecrows, silhouettes, and effigies. They are often very effective in bird deterrence. Static devices are designed to augment the activities of the bird dispersal teams. At no time should static deterrents be considered a replacement for dispersal teams.

3.6.3 Propane Cannons

The BDDT will position and operate propane sound cannons based on active runway, bird locations, and air traffic density. Locations will be changed daily to avoid habituation by the birds. At a minimum, one cannon each will be placed in the approach end, midfield and departure end.

3.6.4 Bioacoustics

Bioacoustics is audio taped distress or predator calls of actual birds. Special care must be taken to play the tape in short intervals to prevent habituation by the birds. The special playback equipment is located in the BDDT Vehicle. BDDT will play the tape 20-30 seconds, then pause briefly. Repeat as required. Birds should respond by taking flight or becoming alert. These calls are effective for waterfowl, gulls, songbirds and shorebirds. Pyrotechnics should be used in conjunction with bioacoustics to enhance complete dispersal. Bioacoustics will be the first option employed to control airfield bird habitation.

3.6.5 Lethal Control (Depredation)

Occasional depredation of birds reinforces the other methods. Shooting one or two from a flock then following with a volley of pyrotechnics is generally a very effective strategy for deterrence. Domestic pigeons, European starlings, and House sparrows may be removed without a permit. All migratory birds require a permit prior to removal. NAS JRB Public Works will contact federal and state wildlife agencies for permits and assistance in this area.

3.6.6 Record keeping

The BDDT will maintain an activity log (Appendix H). This log will document all bird dispersal operations to include species, location, methods, and number of birds dispersed. These will be forwarded on a weekly basis to the ASO. Monthly data will be summarized at BHWG, Aviation Safety and FOD Council meetings.

3.7 Land Management Procedures

One of the most effective and permanent methods of discouraging birds from using the airfield is the removal of attractive habitat features. Passive control methods include:

3.7.1 Managing Grass Height

a. Mow to maintain a uniform grass height between 7 and 14 inches (as directed by BHWG). Long grass discourages flocking species because reduced visibility disrupts inter-flock communication and prevents predator detection. When grasses do not naturally achieve at least 10 inches in height, they should be encouraged to do so. Grass

heights in excess of 14 inches may attract rodents and will also result in the grass laying flat (lodging) thus reducing its deterrent effect to flocking species.
b. Grass heights below 7 inches are of equal concern, as they are generally more attractive to birds that feed on the easily accessible worms and insects. Begin mowing adjacent to runways and finish in the infield or outer-most grass areas. This will cause insects and other animals to move away from the runways.
c. Cut grass before it goes to seed to discourage seed eating birds.
d. Plant native species of grasses that do not provide a viable food source to seed eating birds.

3.7.2 Controlling Broad-leafed Weeds

a. Keep broad-leafed weeds to a minimum on the airfield.
b. Apply herbicides as necessary for control. Broad-leafed weeds attract a variety of birds, may produce seeds or berries, and may limit grass growth. Obtain assistance in herbicide selection for weed control, appropriate grass seed selection, fertilization, and erosion control vegetation from BASH team recommendations, Public Works Department, Environmental Department, Natural Resources Conservation Service (NRCS), or the Agricultural Extension Service (AES).

3.7.3 Planting Bare Areas

Eliminate bare areas on the airfield. Plant grass as necessary and appropriate to maintain ground cover at 7-14 inches in height.

3.7.4 Fertilizing

Selectively stimulate grass growth to promote a uniform cover at 7-14 inches in height. Irrigation may be required to support turf growth.

3.7.5 Removing Edge Effect

Maintain the airfield as uniformly as possible to reduce the transition zone between two distinct habitat types (e.g. brush to grassland).

3.7.6 Leveling of Airfield

Level or fill high or low spots to reduce attractiveness to birds and prevent standing water.

3.7.7 Removing Dead Vegetation

As soon as possible, remove dead vegetation such as brush piles, grass clippings, etc., and the cover it affords.

3.7.8 Remove Bird and Animal Carcasses from the Airfield

This is to avoid attracting scavengers that feed on them. Forward remains that may have been caused by collision with aircraft to the ASO/AASO for identification.

3.7.9 Pest Control

Invertebrates and rodents are key food sources for many birds. Periodically survey and reduce these pests when required. Pesticides and traps can reduce pest populations. Only EPA approved pesticides are authorized, and they must be used strictly according to label instructions. Inspection and control should begin early in the spring in accordance with the Integrated Pest Management Plan (IPMP) and the Fish and Wildlife Section of the Integrated Natural Resources Management Plan (INRMP).

3.7.10 Maintaining Drainage Ditches

Regularly inspect ditches to keep them clear. Maintain ditch sides as steeply as possible (minimum slope ratio of 5 to 1) to discourage wading birds and emergent vegetation. Improve drainage as necessary to inhibit even temporary ponds or puddles. When able, cover ditches with netting/plastic fencing.

3.7.11 Employing Erosion Control Vegetation

Use vegetation that is appropriate for the region and does not produce seeds at heights below 14 to 18 inches.

3.7.12 Controlling Waste Disposal

Landfills are the most significant attractant to hazardous bird species. If a landfill must be used, make it as unattractive to birds as possible by minimizing exposed waste. FAA Order 5200.5 should be consulted for disposal site operation.

3.7.13 Eliminate Roosting Sites

Control roosts by vegetation management of roost sites where possible. Prune trees to reduce the number of perches if necessary.

3.7.14 Bird Proof Buildings and Hangars

Often, bird proofing of buildings and hangars is required to exclude pigeons, sparrows, starlings, and swallows. Excluding birds from a structure they currently utilize will often displace them to an adjacent structure. Existing birds should be destroyed (in accordance with depredation permits) prior to the exclusion effort whenever possible. Denying access by screening windows, closing doors, and blocking entry holes is the most effective method of control. When necessary, consider:

a. Toxic perches. Install where maximum numbers of birds will contact them. Ensure perches are maintained with avicides to remain effective.
b. Pellet guns. A short-term solution only. Proper safety equipment and skilled personnel are required.
c. Netting. Install under superstructure to exclude birds from roosting areas.
d. Avitrol. Pest management should place in or near hangar to remove birds or create a distressed response that scares other birds away.
e. Trapping and Removal. Use a large cage with food and water to trap birds. Release birds away from buildings or depredate if permitted by law. Permits will be coordinated through Public Works.
f. Design Features. If designing a new hangar, consider locating supports on the exterior.
g. Door Coverings. Use netting or plastic strips suspended over the doors to exclude birds. Ensure no tears or holes are present that allow birds access to the hangar.
h. Sharp Projections. Use in limited areas such as ledges and overhangs, or small places where birds cannot be allowed. Too expensive for large areas.
i. Night harassment. Use high-pressure air or water to make hangars an undesirable roosting site.

3.8 Managing Off-Base Land Use

The Navy cannot control off-base land use, however, when a proposed land use may increase or alter bird populations and habits (i.e. landfills, new crops, etc.), the Navy' concerns should be addressed at public hearings and zoning meetings. Environmental Department, Air Installation Compatible Use Zone (AICUZ) Office and Public Works shall monitor off-base land use and report findings to the BHWG.

4 AIRCREW INFORMATION

4.1 Planning the Flight

1. Check FLIP AP/1 (Supplementary Aerodrome Remarks) and NOTAMS for information about permanent and seasonal bird problems at both departure and destination airports and on route of flight.
2. Check NOTAMS and flight planning displays for BHCs and BASH Phase in effect.
3. Consult with the ASO or ATCT for additional BASH information.
4. Brief all crewmembers on potential bird problems and a strong lookout doctrine.
5. Discuss emergency procedures before departure, including aborts following a strike and engine failures. Note: 75% of all multi-engine strikes occur to engines on the same side.
6. Discuss procedures for cockpit lost communications, including change of aircraft control.
7. Consider using combination sunglasses and visor during daylight hours.

4.2 At the Aerodrome

1. Prior to taxi, listen to ATIS for current bird hazard conditions. Ask the Air Traffic Control Tower for specific bird locations or additional information.
2. When taxiing, watch for birds on the airport. The most frequently struck birds (gull) have a gray or black coloring on their backs making them hard to see on the tarmac or concrete. Flocking birds may be partially hidden in grass areas. Look for raptors circling overhead, perched in trees, tall bushes and on airfield structures. Report bird sightings to the ATCT.
3. Birds on the ground face into the wind and may not see or hear you coming. They may take flight just prior to you reaching them.
4. If birds are observed, notify the ATCT and request that BDDT personnel disperse them before takeoff if they are in a location that presents a likely danger to your or another aircraft.
5. Consider increasing interval on section departures to 30 seconds during condition Moderate. The lead aircraft in flight can cause birds to lift and circle behind causing a strike to the wingman.
6. Use landing lights during takeoff, climb, descent, approach and landing. Although there is no conclusive evidence that birds see and avoid aircraft lights, they will make the aircraft more visible.
7. Travel as much as possible above the bird layer. More than 50% of all strikes occur below 100 feet and 88% of all strikes occur below 2000 feet. In practice, this means to climb to 100 feet AGL as rapidly and safely as possible and continue to climb without delay to 2000 feet.
8. If you see birds ahead, attempt to pass above them, as birds usually break away downward when threatened.

9. If dense bird concentrations are expected, avoid high-speed descent and approach. Reducing speed can significantly reduce impact energy. The force of impact is roughly proportional to the square of the aircraft's speed.
10. If ATCT reports birds over approach area, consider a go around for a second attempt, the approach area may then be clear.
11. When able, descend and climb-out in a straight line. This makes it easier for the birds to anticipate your flight path and thus get out of your way.

4.3 Bird Strike Reporting

1. Post flight follow-up and reporting of bird strikes are an essential and important part of the BASH program. After a strike:
a. If airborne, inform air traffic control tower and complete precautionary emergency landing, if required.
b. After post-flight inspection, preserve any remains (however slight) and notify AASO immediately. The AASO will come to the hangar/ramp to collect remains, take pictures and assist aircrews in completing NAS JRB Fort Worth Bird Strike Form.
c. Report strikes even if no bird remains are found on the aircraft. BDDT and Airfield personnel may be able to retrieve the bird on the airfield.
d. Follow up local reporting by completing the standardized Bird/Animal Strike Hazard Report form found in OPS Flight Planning Room or Safety Site. Both damaging and non-damaging strikes are required to be reported. Submit report to Base Operations. Copies will be forwarded to ASO and Environmental Department.
2. To aid in formulating trend data, aircrews should report near misses that involve evasive action or whenever the proximity of the miss is too close for comfort.

4.4 Bird Identification

1. All strike data is entered into both local and Naval Safety Center databases to help track and identify bird hazards. Therefore, it is necessary to know which species are causing bird strike problems so appropriate measures can be taken. Identification of bird remains is essential. If bird remains are found on the aircraft, the following preservation procedures shall be followed:
a. During normal working hours, leave the remains on the aircraft and call the BDDT/Transient Line. They will send a representative to remove the pieces.
b. After hours, or on weekends, notify the ATCT. If a BDDT/Environmental representative is unavailable, remove remains from aircraft, and place in zip lock plastic bag. Put the bag in a freezer. It does not take much (remains) to identify the bird species. Even if just a small part, feather or bloody smear with down, the species can be identified through microscopic techniques. The next workday, call the ASO or Environmental Department for pick up of remains along with a completed NAS JRB Bird Strike form. The Natural Resources Manager will assist in make the identification for command aircraft and tenant commands upon request.

4.5 Operational Limits and Go/No-Go Criteria

Landing or departing in Condition SEVERE may result in aircraft damage from a bird strike.

1. BHC SEVERE

BASH dispersal efforts will be initiated immediately after BHC severe is set. Normally, the hazard can be removed within 5 minutes. However, if initial dispersal efforts have failed, the Air Traffic Control Tower will update delay information in 5-minute intervals to allow aircrew ample time to calculate fuel/divert/mission planning.

Guidance for aircrew actions during BHC SEVERE is contained in NOTAMS Instructions (SEE 4.1). In lieu of specific guidance, the following aircrew actions are recommended:

1. Fuel and weather permitting, inbound aircraft will hold until BDDT actions or natural movements have lowered the hazard condition, otherwise proceed to alternate.
2. Departing aircraft will hold on deck until BDDT actions or natural movements have lowered the hazard condition.
3. If the bird/animal hazard is fowling the runway, the air traffic control tower will close the runway per FAA directives. Control Tower clearance will not be issued; accordingly, all operations will be at the discretion and risk of the pilot in command.

2. BHC MODERATE.

Guidance for aircrew actions during BHC MODERATE is contained in NOTAMS Instructions (SEE 4.1). In lieu of specific guidance, the following aircrew actions are recommended:

a. Delay or terminate practice approaches.
b. Modify altitude above the hazard (restricted low approach to 500 feet AGL, etc.)
c. Initial takeoffs and full stop landings are at the aircraft commander's discretion.
d. Increase interval on section departures to 20 seconds minimum.
e. Increase spacing to a minimum 6000 feet between landing aircraft.

5 CHAPTER 5 LOCAL SPECIES

5.1 General

The following is a summary of the birds within the airfield environment taken from daily bird counts between October 1999 and July 2000. Associated with each is a brief description of how they can be controlled or avoided. Each control measure will require action by one or more tasked organizations as described in Chapter 2. It is very important to know which avian species or airfield attractants are present before control techniques can be effectively applied.

5.1.1 Avian Species

5.1.1.2 Gulls

These birds represent the most significant hazard to aircraft at airports worldwide. Due to the proximity to water, their omnivorous feeding habits and preference for flat, open areas to rest, they are commonly found on this airfield. Gulls are most active just after sunrise and before sunset as they move to and from feeding areas. Maintenance of grass height between 7 and 14 inches is critical in reduction of gull numbers. Even using this maintenance technique, gulls may inhabit the airfield during inclement weather. Persistent harassment using pyrotechnics and bioacoustics is necessary to discourage these birds. Other techniques such as gas cannons, model gulls, radio-controlled model aircraft, hazing dogs and even falconry should be considered if available and cost effective

5.1.1.3 Waterfowl

A distinction needs to be made between resident and migrating populations. Resident waterfowl are attracted to an area to breed or feed. Ponds, lakes, drainage ditches, etc., may attract these birds, particularly if these areas contain emergent or submerged vegetation for feeding, nesting, or shelter. Steepening ditch and pond banks and removing vegetation will reduce waterfowl numbers. When possible, drainage of water sources should be accomplished. Resident birds are most active at dawn and dusk, moving at low altitudes to and from feeding areas. Avoid flying near wildlife refuges, lakes or rivers with known waterfowl concentrations during these times. Migrating waterfowl are particularly dangerous to flight safety due to the large numbers and generally higher altitude of the birds. Large flocks of waterfowl travel along traditional flyways to their breeding and wintering grounds during spring and fall. Huge flocks may stop along the route awaiting favorable weather conditions to continue. Migrating birds are most active from sunset through midnight, with numbers decreasing into the early morning hours. September through March is the most hazardous. Wintering concentration areas should be avoided.

5.1.1.4 Loon, Grebes, Cormorants, Mergansers

These are fish eating birds. Avoid flying at sunrise or sunset when flocks, often flying in formation, can be found flying to and from feeding areas.

5.1.1.5 Long-legged Waders (Herons and Egrets)

These birds feed on fish, amphibians, reptiles and arthropods. Control is best accomplished by eliminating the food sources. Steepening the sides of ditches and shoreline and removing emergent vegetation will drastically reduce accessibility to food sources.

5.1.1.6 Raptors (Hawks, Falcons, Kites, Eagles, Vultures)

These birds are particularly hazardous to aircraft because of their size and widespread distribution over bases and low-level areas. Raptors (particularly vultures) use thermals to their advantage to search for prey. These birds become active during mid-morning and remain aloft until late afternoon. Avoid areas with thermal generating terrain such as ridgelines, rolling hills, water. Landfills are particularly attractive to soaring vultures. In the fall, raptors migrate by day to areas of high winter concentrations in the southern states. Control these birds by removing dead animal carcasses and dead trees and other perching sites on the airfield.

5.1.1.7 Sandpipers/Shorebirds

Large flocks during migration pose the most significant threat to aircraft at NAS JRB Fort Worth. Managing grass height between 7-14 inches will help discourage these birds. Killdeer are quite adept at avoiding aircraft, but bioacoustics may be used to disperse large groups. Some species respond well to hazing and falconry.

5.1.1.8 Owls

Most owls are nocturnal and attracted to rodents as a food source. Maintain grass height between 7-14 inches to control rodent populations.

5.1.1.9 Swallows and Swifts

These birds eat insects in flight and are commonly found above airfields. Insect control will reduce Swallow numbers and discouragement of nesting will further decrease numbers. Remove mud nests from hangars, etc. during nest building and upon completion. Nest removal shall be coordinated with Public Works/Environmental Department since it requires a permit from the USFWS.

5.1.1.10 Crows and Ravens

These omnivorous birds are common in open areas and around landfills and solid waste transfer stations. These birds may occur in large flocks particularly at sunset as they

return to roost sites. Proper grass height management will reduce population numbers. Remove any known roost sites or individual roost trees. Landfills and transfer stations must be operated in a manner to discourage these birds. Bioacoustics can be used to frighten and remove these birds if they occur on the field.

5.1.1.11 Blackbirds, Grackles, Cowbirds, and Starlings

These birds can be particularly hazardous because they frequently occur in large flocks. Blackbirds and Starlings are attracted to flat, open areas to feed, rest, or stage/pre-roost. Maintenance of grass height between 7 and 14 inches is the best method of reducing airfield Blackbird and Starling numbers. These species respond well to bioacoustics. Other methods should be used to supplement this program as necessary. Starlings are not federally protected and may be removed without permits. Other species may require permits so coordination with Public Works/Environmental Department is necessary before removal. Trapping may also be considered. If these birds occur in hangars, toxic bird perches are recommended. These species are most active at dawn and dusk and during spring and fall migration.

5.1.1.12 Meadowlarks

These birds occur on nearly every airfield and are attracted to grasslands and low weeds. Eliminate broad-leafed weeds and maintain grass height at 7-14 inches. Persistence is the key to success.

5.1.1.13 House Sparrows

These birds are not usually a threat to aircraft on the flight line, but are common pests around hangars and other structures. These birds are not protected and may be removed without a permit. Repairing broken windows or screening holes large enough to allow access to the hangar by these birds and toxic bird perches are recommended for control of these birds.

5.1.1.14 Dove (Mourning and White-winged)

These birds migrate in large flocks beginning in February and continuing through April, nest, and begin their fall migration in August, continuing through November. These birds feed on the ground where they eat mostly seeds. They prefer open areas for feeding, and use trees and power lines for loafing. Maintaining grass height between 7-14 inches will discourage dove populations on the airfield.

5.1.1.15 Flycatchers

These birds feed on insects. Bird strikes are uncommon, but should not be overlooked. Control is best accomplished by the controlling the food source.

5.1.1.16 Shrikes

Bird strikes are uncommon since they feed close to the ground on insects and fly short distances at low altitudes between perch sites. Controlling insect populations will discourage shrikes from the airfield.

5.2 Mammalian Species

While concern is mostly centered on birds, several mammalian species also pose threats to flight operations and must be considered. Close coordination the station's Integrated Natural Resources Management Plan is necessary to reduce this type of hazard.

5.2.1 Rabbits

In addition to direct hazards to aircraft these animals often attract raptors. Proper grass management will reduce the number of these animals on airfields.

5.2.2 Rodents

These animals attract raptors. Control by maintaining a uniform turf at the proper heights.

CHAPTER 6 RECOMMENDATIONS

Suggestions for bird proofing buildings and land management around the airfield are covered in Chapter 3. Plastic stripping for hangar doors is very expensive; over $1000 per door. Therefore, trapping, bioacoustics, and toxic perches may be a better option for hangars with doors that need to stay open. For hangars that are not in constant use, closing the doors and screening windows and other access points will work best for excluding pest birds from these structures.

Bird Control Supplies can be purchased from JWB Marketing online at http://birdcontrolsupplies.com/hangar.htm, or telephone 800-555-9634.

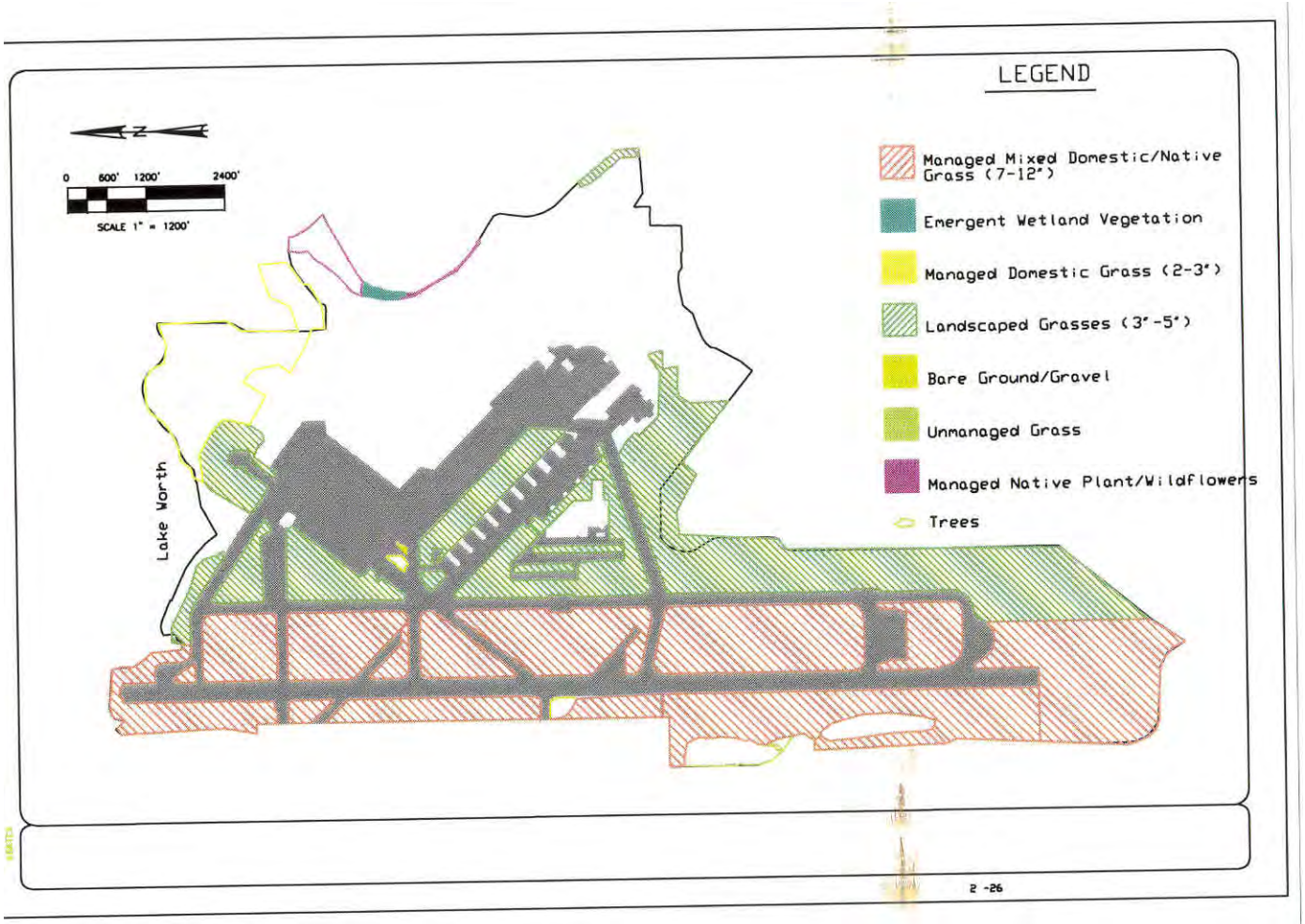
BIRD GARD PRO, a bioacoustic distress call/hawk alert costs just $175, but should be used in conjunction with other methods to be effective.

Live traps for removing pest birds (i.e. starlings) cost $289 and have the capability of removing hundreds of birds daily. Starlings, house sparrows and pigeons (live pigeon traps are $78) are not protected species, so they could be humanely disposed of without causing a public relations problem.

Local breeders/trainers of bird dogs may be willing to trap and remove pigeons from the hangars for their training programs. In the southeast some trainers use pigeons to teach their young animals how to handle live birds.

Hacking owls in cooperation with the USFWS and TPWD would be a viable option for NAS JRB Ft Worth. Great Horned owls and Barn owls readily adapt to urban environments, can control pest species (avian and mammalian) up to the size of jack-rabbits, and used in conjunction with exclusion from buildings and proper grass management around the airfield, should greatly reduce the population of pest species at NAS JRB Ft Worth. A migratory bird permit would be required. Call 505-248-7882 for information. Qualified owl rehabilitators can be found on the TPWD site.

APPENDICES



1 APPENDIX A

NAS JRB FORT WORTH HABITATS

Source: Precision Mapping Streets 4.0

Figure 1-1. NAS JRB Fort Worth - Vicinity Map

1 - 8

APPENDIX B

APPENDIX C

BASH Pest Management Considerations

1. Food Source Control. Since invertebrates and rodents provide important food sources for many birds/animals, the pest management section should periodically survey and reduce these pests when required. Control of insects, earthworms, rodents, etc., through the use of insecticides and rodenticides will be with EPA approved methods and chemicals. Control should begin early in the spring.

2. Eliminate Roosting Sites. Vegetation management of roost sites will control blackbirds and starling roosts where possible. Trees will be pruned to reduce the number of perches available and entire trees will be removed if necessary.

3. Bird Proofing Buildings and Hangars. Pigeons, sparrows, and starlings frequently inhabit buildings and hangars, and must be excluded. Denying access by screening windows, closing doors, and blocking entry holes is effective for buildings, but is ineffective for hangars. When necessary, scare tactics and the following methods should be considered.

a. Toxic perches. Pest management personnel should survey bird roosting sites and consider installing perches where maximum numbers of birds will contact them. Ensure perches are maintained with avicides to remain effective.

b. Avitrol. Pest management personnel may consider placing Avitrol in or near the runway or hangar to kill birds or create a distress response, scaring other birds away.

c. Trapping/Removal. Consider the use of a large cage with food, water and other birds to trap pest birds. Birds can either be released away from the airfield or killed. Permits from the U.S. Fish and Wildlife Service and the state wildlife agency are required to kill protected birds.

d. Design features. In new construction, consider structures with the support features located on the outside of the building (or hangar) to reduce bird numbers.

e. Sharp projections. Consider the use of sharp projections in limited areas such as ledges, overhangs, or small places so birds cannot roost. This may be used with (a) to direct birds to toxic perches. Expensive, so must be used in limited quantities.

f. Netting. Consider the use of netting to deny birds access to roosting areas in hangars. Netting is used to cover ceiling areas just under rafters and beams.

APPENDIX D

INVASIVE/EXOTIC/NUISANCE SPECIES

APPENDIX D

Format to Report Animal/Bird Kills Found on NAS JRB Fort Worth Airfield

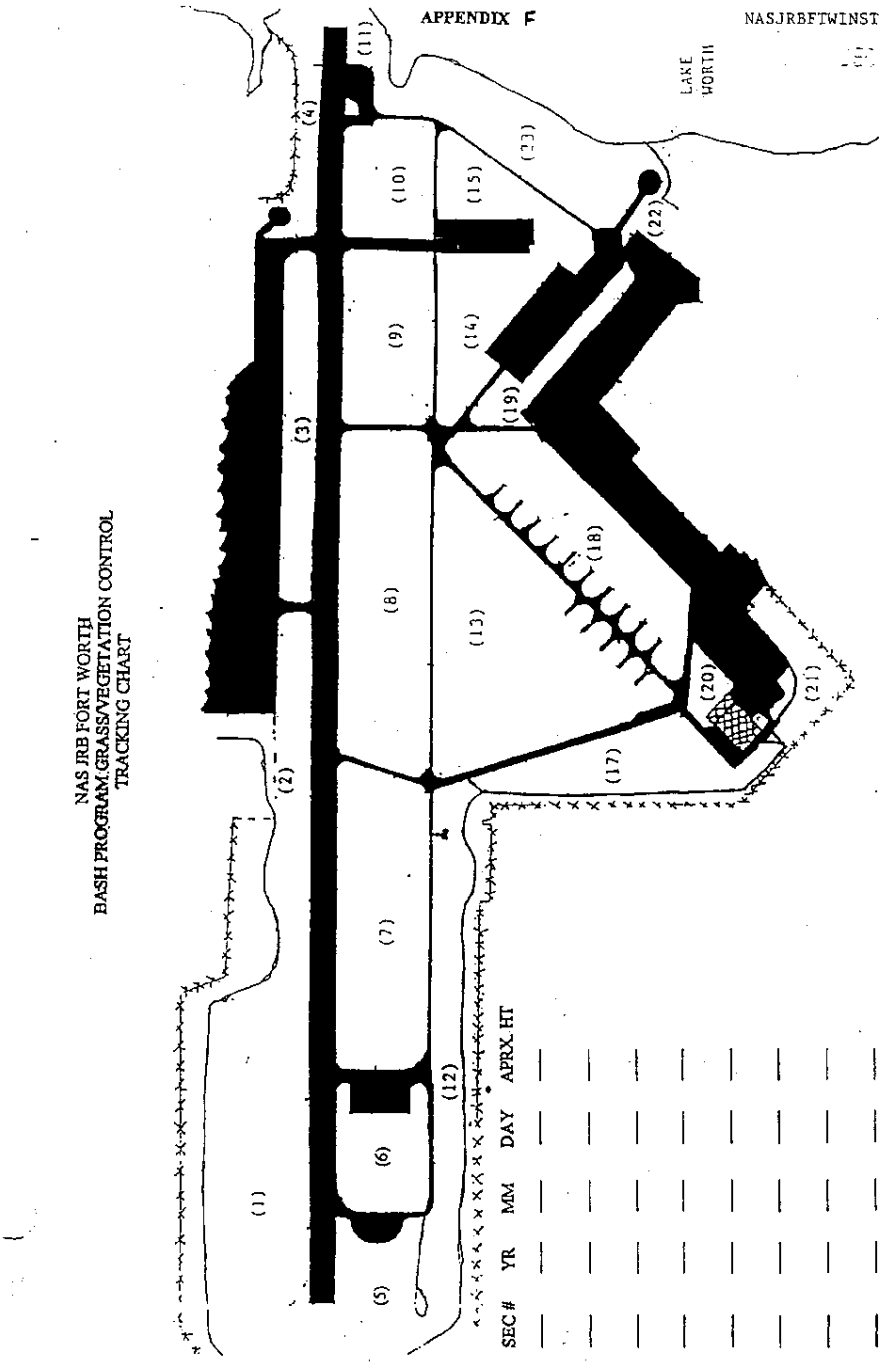
SPECIES	NUMBER	DATE	TIME	COMMENTS

APPENDIX E

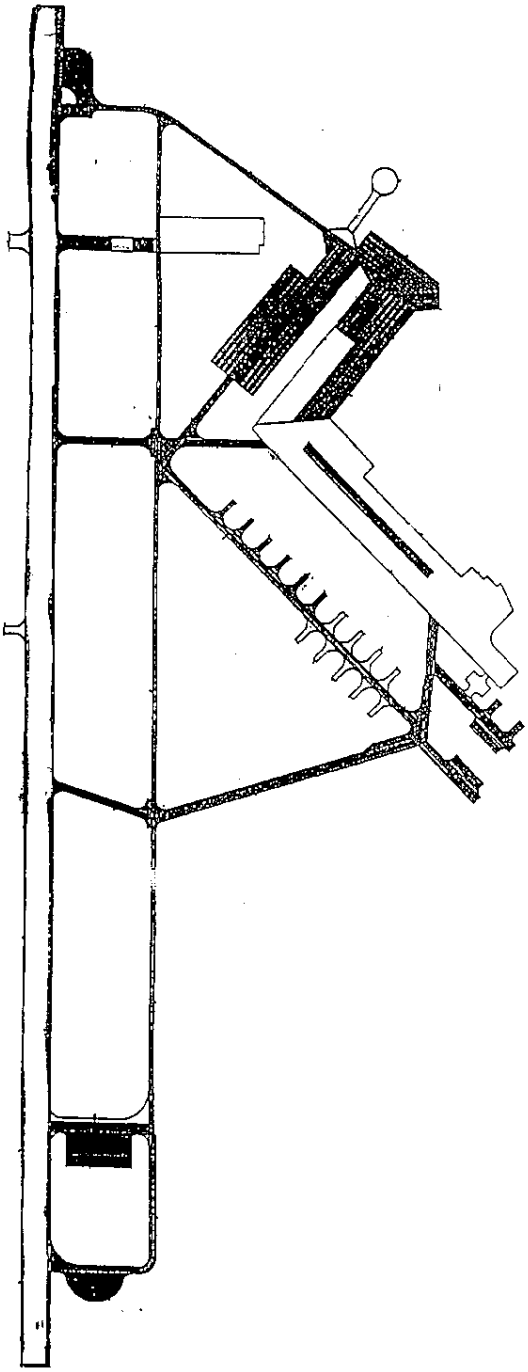
BIRD COUNT OF NAS JRB FT WORTH AIRFIELD (APPROXIMATE)

SPECIES	NUMBER	DATE	TIME	LOCATION	COMMENT
1. _____	_____	_____	_____	_____	_____
2. _____	_____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____	_____
6. _____	_____	_____	_____	_____	_____
7. _____	_____	_____	_____	_____	_____
8. _____	_____	_____	_____	_____	_____
9. _____	_____	_____	_____	_____	_____
10. _____	_____	_____	_____	_____	_____
11. _____	_____	_____	_____	_____	_____
12. _____	_____	_____	_____	_____	_____
13. _____	_____	_____	_____	_____	_____
14. _____	_____	_____	_____	_____	_____
15. _____	_____	_____	_____	_____	_____
16. _____	_____	_____	_____	_____	_____
17. _____	_____	_____	_____	_____	_____
18. _____	_____	_____	_____	_____	_____
19. _____	_____	_____	_____	_____	_____
20. _____	_____	_____	_____	_____	_____
21. _____	_____	_____	_____	_____	_____
22. _____	_____	_____	_____	_____	_____
23. _____	_____	_____	_____	_____	_____
24. _____	_____	_____	_____	_____	_____
25. _____	_____	_____	_____	_____	_____
26. _____	_____	_____	_____	_____	_____

APPENDIX F


APPENDIX F
NAS JRB FORT WORTH
BASH PROGRAM GRASS/VEGETATION CONTROL
TRACKING CHART
SEC # YR MM DAY APRX. HT
LAKE WORTH
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
(10)
(11)
(12)
(13)
(14)
(15)
(17)
(18)
(19)
(20)
(21)
(22)
(23)

APPENDIX G



APPENDIX G
BIRD/ANIMAL CARCASS LOCATION

APPENDIX H

BASH DETECTION AND DISPERSAL TEAM (BDDT) ACTIVITY LOG

DATE	SPECIES	NUMBER	METHODS	LOCATION	COMMENTS

APPENDIX I

BIRD-AIRCRAFT STRIKE HAZARD (BASH)
SELF-INSPECTION CHECKLIST
Reference (a) Natural Resources Program Manual, OPNAVINST 5090.1B
(b) Natural Resources Procedural Manual, NAVFAC P-73, VOL II

1. Is the BASH Plan current, written and readily accessible?

2. Is the BASH Plan reviewed annually?

3. Is the BASH Plan certified by Naval Facilities Engineering Command Field Division?

4. Does the program establish a Bird Hazard Working Group (BHWG) or similar organization?

5. Are base agencies such as Safety, Public Works, Environmental Department and Air Operations assigned responsibilities for BASH Program?

6. Are base commanding officers and/or wing commanders involved in the BASH Program?

7. Are posters, pictures, maps, etc. related to BASH posted in aircrew briefing areas, safety bulletin boards, and base operations flight planning areas?

8. Are local bird problems documented?

9. Are both damaging and non-damaging bird strikes recorded?

10. Are bird remains (feather, beaks, fee) collected as a regular of a bird strike?

11. Are bird remains sent to a local authority (USFWS, university or ornithologist for identification?

12. Is bird strike information tracked to facilitate the identification of trends (e.g. type of bird, route, time of day, type of aircraft)?

13. Are daily surveys taken of the airfield and surrounding areas to observe potential and actual bird hazards?

14. During the surveys, are areas like standing water, food sources, or areas for protection noted?

15. Have aircraft hangars and buildings been inspected for birds?

16. Do bird droppings cause problems for equipment or aircraft?

17. Are hangar doors open all the time?

18. Does the control tower warn operations and pilots of birds in the airdrome?

19. Is there a designated bird control team that actually manages, controls birds and maintains bird dispersal equipment and permits?

20. Is grass being maintained at a height of 7-14 inches?

APPENDIX J

Airfield and Local Area Description and Military Operations Areas (MOAS)

1. The following is a detailed description of the installation and its surroundings:

a. NAS JRB Fort Worth

(1)NAS JRB Forth Worth aerodrome is located 20 miles west of Dallas/Fort Worth (DFW)Airport, and encompasses 1,900 acres of land.

(2)The station maintains one 12,000 foot main runway, and a 2,000 foot assault runway. Airport elevation is 650 feet above Mean Sea Level (MSL).

(3)Lake Worth surrounds the north end of the main runway and forms the northern boundary of the base. State Highway 183 runs along the southern boundary of the airfield, 2,600 feet from the threshold of the main runway. Lockheed/Martin Corporation facilities form the western field boundary, and the base proper is located on the east side of the airfield. Mixed industrial and residential developments exist to all sides of the air station.

(4)The general topography includes predominantly flat terrain with some hills, the Trinity River and Lake Worth. Wetlands/marsh and timbered wildlife habitat areas associated with the lake encompass much of the north/northwest end of the airfield. Nearby area fields and wildlife habitat, including wildlife refuges/sanctuaries, offer undisturbed breeding and nesting habitats. A major shopping mall is located just off the south boundary of the airfield. An east/southeast portion of the station provides base housing and a hospital facility servicing the Federal Bureau of Prisons. Joining the station to the southeast is a civilian-operated golf course.

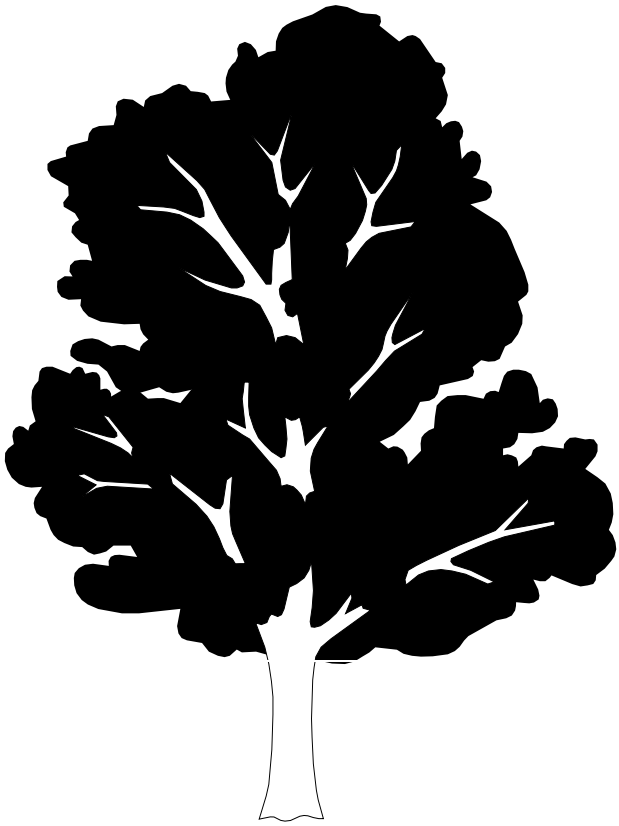
(5)Vegetation is primarily bermuda, coastal bermuda, buffalo, little/big blue stem and johnson grasses, plus small shrubbery with groups of moderately large trees bordering Lake Worth and the airfield perimeter fence.
(6)Developed areas are a moderate mixture of commercial and urban communities, including some outlaying farms, with maintained vegetation.

b. Maps of NAS JRB Fort Worth are provided as Appendix B.

c. A map of the surrounding areas is provided as Appendix C.

2. Military Operations Areas (MOAS)/LOW Level Routes. Tenant command aircraft primarily use the Brownwood; Brady, **MOAs,** and the following Military training routes:

*R2402 *R3801 *R5104 *R5601 *R6302
*IR103 *IR105 *IR117 *IR124 *IR139
*IR164 *VRlOl *VR104 *VRll. 4 *VR118
*VR143 *VR186 *VR188 *VR189 *VRllIO



TREE PLANTING GUIDE FOR NAS FORT WORTH JRB

APPENDIX C

RECOMMENDED PLANTS FOR NATIVE LANDSCAPING
NAS JRB FORT WORTH

COMMON NAME	SCIENTIFIC NAME	SPECIAL CHARACTERISTICS
Grasses		
Big Bluestem	*Andropogon gerardii*	E
Big scanton	*Sporobolus wrightii*	E
Broomsedge bluestem	*Andropogon virginicus*	E
Buffalograss	*Buchloe dactyloides*	E
Common curlymesquite	*Hilaria belangeri*	E
Green spangletop	*Leptochloa dubia*	E
Hairy grama	*Bouteloua hirsuta*	E
Indiangrass	*Sorghastrum nutans*	WU, E
Sand dropseed	*Sporobolus cryptandrus*	E
Sideoats grama	*Bouteloua curtipendula*	E
Switchgrass	*Panicum virgatum*	WU, E
Virginia wildrye	*Elymus virginicus*	E
Forbs/Wildflowers		
Blue sage	*Salvia azurea*	E/C
Carolina snailseed	*Cocculus carolinus*	WU, E
Croton spp	*Croton spp*	WU,E
Feather dalea	*Dalea formosa*	WU,E
Indian Blanket	*Gaillardia pulchella*	C
Indian ceanothus	*Ceanothus herbaceus*	WU,E
Mexican Primrose	*Oenothera speciosa*	E
Partridge pea	*Chamaecrista fasciculata*	WU,E
Plains coreopsis	*Coreopsis tinctoria*	E, C
Prairie sunflower	*Helianthus petiolaris*	WU,C
Texas bluebonnet	*Lupinus texensis*	BS, E, C
Trumpet creeper	*Campsis radicans*	WU,E,C
Turk's cap	*Malvaviscus arboreus mexicanus*	B, H, BF, C
White clover	*Trifolium repens*	WU, E
Shrubs		
Agarito	*Berberis trifoliolata*	B, BS, E
American beautyberry	*Callicarpa americana*	B, BF, WU
American elderberry	*Sambucus canadensis*	WU, E
Brasil	*Condalia hookeri*	B, WU, E
Common beebush	*Aloysia gratissima*	BS, E
Common lantana	*Lantana horrida*	BS, BF, C
Flame acanthus	*Anisacanthus quadriffidus*	H, BF, C
Texas sage, Cenizo	*Leucophyllum candidum*	H, BF, BS, WU, C

RECOMMENDED PLANTS FOR NATIVE LANDSCAPING – NAS JRB FORT WORTH (CONTINUED)

COMMON NAME	SCIENTIFIC NAME	SPECIAL CHARACTERISTICS
Trees		
American elm	*Ulmus americana*	E
Black hickory	*Carya texana*	WU, E
Cedar elm	*Ulmus crassifolia*	E
Green ash	*Fraxinus pennsylvanica*	WU, E
Gum bumelia	*Bumelia lanuginosa*	WU, E
Honey locust	*Gleditsia triacanthos*	WU,E
Live oak	*Quercus virginiana*	BF, WU, E
Redbud	*Cercis canadensis*	E, C
Bitternut hickory	*Carya cordiformis*	E
Yaupon	*Ilex vomitoria*	B, BF, WU, C, E

Source: TPWD Wildlife Habitat Assessment Branch, 2000

SPECIAL CHARACTERISTICS:
B - Birds
H - Hummingbirds
BF - Butterflies
C - Color
E – Good to excellent erosion control
BS - Bees
WU – Wildlife Use

NATIVE PLANT NURSERIES

NURSERY	COMMENTS
Green Mama's 5324 Davis Blvd. North Richland Hills, TX 817/514-7336	Organic garden center Native plants, trees, herbs, antique roses
Redenta's Garden 7729 Hwy 80 W. Fort Worth, TX 817/244-2250	Organic garden centers and landscape
Weston Gardens in Bloom Inc 8101 Anglin Drive Fort Worth, TX 817/752-0549	Native and low maintenance plants Environmental and organic solutions
Dallas Nature Center/Native Plant Center 7171 Mountain Pkwy. Dallas, TX 972/296-1955	100% native plant selection
Bluestem Nursery 4101 Curry Rd. Arlington, TX 817/478-6202	Wholesale grower – native grasses
Kings Creek Gardens 813 Straus Rd. Cedar Hill, TX 972/291-7650	Retail, landscape design
Native American Seed 127 North 16th St. Junction, TX 76849 1-800-728-4043	Grows and harvests seeds from native plants, wildflowers and prairie grasses http://www.seedsource.com
Archie's Gardenland 6700 Camp Bowie Blvd. Fort Worth, TX 817/737-6614	
Mike's Garden Center 5703 Crowley Road Fort Worth, TX 817/293-8800	
Marshall's Grain Company 2224 East Lancaster Fort Worth, TX 817/536/5636	Organic fertilizers and pest control http://www.marshallgrain.com
Powers Landscape Nursery 1150 Highway 205 South Rockwall, TX 75032 972/771-3738	Opening South Forks Trinity River Mitigation Bank

APPENDIX D - INVASIVE/NUISANCE/EXOTIC SPECIES ON NAS JRB FORT WORTH

"Exotic" (E) (alien) species are defined in EO 13112 as any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem. "Invasive" (I) species are defined as those species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Within this INRMP, invasive species also include those native species that readily invade and dominate disturbed areas (e.g. baccharis).

PLANTS		**CATEGORY**
Scientific Name	**Common Name**	
Bothriochloa ischaemum	King Ranch bluestem	I/E
Cynodon dactylon	Bermuda grass	I/E
Sorghum halepense	Johnsongrass	I/E
Melia azedarach	Chinaberry	I/E
Hydrilla verticillata	Hydrilla	I/E
Eichhornia crassipes	Water Hyacinth	I/E
Baccharis salicina	Willow Baccharis	I
Sapium sebiferum	Chinese Tallow	I/E
ANIMALS		
Myocaster coypus	Nutria	I/E
Columba livia	Rock Dove (Pigeon)	I/E
Passer domesticus	House sparrow	I/E
Apis mellifera scutellata	African Honey Bees	I/E
Solenopsis invicta	Red imported fire ant	I/E
Sus scrofa	Feral hog	I/E
Sturnus vulgaris	European starling	I/E
Corbicula fluminea	Asian Clam	I/E

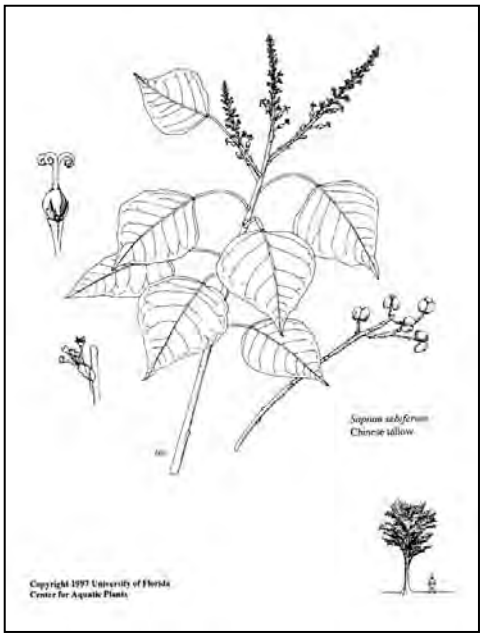
King Ranch bluestem
Planted extensively throughout Texas along highways to stabilize soils. Initiates growth in late spring; flowers year round under favorable moisture conditions.
Warm season perennial native to Asia and Central Europe.

Bermudagrass
Introduced to Texas as a forage and landscape species. A low growing grass with rhizomes and stolons. It has a high salt tolerance; reproduces by seeds, tillers, rhizomes, and stolons. Waste places, weedy habitats. Good for erosion control.

Johnsongrass
Leaves are wide with a strong, lightly colored midvein and splotches of purple caused by fungi.
Erect plant 3-6' tall.
Seedhead large and open.
Thought to be native to the Mediterranean region invasive and tenacious weed which thrives in disturbed soils. The prolific seed production, extensive rhizome system, sprouting ability of fragmented rhizomes and ability to grow in a wide range of environments make Johnsongrass difficult to control.
The distinguishing characteristics of Sorghum halepense are the ribbed leaf sheath, the conspicuous midrib, the large, purplish panicle and the extensive rhizome system.
Sorghum halepense is considered to be one of the ten worst weeds in the world (Holm et al. 1977).
http://tncweeds.ucdavis.edu/

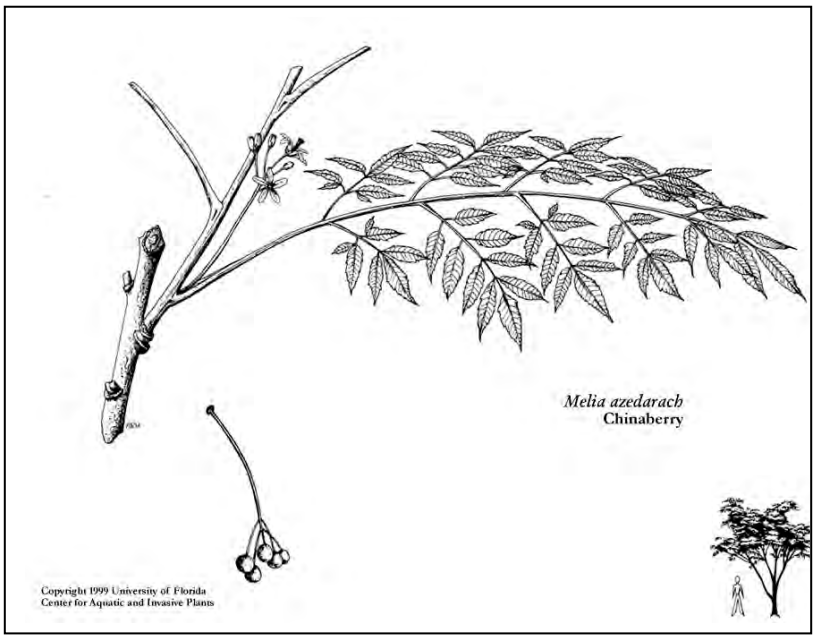
Johnsongrass Root System

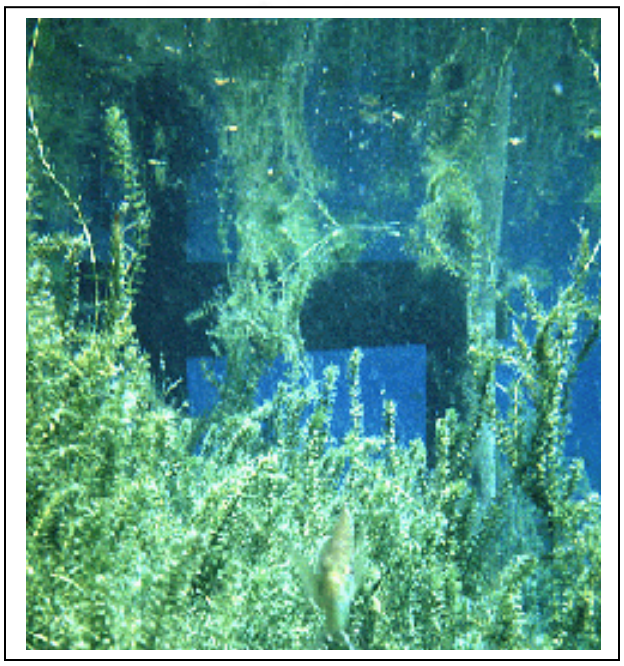
Baccharis (Roosevelt weed, poverty weed)
Much-branched shrub 3-9' tall.
Flowering summer-fall; flowers white, male and female flowers on separate plants.
Found nearly throughout the state; often found in disturbed habitats.

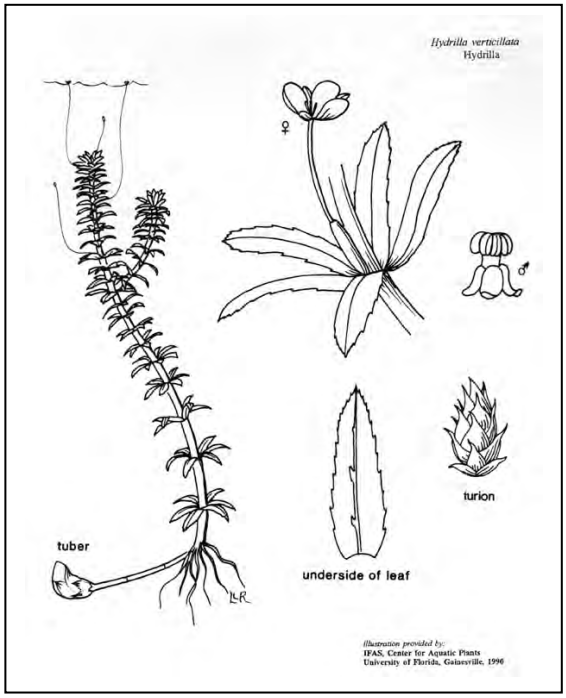


Chinese Tallow
Chinese tallow tree is a small to medium-sized tree. Leaves of Chinese tallow tree turn red in the fall, making it a popular ornamental. Flowers are imperfect with green sepals. The fruit is a three-locular capsule with three seeds. The species grows in a wide range of environmental conditions: wet to dry and shade to full sun.
Native to China.

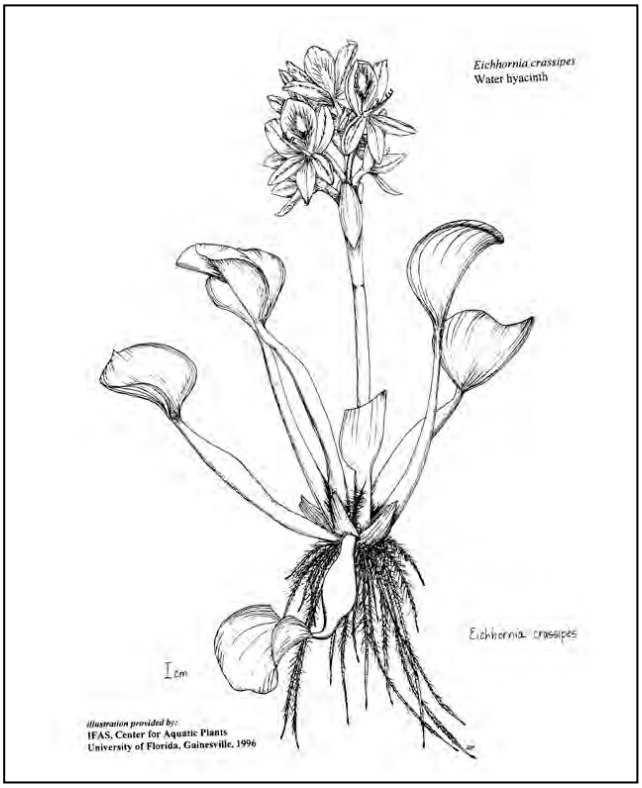
Chinaberry
Tree to 45' tall with broad spreading crown.
Leaves large, deciduous, alternate, bipinnately compound.
Flowering March-May; flowers white to pale lavender; fruit a three- to five-seeded, yellow drupe.
Native to Asia.







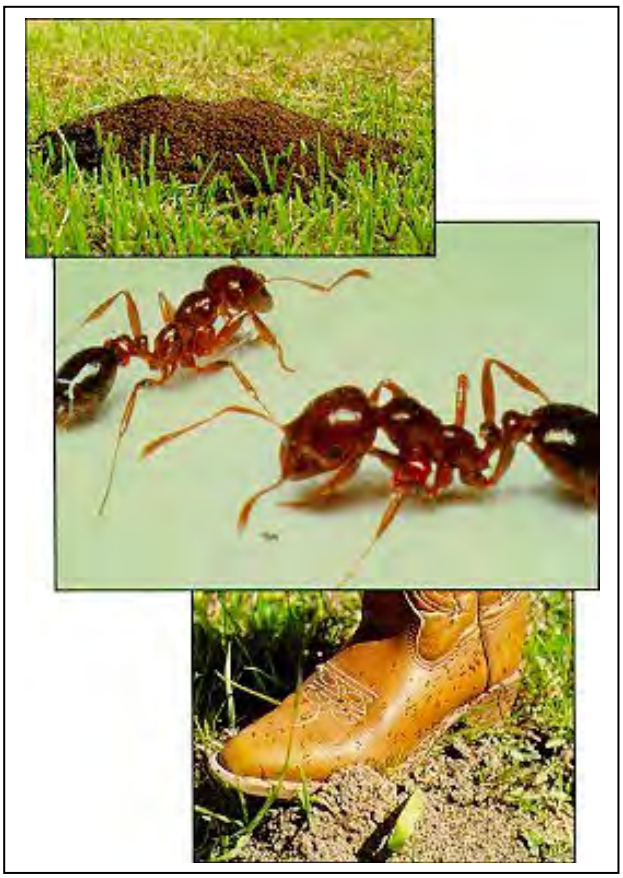
Hydrilla
Hydrilla verticillata, a plant native to Africa, Asia, and Australia was brought into this country as an aquarium plant. It was introduced into local streams by people dumping their aquariums into the local waters. Competes well with many local species and once established is very hard to remove. Reproduces both sexually and asexually. Most reproduction occurs by fragmentation of the stems or by well meaning persons who pull the plant up or cut it off thinking they are removing the plant. Mostly inhabits slow moving waters such as lakes and ponds



Water Hyacinth

Water hyacinth is the worst weed in the world – aquatic or terrestrial. Capable of producing up to 200 tons of hyacinths per acre. This plant was introduced into Florida in the 1880s. Water hyacinth infestations reduce fisheries, shade out submersed plants, crowd out immersed plants, and reduce biological diversity. It can be maintained with herbicides, machines and bio-control insects. It is a free-floating plant that grows up to three feet in height.

Red Imported Fire Ant
Single and multiple queen mounds.
Predaceous to insects and other invertebrates, herptofauna, birds, and mammals.
Major agricultural pest.
Extremely aggressive.
Native to South America.



Feral Hog
Can be extremely destructive; uproots and tramples vegetation, preys on livestock and wildlife.
Potential BASH problem.
Very aggressive and dangerous in some instances.
Present in Texas since 1689.
Information for controlling feral hog damage is available at:
http://agpublications.tamu.edu/pubs/ewild/l1925.pdf

Nutria
Originally brought from South America for use in fur coats. Nutria eat roots and are frequently found in streams, lakes, ponds, swamps and marshes as far north as Oregon. About two feet in length, nutrias look like a beaver but lack the wide, flat tail. They are frequently eaten in restaurants and considered to be quite tasty. They will dig into levees and banks of rivers and are known to cause flooding and crop damage.

Rock Dove (Pigeon)
Introduced from Europe but now worldwide. As self-sustaining as House Sparrows. Typical birds are gray with a white rump.
Forages for seeds, waste grain, fruits, and insects. Roosts and nests in hangars and create a potential BASH problem where gathered in large numbers. Control difficult but some success has been achieved with feeding seed infused with birth control hormones.

House Sparrow
Common name for a small, non-migratory, almost semi-domesticated bird. Native to Eurasia and North Africa, it was introduced from Europe to the Americas in the 19th century and taken to Australia and Asia. Popularly called the English sparrow, it was introduced in all these areas in the hope that it would control insects. Quickly out competing many indigenous species the bird is considered a pest in many areas. Breeding in all but the coldest winter months it produces four to six spotted eggs in one clutch.

Killer Bees are slightly smaller than the European honey bee, but only an expert can tell them apart

Africanized Honey Bees
Popularly known as "killer bees," have been found in Tarrant County. The insect has been migrating from South America since the 1950's. It looks just like the domestic honey bee but is not nearly as good natured. Commercial beekeepers could go out of business if Africanized bees drive out or breed into their domestic colonies. The few colonies that have been discovered recently in Tarrant County were identified and destroyed before any damage occurred.

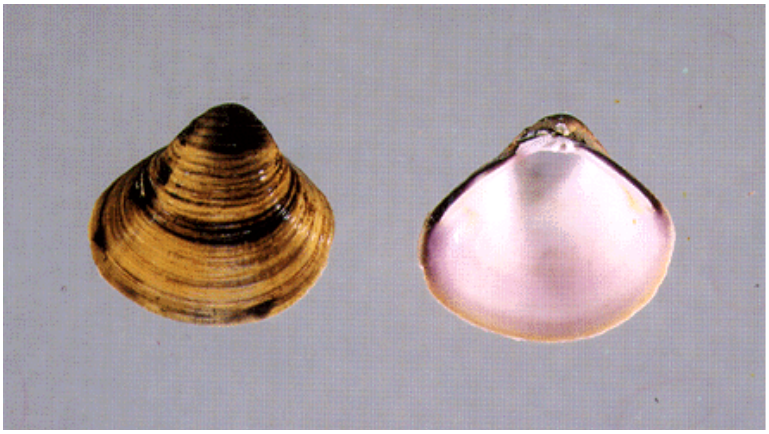
European Starling
Native to Eurasia and North Africa it was introduced into North America in 1890. It is the only yellow billed "blackbird". A very gregarious, garrulous, short-tailed "blackbird" with somewhat the shape of a Meadowlark. Eats mostly insects; some berries and seeds.

Asian Clam

A filter feeder that was originally introduced from ships ballast tanks or from home aquariums. The clam is a relatively small, yellowish brown to black shell with numerous, evenly spaced concentric, elevated ridges on the surface.

Asian clams are filter feeders that consume phytoplankton. When colonies of these filter feeders expand and remove a large percentage of the plankton the smaller fish starve or move out of the area. This causes the larger fish to starve or move. In addition to disrupting the freshwater food chains, the species has clogged power plant discharge pipes, impeded water flow in irrigation canals, contributed to bad tastes and odors in municipal water systems and plagued construction sites where clams accidentally mixed with concrete have weakened structural projects.

The Asian clam does not stick to structures but burrows into the sand. They have been found to be food for ducks, some species of fish and other wildlife.



APPENDIX F - INTERNET WEB ADDRESSES

NAME OF INVOLVEMENT	WEB ADDRESS
Africanized Honey Bees	http://agnews.tamu.edu/bees/home.htm
Asian Clam	http://detroitnews.com/menu/stories/44861.html
Audubon International Sanctuary System	http://www.audubonintl.org/acss/golf.htm
BASH Home page (Air Force)	http://www-afsc.saia.af.mil/AFSC/Bash/home.html
Aviation Directorate - BASH (Navy)	http://www.safetycenter.navy.mil/aviation/Operations/BASH/bash.htm
Bat Conservation International	http://www.batcon.org/
Bird Strike Committee	http://www.birdstrike.org/
Birding Central Texas	http://etex.electrotex.com/aoc/
CADD/GIS Technology Center	http://rpm.wes.army.mil/
Centers for Disease Control	http://www.cdc.gov/
Code of Federal Regulations	http://www.access.gpo.gov/nara/cfr/
Cornell Laboratory of Ornithology	http://www.ornith.cornell.edu/
Defense Environmental Network and Exchange	https://www.denix.osd.mil/
DoD & PIF (Partners in Flight)	http://www.dodpif.org/site.htm
EPA - Laws and Regulations	http://www.epa.gov/epahome/laws.htm
Herps of Texas	http://www.zo.utexas.edu/research/txherps/
House Sparrow	http://encarta.msn.com/find/Concise.asp?ti=04BF5000
The National Audubon Society	http://www.tnc.org/
Natural Resources Conservation Service	http://www.nmfs.gov/habitat/index.html
Navy Electronic Directives System	http://neds.nebt.daps.mil/
Nutria – Animal Directory	http://district.gresham.k12.or.us/ghs/sci/soph/animals/week2/nutria.html
Partners in Flight	http://www.partnersinflight.org/
Smithsonian Natural History Web Home Page	http://www.mnh.si.edu/nmnhweb.html
TAMU ag	http://texnat.tamu.edu/ranchref/guide/rwabc.htm
TAMU Ag. Exp.	http://gallus.tamu.edu/coals/taes.html
TAMU	http://leviathan.tamu.edu:70/11s/taexorg
Texas Department of Health	http://www.tdh.state.tx.us/
Texas General Land Office	http://www.glo.state.tx.us/
Texas Mosquito Control Association	http://www.texasmosquito.org/Index.html
TNRIS - digital data	http://www.tnris.state.tx.us/DigitalData/ftp.htm
Texas Parks and Wildlife Home Page	http://www.tpwd.state.tx.us/
TNC Element Stewardship Abstract - cattails	http://infoseek.go.com/?win=_search&sv=M6&qt=%22cattail+management%22&oq=cattails&url=http%3A//tncweeds.ucdavis.edu/esadocs/documnts/typh_sp.html&ti=Typha+spp&top=
TNRIS-Texas Data Online	http://www.tnris.state.tx.us/
US Audubon	http://www.audubon.org/
US Fish and Wildlife Service	http://www.fws.gov/
US Geological Survey	http://www.usgs.gov/
US Natural Resources Conservation Service	http://www.nrcs.usda.gov/
USDA APHIS (wildlife services)	http://www.aphis.usda.gov/ws/
USDA Forest Service Home Page	http://www.fs.fed.us/
Water Hyacinth	http://aquat1.ifas.ufl.edu/hyacin2.html
CLEAN WATER ACTION PLAN	
	www.epa.gov/cleanwater
	www.nhq.nrcs.usda.gov/cleanwater
	www.epa.gov/owow
	www.epa.gov/surf3
	www.epa.gov/iwi

	www.wqter.usgs.gov
SECTION 4 PHOTOGRAPHS	
	http://www.lnstar.com/mall/txtrails/wildflowers/flowers.htm
	http://www.nenature.com/rubythroatedhummingbird.htm
	http://www.tpwd.state.tx.us/nature/birding/hummingbird_roundup/images/blackchinned.gif
	http://www.tpwd.state.tx.us/nature/wild/reptiles/horned_lizard/
	http://www.gazebos.com/savannah.html
	http://aggie-horticulture.tamu.edu/wildseed/mexicanhat.html

PUBLIC LAWS, EXECUTIVE ORDERS & INSTRUCTIONS

Number	Title	Description
Public Law 65-186	Migratory Bird Treaty Act, as amended (16 USC 703)	Prohibits taking or harming a migratory bird, its eggs, nest, or young without the appropriate permit.
Public Law 85-337	Military Reservation & Facilities – Hunting, Fishing, and Trapping (10 USC 2671)	Provides that hunting, fishing, and trapping on military lands will be in accordance with state laws.
Public Law 86-624 & 96-366	Fish & Wildlife Coordination Act, as Amended (16 USC 661 et. seq.)	Provides for effective integration of the fish and wildlife conservation programs with federal water resource development and construction projects having impact on water resources.
Public Law 86-797	Conservation Programs on Military Installations, as amended (16 USC 670a et. seq.) (Often referred to as the "Sikes Act Improvement Act")	Requires that each military department manage their natural resources to ensure that professional services are provided to all fish and wildlife species, in accordance with a tripartite cooperative plan agreed to by the U.S. Fish and Wildlife Service and the state wildlife agency; to provide personnel with professional training in fish and wildlife management, and to give priority to contracting work with federal and state agencies having responsibility for conservation or management of fish and wildlife.
Public Law 88-29	Outdoor Recreation Program/Organic Act (16 USC 4601 et. seq.)	Requires consultation with the National Park Service (NPS) regarding management for outdoor recreation.
Public Law 89-669	Fish & Wildlife Conservation Act (16 USC 2901 et. seq.)	Provides for conservation, protection, restoration, and propagation of native species of fish and wildlife, including migratory birds threatened with extinction; and for other purposes.
Public Law 90-542	Wild and Scenic Rivers Act	Required identification and protection of any river or stream that qualifies under the Act.
Public Law 90-543	National Trails Systems Act of 1986	Promotes development of recreational, scenic, and historic trails for persons for diverse interest and abilities.
Public Law 90-583	Noxious Plant Control	Provides for the control of noxious plants on land under control or jurisdiction of the federal government.
Public Law 91-190	National Environmental Policy Act (NEPA), as amended (42 USC 4321 et. seq.)	Establishes a national policy to preserve important natural aspects of our national heritage and enhance the quality of renewable resources.

PUBLIC LAWS, EXECUTIVE ORDERS & INSTRUCTIONS (Continued)

Number	Title	Description
Public Law 92-500	Federal Water Pollution Control Act (Clean Water Act), as amended (33 USC 1251)	Prohibits point source discharge of pollutants into navigable waters, unless an appropriate permit is first obtained under Section 401. Section 404 prohibits discharge of dredged or fill material into navigable waters of the United States, including wetlands, without first obtaining a permit from the U.S. Army Corps of Engineers. Section 319 requires federal agencies to comply with State nonpoint source pollution abatement guidelines.
Public Law 92-205	Endangered Species Act of 1973, as amended (16 USC 1531 et. seq.)	Provides for the identification and protection of threatened and endangered species of fish, wildlife, and plants and their critical habitats. Requires federal agencies to ensure that no agency action is likely to jeopardize the continued existence of an endangered or threatened species. Requires biological assessments of any agency action when an endangered or threatened species may be present in the area(s) affected by the action.
Public Law 93-639	Federal Noxious Weed Act of 1974 (7 USC 2801 et. seq.)	Provides for the control and eradication of noxious weeds and their regulation in interstate and foreign commerce.
Public Law 96-366	The Non-Game Species Act	Encourages management of non-game species.
10 USC 2665	Military Construction Authorization Act – Sale of Certain Interests in Lands; Logs	The sale of forest products is authorized to finance the cost of managing forest resources for commercial production.
10 USC 2667	Leases; Non-Excess Property	Provides for the outleasing of public lands for agricultural purposes and retention of cash receipts for administration of the program; improvement of existing leased areas; preparing new areas for outleasing; and for other natural resources projects.
16 USC 590a	Soil Conservation Act	Provides for application of soil conservation practices on federal lands.
16 USC 668 et. seq.	Bald & Golden Eagle Protection Act	Prohibits the taking (harassment, sale, or transportation) of bald or golden eagles, alive or dead, whole or in part and their nest and/or eggs.
42 USC 1962d	Water Resources Planning Act of 1965, as amended	Provides for the optimum development of the Nation's natural resources through the planning of water and related resources.
Executive Orders 11514 and 11991	Protection & Enhancement of Environmental Quality	Directs issuance of instructions and guidelines relative to preparation of Environmental Impact Statements.
Executive Order 11988	Floodplain Management	Requires federal agencies to evaluate effects of action they have taken on floodplains.

PUBLIC LAWS, EXECUTIVE ORDERS & INSTRUCTIONS (Continued)

Number	Title	Description
Executive Orders 11989 & 12608	Off-Road Vehicles on Public Lands	Provides for closing areas to off-road vehicle use where soil, wildlife, or other natural resources are adversely affected.
Executive Order 11990	Protection of Wetlands	Requires agencies to take action to minimize destruction, loss or degradation of wetlands.
Executive Order 12088	Federal Compliance with Pollution Control Standards	Requires agencies to work with the EPA, state and local environmental regulating agencies to comply with "applicable pollution control standards."
Executive Order 12962	Recreational Fisheries	Recognizes importance of recreational fishing and directs federal agencies to improve the quality, function and distribution of aquatic resources for increased recreational fishing opportunities.
Executive Order 13148	Greening the Government Through Leadership in Environmental Management	Requires federal agencies to integrate environmental accountability and management into their daily and long-term decisions and planning procedures.
Presidential Memo 50737	Environmentally & Economically Beneficial Practices on Federal Landscaped Grounds	Provides policy for landscaping on federal facilities concerning the use of native plants for reduced maintenance; reduced water consumption, reduced insect and disease problems; and, a compatible appearance in relationship to the surrounding natural environment.
32 CFR 190	Natural Resources Management Program	Provides DOD policy on natural resources management.

PUBLIC LAWS, EXECUTIVE ORDERS & INSTRUCTIONS (Continued)

Number	Title
DODINST 4700.2	The Secretary of Defense Natural Resources Conservation Award
DODINST 7310.5	Accounting for Production & Sale of Forest Products
SECNAVINST 6240.6E	Environmental Protection & Natural Resources
OPNAVINST 5090.1B	Environmental & Natural Resources Program Manual
NAVFACINST 6250.3F	Performance & Reporting of Pest Control Operations in the Naval Shore Establishment
NAVFACINST 7110	Fish & Wildlife & Game Conservation & Rehabilitation; Funds Management for
NAVFACINST MO-110.1	Natural Resources Land Management
NAVFACINST MO-110.2	Forest Management
NAVFACINST MO-110.3	Fish & Wildlife Management
NAVFACINST MO-110.2	Outdoor Recreation & Cultural Values
NAVFAC P-73	Real Estate Operations & Natural Resources Management Procedural Manual - Volumes 1 & II

FINAL

HAZARDOUS WASTE MANAGEMENT PLAN
NAVAL AIR STATION JOINT RESERVE BASE

FORT WORTH, TEXAS

Prepared for:

Southern Division
Naval Facilities Engineering Command
Contract N62467-99-D-1048, Delivery Order 24

March 2002

Prepared by:

IT Corporation
11499 Chester Road
Cincinnati Ohio 45246

MANAGEMENT APPROVAL

Naval Air Station Joint Reserve Base (NAS JRB)
Fort Worth, Texas
Hazardous Waste Management Plan

My signature below signifies that I understand that the Hazardous Waste Management Plan (HWMP) is required by OPNAVINST 5090.1B and I will fully support the NAS JRB Fort Worth Environmental Director in the implementation of the management practices presented herein.

_____ Date _____
S.P. McMullin
Capt. USNR
Commanding Officer
NAS JRB Fort Worth, Texas

DOCUMENT REVISION TRACKING FORM

NAS JRB FORT WORTH, TEXAS
Hazardous Waste Management Plan
January 2002

This Hazardous Waste Management Plan will be revised as necessary to reflect changes in hazardous waste generation and operations at NAS JRB Fort Worth and to remain current with all applicable federal, state, and local regulations. This sheet is to be updated with each revision of this document.

Revision Number	Date	Name of Person	Initials	Reason for Amendment	Pages Affected

TABLE OF CONTENTS

Page

LIST OF FIGURES iv
LIST OF TABLES iv
LIST OF APPENDICES v
ACRONYMS AND ABBREVIATIONS vi
DEFINITIONS viii

1.0 INTRODUCTION 1-1
- 1.1 Background 1-1
- 1.2 Objectives 1-2
- 1.3 Applicability 1-3
- 1.4 Hazardous Waste Management Organization 1-4

2.0 REGULATIONS AND POLICIES 2-1
- 2.1 40 CFR Parts 116-117 Hazardous Substance Regulations 2-1
- 2.2 49 CFR Parts 170-179 Hazardous Material Transportation Regulations 2-1
- 2.3 40 CFR Part 761 Toxic Substances Contract Act (TSCA) 2-2
- 2.4 29 CFR 1910.120 OSHA Regulations for Hazardous Waste Operations and Emergency Response 2-2
- 2.5 30 TAC 335.1-335.569 Texas Hazardous Waste Regulations 2-2
- 2.6 40 CFR Parts 260-268, 270, and 273, Status of Federal Hazardous Waste and Universal Waste Regulations in Texas 2-3
- 2.7 40 CFR Parts 264-265 Air Emission Standards 2-5
- 2.8 Munitions Rules and Regulations 2-8
- 2.9 Local Regulations 2-10
- 2.10 Navy Hazardous Waste Minimization Policies 2-11
- 2.11 TNRCC Source Reduction and Waste Minimization Requirements 2-12

3.0 SHOP LEVEL WORKER RESPONSIBILITIES 3-1
- 3.1 Training Requirements for Shop Level Worker 3-1
- 3.2 Container Management at Satellite Accumulation Areas 3-2
- 3.3 Universal and Other Waste Management Requirements 3-4
- 3.4 Record Keeping 3-5
- 3.5 Spill Response and Reporting 3-6

4.0 UNIT HW COORDINATOR RESPONSIBILITIES 4-1
- 4.1 Training Requirements for Unit HW Coordinators 4-2
- 4.2 Container Management Requirements at Satellite Accumulation Points 4-3
- 4.3 Universal and Other Waste Management 4-9
- 4.4 Record Keeping and Inspections 4-10
- 4.5 Container Pickup Procedures and Policies 4-14

TABLE OF CONTENTS

Page

4.6 Spill Response and Reporting 4-18

5.0 ENVIRONMENTAL OFFICE HW HANDLER RESPONSIBILITIES 5-1
5.1 Training Requirements for Environmental Office HW Handlers 5-1
5.2 Container Pickup and Transfer to <90-Day Hazardous Waste Storage Area 5-2
5.3 Container Management Requirements at the <90-Day Hazardous Waste Storage Area 5-3
5.4 Conducting Waste Sampling 5-10
5.5 Record Keeping and Inspections 5-14
5.6 Spill Response and Reporting 5-19

6.0 HAZARDOUS WASTE PROGRAM MANAGER RESPONSIBILITIES 6-1
6.1 Training Requirements for Environmental Office HW Program Manager 6-1
6.2 Waste Stream Determinations 6-1
6.3 Management of Waste Sampling and Analysis 6-9
6.4 Land Disposal Restrictions 6-11
6.5 Manifesting 6-11
6.6 Management of Hazardous Waste Disposal Contractor 6-16
6.7 Management of Satellite Accumulation Areas and Waste Storage Area 6-16
6.8 Inspections 6-17
6.9 Records and Reports 6-18

7.0 COMPLIANCE DIVISION HEAD RESPONSIBILITIES 7-1
7.1 Training Requirements for Compliance Division Head 7-1
7.2 Quality Assurance Oversight of Hazardous Waste Management Practices 7-1
7.3 Hazardous Waste Cleanup Oversight 7-3
7.4 Maintaining Hazardous Waste Management Plan 7-3
7.5 Facility Hazardous Waste Liaison 7-3

8.0 CONTRACTOR AND VISITING DOD UNIT RESPONSIBILITIES 8-1
8.1 Training Requirements for Contractors and Visiting DoD Units 8-1
8.2 Container Management 8-2
8.3 Record Keeping 8-2
8.4 Spill Response and Reporting 8-2

9.0 PERSONNEL TRAINING 9-1
9.1 General Requirements 9-1
9.2 Training Records 9-3

10.0 REQUIREMENTS FOR REPORTING AND RECORD KEEPING 10-1

TABLE OF CONTENTS

Page

11.0 INTEGRATED CONTINGENCY PLAN 11-1

12.0 PROCEDURES FOR FILING FOR 30-DAY STORAGE EXTENSION FOR <90-DAY STORAGE AREA 12-1

LIST OF FIGURES

Page

1-1 NAS JRB Forth Worth Hazardous Waste Management Organization 1-6
4-1 Satellite Accumulation Point Container Color Identification 4-6
4-2 Satellite Waste Container Generation Summary Log 4-12
4-3 Satellite Accumulation Point Daily Inspection Log 4-15
4-4 Disposal Turn-In Document 4-17
4-5 NAS JRB Fort Worth Spill Report 4-20
5-1 Hazardous Waste 90-Day Storage Facility 5-4
5-2 Base Hazardous Waste Label (Yellow) 5-6
5-3 Base Nonhazardous Waste Label (Green) 5-7
5-4 Base Universal Waste Label (Purple) 5-8
5-5 Hazardous Waste Container Turn-In and Shipment Log 5-15
5-6 SAP Weekly Inspection Form 5-17
5-7 NAS JRB Fort Worth Weekly Inspection Form for the <90-Day Hazardous Waste Storage Area 5-20

LIST OF TABLES

Page

2-1 TNRCC RCRA Hazardous Waste and Universal Waste Generator Requirements 2-4
3-1 Training Requirements for Shop Level Worker Personnel 3-2
3-2 Satellite Container Requirements for Shop Level Workers 3-4
3-3 Universal Waste Requirements for Shop Level Workers 3-5
4-1 Training Requirements for Unit HW Coordinators and Alternates 4-2
4-2 Satellite Container Requirements for Unit HW Coordinators 4-9
5-1 Training Requirements for Environmental Office HW Handlers 5-2
5-2 Recommended Samplers for Various Types of Wastes 5-11
5-3 Recommended Waste Container Sampling Points 5-11
5-4 Sampling Recommendations for Various Cases 5-12
5-5 Procedure for Sampling Waste in Drums 5-13
6-1 Training Requirements for HW Program Manager 6-2
6-2 Procedures for Characterizing Unknown Materials 6-8
6-3 Hazardous Waste Analytical Screening Protocol 6-12
7-1 Training Requirements for Compliance Division Head 7-2
9-1 Hazardous Waste Training Requirements 9-2
10-1 Hazardous Waste Record-Keeping Requirements 10-2

LIST OF APPENDICES

APPENDIX A: HAZARDOUS WASTE SATELLITE ACCUMULATION POINT LOCATION MAP

APPENDIX B: HAZARDOUS WASTE SATELLITE ACCUMULATION POINTS

APPENDIX C: HAZARDOUS WASTE SATELLITE ACCUMULATION POINT DOCUMENTATION FORMS

APPENDIX D: HANDLING REQUIREMENTS FOR UNIVERSAL AND NON-HAZARDOUS WASTES

APPENDIX E: REGULATORY AGENCY INTERPRETATIONS

APPENDIX F: EXAMPLE UNIT HAZARDOUS WASTE MANAGER APPOINTMENT LETTER

APPENDIX G: WASTE STREAM DOCUMENTATION FORM

APPENDIX H: NAS JRB FORT WORTH WASTE STREAM SUMMARY FOR INDIVIDUAL WORK CENTERS

APPENDIX I: NAS JRB FORT WORTH WASTE STREAM CODES

APPENDIX J: NAS JRB FORT WORTH HW TRAINING LOG

ACRONYMS AND ABBREVIATIONS

AFRES	U.S. Air Force Reserve
AUL	Authorized Use List
BRAC	Base Realignment and Closure Act
CFR	Code of Federal Regulations
DOD	Department of Defense
DOT	Department of Transportation
HAZCOM	Hazard Communications
HAZMIN	Hazardous Material Minimization
HAZWOPER	Hazardous Waste Operations and Emergency Response
HM	Hazardous Material
HMTID	Hazardous Material Turned-In for Disposal
HS	Hazardous Substance
HW	Hazardous Waste
HMIS	Hazardous Material Information System
HWMP	Hazardous Waste Management Plan
ICP	Integrated Contingency Plan
ID	Identification
IDO/IQ	Indefinite Delivery Order/Indefinite Quantity
JRB	Joint Reserve Base
LC	Lethal Concentration
LD	Lethal Dose
MAG 41	Marine Aircraft Group 41
MEK	Methyl Ethyl Ketone
MSDS	Material Safety Data Sheet
MWR	Morale, Welfare, and Recreation
NA	North American
NAS	Naval Air Station
NSN	National Stock Number

OPNAVINST	Naval Operations Instruction
ORM	Other Regulated Material
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PCB	Polychlorinated Biphenyl
POL	Petroleum, Oil, and Lubricants
PPE	Personal Protective Equipment
PPRW	Paint and Paint-Related Wastes
QI	Qualified Individual
RCRA	Resource Conservation and Recovery Act
SAP	Satellite Accumulation Point
SOUTHDIV	Naval Facilities Engineering Command, Southern Division
SPCC	Spill Prevention, Control, and Countermeasures Plan
TAC	Texas Administrative Code
TCLP	Toxicity Characteristic Leaching Procedure
TNRCC	Texas Natural Resource Conservation Commission
TSDF	Treatment, Storage, or Disposal Facility
UN	United Nations
USEPA	U.S. Environmental Protection Agency
USNR	United States Navy Reserve
VF 201	Fighter Squadron 201
VO	Volatile Organics
VR 59	Fleet Logistics Support Squadron
WMM	Waste Military Munitions
WSD	Waste Stream Documentation

DEFINITIONS

Accumulation Start Date. The date on which hazardous waste is first placed in a container, unless it is stored at a SAP. The accumulation date is recorded when a hazardous waste container at a SAP is full and is moved to the <90-Day Hazardous Waste Storage Area.

Acutely Hazardous Waste. A waste that has been found to be fatal to humans in low doses; or in the absence of data on human toxicity, has been shown in studies to have an oral Lethal Dose (LD_{50}) toxicity (rat) of less than 50 milligrams of waste per kilogram of body weight, an inhalation Lethal Concentration (LC_{50}) toxicity (rat) of less than 2 milligrams of waste per liter of air, or a dermal LD_{50} toxicity (rabbit) of less than 200 milligrams of waste per kilogram of body weight; or is otherwise capable of causing or significantly contributing to an increase in serious irreversible, or incapacitating reversible illness. LD_{50} and LC_{50} are doses and concentrations that cause death in 50% of exposed animals. These wastes are identified in 40 CFR 261.31 by the hazard code "H" and are listed in the "P" list in 40 CFR 261.33(e).

Best Management Practice (BMP). A term that is commonly used in the water pollution control industry to indicate any number of practical work techniques to limit the introduction of pollutants to public waters. BMPs are established after achieving a compromise between the environmental ideal (zero discharge of pollutants) and that which is achievable from an economic and operational standpoint.

Empty Container. Any container (or any inner liner that has been removed from a container) that has held any hazardous material/waste (except a waste that is a compressed gas or that is identified as an acute hazardous waste) is considered to be empty if all wastes that can be removed result in no more than 1 inch of residue remaining on the bottom of the container. A container that is less than or equal to 110 gallons in size, is considered empty if no more than 3 percent of residue by weight of the total capacity of the container remains.

Halogenated Solvent. Any solvent containing fluorine, chlorine, bromine, or iodine (e.g., freon; halon; 1,1,1-trichloroethane; 1,1,2-trichloroethane; 1,2,2-trifluoroethane; trichlorotrifluoroethane; and methylene chloride). The radioactive element astatine is also a halogen, but it is not used for the production of solvents.

Hazardous Material (HM). Any material designated by the Department of Transportation (DOT) as posing a potential threat while being transported. Hazardous materials are listed in 49 CFR Part 172.

Hazardous Material Minimization (HAZMIN) Central Distribution Center. A facility that accepts and issues unused or partially used containers of hazardous materials based on an Authorized Use List (AUL) and barcode system.

Hazardous Material Turned-In for Disposal (HMTID). Any hazardous material that is not acceptable for turn-in to the Supply Department is a HMTID. These materials are to be turned in to the Environmental Office for disposal.

Hazardous Substance (HS). A substance included in the specific list of chemicals designated by the USEPA in 40 CFR Part 302 as potentially posing a substantial threat to human health or the environment when discharged into the environment because of the substance's quantity, concentration, or physical,

chemical, or infectious characteristics. Hazardous substances are regulated only when they are discharged in excess of their reportable quantities. Reportable quantities are listed in 40 CFR Part 302.

Hazardous Waste (HW). Any discarded solid waste (liquid, semi-solid, solid, or gaseous) that meets the definition of a hazardous waste by USEPA, the state HM/HW control authorities, or the Navy. In accordance with RCRA, a solid waste is a listed hazardous waste if it is specifically listed in 40 CFR 261.31, 261.32, or 261.33, or it is a characteristic hazardous waste if it exhibits the characteristics of ignitability, corrosivity, reactivity, or toxicity, as described below:

- **Ignitability –** A solid waste exhibits the characteristic of ignitability if a representative sample has any of the following properties (30 TAC 335.1; 40 CFR Part 261, Subpart C):

  i. It is a liquid, other than an aqueous solution, containing less than 24 percent alcohol by volume, that has a closed cup flash point of less than 60 degrees Celsius (140 degrees Fahrenheit) (30 TAC 335.1, 40 CFR 261.21);

  ii. It is not a liquid and is capable under standard temperature and pressure of causing fire through friction, absorption of moisture, or spontaneous chemical changes, and when ignited, burns so vigorously and persistently that it creates a hazard (30 TAC 335.1, 40 CFR 261.21);

  iii. It is an ignitable compressed gas (30 TAC 335.1, 40 CFR 261.21); or

  iv. It is an oxidizer (30 TAC 335.1, 40 CFR 261.21).

  Ignitable wastes are assigned the USEPA Hazardous Waste Number D001.

- **Corrosivity –** A solid waste exhibits the characteristic of corrosivity if a representative sample of the material has any of the following properties (30 TAC 335.1; 40 CFR Part 261, Subpart C):

  i. It is aqueous and has a pH of less than or equal to 2.0, or greater than or equal to 12.5; or

  ii. It is a liquid that corrodes steel at a rate greater than 6.35 millimeters per year at a test temperature of 55 degrees Celsius (130 degrees Fahrenheit).

  Corrosive wastes are assigned the USEPA Hazardous Waste Number D002.

- **Reactivity –** A solid waste exhibits the characteristic of reactivity if a representative sample of the material has any of the following properties (30 TAC 335.1; 40 CFR Part 261, Subpart C):

  i. It is normally unstable and readily undergoes violent change without detonating;

  ii. It reacts violently with water;

iii. It forms potentially explosive mixtures with water;

iv. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment;

v. It is a cyanide- or sulfide-bearing material that when exposed to pH conditions between 2.0 and 12.5 can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment;

vi. It is capable of detonation or explosive reaction if it is subjected to a strong ignition source, or is heated under confinement;

vii. It is readily capable of explosive detonation or reaction at standard temperature and pressure; or

viii. It is a forbidden explosive or a Class A or Class B explosive as defined in 49 CFR 173.51, 173.53, or 173.88, respectively.

Reactive materials are assigned the USEPA Hazardous Waste Code Number D003.

- **Toxicity –** A material exhibits the characteristic of toxicity, as determined by the Toxicity Characteristic Leaching Procedure (TCLP), if the extract from a representative sample contains any of the contaminants listed in 40 CFR 261.24 at a concentration greater than the respective value given in the table. Some of the contaminants are barium, cadmium, chromium, lead, mercury, silver, and certain pesticides and solvents. A solid waste that exhibits the toxicity characteristic, but is not a listed hazardous waste, has the USEPA Hazardous Waste Code Number corresponding to the toxic contaminant causing it to be hazardous (30 TAC 335.1; 40 CFR Part 261, Subpart C).

HW Unit. Each NAS JRB Fort Worth maintenance contractor, department, tenant command, other tenant activity, or base activity whose activities or processes create or originate hazardous waste.

Hazardous Waste Stream. A description of hazardous wastes that originate from a specific process(es). Hazardous waste streams are characterized by analytical testing and/or process knowledge. All hazardous waste streams are assigned a number by the Environmental Office.

Incompatible HM/HS/HW. Any two materials that will react with each other to produce undesirable products, violent reactions, and/or toxic fumes.

Listed Hazardous Waste. A listed hazardous waste that is identified in 40 CFR 261.31, 261.32, and 261.33.

Non-Halogenated Solvent. Any solvent that does not contain the chemicals listed in the definition for Halogenated Solvent (e.g., methyl ethyl ketone, alcohol, xylene, toluene, acetone, and benzene).

Other Regulated Material (ORM) A material (e.g., a consumer commodity) that, although otherwise subject to 49 CFR Part 173, Subpart D, presents a limited hazard during transportation due to its form,

quantity, and packaging. It must be a material for which exceptions are provided in 49 CFR 172.101. Each ORM-D material and category is listed in 49 CFR 172.101.

Reclaimed. Any material that is processed to recover a usable product or to regenerate a material (40 CFR 261.1).

Recycled. Any material that is used, reused, or reclaimed (40 CFR 261.1).

Reused. Any material that is employed as an ingredient in an industrial process to make a product, or is employed in a particular function or application as an effective substitute for a commercial product.

Satellite Accumulation Point (SAP). An area at the site of hazardous waste generation, under the direct control of the operator, where no more than 55 gallons of hazardous waste are accumulated.

<**90-Day Hazardous Waste Storage Area.** An area where hazardous waste is accumulated on a daily basis for interim storage pending transport to an off-site disposal facility. The area must comply with applicable federal, state, local, and Navy standards. Hazardous waste storage time cannot exceed 90 days at the area.

Spill/Release. The intentional or accidental loss, including any leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of a hazardous substance into the environment.

Unit HW Coordinator. The person responsible for the operation and management of the hazardous waste program at each location where hazardous waste is generated.

United Nations/North American Designations (UN/NA). DOT identification numbers assigned to hazardous materials are preceded by either a United Nations (UN) or a North American (NA) designation. The identification numbers are indexed to response instructions for use in the event of an accident. Identification numbers that are preceded by a "UN" are associated with descriptions considered appropriate for international shipments, as well as domestic shipments. The "NA" designation is limited to use in the United States and Canada only.

1.0 INTRODUCTION

1.1 Background

Naval Air Station (NAS) Joint Reserve Base (JRB) Fort Worth was officially established on 1 October 1994, as the first joint-service reserve base. The 1,805-acre base is the result of the Department of Defense (DoD) 1993 Base Realignment and Closure Act (BRAC) recommendation to relocate NAS Dallas and its tenant commands to the former Carswell Air Reserve Base. Additional tenant commands from other closing installations were also directed to relocate to NAS JRB Fort Worth. The 1993 BRAC proceedings placed the Navy as the host of the new joint military reserve base. The mission of NAS JRB Fort Worth is to provide a quality-training environment for Reserve components of all branches of the Armed Services.

During the execution of this mission, waste materials are generated that must be properly managed and dispositioned to protect worker health and the environment, as well as optimize use of resources procured by the Navy. While all wastes must be managed properly, it is especially important to carefully manage those wastes that pose the greatest risks to human health and the environment (e.g., paint wastes, photo fixer, developer, and acids). These wastes (deemed "hazardous waste") must be managed in a safe, consistent and formal manner that conforms to strict regulatory requirements established by the United States Environmental Protection Agency (USEPA) and the State of Texas.

NAS JRB Fort Worth is classified as a large-quantity hazardous waste generator [i.e., it generates at least 1,000 kilograms (2,200 pounds) of non-acute hazardous waste per month], and it also generates acutely hazardous waste; therefore, the base must follow regulations that govern the management of hazardous waste for generators. As a generator of hazardous waste, NAS JRB Fort Worth has previously provided a notification of hazardous waste activities to the USEPA and the Texas Natural Resource Conservation Commission (TNRCC). The base has been assigned USEPA identification (ID) number TX0571924042. The state generator ID for the base is 65004. As a large quantity generator of hazardous waste, NAS JRB Fort Worth is also regulated as being a large quantity generator of universal waste. For wastes that are generated, NAS JRB operates one <90-day hazardous waste storage area located at Building 1347. NAS

JRB Fort Worth may accumulate hazardous waste on-site for 90 days or less without permit. Hazardus waste containers must be shipped off-site within 90 days or less from the accumulation start date marked on the container.

This Hazardous Waste Management Plan (HWMP) establishes a program to ensure proper identification, characterization, and handling of hazardous wastes at NAS JRB Fort Worth. The HWMP was developed in accordance with Naval Operations Instruction (OPNAVINST) 5090.1B, which requires all naval shore installations that generate hazardous waste to develop a HWMP. This HWMP meets the requirements set forth in Title 40 of the Code of Federal Regulations (CFR) and the State of Texas Administrative Code (TAC), Hazardous Waste Management Rules for Hazardous Waste Generators.

A copy of the HWMP will be maintained on file at the NAS JRB Fort Worth Environmental Office. This document will be made readily available upon request to any State of Texas regulator or to any personnel stationed at NAS JRB Fort Worth requiring information on the management of hazardous waste. This HWMP updates the plan developed in July 1999.

1.2 Objectives

The objectives of this HWMP are to:

- Clearly communicate roles and responsibilities for ensuring that hazardous wastes at NAS JRB Fort Worth are managed in accordance with Navy Policy (OPNAVINST 5090.1B, Chapter 12) as well as applicable federal, state, and local requirements;
- Identify training requirements for all NAS JRB personnel involved in hazardous waste management and identify procedures for maintaining training records;
- Identify types and quantities of hazardous wastes generated and handled by NAS JRB Fort Worth;
- Identify applicable federal, state, and local regulations pertaining to the generation and management of hazardous waste;
- Describe the management procedures for handling and disposing of hazardous wastes;

- Reference Hazardous Waste Minimization goals;
- Reference the Integrated Contingency Plan (ICP) and emergency response procedures.

1.3 Applicability

The USEPA was authorized under the Resource Conservation and Recovery Act (RCRA) to implement regulations for the control of hazardous waste from the point of generation through final disposal to ensure that hazardous waste does not pose a threat to human health or the environment. Under the authority granted by the USEPA, the TNRCC developed hazardous waste management regulations. These regulations contain specific requirements for hazardous waste management in the state of Texas and are applicable to NAS JRB Fort Worth.

When a material becomes a hazardous waste, the law requires that the waste be disposed of in an environmentally acceptable manner. Federal and state regulations establish standards for generators and transporters of hazardous waste that require proper handling, storage, transportation, record keeping and reporting, and use of a manifest system to track shipments of hazardous waste to treatment, storage, and disposal facilities (TSDFs). This HWMP provides detailed procedures for the management of hazardous waste at NAS JRB Fort Worth.

To remain in compliance with the applicable hazardous waste regulations for generators, NAS JRB Fort Worth performs the following activities as directed in this HWMP:

- Ship all hazardous waste off site within 90 days or less from the accumulation start date marked on the container.
- Place all hazardous waste in performance-oriented packaging or Department of Transportation (DOT)-certified containers for storage and transportation.
- Inspect all hazardous waste containers stored at the <90-Day Hazardous Waste Storage Area and at the Satellite Accumulation Points (SAPs) on an established schedule. Inspections at the <90-Day Hazardous Waste Storage Area are conducted weekly by the HW Program Manager and/or the Environmental Office HW Handlers. Inspections at the SAPs are conducted daily by the Unit HW

Coordinators and weekly by the HW Program Manager and/or the Environmental Office HW Handlers.

- Place all hazardous waste containers holding ignitable or reactive wastes at least 50 feet from the base's property line or other sources of ignition.
- Ensure the date upon which each period of accumulation begins is clearly marked and visible for inspection on each hazardous waste container.
- Each hazardous waste container is properly marked and labeled per DOT regulations in 49 CFR 172 after the container is placed in the <90-Day Hazardous Waste Storage Area.
- Prepare manifests (or ensure that manifests are properly prepared by disposal contractors) for all hazardous waste before transporting the waste off site.
- Ensure the base complies with 40 CFR 265, Subparts C and D, which address preparedness and prevention, contingency plans, and emergency procedure requirements.
- Maintain a training program that complies with 40 CFR 265.16 and 29 CFR 1910 requirements.

1.4 Hazardous Waste Management Organization

The Environmental Office coordinates hazardous waste management, operates the hazardous waste storage building, and oversees the disposal of all hazardous wastes generated at NAS JRB Fort Worth. A civilian contractor provides for the transportation and disposal of hazardous waste off site with assistance from the Environmental Office. Figure 1-1 outlines the basic organizational structure and facility personnel responsible for managing hazardous waste at NAS JRB Fort Worth.

Facility personnel responsible for hazardous waste management include the Commanding Officer, Public Works Officer, Environmental Director, Compliance Division Head, HW Program Manager, Environmental HW Handlers, HW Disposal Contractor, Unit HW Coordinators, and Shop Level Workers. In addition, any contractor or visiting DoD Unit who may generate hazardous waste while temporarily conducting work related activities at NAS JRB Fort Worth must also be responsible for hazardous waste management and follow the procedures presented

in the HWMP. Hazardous waste generators at NAS JRB Fort Worth include the following activities, departments, tenants and contractors:

- 14th Marines - 4th Division;
- Air Force Reserve 301st Fighter Wing;
- Aircraft Intermediate Maintenance Department;
- Base Fire Department;
- Branch Medical Clinic;
- Contractors and Visiting DoD Units (on an as-needed basis);
- Dyancorp;
- Fighter Squadron 201 (VF 201);
- Fleet Logistics Support Squadron 59 (VR 59);
- Hazardous Material Minimization (HAZMIN) Center;
- Marine Aircraft Group 41 (MAG 41) and subordinate commands;
- Morale, Welfare, and Recreation (MWR) Auto Hobby Shop;
- MWR Department;
- Naval Mobile Construction Battalion 22;
- Naval Regional Dental Clinic;
- Navy Exchange Service;
- Operations Department (including Transient Line, Arresting Gear, Weapons Division, and Contract Maintenance personnel);
- Public Works Department;
- Supply Department (including the fuel depot); and
- Texas Air National Guard.

All base activities, departments, contractors, and tenant commands that create hazardous waste shall provide to the Environmental Office, through the chain-of-command, a list of Unit HW Coordinators and alternates as they are appointed. The list shall include name, rank or position,

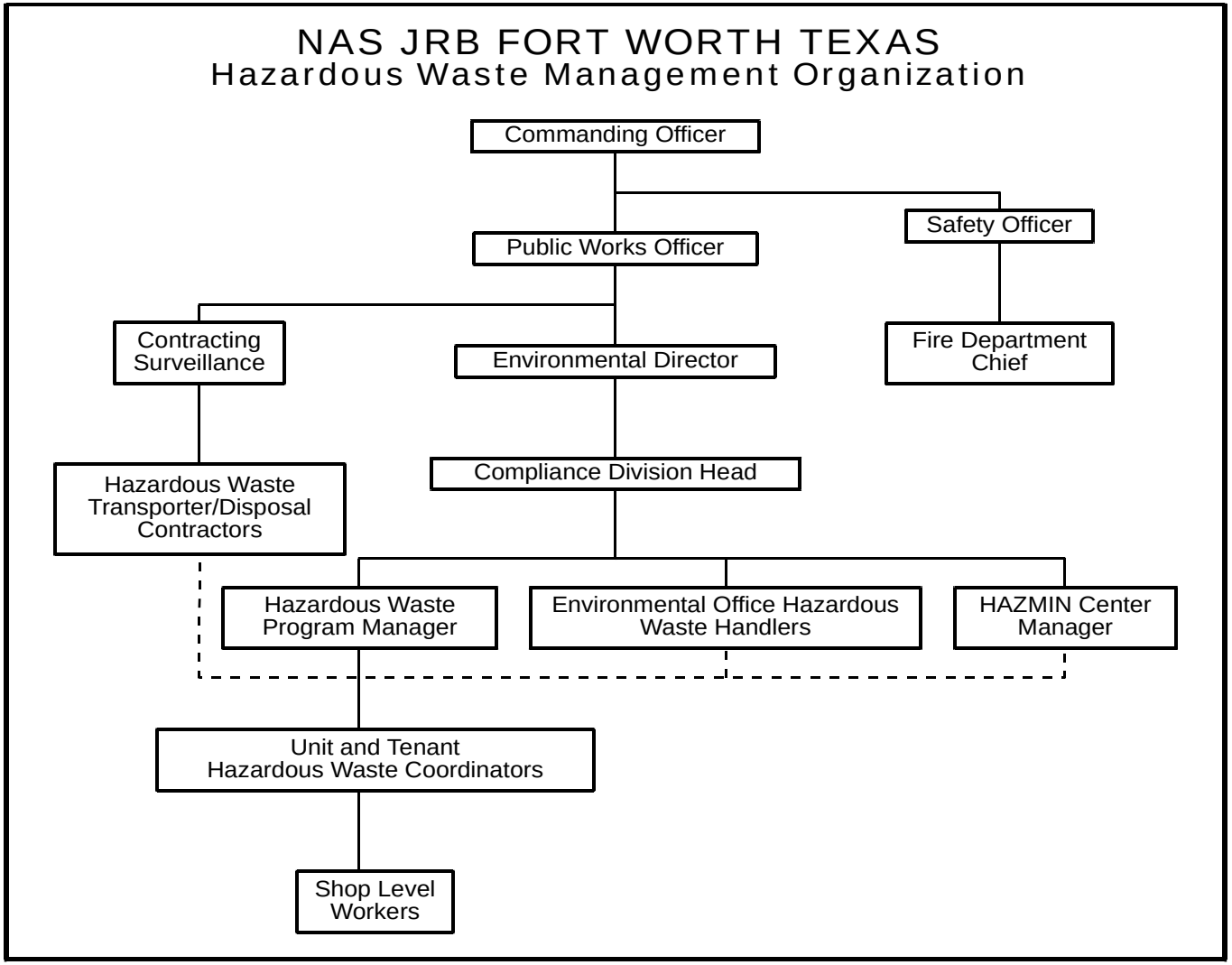


Figure 1-1. NAS JRB Fort Worth Hazardous Waste Management Organization

unit, job description, duties, and phone number, including emergency beeper number. Any changes to the list shall be reported in writing to the Environmental Director at the time of the change. Unit HW Coordinators and alternates shall receive appropriate training and be responsible for implementing this HWMP.

Basic responsibilities for each of the hazardous waste management positions are summarized in the following paragraphs. Detailed roles, responsibilities, and procedures are presented in the remainder of this HWMP for each of these positions except for the Commanding Officer, Public Works Officer, Safety Officer, Fire Department Chief, Contracting Surveillance, Environmental Director, and Hazardous Waste Contractor/Broker.

1.4.1 Commanding Officer

The Commanding Officer bears overall responsibility for proper implementation of the HWMP. He is legally responsible for NAS JRB Fort Worth's compliance with all applicable regulations and laws that apply to hazardous waste and hazardous substances. The Commanding Officer shall:

- Comply with all applicable federal, state and local regulations and laws that apply to hazardous substances.
- Assume on-scene command authority and overall responsibility for all hazardous waste spills.
- Allocate funds for hazardous waste management.
- Designate, in writing with a copy to the Environmental Office, qualified individuals to serve as Unit HW Managers and Assistant Unit HW Managers.
- Ensure all assigned personnel are aware of and comply with the provisions of this plan; the NAS JRB Fort Worth ICP; and all pertinent federal, state, local, and Navy regulations governing hazardous waste.

1.4.2 Public Works Officer

The Public Works Officer shall:

- Coordinate with the Base Fire Chief to provide logistical support and emergency equipment and supplies when required for response to a major incident.

- Ensure that all construction contracts at NAS JRB Fort Worth include provisions for the proper handling and disposal of hazardous material and hazardous waste by the contractor. Such waste shall be managed and disposed of in accordance with applicable NAS JRB Fort Worth instructions and transported off-base for disposal in accordance with all federal, state, and local regulations.

1.4.3 Environmental Director

The Environmental Director is the head of the NAS JRB Fort Worth Environmental Office and may be contacted in Building 1215 (previously located in Building 1510) or by telephone at 782-6470. The Environmental Director shall:

- Serve as the coordinator, under delegation from the Commanding Officer, for all hazardous waste activities.

- Ensure all necessary data from the tenant commands is compiled to complete all required plans and reports.

- Submit all required plans and reports to federal, state, and local environmental regulatory agencies.

- Obtain all necessary permits and licenses from federal, state, and local environmental regulatory agencies.

- Serve as the single point of contact for all inquiries, inspections, and other actions from federal, state, and local environmental regulatory agencies.

- Act as a liaison with federal, state, and local environmental regulatory agencies.

- Approve all purchases of emergency equipment, waste handling equipment, and reference materials.

- Ensure NAS JRB Fort Worth personnel receive training in the proper handling and storage of hazardous waste.

- Perform independent inspections of SAPs and the <90-Day Hazardous Waste Storage Area, and ensure scheduled maintenance is completed.

- Track tenant hazardous waste disposal costs when reimbursement is provided as part of an Interservice Support Agreement.
- Ensure storage and inspection records are maintained.
- Maintain a list of Unit HW Coordinators.

1.4.4 Compliance Division Head

The Compliance Division Head is a member of the Environmental Office who provides supervisory support for the Environmental Director and is responsible for all environmental compliance issues at NAS JRB Fort Worth. The Compliance Division Head shall:

- Perform quality assurance checks at SAPs and <90-Day Hazardous Waste Storage Area to ensure compliance with all requirements.
- Advise during cleanups of hazardous waste spills/leaks.
- Update the HWMP as necessary to incorporate changes in facility operations, wastes generated, and applicable regulations.
- Coordinate with other base departments, such as Fire, Safety, and Supply in matters that pertain to hazardous waste.

1.4.5 Hazardous Waste Program Manager

The HW Program Manager oversees the management of hazardous waste at NAS JRB Fort Worth. This person serves as the hazardous waste technical expert, interprets regulatory requirements, and implements the hazardous waste management practices as described in the HWMP. The HW Program Manager shall:

- Serve as a liaison with Unit HW Coordinators.
- Acquire analytical tests of wastes for hazardous waste disposal and act as a liaison with contract laboratories.
- Supervise the loading and unloading of hazardous waste for disposal and act as a liaison with disposal vendors.
- Review and approve proposed SAP locations.
- Oversee operations at the <90-Day Hazardous Waste Storage Area in a manner that ensures compliance with federal, state, local, and Navy requirements.

- Complete and maintain the daily inspection records for the <90-Day Hazardous Waste Storage Area.
- Maintain records of the hazardous waste stored at the SAPs as required by the regulations.
- Coordinate removal and transportation of hazardous waste from the SAPs to the <90-Day Hazardous Waste Storage Area.
- Monitor truck loading/unloading and securing of containers for transportation.
- Assist all department and tenant commands in implementing the HWMP.
- Monitor hazardous waste containerization.
- Coordinate with contractors and Naval Facilities Engineering Command, Southern Division (SOUTHDIV) personnel on hazardous waste issues.
- Prepare and sign manifests and exception reports.
- Prepare required reports.
- Coordinate the removal of hazardous waste from the <90-Day Hazardous Waste Storage Area to an off-base TSDF.
- Train NAS JRB Fort Worth personnel in the proper handling and storage of hazardous waste.

1.4.6 Environmental Office Hazardous Waste Handlers

The Environmental Office HW Handlers are responsible for transporting hazardous waste from shop SAPs to the <90-Day Hazardous Waste Storage Area, conducting waste sampling, conducting inspections, labeling containers, and maintaining the container log at the <90-Day Hazardous Waste Storage Area. The Environmental Office HW Handlers shall:

- Collect hazardous waste samples.
- Move hazardous waste containers under supervision of the HW Program Manager.
- Operate vacuum trucks, pumps, forklifts, and other material handling equipment.
- Notify the Fire Department in the event of an emergency.
- Collect data for hazardous waste reporting.
- Accept instructions from the HW Program Manager.
- Label and mark hazardous waste drums.

- Maintain the <90-Day storage container log.
- Conduct weekly inspections of SAP and <90-Day Hazardous Waste Storage Area as directed by the HW Program Manager.
- Maintain qualifications through continual training.

1.4.7 Host and Tenant Unit Hazardous Waste Coordinators

All base activities, departments, contractors, and tenant commands that create hazardous waste shall have an appointed Unit HW Coordinator and alternate. This person has the responsibility for coordinating hazardous waste compliance within unit work centers. The Unit HW Coordinator will submit a report to the HW Program Manager listing any changes in the types and/or quantities of hazardous waste created at the unit. Host and Tenant Unit HW Coordinators and alternates shall:

- Ensure that the Unit HW Coordinator and alternate designations are current, and provide a copy of this information to the Environmental Office.
- Represent the unit with respect to all hazardous business and compliance evaluations.
- Act as a liaison with the Environmental Office.
- Submit Waste Stream Determination Forms to the Environmental Office.
- Complete and submit SAP summary logs, daily inspection records, waste generation summary records, and container turn-in documents to the Enviromental Office.
- Be familiar with the NAS JRB Fort Worth ICP and the Unit HW Coordinator responsibilities designated in the plan.
- Prepare non-emergency release reports.
- Ensure that individuals using the SAPs are trained in implementing the site-specific contingency plans.
- Identify individuals requiring hazardous waste training and notify the Environmental Office within six months of the individual reporting for duty.

- Maintain SAPs in compliance with federal, state, and Navy requirements.
- Ensure that containers are properly stored and that labels/markings are legible.
- Ensure that wastes are turned-in for disposal using the procedures specified in this plan.
- Implement waste minimization procedures at outlined in the activitiy's Pollution Prevention Plan. Each Unit HW Coordinator must initiate steps to minimize the generation of hazardous waste. Such steps include, but are not limited to, material substitutions (through coordination with the Environmental Office) and implementing tighter controls on hazardous material obtained for their work center.
- Call the Environmental Office to schedule a pickup when a hazardous waste container is full.

1.4.8 Shop Level Worker

The Shop Level Worker is responsible for handling hazardous waste as directed by the Unit HW Coordinator. Duties of the Shop Level Worker include the transfer of hazardous waste from the point of generation to the appropriate shop-specific satellite accumulation containers, segregation of waste types, and notification to unit coordinators of any spills, leaks, or damaged containers. The Shop Level Worker shall:

- Follow instructions from the Unit HW Coordinator regarding the handling, segregation, and transfer of hazardous waste to shop-specific satellite accumulation containers.
- Notify immediately the Unit HW Coordinator when a SAP container is discovered damaged, leaking, or full.
- Under the direct supervision of the Unit HW Coordinator, check the content and container labeling prior to adding hazardous waste to a SAP container.
- Remove all drum funnels from hazardous waste containers after adding waste. Ensure hazardous waste containers are tightly closed, except when adding or removing waste.
- Assist HW Unit Coordinator with maintaining the waste container generation summary records.

- Ensure, through good house keeping practices, that SAPs are kept free of trash, debris, and obstacles to allow safe access to containers.

- Be familiar with the location of spill response equipment at your site-specific hazardous material and hazardous waste storage locations.

- Follow instructions from the Unit HW Coordinator regarding the proper handling, segregation, storage and transfer of universal and other waste materials including:

  1) Universal Wastes such as fluorescent light bulbs, batteries, pecticides, thermostats, and paint wastes;
  2) Used petroleum, oil, or lubricants (POL) such as used jet fuel, used motor oil, used hydraulic fluid; and
  3) Waste "by-products" such as contaminated rags, absorbents, paint brushes, paint rollers, cotton swabs, etc.

1.4.9 HAZMIN Center Manager

The Hazardous Material Minimization (HAZMIN) Center for NAS JRB Fort Worth is located at Building 1266. The HAZMIN Center is the central storage and distribution point of all hazardous materials for the base. The Manager of the HAZMIN Center shall:

- Maintain records and inventories of all hazardous materials throughout the base and periodically submit this information to the Environmental Director.

- Ensure that Material Safety Data Sheets (MSDSs) are produced and distributed for those materials not previously listed in the Hazardous Material Information System (HMIS). Supply copies of MSDSs to work center personnel, the Safety Department, the Fire Department, and the Unit HW Coordinators.

- Verify that open purchases of hazardous materials comply with the AUL.

- Maintain a stock of appropriate hazardous material/hazard communication labels and marking stencils to be used at the HAZMIN Center or provided to departments/tenants upon request.

- Require manufacturers or vendors, as part of each purchase contract, to provide a MSDS for each hazardous material.

- Coordinate with the Environmental Office to properly classify hazardous materials.

- Manage the Shelf-Life Program to ensure all materials are used in a timely manner.

1.4.10 Hazardous Waste Disposal Contractor

Defense Reutilization and Marketing Office (DRMO) does not arrange for the transfer of hazardous waste off site for disposal at NAS JRB Fort Worth. This department was removed from NAS JRB Fort Worth due to Base Realignment and Closure (BRAC) decisions. The Environmental Office performs this function. The base has an Indefinite Delivery Order/Indefinite Quantity (IDO/IQ) contract with a contractor who subcontracts out waste disposal for NAS JRB Fort Worth. The HW Disposal Contractor shall:

- Prepare waste manifests, which are to be reviewed and signed by the HW Program Manager or Environmental Director prior to shipment.
- Prepare land disposal restriction notifications to accompany manifests as directed, which are to be reviewed and signed by the HW Program Manager or Environmental Director prior to shipment.
- Ensure all contractor personnel have received proper training pertaining to hazardous waste handling, labeling, record keeping, transportation, and spill response.

1.4.11 Safety Officer

The Safety Officer shall:

- Cooperate with the Environmental Director in establishing joint hazardous waste facility/procedure inspection and training programs and in maintaining information on auxiliary hazardous waste training available from external sources.
- Coordinate with the Environmental Director on necessary actions to be taken during spill responses.
- Approve personal protective equipment (PPE) purchases.
- Maintain a technical library of references detailing hazardous waste safety, handling, storage, transport, treatment, disposal, and characteristics for both stock and nonstock items, including hazardous waste characterization references and MSDSs from the HAZMIN Central Distribution Center.

- Ensure that open purchases of hazardous materials comply with the Authorized Use List (AUL).

- Routinely note and inform the Environmental Director of environmental health/safety deficiencies (e.g., corroding containers, incompatible storage) identified during safety inspections.

- Provide information on Occupational Safety & Health Administration (OSHA) Hazard Communication (HAZCOM) requirements for hazardous waste training courses.

1.4.12 Base Fire Chief

The Base Fire Chief shall:

- Act as Incident Commander until fires are extinguished and/or until relieved by the Environmental Director in all HM/HW incidents and emergencies.

- Provide initial emergency response to HM/HW incidents and act as the Incident Commander. Additionally, the Fire Department Chief or Duty Fire Captain shall act as the field emergency coordinator for HM/HW incident response.

- Maintain spill response equipment stored in the Fire Department emergency vehicles and the Fire Station.

1.4.13 Contractors and Visiting DoD Units

Contractors and visiting DoD units temporarily working at NAS JRB Fort Worth that will generate waste are responsible for waste accumulation and management in accordance with this HWMP, with Navy policy, and with all applicable federal, state, and local waste regulations. Specific requirements include:

- Designate a Point of Contact as Waste Coordinator to act as liaison with the Environmental Office.

- Contact the Environmental Office for assistance in waste management prior to generating any waste.

- Become familiar with the NAS JRB Fort Worth HWMP.

- Ensure that individuals coming in contact with hazardous waste are trained in accordance with NAS JRB Fort Worth requirements.

2.0 REGULATIONS AND POLICIES

Subtitle C of the Solid Waste Disposal Act, amended by the Resource Conservation and Recovery Act of 1976 (RCRA) authorized the United States Environmental Protection Agency (USEPA) to implement regulations for the control of hazardous waste from the point of generation through final disposal (i.e., "cradle to grave") to ensure that hazardous wastes do not pose a threat to human health or the environment. These regulations contain specific requirements for identifying, packaging, labeling, storing, shipping, and disposing of hazardous waste. In addition to the federal waste management requirements, the State of Texas, local authorities, and the Navy have regulations applicable to hazardous waste management at NAS JRB Fort Worth. The USEPA has delegated responsibility for the RCRA program to the State of Texas.

The following paragraphs summarize key federal, state, and local regulations and Navy policies that govern the management of hazardous waste at NAS JRB Fort Worth.

2.1 40 CFR Parts 116-117 Hazardous Substance Regulations

40 CFR 116-117 provides a list of chemicals that the USEPA has designated as hazardous substances. Mixtures or solutions containing any of the designated hazardous substances are included under the hazardous substance regulations. The list also specifies what the reportable quantity is for each substance. Any release of a reportable quantity (or greater) of a hazardous substance must be immediately reported to the National Response Center (800/424-8802, 202/426-2675) and the TNRCC. To report releases to the TNRCC, call 512/239-2507 during business hours or 512/463-7727 after hours. A release is defined in 40 CFR 280.12 as any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment any hazardous substance where such a release has the potential to threaten human health or the environment outside the facility.

2.2 49 CFR Parts 170-179 Hazardous Material Transportation Regulations

Both the USEPA and the State of Texas have incorporated the DOT hazardous material transportation regulations contained in 49 CFR 170-179 with respect to the shipping, packaging,

labeling, and transporting of hazardous waste. The DOT regulations specify the types of containers that must be used, descriptions of materials, labeling and marking of containers, placarding of vehicles, and required shipping paper entries.

The rules of the Bureau of Motor Carrier Safety in 49 CFR 390 through 397 also apply to the transportation of hazardous waste. These regulations govern qualifications of the driver, equipment in the vehicle and, in some cases, routing.

Shipping regulations for the State of Texas are found in 30 TAC 335.10-335.14 and 335.91-335.94.

2.3 40 CFR Part 761 Toxic Substances Control Act (TSCA)

40 CFR 761 provides USEPA requirements for managing polychlorinated biphenyls (PCBs).

2.4 29 CFR 1910.120 OSHA Regulations for Hazardous Waste Operations and Emergency Response

These OSHA regulations provide standards for protecting workers during hazardous waste operations such as cleanup, storage, disposal, and emergency response. Topics addressed include hazard evaluation, training, personal protective equipment and clothing, and container handling safety.

2.5 30 TAC 335.1-335.569 Texas Hazardous Waste Regulations

The rulemaking and enforcement agency in Texas for hazardous waste management is the TNRCC, Industrial and Hazardous Waste Division.

The Texas regulations are entitled "Industrial Solid Waste and Municipal Hazardous Waste." Under TNRCC rules, NAS JRB Fort Worth is classified as a municipal generator or a non-industrial generator of wastes. The TNRCC regulates nonhazardous industrial wastes (i.e.,

nonhazardous wastes from industrial generators) as Class 1, 2, or 3 waste. These industrial waste stream rules are not applicable to municipal generators such as NAS JRB Fort Worth.

The TNRCC rules for hazardous waste management may be found in Title 30 of the TAC, Chapters 335.1 through 335.569. The Texas hazardous waste regulations are substantially equivalent to the federal regulations, and they reference the federal regulations in many cases. The major difference in the TNRCC waste management program applicable to NAS JRB Fort Worth involves waste classification of paint and paint related wastes as universal waste versus a RCRA hazardous waste (see Subsection 2.6).

Texas interpretations on Federal RCRA requirements regarding hazardous waste accumulation [40 CFR 262.34 (c) (1)] allows facilities to store up to 55 gallons of “each separate and distinct hazardous waste stream” versus up to 55 gallons “total” of hazardous waste in a SAP. NAS JRB Fort Worth has elected to limit the total quantity of all hazardous waste in a SAP to the EPA Federal limit of 55 gallons total.

2.6 40 CFR Parts 260-268, 270, and 273, Status of Federal Hazardous Waste and Universal Waste Regulations in Texas

The federal regulations for hazardous waste management form the basis for this HWMP. The State of Texas has adopted the federal regulations and has been given general authorization from the USEPA to administer a hazardous waste program. The TNRCC has complete responsibility for enforcement of its hazardous waste program. The USEPA retains the authority to enforce hazardous waste management regulations that are not included within the authority of the State of Texas.

The hazardous waste regulations establish a "cradle-to-grave" approach for managing the treatment, storage, and disposal of hazardous wastes. Topics addressed include: hazardous waste characteristics; the hazardous waste manifest system; performance standards for hazardous waste generators and TSDFs; and requirements for recyclable materials, including burning for energy and precious metal recovery.

40 CFR 273 includes regulations for Universal Waste Management. Universal wastes include batteries, pesticides, and mercury thermostats and lamps. These regulations are intended to make storage and disposal requirements less burdensome to facilities that generate these items.

The State of Texas, under 335.261(b)(16)(f), has redefined universal wastes to also include paint and paint-related material (i.e., used or unused paint and paint-related material).

The regulatory requirements associated with the management of RCRA hazardous waste and universal waste are summarized in Table 2-1. Although not required, NAS JRB Fort Worth is currently managing universal waste as a RCRA hazardous waste, with the exception of the on-site accumulation requirement. All paint and paint-related wastes (PPRW) generated at NAS JRB Fort Worth are sent to TSDFs located in Texas and, as such, can be managed as universal waste. Should NAS JRB Fort Worth ship PPRW to TSDFs located outside the State of Texas, this waste would need to be managed as a RCRA hazardous waste.

Table 2-1
TNRCC RCRA Hazardous Waste and Universal Waste Generator Requirements

	Waste Type		
Regulatory Requirement	RCRA Hazardous Waste	Universal Waste	Universal Waste Managed as Hazardous Waste (or PPRW Shipped out of Texas)
TNRCC notification	Yes	No[a]	Yes
On-site accumulation	90 days	1 year	1 year (90 days if PPRW)
Hazardous waste manifest	Yes	No	Yes
Use registered transporter	Yes	No	Yes
Subject to year-end TNRCC fees	Yes	No	Yes
Waste quantity counts toward hazardous waste generator status	Yes	No	Yes

[a] Notification not required if TNRCC is notified of other solid waste activity.

2.7 40 CFR Parts 264-265 Air Emission Standards

The USEPA has promulgated requirements to reduce air emissions from hazardous waste TSD activities. These requirements are contained in 40 CFR 264 and 265, Subparts AA, BB, and CC. Subparts AA and BB apply to process vents and equipment leaks, respectively, that are associated with hazardous waste TSD management units. Subpart CC applies to hazardous waste tanks, surface impoundments, and containers. 40 CFR 262.34(a)(1)(i) also requires that a generator operating a <90-Day Hazardous Waste Storage Area must comply with the applicable air emission standards specified in 40 CFR 265.

NAS JRB Fort Worth currently does not have an active permitted TSDF. Furthermore, there are no hazardous waste surface impoundments or hazardous waste tank systems utilized for the storage or treatment of hazardous waste. Therefore, only the container requirements under Subpart CC are applicable. Specifically, Subpart CC applies only to containers located in <90-Day Storage Areas. The containers must also be greater than 26 gallons in capacity and receive hazardous waste having an average volatile organic (VO) content equal to or greater than 500 parts per million (ppm) by weight (w). For purposes of determining VO content of a hazardous waste, organic compounds having a Henry's Law constant equal to or greater than 1.8 x 10^{-6} atm/gm-mole at 25 degrees Celsius must be included.

According to an applicability assessment conducted in August 1998, NAS JRB Fort Worth has several hazardous waste streams that reportedly have a VO content greater than 500 ppmw. These include waste streams such as alodine, halogenated solvents, denatured alcohol, methyl ethyl ketone, naphtha, non-halogenated solvents, paint gun solvent, paint-related material, paint stripper, and weapons cleaning solvent. Therefore, should these waste streams be placed in drums having a capacity greater than 26 gallons (e.g., 55-gallon drum) and stored at the <90-Day Storage Area, NAS JRB Fort Worth would need to comply with the Subpart CC container requirements. Based on the size of container, Subpart CC has three "Container Level" Standards for controlling air emissions. Of these, Container Level 1 standards are more likely to be applicable at NAS JRB Fort Worth. Container Level 1 standards are for hazardous waste containers having a capacity greater

than 26 gallons but less than or equal 121.5 gallons. Container Level Standards 2 and 3 are for hazardous waste containers having capacities greater than 121.5 gallons, which are currently not used at NAS JRB Fort. A summary of the potentially applicable requirements under Subpart CC is as follows:

- General Container Requirements

  Container Level 1 requirements [40 CFR 265.1087(c)]:

  1. Must use a container that meets applicable U.S. DOT regulations on packaging hazardous materials for transportation as specified in 49 CFR 178; or
  2. Container must be equipped with a cover of closure devices that form a continuous barrier over the container openings such that when the cover and closure devices are secured in the closed position, there is no visible holes, gaps, or other open spaces into the interior of the container; or
  3. An open top container in which an organic vapor-suppressing barrier is placed on or over the hazardous waste such that no hazardous waste is exposed to the atmosphere.

- Work Practice Requirements

  1. All containers must be maintained in the closed position except when adding or removing material to or from the container or to perform other routine activities such as sampling or taking container depth measurements.
  2. When a container is completely filled, the container must be promptly closed upon conclusion of the filling operation.
  3. When discrete batches are added intermittently over a period of time, the container should be closed upon which ever of the following occurs first:
     a) Upon reaching the final level of the container;
     b) After a batch loading after which no additional material will be added for 15 minutes;
     c) Upon shutdown of the process generating the waste being added to the container; or
     d) When the person loading the container leaves the immediate vicinity.

- Inspection and Monitoring Requirements
    1. The container and its cover and closure devices shall be inspected for visible cracks, holes, gaps, or other open spaces upon acceptance at the <90-Day Storage Area.
    2. If a defect is detected, the owner/operator shall make first efforts to repair the defect within 24 hours of detection, and the defect must be completely repaired within 5 calendar days of detection. If repairs cannot be completed within 5 calendar days, then the hazardous waste will be removed from the container and the container will not be used to manage hazardous waste until the defect is repaired.
    3. A written plan must be developed and implemented for visual inspection of containers subject to Subpart CC and incorporated into the facility's general inspection plan as required under 40 CFR 265.15.

- Record Keeping Requirements
    1. For hazardous wastes exempted form Subpart CC due to VO concentrations, the owner/operator must record the information used for each waste stream determination in a facility-operating log.
    2. If analysis results for waste samples are used for waste determinations, the date, time, and location of each sample collected must be recorded.
    3. Where knowledge of the waste is used to make such determination, the information used as the basis for the determination must be documented in the facility log.

- Reporting Requirements
    1. The owner/operator using the VO concentration exemption must provide a written report of all known incidences of noncompliance within 15 calendar days of the time that the owner/operator becomes aware of the occurrence.
    2. Non-compliance incidence reports will include the following:
        a) USEPA identification number;
        b) Facility name and address;

c) Description of the noncompliant event and its cause;

d) Date(s) of noncompliance;

e) Actions taken to correct the noncompliance and to prevent recurrence of the noncompliance; and

f) Signature of owner/operator, with the date of signature.

To assure complete compliance with the above requirements, NAS JRB Fort Worth has implemented a management practice for all hazardous wastes generated on base. With only a few allowances approved by the Environmental Office (i.e., AFRES SAPs), VO containing hazardous wastes are no longer allowed to be stored at SAPs or the <90-Day Storage Area in containers having capacities greater than 26 gallons. VO containing hazardous wastes, are currently placed in 10 or 15 gallon Level 1 DOT-approved containers. By doing so, NAS JRB Fort Worth is currently exempt from the container requirements stipulated under Subpart CC. In addition, current hazardous waste management practices employed by NAS JRB Fort Worth such as the use of DOT-approved containers, correct work practices when filling containers, and the development and implementation of a container inspection plan, provide added assurance of complying with Subpart CC container requirements.

2.8 Munitions Rules and Regulations

The TNRCC has adopted USEPA regulations that identify the conditions under which military munitions become solid waste, and the management requirements applicable to these wastes if they qualify as RCRA hazardous waste according to 40 CFR 261 or 30 TAC 335 rules. DoD's "Policy to Implement the USEPA's Munitions Rules" states that the military munitions rule provides for a conditional exemption from RCRA regulations for waste military munitions (WMM) when each of the following conditions are met:

1) WMM are not chemical agents or munitions,

2) WMM must be transported from a military-owned or -operated installation to a military-owned treatment, storage, or disposal facility, and

3) WMM are transported in accordance with DoD and DOT shipping controls applicable to the transport of military munitions.

If WMM are determined to be RCRA hazardous waste and are managed under the conditional exemption for transportation or storage, RCRA generator requirements do not apply. WMM at NAS JRB Fort Worth are typically managed under the exemption.

The military munitions rule establishes the regulatory definition of solid waste as it applies to the specific categories of military munitions listed below. Military munitions meeting the definition of a solid waste are potentially subject to regulation as a RCRA hazardous waste if they meet the criteria outlined in 40 CFR 261.

1) *Used or fired munitions.* Used or fired munitions are solid waste when they are removed from their landing spot and then either:

   a) Managed off-range (i.e., when transported off-range and stored, reclaimed, treated, or disposed of); or

   b) Disposed of (i.e., buried or landfilled) on-range.

In both cases, when the used or fired munition is considered a solid waste, it is potentially subject to regulation as a RCRA hazardous waste. Also, munitions that land off-range and that are not promptly retrieved are solid waste.

2) *Munitions being used for their intended purpose.* Military munitions are not a solid waste if:

   a) They are being used for their intended purpose, which includes training, research, development, testing, and evaluation; and when they are destroyed during range clearance operations at active and inactive ranges; and

   b) They have not been used or discharged, repaired, reused, recycled, reclaimed, disassembled, reconfigured, or otherwise subjected to materials-recovery activities.

3) *Unused munitions.* There are four specific circumstances under which an unused munition is considered to be a solid waste (and thus potentially a RCRA hazardous waste):

a) It is abandoned by being disposed of, burned, incinerated, or treated prior to disposal;

b) It is removed from storage for purposes of disposal or treatment prior to disposal;

c) It is deteriorated, leaking, or damaged to the point that it can no longer be put back into serviceable condition, and cannot be reasonably recycled or used for other purposes; or

d) It has been determined by an authorized military official to be solid waste.

All waste munitions at NAS JRB Fort Worth are held in munition bunkers managed by Station Weapons prior to shipment for reworking or disposal. All WMM shipments are coordinated through the HW Program Manger. Munitions are shipped in accordance with the conditional exemption in the RCRA munitions rule, DOT regulations, and DoD guidelines. The WMM are shipped from NAS JRB to the military-owned EOD facilities in Killeen, Texas (Fort Hood), or Abilene, Texas (Dyess Air Force Base). The conditional exemption allows for the shipment of WMM for disposal using a bill of lading rather than a uniform hazardous waste manifest and the transportation of munitions in unplacarded trucks (provided the trucks are escorted). Shipments of WMM from NAS JRB Fort Worth are documented on Form DD 836 (the dangerous goods shipping and emergency response documentation form) and trucks are placarded as specified in 49 CFR 397. Military trucks hauling dangerous goods are also inspected and the inspections are documented on Form DD 626. Any waste munitions which cannot be shipped off site due to safety or security concerns will be used for disposal training purposes by the EOD team from Fort Hood. All EOD activities performed at NAS JRB are strictly for training purposes only and, as such, are exempt under RCRA hazardous waste regulations.

2.9 Local Regulations

Fort Worth City Ordinance 10880 requires permits to discharge industrial wastewater into the Fort Worth sanitary sewer system. This ordinance includes restrictions on the types and quantities of waste and wastewater discharged to the Fort Worth sanitary sewer system and Fort Worth storm drains.

2.10 Navy Hazardous Waste Minimization Policies

Chapter 3 of the Navy "Environmental and Natural Resources Program Manual" (OPNAVINST 5090.1B) dated 1 November 1994 and updated 9 September 1999, requires every Navy installation to develop and implement a Pollution Prevention (P2) Plan. The purpose of the P2 plan is to:

- Identify activities and processes that generate pollutants, including hazardous and non-hazardous wastes and toxic releases to all media.
- Develop technically and economically feasible options to reduce the generation of pollutants consistent with DoD measures of merit and associated goals.
- Identify methods and mechanisms to use P2 as a tool to achieve full and sustained compliance with DoD instructions and federal, state, and local laws and regulations at the lowest feasible cost.

NAS JRB Fort Worth developed a P2 plan in 1997 that was revised in April 1998 and September 2000. The P2 plan is reviewed annually to identify any significant changes in base mission, compliance requirements, function, or personnel, as well as changes in activity priorities. The P2 plan is revised at least every three years. Chapter 12, Section 5.3 of OPNAVINST 5090.1B requires that each HWMP include or reference hazardous waste minimization plans and goals.

NAS JRB Fort Worth has established pollution prevention goals. Please refer to the latest revised P2 Plan for a summation of these goals. To reach these goals, NAS JRB Fort Worth investigated the implementation of the following procedures:

- Eliminating and/or reducing the source and use of hazardous materials by changing the process, requirement, or materials used.
- Substituting a less hazardous/toxic hazardous material in the process.
- Reducing and/or eliminating the generation of hazardous waste by changing the production process or equipment.
- Recycling/recovery and reuse of hazardous material.
- Reducing and/or eliminating excess and expired shelf-life hazardous materials.

The updated NAS JRB Fort Worth P2 plan generated numerous recommendations for source reduction and hazardous waste minimization. A list of recommendations, the process that it affects, the priority it should receive for investigating its potential implementation, the estimated completion date, and an indication of whether that milestone has been met for source reduction and waste minimization recommendations are contained in the P2 plan.

2.11 TNRCC Source Reduction and Waste Minimization Requirements

TNRCC requires large-quantity RCRA hazardous waste generators to develop a source reduction and waste minimization plan as specified under 30 TAC 335, Subchapter Q (specifically §335.471 - §335.480). Key elements of the plan include:

- A listing of activities that generate RCRA hazardous waste.
- A prioritized list of economically and technologically feasible source reduction and waste minimization projects.
- Project implementation schedule and anticipated benefit.
- Employee awareness and training programs addressing source reduction and waste minimization.
- Facility Owner Certification of Completeness and Correctness of the plan and a commitment to implement the plan.

The plan must be maintained at the facility and made available for TNRCC review and inspection. An initial executive summary of the plan and a copy of the Certification of Completeness and Correctness must be submitted to TNRCC. Within 30 days of any revision of the plan, a revised Executive Summary, including a copy of a new Certification of Completeness and Correctness must be submitted to TNRCC.

An annual report must also be submitted to TNRCC by July 1 of each year detailing progress in implementing source reduction and waste minimization, progress toward meeting established reduction goals, the amount of RCRA hazardous waste generated during the year, and any modifications to the plan.

3.0 SHOP LEVEL WORKER RESPONSIBILITIES

This section presents the hazardous waste management responsibilities for the NAS JRB Fort Worth Shop Level Worker who is involved in handling hazardous waste as directed by the Unit HW Coordinator. Shop Level Worker duties may include the transfer of hazardous waste from the point of generation to appropriate shop-specific satellite accumulation containers, segregation of waste types, and notification of unit coordinators of any spills, leaks, or damaged containers. In order to perform these duties correctly, the Shop Level Worker is responsible for knowing container management practices for SAPs, proper handling procedures for universal and other possible wastes, record keeping, and spill response and reporting procedures. In addition, prior to initiating any hazardous waste management duties, the shop level worker must obtain proper training in the handling of hazardous wastes. Each of these responsibilities is further discussed below.

3.1 Training Requirements for Shop Level Worker

Navy policy, outlined in OPNAVINST 5090.1B, requires Navy personnel producing, packing, treating, transporting, or handling RCRA hazardous waste to receive the following training:

- Applicable NAVOSH Worker Right-to-Know training regarding hazardous materials; and
- Job-specific training regarding hazardous waste safety, packaging, labeling, handling, documentation, and installation-specific procedures.

Chapters 12 and 24 of OPNAVINST 5090.1B also require that every person involved in RCRA hazardous waste management receive general environmental overview training. Specific training requirements for Shop Level Worker personnel are outlined in Table 3-1. A specific training course may satisfy more than one training requirement. For example, Command Orientation and the command-specific environmental awareness training may satisfy Worker Right-to-Know training requirements. Shop Level Workers should arrange for this training through their Unit HW Coordinator in cooperation with the NAS JRB Fort Worth HW Program

Manager. For additional information, please refer to Section 9, which summarizes the training requirements for all base personnel who participate in the management of hazardous waste at NAS JRB Fort Worth.

Table 3-1
Training Requirements for Shop Level Worker Personnel

Training Type	Regulation or Policy Requiring Training	When Training First Required	Training Renewal Frequency
General environmental awareness training[a]	OPNAVINST 5090.1B, Chapter 24, §4.1	Upon reporting to a command	Annual
Command Orientation[a]	OPNAVINST 5090.1B, Chapter 24, §4.2	Upon reporting to a command	As duties or work area changes
Hazardous waste generators[a]	OPNAVINST 5090.1B, Chapter 24, §4.24	Upon reporting to a command	As duties or work area changes
OSHA Worker right-to-know	29 CFR 1910.1200	Upon initial assignment to work area	As duties or work area changes
OSHA HAZWOPER 8-hour awareness off-site training plus 1-day on-the-job training[b]	29 CFR 1910.120[c]	Prior to commencing work with hazardous wastes	One Time
OSHA HAZWOPER 8-hour refresher[d]	29 CFR 1910.120[c]	Within one year of initial training	Annual
RCRA hazardous waste generator training	40 CFR 262.34(a)(4) and 40 CFR 265.16	Prior to commencing unsupervised work	Annual Review Required

[a] May also satisfy the RCRA hazardous waste generator training requirements of 40 CFR 262.34(a)(4) and 40 CFR 265.16.

[b] HAZWOPER = Hazardous Waste Operations and Emergency Response.

[c] Also requires a medical surveillance program.

[d] Annual refresher training required 1 year after completion of the initial off-site training.

3.2 Container Management at Satellite Accumulation Areas

Every department/tenant at NAS JRB Fort Worth that generates hazardous waste is directly responsible for proper hazardous waste collection and management. As a large quantity generator, NAS JRB Fort Worth generates greater than 1,000 kilograms (2,200 pounds) of hazardous waste per month. This is the cumulative total of all generating sources. Therefore, each department/tenant must be familiar with the requirements for hazardous waste handling no matter how much they generate.

The overall management of hazardous waste at NAS JRB Fort Worth is the responsibility of the Environmental Office. The Environmental Office will provide support to all departments, tenants, and commands. Each department, command, or tenant that produces a hazardous waste is defined as a generator. Generators must identify wastes and follow the handling instructions specified by the Environmental Office.

NAS JRB Fort Worth departments and tenants may accumulate up to a total of 55 gallons of hazardous waste or up to 1 quart of acutely hazardous waste in hazardous waste containers at or near any point of waste generation where wastes initially accumulate. These areas are known as satellite accumulation points or SAPs. This is simply a designated area for holding RCRA hazardous waste temporarily prior to its transfer to a central hazardous waste storage area on base. The Environmental Office must approve all SAP locations before they can begin to be used. Under the direct supervision of the Unit HW Coordinator, the Shop Level Worker will transfer waste from the point of generation to the SAP in a safe manner that prevents unnecessary exposure to RCRA hazardous waste. If determined by the Safety Officer, the Shop Level Worker will also wear the specified protective equipment when transferring waste. The Shop Level Worker is responsible for notifying the Unit HW Coordinator when a SAP container is nearly full. The Unit HW Coordinator will arrange the transfer of full containers from the SAP to the <90-Day Hazardous Waste Storage Area in Building 1347.

A map showing SAP locations at NAS JRB Fort Worth is included in Appendix A. A list of SAP names, associated building numbers, and contact telephone numbers is included in Appendix B. SAP documentation forms, which describe each SAP and summarize current waste handling procedures at each area, are included in Appendix C. Satellite container requirements specific to Shop Level Workers are summarized in Table 3-2.

3.3 Universal and Other Waste Management Requirements

Universal waste is also generated and managed at NAS JRB Fort Worth. This includes batteries, pesticides, thermostats, lamps, and paint waste. Although the management requirements for universal waste are less strict than for RCRA hazardous waste, they include requirements for labeling as universal waste and proper packaging of potentially leaking units, such as batteries, thermostats, and pesticide and paint containers. Unless otherwise instructed by the Unit HW Coordinator or the HW Program Manager, universal waste at NAS JRB Fort Worth is to be handled following the same procedures as a RCRA hazardous waste. A summary of the universal waste management requirements specific to shop level workers are summarized in Table 3-3.

Table 3-2
Satellite Container Requirements for Shop Level Workers

The container must be under the control of the operator of the process generating the waste. At NAS JRB Fort Worth, this person is the Unit HW Coordinator. Follow instructions from the Unit HW Coordinator regarding the handling, segregation, and transfer of hazardous waste to satellite accumulation containers.
NAS JRB Fort Worth policy is to use only containers supplied by the Environmental Office.
Check the content and container labeling before adding waste.
The container must be labeled "Hazardous Waste" or with other words identifying the contents.
Nonhazardous wastes must be kept in separate containers from RCRA hazardous waste, and not commingled. Nonhazardous waste may be placed in 55-gallon containers (e.g., used oil, used jet fuel).
Remove all drum funnels from hazardous waste containers after adding waste.
The container must be closed except when it is necessary to add or remove waste.
Provide the necessary information needed to the HW Unit Coordinator to complete the hazardous waste container generation log.
The Unit HW Coordinator must be notified immediately when a container is full, damaged, or leaking. The Environmental Office HW Handlers must transfer full containers containing RCRA hazardous waste to the <90-Day Storage Area within 3 days.
Keep SAPs free of trash, debris, and obstacles to permit safe access to containers.

In addition to RCRA hazardous waste and universal wastes, NAS JRB Fort Worth also generates other wastes that are typically not hazardous and are not regulated under RCRA. Such wastes include used petroleum, oil, and lubricant (POL) products, used antifreeze, and waste byproducts such as contaminated rags and paper towels, empty material containers, and POL absorbent materials. It should be noted that while uncontaminated used materials such as POL and antifreeze are typically not hazardous, when they are contaminated with hazardous substances (through commingling or lack of segregation) they can qualify as a RCRA hazardous waste. The waste handling requirements for these special wastes (including universal wastes) are provided in Appendix D.

Table 3-3
Universal Waste Requirements for Shop Level Workers

Follow instructions from the Unit HW Coordinator regarding the handling, segregation, and storage location of universal wastes.
For waste paint, follow all of the satellite container requirements stated in Table 3-1.
Place mercury or nickel cadmium batteries in separate containers and, when full, contact the Environmental Office for pick-up.
Contact the Environmental Office for pickup of lead acid batteries. Do not drain batteries, and keep them covered. The Unit HW Coordinator must be notified immediately when a lead acid battery is damaged or is leaking.
Full, partially full, and empty aerosol cans are to be returned to the HAZMIN Center for disposition.
Contact the Environmental Office for guidance regarding all fluorescent light ballasts.
Recycle fluorescent bulbs. Collect burned-out bulbs, return to original packaging, and when full, transfer to Building 1278.
Completely use all pesticides so that no waste pesticides are generated. Full, partially full and empty pesticide containers are to be returned to the HAZMIN Center for disposition.
Provide the necessary information needed to the Unit HW Coordinator to complete the universal waste container generation log.
The shop level worker under the direct supervision of the Unit HW Coordinator will place the date on the container when the first waste is placed in that Universal waste container.
Storage of universal wastes on base is not to exceed one year from the date the universal waste is generated.

3.4 Record Keeping

The Shop Level Worker is responsible for providing information to the Unit HW Coordinator for use in completing the Waste Container Generation Summary Log, shown later in Figure 4-2. This documentation must be maintained at the shop or work center generating the

waste. One Waste Container Generation Summary Log must be completed for each satellite accumulation container. Information required on the log includes container number, waste description, date, quantity, depositor's name, and work center.

3.5 Spill Response and Reporting

All releases of hazardous material or RCRA hazardous waste must be reported to the Unit HW Coordinator immediately. A release is defined as any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous substances where there is the potential to cause physical injury or environmental damage. Shop Level Workers should be familiar with the location and use of spill response equipment at their shop's hazardous material and waste storage locations.

4.0 UNIT HW COORDINATOR RESPONSIBILITIES

This section presents the basic responsibilities for the personnel designated as Unit HW Coordinators. Every department/tenant at NAS JRB Fort Worth that generates hazardous waste is directly responsible for proper hazardous waste collection and management. Due to the importance of coordination between the generators and the Environmental Office, a Unit HW Coordinator will be designated by each unit to act as liaison for waste management activities. Each Unit HW Coordinator is primarily responsible for identifying and providing information on wastes generated, controlling access to SAPs, ensuring the segregation of incompatible wastes and maintaining waste records.

According to federal hazardous waste regulations contained 40 CFR 262.34(c)(1), SAPs must be under the control of the operator of the process creating the waste. The TNRCC has released a draft statement (see Appendix E) stating that the person responsible for maintaining the SAP must meet the requirements of "operator of the process." At NAS JRB Fort Worth, the responsible person is the Unit HW Coordinator. The Unit HW Coordinator must have a working knowledge of hazardous waste management and practices to ensure that all hazardous and non-hazardous wastes collected at the unit are managed in accordance with the NAS JRB Fort Worth HWMP.

Each command, tenant, and department that accumulates hazardous waste at a SAP shall designate (in writing) a Unit HW Coordinator and two alternates. An example letter for appointing a Unit HW Coordinator or alternate is included in Appendix F. A copy of the appointment letter must be provided to the Environmental Office. The Environmental Office must be notified of all changes in Unit HW Coordinators and alternates. It is the responsibility of NAS JRB Fort Worth's Environmental Director to maintain a current list of Unit HW Waste Coordinators, and to ensure that they are adequately trained for their position with respect to hazardous waste management. Prior to initiating any hazardous waste supervision or management duties, the Unit HW Coordinator must obtain proper training. The following subsections present in more detail the hazardous waste training requirements and responsibilities of the Unit HW Coordinator.

4.1 Training Requirements for Unit HW Coordinators

Specific training requirements for Unit HW Coordinators are outlined in Table 4-1. As previously discussed in subsection 3.1 of the HWMP, these training programs are needed to meet training requirements as specified by Navy policy outlined in Chapters 12 and 24 of OPNAVINST 5090.1B and RCRA, OSHA, and DOT federal requirements. The type and amount of training required is based on the job duties of the individual worker. In some cases, a specific training course may satisfy more than one training requirement. For example, Command Orientation and the command-specific environmental awareness training may satisfy Worker Right-to-Know training requirements. Unit HW Coordinators should arrange for their training through the NAS JRB Fort Worth HW Program Manager.

Table 4-1
Training Requirements for Unit HW Coordinators and Alternates

Training Type	Regulation or Policy Requiring Training	When Training First Required	Training Renewal Frequency
General environmental awareness training[a]	OPNAVINST 5090.1B, Chapter 24, §4.1	Upon reporting to a command	Annual
Command Orientation[a]	OPNAVINST 5090.1B, Chapter 24, §4.2	Upon reporting to a command	As duties or work area changes
Hazardous waste generators[a]	OPNAVINST 5090.1B, Chapter 24, §4.24	Upon reporting to a command	As duties or work area changes
OSHA Worker right-to-know	29 CFR 1910.1200	Upon initial assignment to work area	As duties or work area changes
OSHA HAZWOPER 40-hour off-site training plus 3-day on-the-job training[b]	29 CFR 1910.120[c]	Prior to commencing work with hazardous wastes	One Time
OSHA HAZWOPER 8-hour refresher[d]	29 CFR 1910.120[c]	Within one year of initial training	Annual
RCRA hazardous waste generator training	40 CFR 262.34(a)(4) and 40 CFR 265.16	Prior to commencing unsupervised work	Annual Review Required

[a] May also satisfy the RCRA hazardous waste generator training requirements of 40 CFR 262.34(a)(4) and 40 CFR 265.16.
[b] HAZWOPER = Hazardous Waste Operations and Emergency Response.
[c] Also requires a medical surveillance program.
[d] Annual refresher training required 1 year after completion of the initial off-site training.

The Unit HW Coordinator is also responsible for ensuring that Unit personnel working with hazardous waste are adequately trained in hazardous waste management. With guidance from the Environmental Office, each Unit HW Coordinator will ensure that all personnel associated with the management of hazardous waste are properly trained on how to perform their duties. For additional information, please refer to Section 9, which summarizes the training requirements for all Base personnel who participate in the management of hazardous waste at NAS JRB Fort Worth.

4.2 Container Management Requirements at Satellite Accumulation Points

Hazardous waste is accumulated at NAS JRB Fort Worth in containers at SAPs using specific storage procedures. It is the responsibility of the HW Unit Coordinator to ensure that these procedures are followed. These container storage procedures are described in detail in the following subsections.

4.2.1 Satellite Accumulation Point Design Criteria

SAPs must meet the following design criteria to ensure the safe storage of hazardous waste containers before they are transported to the <90-Day Hazardous Waste Storage Area:

- SAP storage cabinets must be in good condition without rust or corrosion, dents, or structural damage.
- SAPs should not be placed in locations where containers may be knocked over or damaged.
- The areas around the SAPs must be kept free of trash, debris, and obstacles to allow safe access to containers.
- SAP stroage cabinets must be closed and locked, except when waste is being added or removed.
- No more than 55 gallons total of hazardous waste or 1 quart of acute hazardous waste may be accumulated at a SAP.
- Storage must be operated in a manner that will prevent ignitable and/or reactive wastes from extreme heat or pressure that may lead to the production of toxic fumes, mists, dusts or gases that may damage the container or lead to other environmental or health threats.

4.2.2 Satellite Accumulation Point Containers

A container is defined as any portable device in which a material is stored, transported, treated, disposed, or otherwise handled. The Environmental Office will provide an appropriate container for each waste stream. The containers typically used for hazardous waste storage are 5-, 10-, 15- and 55-gallon steel drums; fiberboard containers; or plastic drums. Containers with capacities of 1, 5, 10, and 15 gallons may be used for materials that become wastes while still in their original containers, such as off-specification materials and batteries. Other container requirements include:

- All containers used for HW storage must be DOT-approved.
- Containers holding liquid wastes must not be filled in excess of 90% capacity.
- To reduce hazardous waste quantities and associated disposal costs, the size of a container holding a waste must be commensurate with the amount of waste placed in it. Large containers with small amounts of waste will not be accepted; they will be returned for re-packing.
- Containers storing waste must be free of oil, grease, rust/corrosion, holes, dents, or other damage; or extraneous labels or tags not required by DOT shipping regulations. Containers must be closed tightly with all gaskets in place.
- Liquid wastes must be placed in bung-type drums and may not be placed in open-top drums. Open-top drums are for packaging solid wastes only.
- Overpacking of leaking or damaged containers is the only acceptable use of an 85-gallon container. When using an overpack container, it must be compatible with the material in the original container.

Under no circumstances shall incompatible wastes be placed in the same container. All hazardous wastes, oils, lubricants, paint wastes, batteries, rags, and other absorbents must be placed in appropriate containers. No hazardous waste shall be placed in tanks unless approved by the Environmental Office. The only waste that may be stored in a temporary storage tank is used oil/fuel. When a temporary used oil storage tank is full, the Unit HW Coordinator should notify the Environmental Office. The Environmental Office will either empty the storage tank with a vacuum tank truck and transport the used oil to the Base used oil/fuel storage tank or will arrange to have

the used oil removed from the tank directly by a private contractor. Nonflammable used oil is sold for energy recovery.

Used oil/fuel must not be contaminated by hazardous wastes and must not be mixed with other wastes. Used oil containing hazardous wastes shall be classified and handled as hazardous waste.

4.2.3 Labeling

All hazardous waste containers at the SAP are properly labeled by the Environmental Office HW Handler with a "HAZARDOUS WASTE, FEDERAL LAW PROHIBITS IMPROPER DISPOSAL", "NONHAZARDOUS WASTE", or "UNIVERSAL WASTE", label before the containers are delivered to the SAP. The Environmental Office HW Handler also legibly marks the name and description of the waste and the unit originating the hazardous waste on each label with an indelible marker. The outside of the container is marked adjacent to the label with the unit name and container ID number using a crayon paint stick. It is the responsibility of the Unit HW Coordinator to aid the Environmental Office HW Handlers in performing the labeling to ensure all of the containers at the SAP are labeled prior to use.

4.2.4 Storage

Some wastes may be produced in small quantities (a few gallons per day) and may be mixed with other similar wastes. Groups of similar waste are called categories.

Small-quantity wastes may be mixed in a single container by category. The segregation of small-quantity wastes by category ensures that incompatible wastes are not mixed. Each category of mixed wastes at NAS JRB Fort Worth has been assigned a color code to simplify its disposal at SAPs (see Figure 4-1). Color-coding may be accomplished by painting the entire drum (or a portion of the drum) or by using colored labels. If mixtures of hazardous waste are created at the work centers, each component of the mixture and an estimate of its quantity must be included on the

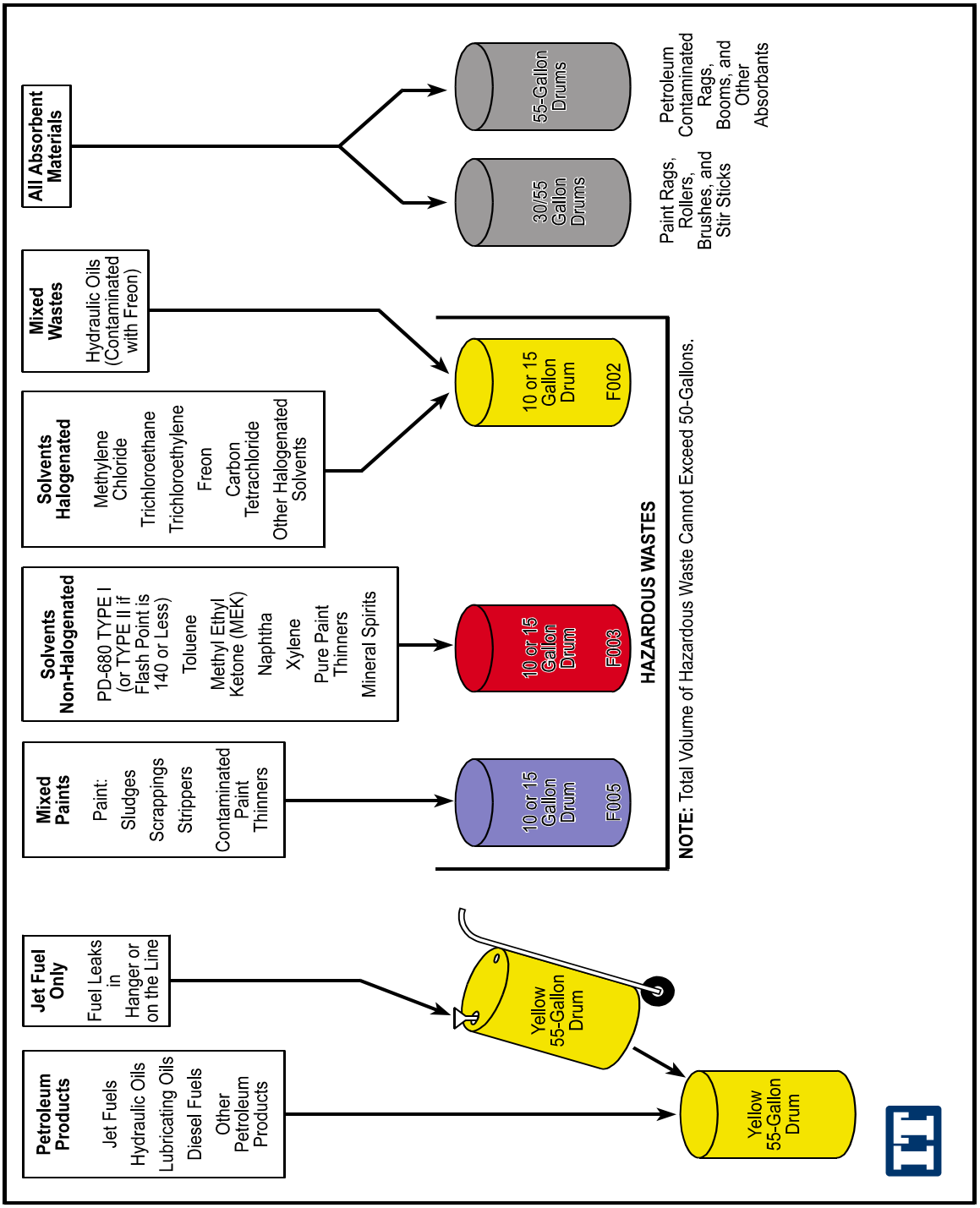


Figure 4-1. Satellite Accumulation Point Container Color Identification.

Waste Stream Documentation form (see subsection 4.4.2) that is submitted to the Environmental Office.

Categories of mixed waste are as follows:

- Category 1 - Petroleum Products: Color Code Yellow
  (Note: Uncontaminated petroleum products are not hazardous waste, but they may become subject to regulation if they are mixed with hazardous waste.)

  - Jet fuels
  - Hydraulic oils (not contaminated with Freon)
  - Lubricating oils
  - Diesel fuels
  - Other petroleum products

- Category 2 - Solvents – Nonhalogenated: Color Code Red
  (Note: Nonhalogenated solvents are those that do not contain chlorides, fluorides, bromides, or iodides. If uncertain whether a solvent is nonhalogenated, check with the Environmental Office.)

  - PD-680 Type I (or Type II if flash point is 140 degrees Fahrenheit or less)
  - Toluene
  - Methyl ethyl ketone (MEK)
  - Naphtha
  - Xylene
  - Paint thinners (containing no paint waste)
  - Mineral spirits
  - Other nonhalogenated solvents

- Category 3 - Solvents – Halogenated: Color Code White
  - Methylene chloride
  - Trichloroethane
  - Trichloroethylene
  - Freon
  - Carbon tetrachloride
  - Other halogenated solvents

- Category 4 - Mixed Paint Wastes: Color Code Blue
  - Paint sludges
  - Paint scrapings
  - Paint strippers (nonhalogenated)
  - Contaminated paint thinners

- Category 5 - Contaminated Rags: Color Code None
  Appropriately marked 55-gallon plastic drums shall be provided by the Environmental Office for rags contaminated with halogenated or nonhalogenated solvents, or paint wastes (as described above).

- Category 6 - Batteries: Color Code None
  All batteries shall be turned-in to the Environmental Office. Lithium batteries require special handling--contact the Environmental Office for disposal instructions.

Some products contain both halogenated and nonhalogenated solvents. These products should be placed in the "solvents - halogenated" category. Caustic materials should never be placed in this category because toxic fumes may result. When the above waste mixing plan is implemented, all other wastes should be placed in individual containers without mixing. If additional or different mixtures are desired, approval for mixing must be obtained from the Environmental Office.

After the hazardous waste has been placed in the appropriate container and properly labeled, each hazardous waste container must be safely stored by implementing the following procedures:

- Containers must remain closed except when adding or removing waste. Lids must be on, closure rings and bungs must be tight, and drain funnels must be removed.

- All containers must be handled with care to avoid rupturing the container and spilling the contents.

- Containers must be operated in a manner (e.g., grounding, use of explosion-proof equipment) that will prevent ignition or reaction of ignitable or reactive wastes.

- Depending on the quantities of waste to be stored, storage cabinets or specially designed accumulation structures may be purchased with approval from the Environmental Department.

4.2.5 Container Accumulation Time

No more than 55 gallons total of hazardous waste may be collected at a SAP at any time. When a container is full, the container must be transferred to the <90-Day Hazardous Waste

Storage Area within three days (72 hours). To prevent over-accumulation when more than one type of waste is collected at a SAP it is recommended that small collection containers, with a total capacity of 55 gallons or less, be used to collect wastes.

The above HW Unit Coordinator responsibilities regarding satellite container management requirements are summarized in Table 4-2. The Unit HW Coordinator must also instruct their Shop Level Workers regarding proper labeling, handling, segregation, and transfer of hazardous waste in satellite accumulation containers.

Table 4-2
Satellite Container Requirements for Unit HW Coordinators

Ensure that the container is under the control of the operator of the process generating the waste.
Instruct and ensure Shop Level Workers follow proper handling, segregation, and transfer of hazardous waste to SAP containers.
Ensure only containers provided by Environmental Office are used to store waste.
Ensure containers are labeled "Hazardous Waste" or with other words identifying the contents.
Prevent commingling of nonhazardous waste with RCRA hazardous waste.
Ensure that the container is closed except when it is necessary to add or remove waste.
Ensure all drum funnels are removed from hazardous waste containers after adding waste.
Ensure that that the hazardous waste container generation log is maintained.
Ensure that waste that is in a container that is not in good condition or that begins to leak is transferred to a new container that is in good condition.
Arrange with the Environmental Office HW Handlers for transfer of the waste to the <90-Day Storage area in Building 1347 within 3 days after the satellite accumulation container is full.
Obtain newly labeled containers from the Environmental Office HW Handler for the storage of hazardous, nonhazardous, and universal waste.

4.3 Universal and Other Waste Management

The Unit HW Coordinator is responsible for ensuring that universal and other wastes are properly management by unit personnel. He/she must also ensure that personnel received proper training in handling and responding to potential releases/spills of universal wastes. Universal wastes include batteries, pesticides, mercury thermostats, and lamps. The TNRCC has also classified paint waste as being a universal waste in the state of Texas. As a large quantity generator of hazardous waste (i.e., more than 1,000 kg or 2,220 lb per month of RCRA

hazardous waste), NAS JRB Fort Worth is regulated as being a large quantity generator of universal waste. 40 CFR Part 273, Subpart C contains the Standards for Large Quantity Handlers of Universal Waste. Although the regulatory requirements for universal wastes are less strict than for RCRA hazardous waste, they include requirements for proper handling, packaging, labeling, and storage. A record of the amount generated and sent offsite for disposal must also be maintained.

Unless otherwise instructed by the HW Program Manager, universal waste at NAS JRB Fort Worth is to be handled following the same procedures as a RCRA hazardous waste (with the exception of accumulation time limit, which is no longer than one year from the date the universal waste is generated). A summary of NAS JRB Fort Worth universal waste management requirements can be found in Appendix D, "Handling Requirements for Universal and Non-Hazardous Waste" and also in Table 3-3, "Universal Waste Requirements for Shop-Level Workers."

In addition to RCRA hazardous waste and universal wastes, NAS JRB Fort Worth also generates other wastes that are typically not hazardous and are not regulated under RCRA. Such wastes include used petroleum, oil, and lubricant (POL) products, used antifreeze, and waste byproducts such as contaminated rags and paper towels, empty material containers, and POL absorbent materials. It should be noted that while uncontaminated used materials such as POL and antifreeze are typically not hazardous, when they are contaminated with hazardous substances (through commingling or lack of segregation) they can qualify as a RCRA hazardous waste. The waste handling requirements for these special wastes (including universal wastes) are also provided in Appendix D.

4.4 Record Keeping and Inspections

The following subsections discuss the various record keeping and inspection requirements of the Unit HW Coordinator.

4.4.1 Satellite Waste Container Generation Summary Log

The Unit HW Coordinator must ensure that the SAP Waste Container Generation Summary Log (see Figure 4-2) is completed each time waste (hazardous or universal) is added to a SAP container. Each container of hazardous or universal waste must have a SAP Waste Container Generation Summary Log (please refer to Figure 3-1). The information to be documented on the logs includes the following:

1) The name of the work center generating the waste;
2) Waste type (hazardous or universal);
3) The container identification number;
4) The date the waste was added;
5) The waste stream determination identification number; the quantity added, the total daily amount (all waste amounts on the log are to be documented using units of volume (i.e., gallons);
6) The name and initials of the person adding the waste;
7) The date the container was full and the date the container was transferred out of the work station to the <90-Day Hazardous Waste Storage Area; and
8) The name and signature of the Unit HW Manager who signs the Summary Log when the waste is removed from the SAP.

All SAP Waste Container Generation Summary Logs will be maintained in close proximity of the SAP. The ultimate responsibility of ensuring that the SAP does not exceed its maximum allowable capacity of 55 gallons of hazardous waste is that of the Unit HW Manager. Therefore, the Unit HW Manager must have total responsibility and control of the SAP at all times. The Unit HW Manager must total the amount(s) of waste on all of the SAP Waste Container Generation Summary Logs at the end of each work day, thus minimizing the chances of the SAP exceeding its maximum allowable capacity of 55 total gallons of hazardous waste. For example: Four containers of hazardous waste are maintained at the SAP, each containing 15 gallons (>55 total gallons). The Unit HW Manager will contact the Environmental Department (782-6470) and schedule a pick up for one or all of the hazardous waste containers from the SAP.

WORK CENTER	**DATE BEGINNING TO FILL DRUM**
WASTE TYPE: Hazardous Waste_____ Universal Waste _____	
CONTAINER IDENTIFICATION NUMBER	

DATE	WASTE DESCRIPTION AND DETERMINATION ID NUMBER	QUANTITY (gal)	TOTAL (gal)	DEPOSITOR (NAME AND INITIALS)

DATE DRUM IS FULL	**DATE DRUM IS PICKED UP**

UNIT HW COORD. NAME:_____	**SIGNATURE:_____**

Figure 4-2. Satellite Waste Container Generation Summary Log.

With the pickup, the Unit HW Manager must submit the appropriate SAP Waste Container Generation Summary Log with the container being removed. Since less than 55 total gallons of hazardous waste is now in the SAP, the process can continue with the work center remaining in compliance. New SAP Waste Container Generation Summary Log(s) must be started by the Unit HW Coordinator to replace any that were taken with the removed waste.

Once the original SAP Waste Container Generation Summary Log(s) has been accepted by the Environmental Office HW Handler, the HW Handler has 24 hours to return a copy of the original SAP Waste Container Generation Summary Log to the work center where the waste was generated. A copy of the SAP Waste Container Generation Summary Log must be kept on file by both the work center generating the waste and the Environmental Office for cross-reference purposes and waste generation documentation.

4.4.2 Waste Stream Decontamination Form

Unit HW Coordinator shall be responsible for identifying hazardous waste streams created by any work centers that use a SAP. Information on each waste stream must be provided on a Waste Stream Documentation (WSD) form. A blank WSD form is included in Appendix G. The information on the WSD forms must be accurate and kept up-to date. Unit HW Coordinators must provide current copies of the WSD forms for waste streams accumulated at the SAPs to the Environmental Office. The completed document becomes a permanent record of the waste stream and provides information needed for properly packaging, storing, and disposing the waste. If there is a significant change in a waste stream (e.g., process change, waste mixture, or physical form), an amended WSD form must be filed with the Environmental Department prior to requesting container pick-up. A summary of the waste streams currently generated at NAS JRB Fort Worth by work center is presented in Appendix H.

The Environmental Office can provide assistance to Unit HW Coordinators in identifying potentially hazardous wastes. In addition, the following references are available to determine if a particular substance or material is considered hazardous:

- **DoD HMIS** - Lists the hazardous characteristics and safety and spill requirements for thousands of hazardous materials, indexed by National Stock Number (NSN). All Unit HW Coordinators, the Environmental Office , the HAZMIN Central Distribution Center, the Fire Department, and the Safety Department maintain the HMIS. To obtain the HMIS, contact the Naval Environmental Health Center, Code HMIS, Naval Base, Norfolk, VA 23511-6695.

- **MSDSs** - Identifies the physical properties and hazardous ingredients of several hundred chemicals and provides guidance on personal protective equipment, spill response, and disposal methods. The manufacturers of hazardous materials are required to provide MSDSs to all users. Copies of relevant MSDSs shall be kept at all work centers.

- **Hazardous Waste Stream List** – Lists waste stream codes for existing wastes at the Base. The list is maintained by the Environmental Office. A list of waste stream codes for existing hazardous and non-hazardous wastes is included in Appendix I.

4.4.3 Inspections

The Unit HW Coordinator is responsible for conducting daily inspections of SAPs. The Unit HW Coordinator must complete an inspection form, with copies provided to the Environmental Office once a week during the Environmental Office's weekly inspection of the SAP. The Unit HW Coordinator's inspection must include verification of inspection for leaks, deterioration, labeling, integrity, and security of the SAPs to ensure compliance and to take any and all necessary actions to correct any deficiencies. The suggested daily inspection form is provided in Figure 4-3.

4.5 Container Pickup Procedures and Policies

The Unit HW Manager shall call the Environmental Office at 782-6470 to schedule a pickup when a hazardous waste container is full. Under no circumstances shall a full 55-gallon hazardous waste container remain at a SAP for more than 3 days. The container pick-up procedures for the Unit HW Coordinators are as follows:

Satellite Accumulation Name: _____ **Building No.:** _____
Command: _____ **Week Ending Date/Yr:** _____
Inspector Name/Signature: _____ **Phone:** _____

Using the calendar below, use Y or N for each applicable question. This log is to be completed daily and copies provided to Environmental Office on a weekly basis.

Check List Item	DAY OF THE WEEK						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1) Were containers for storing waste obtained from the Environmental Office?							
2) Are all containers clearly marked with the word "Hazardous" or other words that identify the content and/or purpose?							
3) Is all waste being generated being placed into containers?							
4)Are all waste containers compatible with the waste being stored?							
5)Are all containers in good condition with no rust or disfigurations such as dents or bulges?							
6) Are all containers securely closed (lid on, ring or bung tight, drain funnel removed) except when adding or removing waste?							
7) Is there no evidence of spills/leaks in container storage area ?							
8) Is total volume of HW stored <55 gallons or total volume of acute HW <1 quart? Is excess relocated to the 90 day area within 72 hours?							
9) Is the SAP kept clean and free of any obstructions?							
10) Are "No Smoking" and "Flammable Waste Storage Area" signs clearly visible and in place?							
11) Are spill and secondary containment adequate for container volume?							
12) Are all special storage requirements, such as grounding of flammable wastes in place?							
13) Is the SAP being used only for storage of waste material (i.e., no usable or hazardous material stock items were observed stored in SAP)?							
14) Is there no evidence that smoking occurred within 50 feet of the SAP area?							

Notes: On the reverse side of this inspection form, record the date, time, and person taking corrective actions for all discrepancies observed.

Figure 4-3. Satellite Accumulation Point Daily Inspection Log

- A Disposal Turn-In Document must be completed and provided to the Environmental Office for each hazardous waste container that is picked up. A blank Disposal Turn-In Document is shown in Figure 4-4.

- The WSD form must be filed with the Environmental Office before requesting a hazardous waste pickup.

- Ensure that all hazardous waste containers are in good condition without leaks, sharp dents, or rust.

- Make sure that all rings and bungs on the hazardous waste containers are tight.

- Check that all hazardous waste containers are clearly marked with an identification of the contents and the waste stream identification number.

- At the scheduled waste pickup time, meet with the Environmental Office HW Handler at the SAP. Provide assistance as required during the transfer of the waste to the <90-Day Hazardous Waste Storage Area.

The Unit HW Coordinator is also responsible for following base waste pick-up polices for hazardous materials and non-hazardous wastes. These pickup policies are briefly presented in the following subsections.

4.5.1 Hazardous Materials

Unused/unopened hazardous materials in their original containers should be turned-in to the HAZMIN Center. Excess or expired-shelf-life hazardous materials must also be turned-in to the HAZMIN Center. If the HAZMIN Center will not accept these materials, a pickup request should be directed to the Environmental Office for disposal of the materials as hazardous waste.

Useable hazardous materials must not be stored at SAPs or at the <90-Day Hazardous Waste Storage Area.

4.5.2 Nonhazardous Wastes

Nonhazardous wastes may be held by units until containers are full, since no time limit applies to their storage. NONHAZARDOUS WASTE markings should be indicated on these containers.

WORK CENTER NAME	**HW UNIT COORDINATOR**

WASTE DESCRIPTION	**CONTAINERS #/TYPE**	**QUANTITY GAL/LB**	**ACTION/DATE**

I CERTIFY THAT THE ABOVE WASTE IS PROPERLY IDENTIFIED/CLASSIFIED, PACKAGED, MARKED AND LABELED IN ACCORDANCE WITH THE APPLICABLE USEPA AND DOT REGULATIONS.

SIGNATURE DATE:

ENVIRONMENTAL OFFICE INSPECTION COMPLETED:

SIGNATURE DATE:

Figure 4-4. Disposal Turn-in Document

Examples of nonhazardous wastes include:

- Rags contaminated with used oil only
- Absorbent materials contaminated with used oil only
- Drysweep (speedy dry) contaminated with used oil only
- Soil contaminated with used oil only
- Grease
- Other used oils contaminated with water and/or dirt only

4.6 Spill Response and Reporting

The Unit HW Coordinator is responsible for ensuring that spill control supplies are easily accessible to workers and emergency response personnel during routine working hours. Spill control supplies and equipment must consist of, but are not limited to, personnal protective equipment, absorbent material (such as oil dry or a pig), tools (non-sparking), fire extinguisher, poly bags (in case of corrosive waste spills), and empty 55-gallon drums. These supplies must be maintained at or near the SAP for emergency response activities for the types of wastes stored. The area in and around a SAP must be kept free of paper, trash, and debris, and the area adjacent to the storage area must be maintained to allow free movement of fire protection, spill control, and decontamination equipment. All personnel who use or have access to a SAP must be trained in hazardous waste management and emergency response procedures.

All spills or leaks of hazardous waste must be promptly cleaned up and reported. The Unit HW Manager should be contacted immediately if a spill or leak of hazardous waste is discovered at a SAP. The Unit HW Manager is responsible for cleaning up minor spills and leaks and for calling the Base Fire Department in the event that a spill or leak of hazardous waste is beyond the response capabilities of the Unit HW Manager. The local Fire Department shall be contacted (at 911) for incidents beyond the capability of the Base Fire Department. A Spill Report (see Figure 4-5) must be completed and submitted to the Environmental Office within 24 hours of an incident.

Each Unit HW Coordinator will make arrangements to familiarize on-base security, fire departments, and emergency response teams with the locations of their SAPs and the types of wastes stored at the SAPs.

MEMORANDUM

From:
To: Environmental Officer
Subj: HM/HW/POL SPILL REPORT
Ref: (a) NAS JRB Fort Worth Hazardous Waste Management Plan

In compliance with reference (a), the following report of a hazardous substance spill is made:

a. Date: _____ Time: _____

b. Name of Person Reporting Spill:_____
Rank: _____

c. Location of Spill-Unit: _____ Bldg: _____

d. Hazardous Substance Spilled: _____
Gallons: _____

e. Steps Used to Eliminate Spill/Fire Hazard: _____
_____
_____

f. Fire Department Response Supervisor: _____

g. Notification:

	Work Hrs.	After Hrs.	Yes	No
(1) Fire Department Dispatcher	911	911	___	
(2) Environmental Office	782-6470		___	
(3) Supervisor/Duty Officer Unit Involved			___	
(4) Personnel Exposure			___	
(5) Medical/Security Required			___	

h. Additional Comments (Cause of spill and description of physical damage):
_____
_____
_____
Unit HW Manager's Signature _____
Date _____

Figure 4-5. NAS JRB Fort Worth Spill Report

5.0 ENVIRONMENTAL OFFICE HW HANDLER RESPONSIBILITIES

Hazardous Waste Handlers are Environmental Office personnel responsible for the transportation of hazardous waste from shop SAPs to the <90-Day Hazardous Waste Storage Area. Other responsibilities of the HW Handler include conducting waste sampling, conducting weekly inspections of the SAPs and <90-Day Hazardous Waste Storage Area, labeling containers, and maintaining the container log at the <90-Day Hazardous Waste Storage Area. Prior to initiating any hazardous waste management duties, the HW Handler must obtain proper training in the handling of hazardous wastes. Each of these responsibilities is further discussed below.

5.1 Training Requirements for Environmental Office HW Handlers

Specific training requirements for Environmental Office HW Handlers are outlined in Table 5-1. These training requirements are needed to meet the training specifications in Navy policy, outlined in Chapters 12 and 24 of OPNAVINST 5090.1B, and in RCRA, OSHA, and DOT regulations. Shipping and transporting hazardous waste off base requires training in DOT Hazardous Materials Transportation Regulations. HW Handlers at NAS JRB Fort Worth are not required to have this DOT training to transport waste on-base, as long as the vehicle remains within the boundaries of NAS JRB Fort Worth and does not travel on any public highway. It is recommended that they receive DOT training, however, to ensure that all hazardous waste shipments transported off site are conducted in accordance with DOT regulations, including selection of the proper DOT shipping description; use of approved containers; container markings and labels; vehicle loading procedures; placards; and manifests. Environmental Office HW Handlers should arrange for their training through the NAS JRB Fort Worth HW Program Manager. For additional personnel training information, please refer to Section 9, which summarizes the training requirements for all Base personnel who participate in the management of hazardous waste at NAS JRB Fort Worth.

Table 5-1
Training Requirements for Environmental Office HW Handlers

Training Type	Regulation or Policy Requiring Training	When Training First Required	Training Renewal Frequency
General environmental awareness training[a]	OPNAVINST 5090.1B, Chapter 24, §4.1	Upon reporting to a command	Annual
Command Orientation[a]	OPNAVINST 5090.1B, Chapter 24, §4.2	Upon reporting to a command	As duties or work area changes
Hazardous waste generators[a]	OPNAVINST 5090.1B, Chapter 24, §4.24	Upon reporting to a command	As duties or work area changes
OSHA worker right-to-know	29 CFR 1910.1200	Upon initial assignment to work area	As duties or work area changes
OSHA HAZWOPER 40-hour off-site training plus 3-day on-the-job training	29 CFR 1910.120[b]	Prior to commencing work with hazardous wastes	One Time
OSHA HAZWOPER 8-hour refresher[c]	29 CFR 1910.120[b]	Within one year of initial training	Annual
RCRA hazardous waste generator training	40 CFR 262.34(a)(4) and 40 CFR 265.16	Prior to commencing unsupervised work	Annual Review Required
DOT general awareness	40 CFR 172.704	Within 90 days after employment or change in job function	Every 3 years
DOT function specific[d]	40 CFR 172.704	Within 90 days after employment or change in job function	Every 3 years

[a] May also satisfy the RCRA hazardous waste generator training requirements of 40 CFR 262.34(a)(4) and 40 CFR 265.16.
[b] Also requires a medical surveillance program.
[c] Annual refresher training required 1 year after completion of the initial off-site training.
[d] Training content specific to job function.

5.2 Container Pickup and Transfer to <90-Day Hazardous Waste Storage Area

The Unit HW Manager shall call the Environmental HW Handler to schedule a pickup whenever a hazardous waste container is full. At the scheduled waste pickup time, a HW Handler should meet the Unit HW Manager at the SAP and conduct the following activities:

- Ensure that the HW containers are properly marked, and that the waste stream identification numbers are correct (see subsection 5.3.3).
- Verify that the Disposal Turn-In Document (see Figure 4-4) is complete and correct and one is provided by the work center for each hazardous waste container that is picked up.

- Load the hazardous waste container into the government owned hazardous waste transport vehicle using appropriate container handling equipment, and transport the hazardous waste container from the SAP to the <90-Day Hazardous Waste Storage Area.

5.3 Container Management Requirements at the <90-Day Hazardous Waste Storage Area

The hazardous waste container should be unloaded at the <90-Day Hazardous Waste Storage Area, using appropriate container handling equipment, and properly stored by the HW Handler as described in the following subsections. The <90-Day Hazardous Waste Storage Area is currently located at Building 1347. A site plan of this facility is shown in Figure 5-1.

5.3.1 Design Criteria

The <90-Day Hazardous Waste Storage Area must meet the following design criteria to ensure the safe storage of hazardous waste containers before they are transported off site for disposal:

- A concrete curb or other impervious structure must surround the entire area, and a device (e.g., a wall, dike, or earthen dam) must physically separate incompatible wastes to prevent contact between the wastes in the event of a spill or leak.

- The containment system must be designed to contain at least 10% of the total volume of all containers in storage or 110% of the capacity of the largest container, plus any rain water that might accumulate, and to prevent spill and rain water run-off.

- The <90-Day Hazardous Waste Storage Area must be located at least 50 feet away from the Base property line and any occupied building.

5.3.2 Containers

All containers used for hazardous waste storage must be DOT-approved, in good condition, and have no corrosion, dents, or leaks. The containers typically used for hazardous waste storage are 5-, 10-, 15- and 55-gallon steel drums, fiberboard containers, or plastic drums. Containers with capacities of 1, 5, 10 and 15 gallons may be used for materials that become wastes while still in their original containers, such as off-specification materials and batteries.

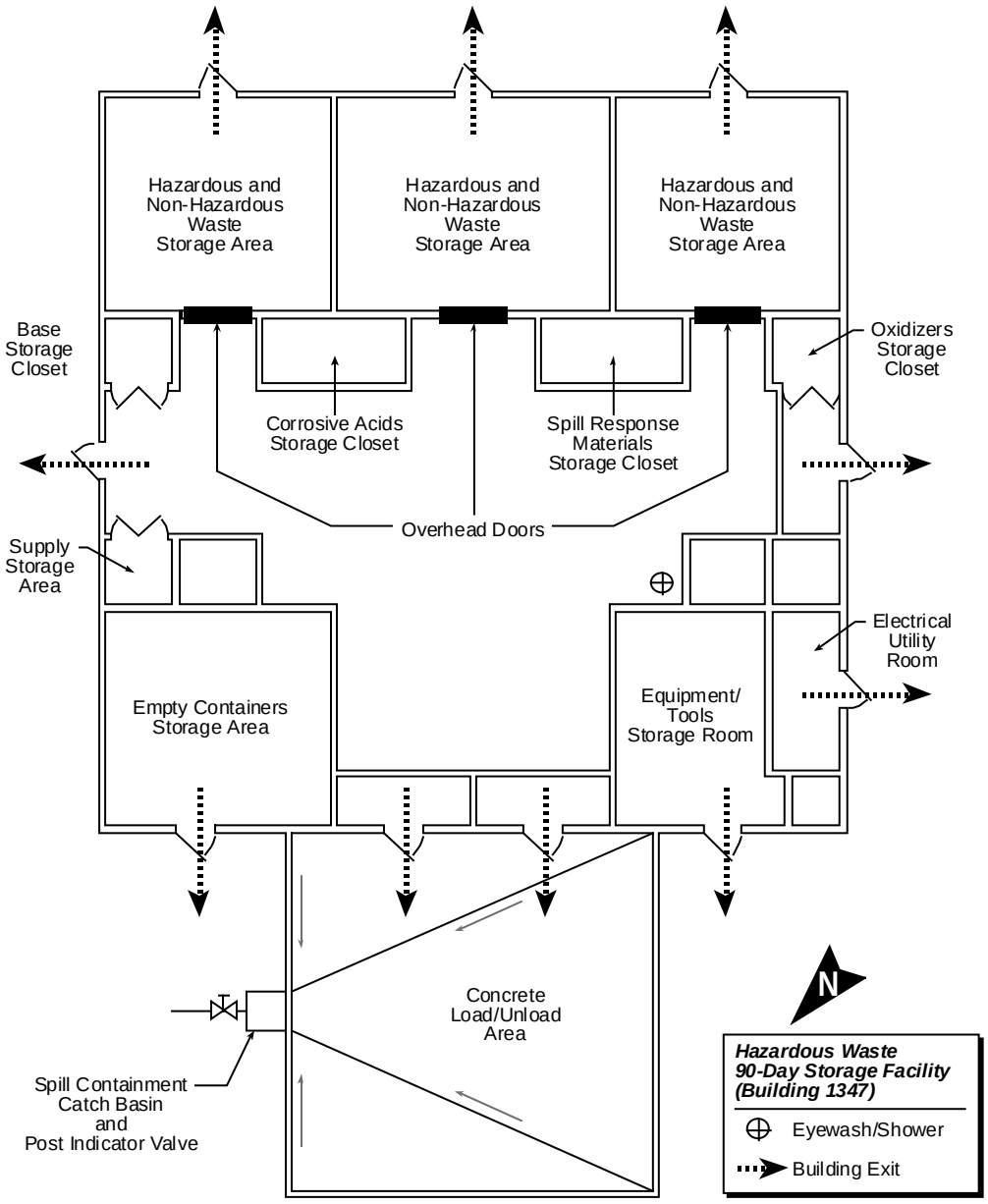


Figure 5-1. Hazardous Waste 90-Day Storage Facility (Building 1347).

Hazardous waste shall not be placed in used containers, except materials that are returned to their original containers as wastes. Washing of empty used containers for the purposes of waste disposal is not conducted at NAS JRB Fort Worth.

Information regarding approved containers can be found in 49 CFR 172 and 173, Naval Supply Publication 505, or NSTM Chapter 593. In all cases, the containers must meet DOT specifications for the types of materials or wastes to be stored. Under no circumstances should incompatible wastes be placed in the same container. No hazardous waste should be placed in tanks.

5.3.3 Container Labeling

All containers placed in the <90-Day Hazardous Waste Storage Area must have RCRA/DOT-approved labels and be properly labeled by the Environmental Office HW Handler with “HAZARDOUS WASTE, FEDERAL LAW PROHIBITS IMPROPER DISPOSAL”, “NONHAZARDOUS WASTE”, or “UNIVERSAL WASTE” labels. Examples of approved labels for use at NAS JRB Fort Worth are included as Figures 5-2, 5-3, and 5-4, respectively.

DOT regulations governing the transportation of hazardous materials are presented in 49 CFR. Specific hazardous materials are listed in 49 CFR 172.101, Hazardous Materials Table. The hazardous waste table includes specific information required for the transportation process (i.e., proper shipping name, UN/NA number, required labels, etc.).

The HW Handler is responsible for placing the correct DOT markings and labels on each hazardous waste container shipped off site for disposal. Marking requirements are presented in 49 CFR 172.300. Labeling requirements are presented in 49 CFR 172.400. Placarding requirements are the responsibility of the Environmental Office; however, the disposal contractor transporting the waste off site typically supplies the necessary placards.

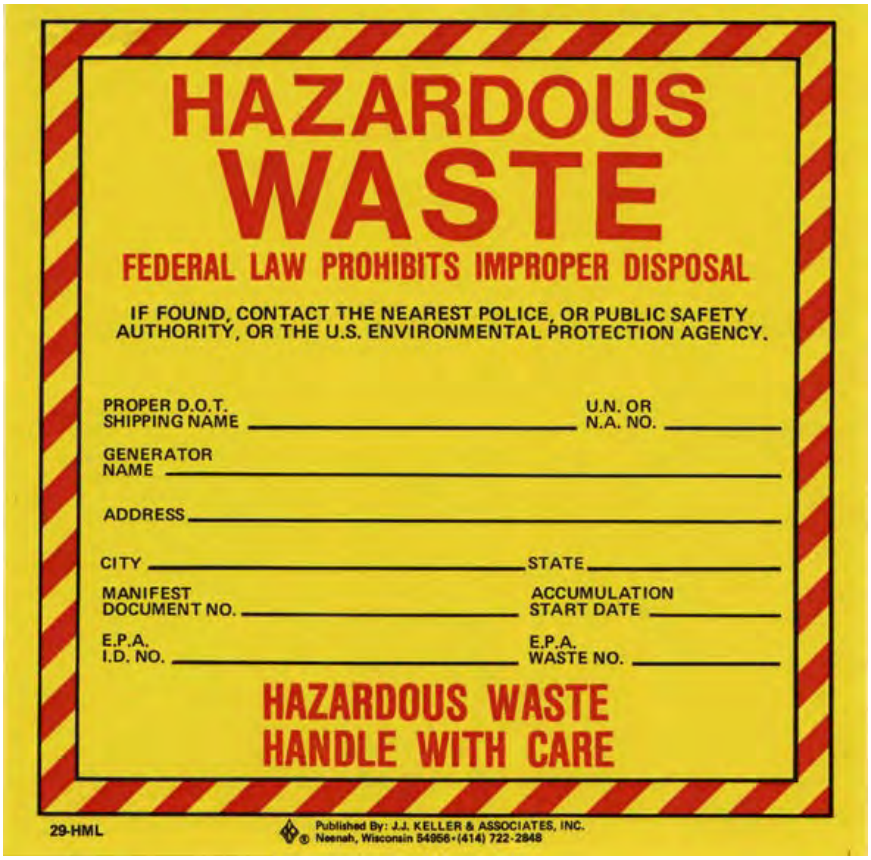


Figure 5-2. Base Hazardous Waste Label (Yellow)

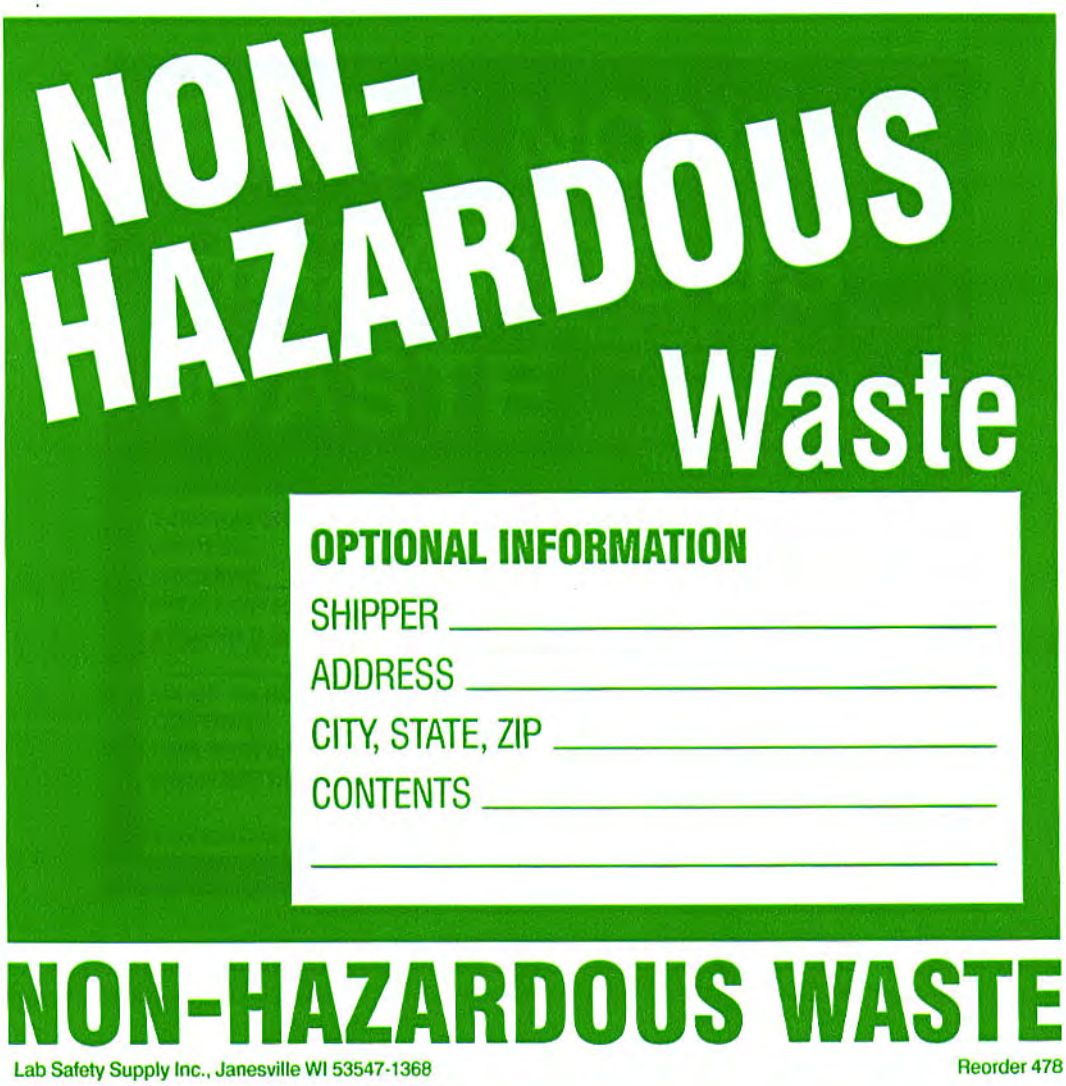


Figure 5-3. Base Nonhazardous Waste Label (Green)

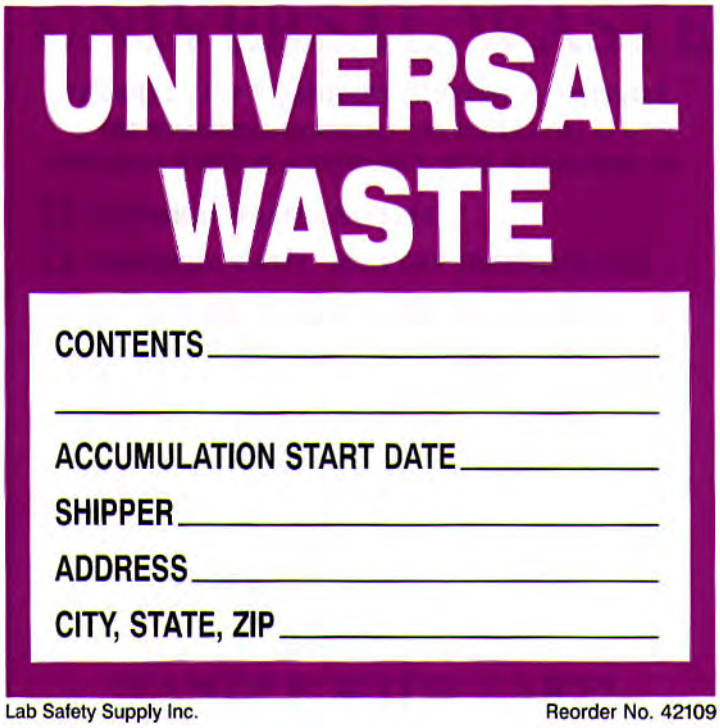


Figure 5-4. Base Universal Waste Label (Purple)

The following information must be legibly marked on each label with an indelible marker or paint stick:

- Name and description of the waste
- Accumulation start date (the date on which the first drop of a waste substance is added to a container at the <90-Day Hazardous Waste Storage Area, or when a container is removed from a SAP and placed in the <90-Day Hazardous Waste Storage Area)
- Unit originating the hazardous waste

5.3.4 Storage

After the hazardous waste has been placed in the appropriate container and properly labeled, each hazardous waste container must be safely stored in the <90-Day Hazardous Waste Storage Area by implementing the following procedures:

- Containers must remain closed except when adding or removing waste.
- Lids must be on, closure rings and bungs must be tight, and drain funnels must be removed.
- All containers must be handled with care to avoid rupturing the containers and spilling the contents.
- Storage must be operated in a manner that will prevent ignitable and/or reactive wastes from extreme heat or pressure that may lead to the production of toxic fumes, mists, dusts, or gases that may damage the container or lead to other environmental or health threats.
- Storage must be operated in a manner (e.g., grounding, use of explosion-proof equipment) that will prevent ignition or reaction of ignitable or reactive wastes.
- Containers must be elevated or palletized for protection from accumulated liquids that may leak or spill into the containment system.

5.3.5 Accumulation Time

NAS JRB Fort Worth may accumulate hazardous waste on site for 90 days or less without a permit. Hazardous waste containers must be removed within 90 days of the accumulation start

date marked on the container labels. All container shipment logs and manifests must be documented and must indicate that shipment off site occurred before the 90 day accumulation time limit. The HW Program Manager should be notified immediately regarding any situation that might result in exceeding the 90-day accumulation storage time limit.

5.4 Conducting Waste Sampling

Environmental Office HW Handlers are responsible for the collection of waste samples as directed by the HW Program Manager. Occasionally, sampling must be conducted when a generator is unable to positively identify a waste due to the loss of container markings or to other causes. If laboratory analysis is required to characterize a waste, the HW Program Manager will determine the proper sampling, handling and analytical method to be used based on generator descriptions of known or suspected chemical composition or properties. Extreme caution should be exercised when handling unknown wastes. It is generally expedient to assume unknowns are hazardous until proven otherwise. The sampling methods and procedures to be used by the Environmental HW Handler when collecting samples are presented in the following subsection.

5.4.1 Sampling Methods and Procedures

Many waste streams are heterogeneous; therefore, care must be taken to obtain a representative sample. In sampling wastes, consideration should be given to the uniformity of the waste in a container and to daily variations in production that may cause the wastestream to vary. Table 5-2 is a summary of waste sampling methods for different types of wastes. Although liquids and sludges are the most common forms of hazardous waste at NAS JRB Forth Worth, occasionally other forms of wastes may be encountered. Recommended sampling access points for different waste containers and soil are listed in Table 5-3. The recommended number of samples to be taken for different types of wastes and soil is provided in Table 5-4.

Table 5-2
Recommended Samplers for Various Types of Wastes

Waste Type	Recommended Sampler[a]	Limitations
Liquids, sludges, and slurries in drums, vacuum trucks, barrels, and similar containers	Coliwasa[b]	Not for containers 1.5 m (5 ft.) deep.
	a) Plastic	Not for wastes containing ketones, nitrobenzene, dimethylformamide, mesityl oxide, or tetrahydrofuran.
	b) Glass	Not for wastes containing hydrofluoric acid, and concentrated alkali solutions.
Powdered or granular solids in bags drums, barrels, and similar containers	a) Grain sampler	Limited application for sampling moist and sticky solids with a diameter 0.6 cm (1/2 in.)
	b) Sampling trier	May incur difficulty in retaining core sample of very dry granular materials during sampling.
Dry sludges deeper than 8-cm (3 in.)	a) Soil auger	Does not collect undisturbed core sample.
	b) Veihmeyer sampler	Difficult to use on stony, rocky, or very wet soil.
Wastes in storage tanks	Weighted bottle sampler	May be difficult to use on very viscous liquids.

a Glass sampler and sample container must be used when organics are to be determined.

b Composite Liquid Waste Sampler.

Table 5-3
Recommended Waste Container Sampling Points

Container Type	Sampling Point
Drum, bung on one end	Withdraw sample through the bung opening.
Drum, bung on side	Lay drum on side with bung up. Withdraw sample through the bung opening.
Barrel, fiber drum, buckets, sacks, bags	Withdraw samples through the top of barrels, fiber drums, buckets, and similar containers. Withdraw samples through fill openings of sacks and bags. Withdraw samples through the center of the containers and to different points diagonally opposite the point of entry.
Vacuum trucks and similar containers	Withdraw sample through open hatch. Sample all other hatches.
Soil	Divide the surface area into an imaginary grid. (The number of grids is determined by the desired number of samples to be collected which, when combined, should give a representative sample of the wastes.) Sample each grid.

Table 5-4
Sampling Recommendations for Various Cases

Case No.	Information Desired	Waste Type	Container Type	Number of Samples to be Collected
1	Average concentration	Liquid	Drum, vacuum truck, and similar	1 collected with Coliwasa[a]
2	Average concentration	Solid (powder or granular)	Bag, drum, bin, sack	1 composite sample of concentration Several samples collected at different sampling areas
3	Average concentration	Soil	-----	1 composite of several samples collected at different sampling areas
4	Concentration range	Liquid	Drum, vacuum truck, storage tank	3 to 10 separate samples, each from a different depth of the liquid
5	Concentration range	Solid (powder or granular)	Bag, drum, bin	3 to 5 samples from different sampling points
6	Concentration range	Soil	-----	3 to 20 separate samples from different sampling areas
7	Average concentration for legal evidence	All types	All containers	3 identical samples or 1 composite sample divided into 3 identical samples if homogeneous
8	Average concentration	Liquid	Storage tank	Same as Case #2
9	Concentration range	Liquid	Storage tank	Same as Case #4

[a] Composite Liquid Waste Sampler.

For all hazardous wastes that are placed in containers ranging in capacity from 5 gallons to 85 gallons, the sampling method employed is a Coliwasa sampler. This device collects liquid throughout the depth of liquid in a drum, assuring a representative sample. Instructions for drum sampling are presented in Table 5-5. For all wastes, except mixed paint wastes, a single sample (top to bottom) will be collected from a container. Paint waste containers are typically sampled by obtaining a composite sample from three grab samples: one each from the top, middle, and bottom of the container. Samples from multiple containers of the same waste will be composited for analysis (except for heterogeneous or layered wastes). Samples to be analyzed for volatile organics should be grab samples and should not be composited.

Table 5-5
Procedure for Sampling Waste in Drums

1. Choose plastic or glass Coliwasa for the liquid waste to be sampled, referring to Table 5-2.
2. Make sure that the sampler is clean.
3. Check to make sure the sampler is functioning properly. Adjust the locking mechanism if necessary to make sure the neoprene rubber stopper provides a tight closure.
4. Wear necessary protective clothing and gear and observe required sampling precautions.
5. Put the sampler in the open position by placing the stopper rod handle in the Tee-position and pushing the rod down until the handle sits against the sampler's locking block.
6. Slowly lower the sampler into the liquid waste. (Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to remain about the same. If the level of the liquid in the sampler tube is lower than that outside the sampler, the sampling rate is too fast and will result in a non-representative sample.)
7. When the sampler stopper hits the bottom of the waste container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the Tee handle until it is upright and one end rests tightly on the locking block.
8. Slowly withdraw the sampler from the waste container with one hand while wiping the sampler tube with a disposable cloth or rag with the other hand.
9. Carefully discharge the sample into a suitable sample container by slowly opening the sampler. This is done by slowly pulling the lower end of the Tee handle away from the locking block while the lower end of the sampler is positioned in a sample container.
10. Cap the sample container; attach label and seal; record in field log book; and complete sample analysis request sheet.
11. Preserve as required; fill-out the chain-of-custody record.
12. Unscrew the Tee handle of the sampler and disengage the locking block. Clean the sampler on site or store the contaminated parts of the sampler in a plastic storage tube for subsequent cleaning. Store used rags in plastic bags for subsequent disposal.
13. Deliver the sample to the laboratory for analysis (to be submitted by the HW Program Manager).

Strict chain-of-custody records must be maintained for all samples, particularly for those samples collected for regulatory agencies. Each person who handles the sample will, upon receipt, sign and date the identification tag. The sample container must be compatible with the waste. Sampling containers and quantities will be determined by and provided from the laboratory performing the analysis or from the HW Program Manager.

The submission of the samples to the laboratory for analysis will be as directed by the HW Program Manager. No samples are to be submitted without prior approval by the HW Program Manager. Only all-cargo aircraft, trucks, or other non-passenger vehicles will be used

to ship hazardous waste samples to laboratories. USEPA procedures (SW-846) for sample preservation must be followed and USEPA and DOT regulations for transporting hazardous materials/wastes must be met. Laboratories must certify that their procedures are USEPA-approved and, in that certification, reference either 40 CFR 261 or SW-846.

5.5 Record Keeping and Inspections

The following subsections discuss the various record keeping and inspection requirements of Environmental Office HW Handler personnel.

5.5.1 Hazardous Waste Container Turn-in and Shipment Log

Environmental Office HW Handler personnel must ensure that the Hazardous Waste Container Turn-In & Shipment Log is completed each time a container is transferred from a SAP to the <90-Day Hazardous Waste Storage Area located at Building 1347. Each container of hazardous or universal waste must be documented on a Hazardous Waste Container Turn-in and Shipment Log (please refer to Figure 5-5). The information to be documented on the log includes the following:

- Drum Identification Number: ID number includes the calendar year, Julian date, tenant/command identification letter, followed by the sequential drum number for that year (e.g., 1115Z253 = year 2001, 115th day of the year, Z=HAZMIN Center was the generator, 253rd drum transferred to 90 day area in calendar year 2001)
- Receipt date
- Activity name
- Contents of container
- USEPA identification number or UN identification number
- Quantity (volume in gallons or weight in pounds)
- Hazardous waste documentation number
- Date container is shipped off site for disposal (completed by the HW Program Manager only
- Manifest Number (completed by the HW Program Manager only)

Drum Number	Receipt Date	Activity Name	Contents	USEPA # or UN#	Quantity	Hazardous Waste DOC #	Shipping Date	Manifest Number

Figure 5-5. Hazardous Waste Container Turn-In & Shipment Log

5.5.2 Inspections

Environmental HW Handler personnel are responsible for conducting weekly inspections of SAPs. At this time, the HW Handler will also collect from the Unit HW Coordinator copies of the daily inspection forms completed by the work center for the SAP. The SAP weekly inspections should include the following checks:

- Containers are not leaking, corroded, structurally unsound, or deteriorating;
- Containers are closed and rings or bungs are tight;
- No more than 55 gallons total of hazardous waste stream is accumulated;
- Fire extinguishers are charged (inspect monthly);
- PPE is in adequate supply and is in proper working condition (inspect and clean monthly or after each use, whichever is greater);
- A spill kit is available and stocked; and
- Liquids (e.g., rain water or wastes) are not standing on top of any container.

The suggested weekly inspection form is included in Figure 5-6.

Environmental HW Handler personnel are also responsible for conducting weekly inspections of the <90-Day Hazardous Waste Storage Area. The inspection should include the following checks:

- Containers are not leaking, corroded, structurally unsound, or deteriorating;
- Containers are closed and rings or bungs are tight;
- Eyewash station is operational (flush monthly, with signature card as proof of inspection);
- Fire extinguishers are charged (inspect monthly);

- PPE is in adequate supply and is in proper working condition (inspect and clean monthly or after each use, whichever is greater);

NAS JRB FORT WORTH HAZARDOUS WASTE GENERATOR SATELLITE WEEKLY INSPECTION FORM

FOR THE WEEK OF:

COMMAND/LOCATION	SAT	UNSAT	DISCREPANCY	CORRECTIVE ACTION	COMMENTS	INSPECTED BY
14TH MARINES (B-4210)						
AIMD (B-1414)						
AIMD (B-1060)						
AIMD (B-1055)						
AIMD (VAN PADS)						
VR-59 (B-1050)						
VF-201 (B-1403)						
MACS-24 (BLDG. 4245)						
MARINE (VAN PADS)						
MWSS-471 (B-4210)						
VMFA-112 (B-1049/1027)						
VMGR-234 (B-1050)						
MWR AUTO (B-1145)						
HAZMIN (B-1266/1270)						
FIRE DEPT. (B-1425)						
TANG (B-4175)						

Figure 5-6. SAP Weekly Inspection Form

FOR THE WEEK OF:

COMMAND/LOCATION	SAT	UNSAT	DISCREPANCY	CORRECTIVE ACTION	COMMENTS	INSPECTED BY
TANG (B-1674)						
TANG (B-1675)						
TANG (B-1676)						
USAF (B-1191)						
USAF (B-1213)						
USAF (B-1217)						
USAF (B-1601)						
USAF (B-1602)						
USAF (B-1618)						
USAF (B-1619)						
USAF (B-1628)						
USAF (B-1629)						
USAF (B-1641)						
USAF (B-1643)						
USAF (B-1648)						
USAF (B-1655)						
USAF (B-1656)						

Figure 5-6. SAP Weekly Inspection Form (continued)

- Containment system is not cracked and contains no standing water;
- Material handling equipment is in proper working order;
- Logs and records are properly maintained and used, and are available for inspection;
- Incompatible wastes are properly stored;
- A two-way communication system is available (e.g., direct voice or visual contact);
- A spill kit is available and stocked; and
- Liquids (e.g., rain water or wastes) are not standing on top of any container.

A blank <90-Day Hazardous Waste Storage Area Weekly Inspection Form is included as Figure 5-7.

5.6 Spill Response and Reporting

Environmental Office HW Handler personnel shall respond to minor leaks and spills discovered at the <90-Day Hazardous Waste Storage Area. Spills, leaks, or precipitation shall be removed from the area within 24 hours to prevent overflow of the containment system. The Base Fire Department must be contacted immediately in the event that a spill or leak of hazardous waste is beyond the response capabilities of HW Handler personnel. The local Fire Department will be contacted for incidents beyond the capability of the Base Fire Department.

Refer to the NAS JRB ICP for details concerning spill response procedures at the <90-Day Hazardous Waste Storage Area. The site-specific portion of the ICP that addresses the <90-Day Hazardous Waste Storage Area is conspicuously posted at the <90-Day Hazardous Waste Storage Area, and all personnel using the area or having access to it are required to be trained on the plan's contents.

MONTH_____YEAR___UNIT_____INSPECTOR

	S/U
1. HW/POL ACCUMULATION AREAS	
a. Do all containers have "HAZARDOUS WASTE" or "NONHAZARDOUS WASTE" vinyl labels properly affixed?	
b. Are all containers clearly identified as to their purpose and/or contents?	
c. Is the accumulation start date clearly marked on each HW label?	
d. Are covers for open containers bolted or padlocked in place?	
e. Are all liquid container bungs in place and secured?	
f. Are bung lid gaskets in place and in good condition?	
g. Are any containers leaking?	
h. Is excessive rust or disfiguration noted on any container?	
i. Does the storage area have proper signs posted? (Unauthorized personnel keep out, no smoking & point of contact)	
j. Is aisle space adequate for access to all containers?	
k. Is there any evidence of spills or leaks in the area?	
l. Is appropriate HM/HW equipment and PPE available to respond to an emergency? (Do not store PPE with wastes.)	
m. Is the container storage area fenced and locked?	
n. Are "empty" containers marked and stored properly?	
o. Are containers properly grounded?	
2. HM/HW ADMINISTRATIVE REQUIREMENTS	
a. Is the emergency contingency plan current for fire, explosions, spills, or releases of HM/HW?	
b. Is the Hazardous Waste Inventory current?	
c. Has the Environmental Department been notified of personnel changes in assignments of Unit HW Managers, and Assistant Unit HW Managers?	
d. Are emergency response and evacuation plans posted?	
INSPECTOR'S INITIALS	

NOTES:
S=Satisfactory U=Unsatisfactory
For any items marked "U", record the corrective action, noting the date, time, and person making the correction.

ITEM #	DATE OF CORRECTION	TIME	ACTION TAKEN	NAME OF PERSON MAKING CORRECTION

Figure 5-7. NAS JRB Fort Worth Weekly Inspection Form for the <90-Day Hazardous Waste Storage Area

In addition, the equipment and procedures listed below must be used to ensure prompt response to emergency or spill events and to maintain safe operation of the <90-Day Hazardous Waste Storage Area:

- The area must be equipped with internal communications or an alarm system capable of providing immediate emergency instruction (voice or signal) to facility personnel.
- A device, such as a telephone or a hand-held two-way radio that is capable of summoning emergency personnel from security, fire department, and emergency response teams, must be immediately available.
- A portable fire extinguisher and an adequate water supply must be available if ignitable wastes are stored.
- A sufficient quantity of personal protective, fire control, spill control, and decontamination equipment must be available at or near the storage area for emergency response activities for the types of wastes stored.
- Equipment must be tested and maintained to ensure its proper operation.
- Sufficient aisle space (30 to 36 inches) must be maintained to allow for the unobstructed movement of personnel and fire protection, spill control, and decontamination equipment.
- The area in and around the <90-Day Hazardous Waste Storage Area must be kept free of paper, trash, and debris, and the area adjacent to the storage area must be maintained to allow free movement of fire protection, spill control, and decontamination equipment.
- All personnel who use or have access to the <90-Day Hazardous Waste Storage Area must be trained in hazardous waste management and emergency response procedures, as described in the ICP.

6.0 HAZARDOUS WASTE PROGRAM MANAGER RESPONSIBILITIES

The Hazardous Waste Program Manager oversees the management of hazardous waste at NAS JRB Forth Worth. He/she serves as the hazardous waste technical expert, interprets policies, performs hazardous waste training of base personnel, and implements programs as described in the HWMP. The HW Program Manager conducts inspections, prepares regulatory agency reports, and maintains environmental compliance documentation. He/she is ultimately responsible for identifying and classifying NAS JRB waste streams that qualify as hazardous. The Hazardous Waste Management Disposal Contractor and other contractors' hazardous waste activities, including visiting DoD tenants, are conducted at the direction of the HW Program Manager.

Prior to initiating any hazardous waste management duties, the HW Program Manager must obtain proper training in the handling of hazardous wastes. Each of these above responsibilities is further discussed below.

6.1 Training Requirements for Environmental Office HW Program Manager

Specific training requirements for the HW Program Manager are outlined in Table 6-1. These training requirements are needed to meet training requirements as specified by Navy policy outlined in Chapters 12 and 24 of OPNAVINST 5090.1B and RCRA, OSHA, and DOT federal regulations. Section 9 contains a summary of the training requirements for all Base personnel who participate in the management of hazardous waste at NAS JRB Fort Worth.

6.2 Waste Stream Determinations

The HW Program Manager has the overall responsibility for determining which waste streams qualify as hazardous waste. He/she is responsible for maintaining all records regarding the characteristics of individual waste streams including analytical sampling results as required by 40 CFR 262.11. Waste stream determinations are required in order to:

- Determine which waste streams are hazardous and identify hazardous characteristics.

Table 6-1
Training Requirements for HW Program Manager

Training Type	Regulation or Policy Requiring Training	When Training First Required	Training Renewal Frequency
General environmental awareness training[a]	OPNAVINST 5090.1B, Chapter 24, §4.1	Upon reporting to a command	Annual
Command Orientation[a]	OPNAVINST 5090.1B, Chapter 24, §4.2	Upon reporting to a command	As duties or work area changes
Hazardous waste generators[a]	OPNAVINST 5090.1B, Chapter 24, §4.24	Upon reporting to a command	As duties or work area changes
OSHA worker right-to-know	29 CFR 1910.1200	Upon initial assignment to work area	As duties or work area changes
OSHA HAZWOPER 40-hour off-site training plus 3-day on-the-job training	29 CFR 1910.120[b]	Prior to commencing work with hazardous wastes	One Time
OSHA HAZWOPER 8-hour refresher[c]	29 CFR 1910.120[b]	Within one year of initial training	Annual
RCRA hazardous waste generator training	40 CFR 262.34(a)(4) and 40 CFR 265.16	Prior to commencing unsupervised work	Annual Review Required
DOT general awareness	40 CFR 172.704	Within 90 days after employ-ment or change in job function	Every 3 years
DOT function specific[d]	40 CFR 172.704	Within 90 days after employ-ment or change in job function	Every 3 years

[a] May also satisfy the RCRA hazardous waste generator training requirements of 40 CFR 262.34(a)(4) and 40 CFR 265.16.
[b] Also requires a medical surveillance program.
[c] Annual refresher training required 1 year after completion of the initial off-site training.
[d] Training content specific to job function.

- Meet the requirements of waste disposal vendors for waste profile data.
- Collect sufficient information to determine waste incompatibilities, container specifications, and shipping names.
- Meet certain federal and state regulatory requirements.

The proper characterization of waste streams may require data from several sources. The Safety Office will obtain MSDSs from all vendors of hazardous materials and provide copies to

the Environmental Office. The Environmental Office will conduct laboratory analysis when necessary to further characterize each waste. Waste stream determinations are reviewed annually at NAS JRB Fort Worth or whenever changes in hazardous materials or processes occur that alter the characteristics of the waste. If the HW Program Manager cannot, with reasonable certainty, determine whether a waste stream meets a new listing, the waste should be analyzed as required.

A summary of hazardous waste streams currently generated at NAS JRB Fort Worth by individual work centers is provided in Appendix H. The following subsections provide the information and procedures needed by the HW Program Manager for making waste stream determinations.

6.2.1 USEPA Hazardous Waste Definition

Hazardous waste management begins with properly identifying and classifying all solid waste streams throughout the Base. After waste streams are identified, they must be classified as hazardous or nonhazardous according to the USEPA definition. The following four steps should be used to determine whether a solid waste is regulated as a hazardous waste under federal law:

1. Determine if the waste is exempted from regulation as solid or hazardous waste in 40 CFR 261.

2. Check to see if the waste is listed as a hazardous waste in Subpart D of 40 CFR 261. Listed wastes are regulated as hazardous waste unless they have been specifically delisted.

3. If the waste has not been listed as a hazardous waste, determine if it exhibits the hazardous waste characteristics cited in Subpart C of 40 CFR 261.

4. Determine if the waste is hazardous because of the "Mixture," "Derived From," or "Contained In" rules.

6.2.2 Mixture Rule

The Mixture Rule currently contains two elements:

- **Characteristic Hazardous Waste.** Under 40 CFR 261.3(a)(2)(iii), a mixture of a solid waste and a characteristic hazardous waste continues to be managed as a hazardous waste unless the resulting mixture no longer exhibits the characteristic.

- **Listed Hazardous Waste.** Under 40 CFR 261.3(a)(2)(iv), a mixture of a solid waste and one or more listed hazardous wastes (including a waste derived from a listed hazardous waste) is regulated as a hazardous waste, regardless of the concentration of the listed waste in the mixture, unless the mixture falls within the following exemptions:

  - The listed hazardous waste in the mixture was listed solely because it exhibits a hazardous waste characteristic (e.g. ignitability) and the mixture no longer exhibits that characteristic; or

  - The generator can demonstrate that the mixture consists of wastewater, the discharge is subject to the Clean Water Act, and the hazardous waste mixed with the wastewater is one of the following:

    - ♦ Carcinogenic spent solvents listed in 40 CFR 261.31, provided that the concentration of the solvents to the treatment system is ≤1 ppm (calculated by a specified equation)

    - ♦ Non-carcinogenic spent solvents listed in 40 CFR 261.31, provided that concentrations of the solvent in the flow to the treatment system do not exceed 25 ppm (calculated by a specified equation)

    - ♦ Discarded commercial chemical products listed in 40 CFR 261.33 (i.e., “P” and “U” wastes) arising from de minims losses in manufacturing operations

    - ♦ Wastewater resulting from laboratory operations involving listed toxic wastes in small amounts

Therefore, unless one of the exemptions listed above applies, or the waste is delisted, USEPA’s basic rules for listed waste “once hazardous, always hazardous” will apply.

6.2.3 Derived From Rule

The "derived from" rule states that any solid waste generated from the treatment, storage, or disposal of a hazardous waste, including any sludge, spill residue, ash, emission control dust, or leachate, is a hazardous waste unless:

- It is specifically excluded by a separate regulatory action and does not exhibit a hazardous waste characteristic [see 40 CFR 261.3(c)(2)(ii)]

- The solid waste is not a listed waste nor derived from a listed waste and does not exhibit any of the four characteristics (ignitability, corrosivility, reactivity, and toxicity) [see 40 CFR 261.3(d)(1)]

- It is a listed waste, contains a listed waste, or is derived from a listed waste and has been delisted

6.2.4 Contained In Rule

Mixtures of environmental media and a listed hazardous waste (i.e., contaminated groundwater, contaminated soil, and contaminated sediments) must be managed as if they were hazardous waste.

6.2.5 Generator Waste Data for Conducting Waste Stream Determinations

A Waste Container Generation Summary Log (see Figure 3-1) is to be maintained at a SAP by each work center generating hazardous waste. Entries on that record will include: the type of waste, generator container number, the accumulation start date, the name of the waste material, the quantity, date additional waste was added to the container (small quantity mixtures), the name and initials of the person adding the waste, and the date the container is transferred out of the SAP. Work centers must also keep WIDs (see Appendix G) up to date with the NAS JRB Forth Worth HW Program Manager.

The characteristics of a waste stream will be determined first by reviewing available information such as the Waste Generation Summary Log and MSDS for those materials known to comprise the waste. If this information is not adequate, the HW Program Manager will determine the classification of a waste stream using the sampling and analysis procedures outlined in Subsection 6.3.

6.2.6 Other Data Sources for Making Waste Stream Determinations

Specific hazard information for materials for use in making waste stream determinations can also be obtained using the DOD HMIS. The HMIS includes the following data on individual chemical products:

- National Stock Number
- Proprietary
- Item name
- Container size
- Radioactive data
- Hazardous components
  - Chemical name
  - National Institute of Occupational Safety and Health Number
  - Percent product
  - Threshold limit value
- Health and physical property data
  - Boiling point
  - Flash point
  - Explosion limits
  - Vapor density
  - Specific gravity
  - Solubility in water
  - Appearance and odor
  - Effects and overexposure
  - First aid
  - Hazardous decomposition products
- Part number/trade names
- Manufacturer and telephone number
- Unit of quantity
- Chemical name(s) formula
- DOT requirements
  - Class
  - Label
  - ID number
  - Reportable quantity
- Storage and handling data

It is possible that the HMIS will not have all desired information. In that case, additional sources of information must be consulted. The following information may be used:

- The Condensed Chemical Dictionary - contains technical data and descriptive information for thousands of chemicals
- National Fire Protection Agency Fire Protection Manual on Hazardous Materials - includes data on many name brand products
- Dangerous Properties of Industrial Materials - provides extensive toxicological data and is cross-indexed by known synonyms
- Material Safety Data Sheets prepared by the manufacturer
- Hazardous Material Shipping Table found in 49 CFR 172 - contains lists of materials recognized as hazardous by DOT and associated hazard class and packaging requirements
- Lists of hazardous waste published by USEPA in 40 CFR 261

If the reference materials do not contain the needed information, laboratory testing of the waste will be necessary. A representative sample of the waste should be collected and the analysis protocol described below for unknown wastes should be followed. The protocol can be reduced based on the information that is available (e.g., a water-based waste need not be tested for flash point, a paint sludge waste need not be tested for pesticides). Testing may be reduced based upon a reasonable knowledge that one or more parameters are not relevant to the waste stream.

6.2.7 Characterization Procedures for Unknown Wastes

Occasionally containers of unidentified waste may be discovered because container markings have been lost or for other reasons. The procedure presented in Table 6-2 should be followed by the HW Program Manager to determine whether the material is a RCRA hazardous waste. Extreme caution should be exercised when handling unknown wastes. It is generally expedient to assume unknowns are hazardous until proven otherwise.

Table 6-2
Procedures for Characterizing Unknown Materials

Record all marks on the drum; particularly a National Stock Number (NSN), product name, or chemical name.
If an NSN is found, locate the NSN in the HMIS. The record will contain specific information (color, appearance, pH, specific gravity) which should be compared to the unknown material. This may eliminate the need for expensive analytical testing. For instance, if the HMIS indicates that the material should have a pH of 4.0 and a specific gravity of 1.3, a laboratory can quickly and inexpensively check these parameters. If the unknown material matches these parameters, the unknown is the material identified by the NSN on the drum.
If no NSN is present, but a product name is located on the drum, use the same procedure, checking the product name cross-referenced to the HMIS. If only a chemical name is present, information on the physical properties of chemicals can be found in *Dangerous Properties of Industrial Materials*, Irving Sax, editor, *the Fire Protection Guide to Hazardous Materials* or equivalent reference materials. MSDSs on file in the HWTF may also be used to obtain information on the chemical and physical properties of hazardous materials.
If the material has been determined to be the same as the drum markings, use the HMIS or other information sources to determine the following. A yes answer to any one of the following questions means the material is a hazardous waste. a. Is the pH less than or equal to 2.0 units? b. Is the pH greater than or equal to 12.5 units? c. Is the flash point less than 140 degrees F? d. Is the material an oxidizer? e. Does the material react violently with water? f. Does the material contain arsenic, barium, cadmium, chromium, lead, mercury, silver or selenium? If so, laboratory tests for TCLP are required to determine if the material is a hazardous waste. g. Does the material contain any chemical listed in 40 CFR 261.31, or the state regulations? h. Is the material a pure form of any chemical listed in 40 CFR 261.33(e) or 40 CFR 261.33(f)?
If the material does not match the container markings, it is necessary to sample and perform laboratory tests to determine if the waste is a hazardous waste. Have a competent laboratory perform the following protocol: a. "Characteristics of Hazardous Waste" on a representative sample of the waste. If the waste fails one or more of the characteristic tests, it is a hazardous waste. If the unknown passes these tests, implement Step b. b. Have the laboratory identify the material(s) in the waste by either Gas Chromatography/Mass Spectroscopy (GC/MS) or High Pressure Liquid Chromatography (HPLC). Compare results with the characteristic waste regulatory limits of 40 CFR 261.

For drums that contain less than one inch of residue, the analytical protocol will consist of two parts:

- A gas chromatography/mass spectroscopy (GC/MS) or high-pressure liquid chromatography (HPLC) test for chemicals listed in 40 CFR 261.33 (e)
- A check for DOT hazardous material definitions (flammability, corrosiveness, poison, etc.)

For drums that contain more than one inch of residue, the analytical protocol will consist of three parts:

- A test for the four characteristics of hazardous waste (ignitability, corrosiveness, reactivity, and TCLP)
- A GC/MS or HPLC test for chemicals listed in 40 CFR 261.33 (a) through (f)
- A test for the DOT hazardous materials definitions

It is possible that additional tests may be required on some containers. For instance, a check for PCBs may be necessary on unknown oily wastes prior to disposal. All laboratory tests should be performed in accordance with regulatory-approved, required analytical protocols and be certified by the analyst. Procedures to be followed include those in USEPA Publication SW-846, *Test Methods for Evaluating Solid Wastes*, and DOT methods referenced in 49 CFR 171.

The laboratory employed to obtain analytical data must certify its use of the methods specified and must be able to provide, upon request, documentation of acceptable QA/QC procedures. Acceptable documentation may include compliance with the quality control section of SW-846 procedure, certification under a state or federal public drinking water act for equivalent parameters, and/or the performance and reporting of replicates and percent recovery data.

6.3 Management of Waste Sampling and Analysis

The HW Program Manager is responsible for the management of waste sampling and analysis when required for waste stream determination purposes. As described above, if a waste

stream needs to be reviewed or the generator cannot positively identify a waste, he/she must work with the HW Program Manager to determine the origin of the material and provide information that may assist with characterizing the waste. In the event a laboratory analysis is required to characterize a waste, the HW Program Manager will determine the proper sampling and handling methods based on generator descriptions of known or suspected chemical composition or properties.

At the direction of the HW Program Manager, Environmental Office HW Handler personnel will perform required sampling and subsequent analysis of the waste. The work center will complete or update a WID based on this analysis, and send it with the material/waste to the Environmental Office. This characterization should be performed with the waste located at the point of generation. Containers of waste cannot safely be stored in the <90-Day Hazardous Waste Storage Area until characterization and specific incompatibilities are determined.

Unused material, in unopened containers, is not typically analyzed unless the identifying label has been destroyed. As described above, characteristics of these are known through reference to the material's MSDS, available through the HMIS. If there is a question regarding the accuracy of existing markings, analytical protocol should be limited to a check for agreement with container markings, as determined by the HW Program Manager.

Table 6-3 is a list of wastes showing the appropriate laboratory analytical parameters and rationale for each waste. Only analyses that may be relevant to hazardous waste characteristics are shown. For most of the substances/materials, preliminary identification is made using labels, MSDSs or other markings. In some cases, wastes are identifiable mixtures of uncertain composition (i.e., mixed paint wastes). Table 6-3 also indicates the required analyses for these. Analytical test methods are specified in the Appendices to 40 CFR 261 and in USEPA Publication SW-846.

6.4 Land Disposal Restrictions

Prior to disposal, hazardous wastes must be evaluated in accordance with 40 CFR 268 to determine if the waste is restricted from land disposal. The corresponding treatment standards are listed in 40 CFR 268, Subpart D. The NAS JRB Fort Worth HW Program Manager must determine if a waste meets the treatment standard. This determination may be based on process knowledge or laboratory analysis.

If it is determined that a restricted waste does not meet the treatment standards established in 40 CFR 268, Subpart D, NAS JRB Fort Worth (as the generator of the waste) must notify the TSDF in writing of these treatment standards. The notice will include the following information:

- USEPA Hazardous Waste Number
- The corresponding treatment standards and all applicable prohibitions set forth in 40 CFR 268 or RCRA section 3004(d)
- The manifest number associated with the shipment of wastes
- Waste analysis data where available

Currently, NAS JRB Fort Worth is notifying the TSDF in writing, in accordance with state requirements, every time a waste is manifested. Under federal requirements, per 40 CFR 268, if the waste stream is determined to be restricted for land disposal and has not changed, this notification is required only once. Should the state relax this requirement, it is still recommended that the current practice be continued (filed every time with the manifest). The notification must be signed by an authorized person and include the certification statement found in 40 CFR 268.7(a)2(ii).

6.5 Manifesting

The HW Program Manager is responsible for the preparation and signing of all hazardous waste manifest documents for NAS JRB Fort Worth. The RCRA hazardous waste manifest system was

Table 6-3
Hazardous Waste Analytical Screening Protocol

Waste	Analytical Parameter	Rationale
Misc. waste acids	pH	pH 2.0
Battery electrolyte[b]	TCLP (Pb), total Pb, pH	Sulfuric acid solution that has a pH <2 and contains soluble lead.
Chromic acid (alodine)	TCLP, total metals, pH	Waste is acidic (corrosive) and contains chromium.
Lead acid batteries (drained)	TCLP	Contains soluble lead.
Lead acid batteries	TCLP, pH	Contains soluble lead, sulfuric acid-pH <2.0.
Adhesives[c]	TCLP, flash point, TOX	Has flash point <140°F, may contain listed solvents.
Ammonium hydroxide	pH	Solution has pH >12.5 and is corrosive.
Beryllium dust	None	Listed hazardous waste - P015.
Blasting media[d]	TCLP, total metals	May contain soluble lead, chromium or cadmium.
Calcium hypochlorite	Flash point	Has flash point <140°F.
Calibration fluid	Flash point	Has flash point <140°F.
Carbon remover	Chlorinated fluorocarbons	Waste contains listed solvents.
Cleaning compound (mineral spirits)	Flash point	Has flash point <140°F.
Contaminated fuels	Flash point, TCLP, TOX, total metals	Has flash point <140°F may contain soluble lead or listed solvents.
Corrosion inhibitor	Flash point, TCLP, TOX	Has a flash point <140°F, may contain listed solvents.
Descaling compound	pH	Solution has pH <2.0 and is corrosive.
Disodium phosphate	pH, steel corrosion	High concentrations may corrode steel.
Duplicating fluid	TCLP, flash point	Has a flash point <140°F, may contain listed solvents.
Ethyl alcohol	Flash point	Has flash point <140°F.
Formaldehyde	Flash point	Has flash point <140°F. Listed hazardous waste - U122.
Freon contaminated hydraulic fluid	TOX, TCLP, flash point	Waste contains listed solvents.
Freon	CCl_3F	Listed toxic hazardous waste.
Halogenated solvents	F001/F002 solvents	Listed hazardous waste.
Methylene chloride	Total metals, TOX, flash point, % methylene chloride, % phenol	Listed toxic solvent, may have flash point <140°F, metals from paint stripping operations
Tetrachloroethylene	Tetrachloroethylene	Listed toxic solvent.
Lithium/SO_2 batteries	None	Lithium is water reactive.

Waste	Analytical Parameter	Rationale
Mercuric nitrate	TCLP, total metals, pH	May contain soluble mercury, pH <2.
Mercury	Mercury (total, TCLP)	Listed hazardous waste.
Misc. contaminated POLs[e]	Flash point, TCLP, total metals, TOX	May have flash point <140°F, may contain metals or listed solvents.
Naphtha	Flash point	Has flash point <140°F.
Nickel/cadmium batteries	TCLP	Contains soluble cadmium, contains nickel carbonyl which is air reactive.
Nonhalogenated solvents	F003/F005 solvents	Waste contains listed solvents.
Methyl alcohol	CH_3OH, flash point	Listed solvent with flash point <140°F.
Paint removers (strippers)	Total metals, pH, TOX, % methylene chloride, % phenol	May be acidic (pH <2), may contain listed solvents, methylene chloride, phenol and metals
Painting wastes[f]	TCLP, pH, total metals, TOX, flash point, % MEK, % toluene, % xylene, % acetone	May be contaminated with acidic strippers, have flash point <140°F, contain metals or listed solvents.
PD-680 cleaning compound	Flash Point	Has flash point <140°F.
Phenols	% Phenols	Toxic commercial chemical product U-129.
Photographic fixers and developers	TCLP, total metals, pH	Waste contains soluble silver.
Sodium nitrate	Flash point	Has flash point <140°F.
Stoddard solvent	Flash point	Has flash point <140°F.
Turco cleaning compound	pH	May have a pH >12.5 and be corrosive.
Waste paints[g]	TCLP, TOX, total metals, flash point, % MEK, % toluene, % xylene, % acetone	Most paints are solvent-based with flash points <140°F, contain metals or listed solvents.

[a] Test methods as found in USEPA Publication SW 846 and referenced in the appendices to 40 CFR 261.

[b] Battery electrolyte refers to the sulfuric acid/water mixture drained from lead acid batteries.

[c] Adhesives refers to variety of adhesive materials that contain low flash point solvents.

[d] Blasting media consists of spent glass beads contaminated with metals.

[e] POLs (petroleum, oils and lubricants) potentially contaminated with one or more ignitable wastes of F-listed solvents.

[f] Painting wastes refers to waste paints or paint-related materials that are contaminated with one or more of the following materials: oils, thinners, dirt, halogenated solvents, nonhalogenated solvents, corrosive strippers or heavy metals.

[g] Waste paints include acrylics, enamels, epoxy paints, lacquers, oil-based paints, polyurethane paints, varnish, primers, deck coating and shellac.

established to ensure that hazardous waste designated for delivery to off-site treatment, storage, or disposal facilities actually reaches its destination. The central element of the system is the "manifest," a control and transport document that accompanies the hazardous waste shipment from its point of generation to its point of disposal.

RCRA regulations require the use of a uniform hazardous waste manifest for all offsite shipments of RCRA hazardous waste. The regulations specify minimum information to be included on all hazardous waste manifests. The manifest must consist of, at a minimum, the number of copies which will provide the generator (NAS JRB Fort Worth), each transporter, and the owner or operator of the designated treatment and disposal facility one copy each for their records and a copy for the facility to return to NAS JRB Fort Worth. In addition, if applicable, land disposal restriction certifications and notification forms must accompany the manifest (see Section 6.4). The off-site shipment of universal wastes does not require a hazardous waste manifest.

Preparation of Manifests

Attention must be exercised in preparing the manifest to assure that all required information is provided and all copies are legible. A copy of the uniform hazardous waste manifest and instructions on completing the manifest can be found in the Appendix to 40 CFR 262.

Manifest Copy Distribution

One copy of the manifest must be retained pending receipt of a signed copy of the manifest from the owner or operator of the designated TSDF. The HW Program Manager must retain a copy of the manifest containing the handwritten acceptance signature and date of acceptance by the designated TSDF for three years. The HW Program Manager will provide a certified true copy of the Manifest to the HW Disposal Contractor for their record purposes.

Routing and Out-of-State Manifests

NAS JRB Fort Worth currently does not currently send waste out-of-state and this information is presented for information purposes only. Many of the individual states require the use of a

manifest issued by the state (e.g., Louisiana). Careful attention should be given to the various states' manifest requirements in selecting the routes for hazardous waste shipments so as to minimize paperwork and associated regulatory compliance burdens. Out-of-state hazardous waste shipments should be coordinated with the environmental regulatory agency in those states to which the waste will be sent to ensure compliance in each state.

Manifest Follow-Up Requirements

If a copy of the manifest is not returned within 35 days of the date the waste was shipped, the HW Program Manager must promptly contact the transporter and/or the owner or operator of the designated facility to determine the status of the waste. Efforts to locate the waste and the results of those efforts must be documented.

Written Exception Reports

If a signed copy of the manifest has not been received from the designated facility within 45 days of the date of acceptance by the transporter, a written exception report must be made. The exception report must include a cover letter explaining the efforts to locate the shipment of waste and the results of those efforts. A legible copy of the manifest that does not have confirmation must be included with the exception report. The exception report must be submitted to TNRCC.

Out-of-State Shipments

For out-of-state shipments of hazardous waste for which a return copy of the manifest is not received within 45 days, the HW Program Manager must initiate notification to the appropriate regulatory agency of the state in which the designated facility is located and the appropriate regulatory agency of the state to which the shipment may have been delivered. Those actions and the results of those actions are to be included in the written exception report. Again, NAS JRB Fort Worth currently does not currently send waste out-of-state and this information is presented for information purposes only.

6.6 Management of Hazardous Waste Disposal Contractor

The HW Program Manager is responsible for providing management oversight of the Hazardous Waste Disposal Contractor for NAS JRB Fort Worth. NAS JRB Fort Worth has an Indefinite Quantity (IQ) contract with a contractor who subcontracts out waste disposal for NAS JRB Fort Worth. The NAS JRB Fort Worth Contracting Surveillance Office oversees all contract issues pertaining to the Hazardous Waste Disposal Contractor.

The Hazardous Waste Disposal Contractor acts as a " broker" responsible for contacting disposal facilities, arranging transportation of the waste to the disposal facilities, and ensuring the wastes are safely disposed of in accordance with Navy and with federal, state, and local requirements. DRMO was removed from NAS JRB Fort Worth due to Base Realignment and Closure (BRAC) is not available to arrange for waste disposal at NAS JRB Fort Worth. Therefore, this contractor is also responsible for preparing the following documentation for NAS JRB Fort Worth:

- Waste manifests, which are to be reviewed and signed by the HW Program Manager or Environmental Director prior to shipment.
- Land disposal restiction notifications to accompany manifests as directed, which are to be reviewed and signed by the HW Program Manager or Environmental Director prior to shipment.
- Other notification forms required for shipment of wastes for disposal purposes.

6.7 Management of Satellite Accumulation Areas and Waste Storage Area

The HW Program Manager is responsible for management of the NAS JRB Fort Worth SAPs and the 90-Day Hazardous Waste Storage Area located at Building 1347. He will maintain all records, as discussed below and summarized in Section 10, including the documentation of waste transfers and records of daily and weekly inspections. The HW Program Manager will ensure that all drums are labeled with the appropriate DOT hazard class and hazardous waste/nonhazardous waste/universal waste labels and will supervise the loading and manifesting of hazardous waste for shipment off Base for disposal.

6.8 Inspections

The HW Program Manager is responsible for performing weekly inspections of the SAPs and the <90-Day Hazardous Waste Storage Area. The SAP weekly inspections should include the following checks:

- Containers are not leaking, corroded, structurally unsound, or deteriorating.
- Containers are closed and rings or bungs are tight.
- No more than 55 gallons total of hazardous waste is accumulated.
- Fire extinguishers are charged (inspect monthly).
- PPE is in adequate supply and is in proper working condition (inspect and clean monthly or after each use, whichever is greater).
- A spill kit is available and stocked.
- Liquids (e.g., rain water or wastes) are not standing on top of any container.

Please see Section 5 (Figure 5-6) for the suggested weekly inspection form.

The HW Program Manager is also responsible for conducting weekly inspections of the <90-Day Hazardous Waste Storage Area. The inspection should include the following checks:

- Containers are not leaking, corroded, structurally unsound, or deteriorating.
- Containers are closed and rings or bungs are tight.
- Eyewash station is operational (flush monthly, with signature card as proof of inspection).
- Fire extinguishers are charged (inspect monthly).
- PPE is in adequate supply and is in proper working condition (inspect and clean monthly or after each use, whichever is greater).
- Containment system is not cracked and contains no standing water.
- Material handling equipment is in proper working order.
- Logs and records are properly maintained and used, and are available for inspection.

- Incompatible wastes are properly stored.
- A two-way communication system is available (e.g., direct voice or visual contact).
- A spill kit is available and stocked.
- Liquids (e.g., rain water or wastes) are not standing on top of any container.

Please see Section 5 (Figure 5-7) for the suggested <90-Day Hazardous Waste Storage Area Weekly Inspection Form.

6.9 Records and Reports

The hazardous waste management regulations and Navy instructions require certain records be kept at NAS JRB Forth Worth. The records must be made available upon request to USEPA or TNRCC and, therefore, should be maintained separately from purchasing, inventory or maintenance records, and should be easily recoverable. The HW Program Manager will maintain these records.

The required or appropriate retention time for the records and reports varies. The records and the corresponding retention periods are described below and summarized again for reference purposes in Section 10.

Operating Record

Although it is not a legal requirement for NAS JRB Fort Worth to maintain an operations record, best management practices dictate that it be maintained. The following information must be recorded, as it becomes available, and maintained in the operating record until closure of the facility:

- A description and the quantity of each hazardous waste generated, with the date and identification of the generator
- The location of each hazardous waste within the facility and the quantity at each location

- Records and results of waste analyses performed in order to obtain all the information that must be known to store or dispose of the waste
- Summary reports and details of all incidents that require implementing the ICP
- Records and results of inspections, as discussed above (these records must only be retained for 3 years)

Uniform Hazardous Waste Manifests

In accordance with 40 CFR 263, a copy of each hazardous waste manifest that contains the acceptance signature of the owner or operator of the TSDF must be kept for at least 3 years; however NAS JRB Fort Worth maintains manifests indefinitely. Signed manifest originals will be retained by the HW Program Manager and a certified copy provided by him/her to the Hazardous Waste Disposal Contractor.

Exception Reports

An exception report must be submitted to the state if a copy of the manifest with the handwritten signature of the owner or operator of the designated facility is not received within 45 days of the date the waste is accepted by the initial transporter. Exception reports must be kept for 3 years. The exception report must include:

- A legible copy of the manifest for which the generator does not have confirmation of delivery
- A cover letter signed by the generator or his/her authorized representative explaining the efforts taken to locate the hazardous waste and the results of those efforts

Waste Analyses Results

Records of any test results, waste analyses, or other hazardous waste determinations must be kept for at least 3 years from the date that the waste was last sent to on-site or off-site treatment, storage, or disposal. NAS JRB Fort Worth has chosen to retain sample results indefinitely.

Texas Monthly Summary Report

A monthly report must be submitted to TNRCC by the 25th of each month. The report must summarize, for the month, all wastes shipped out of state. This report must only be retained for 3 years. The monthly summary report will include:

- All manifests received during the month
- The quantity and classification of each waste shipped and itemized by manifest document number

Navy Annual Report

A Navy hazardous waste annual report is required by OPNAVINST 5090.1B for all Navy shore activities that treat, dispose, generate, or store hazardous waste. This report, prepared in accordance with guidance from the Naval Facility Engineering Service Center, must be submitted for each calendar year by 1 February of the following year.

Texas Annual Report

An annual report must be submitted to TNRCC by 1 March of each year. The report must cover facility activities during the previous calendar year . This report must only be retained for 3 years. This report will include:

- The USEPA identification number, name, and address of the facility
- The calendar year covered by the report
- A description and the quantity of each hazardous waste the facility generated during the year
- The method of treatment, storage, or disposal for each hazardous waste
- The certification signed by the owner or operator of the facility or his/her authorized representative

HW Storage Records

These records document storage and inspection activities at each SAP and the <90-Day Hazardous Waste Storage Area. The data maintained include the generator's name, waste de-

scription, waste quantities and containers, date in and out of <90-Day Hazardous Waste Storage Area, and manifest number.

Inspection Records

These records documents results of inspections of SAPs and the <90-Day Hazardous Waste Storage Area and are retained as part of the operating records for the facility. The records include:

- Work center name, inspection date; and inspector's name
- All inspection criteria, conditions found, corrective action taken, date of completion
- Container condition, storage safety, work practices of HW Handlers, inventory and condition of emergency/spill equipment and fire protection systems

Training Records

Training records must include the following information:

- The job title and a written job description for each position related to hazardous waste management and the name of the person filling the job
- A written description of the type and amount of both initial and continuing training that will be given to each person
- Documentation that the training or job experience required has been completed

Training records for current personnel must be kept as permanent records. Training records on former personnel must be kept for at least three years from the date the personnel last worked at NAS JRB Fort Worth. Personnel training records may accompany personnel transferred within the Navy.

Hazardous waste training records will be maintained on Base for all hazardous waste activities, including records for generating shops/work centers.

Land Disposal Restriction Notifications, Demonstrations and Certifications

These notifications document if a waste is restricted from land disposal and accompany the uniform hazardous waste manifest. The information recorded, which must be maintained for the life of the facility, includes the generator name, manifest number, USEPA hazardous waste number, profile number, type of restriction, and certification/signature.

Certifications of Disposal

The HW Program Manager will also retain Certificates of Disposal. These records designate the method used by the disposal firm and serves as a permanent record of a waste's proper disposal. These records must only be retained for 3 years.

Medical Surveillance Program Records

Proper record keeping is essential for those who handle hazardous materials or hazardous waste because of the nature of the risks, especially where long-term exposure may not become apparent for many years. Records enable subsequent medical care providers to be informed about workers' previous and current exposures. The HW Program Manager must ensure that medical records programs are in place for both Navy and contractor personnel. These programs must address the following items:

- Require of medical examiners a written certification of the fitness of each worker to handle hazardous material/hazardous waste. This should be done prior to initial work and annually thereafter. Any work limitation should be stipulated therein.
- Maintain and preserve medical records on hazardous material/hazardous waste workers for 30 years after they leave employment at the station (29 CFR 1910.20).
- Make available to workers, their authorized representatives, and authorized OSHA representatives the results of medical testing and analyses (29 CFR 1910.20).
- Maintain records of occupational injuries and illnesses and post a yearly summary report (29 CFR 1904).

7.0 COMPLIANCE DIVISION HEAD RESPONSIBILITIES

The Compliance Division Head is a member of the Environmental Office who provides supervisory support for the Environmental Director on all environmental compliance issues including RCRA compliance. The Compliance Division Head will perform quality assurance checks of Base hazardous waste management practices, provide advice to emergency spill response personnel, ensure the HWMP is current and meets applicable Navy and federal, state and local requirements, and will coordinate with other NAS JRB Fort Worth departments on matters pertaining to hazardous waste management.

Prior to initiating the above hazardous waste management duties, the Compliance Division Head must obtain proper training for his/her management and supervision of hazardous waste activities at NAS JRB Forth Worth. Each of these above responsibilities is further discussed below.

7.1 Training Requirements for Compliance Division Head

Specific training requirements for Compliance Division Head are outlined in Table 7-1. These training requirements are needed to meet the training requirements specified by Navy policy in Chapters 12 and 24 of OPNAVINST 5090.1B and as required by RCRA, OSHA, and DOT federal requirements. Section 9 contains a summary of the training requirements for all Base personnel who participate in the management of hazardous waste at NAS JRB Fort Worth.

7.2 Quality Assurance Oversight of Hazardous Waste Management Practices

The Compliance Division Head will perform quality assurance reviews of hazardous waste records (please refer to Section 10). He/she will also conduct periodic inspections of hazardous waste management practices at SAPs and the <90-Day Hazardous Waste Storage Area to ensure that NAS JRB Fort Worth is in compliance with Navy, federal, state, and local RCRA requirements. The recommended checklists for conducting either daily or weekly inspections are provided in the HWMP. If any unsatisfactory procedure or practice is discovered, he/she will

Table 7-1
Training Requirements for Compliance Division Head

Training Type	Regulation or Policy Requiring Training	When Training First Required	Training Renewal Frequency
General environmental awareness training[a]	OPNAVINST 5090.1B, Chapter 24, §4.1	Upon reporting to a command	Annual
Command Orientation[a]	OPNAVINST 5090.1B, Chapter 24, §4.2	Upon reporting to a command	As duties or work area changes
Hazardous waste generators[a]	OPNAVINST 5090.1B, Chapter 24, §4.24	Upon reporting to a command	As duties or work area changes
OSHA worker right-to-know	29 CFR 1910.1200	Upon initial assignment to work area	As duties or work area changes
OSHA HAZWOPER 24-hour off-site training plus 1-day on-the-job training	29 CFR 1910.120[b]	Prior to commencing work with hazardous wastes	One time
OSHA HAZWOPER 8-hour refresher[c]	29 CFR 1910.120[b]	Within one year of initial training	Annual
RCRA hazardous waste generator training	40 CFR 262.34(a)(4) and 40 CFR 265.16	Prior to commencing unsupervised work	Annual review required

[a] May also satisfy the RCRA hazardous waste generator training requirements of 40 CFR 262.34(a)(4) and 40 CFR 265.16.
[b] Also requires a medical surveillance program.
[c] Annual refresher training required 1 year after completion of the initial off-site training.

ensure that the problem is corrected as soon as possible by working with all applicable responsible parties.

7.3 Hazardous Waste Cleanup Oversight

The Compliance Division Head will direct Base personnel on the cleanups of minor hazardous waste spills/leaks. In cases which pose a danger to the environment and/or health and safety of Base personnel, the Base Fire Department will be contacted immediately and act as the Emergency Coordinator as stipulated in the base ICP (see Section 11).

7.4 Maintaining Hazardous Waste Management Plan

The Compliance Division Head must ensure that the HWMP is current and meets applicable DoD and federal, state and local requirements. An HWMP is needed in order to establish a program to ensure proper identification, characterization, and handling of hazardous wastes at NAS JRB Fort Worth. The plan assigns responsibilities and establishes procedures for the management of hazardous wastes that are received or generated by NAS JRB Fort Worth personnel, tenant commands, and visiting contractor and/or DoD Unit personnel. Navy Policy OPNAV 5090.1B, Chapter 12 requires that a HWMP be kept up to date and include changes in hazardous waste generation and uses, as well as changes in applicable federal, state, and local hazardous waste regulations. Any updates to the HWMP are to be tracked by the Compliance Division Head using the document revision tracking form presented at the beginning of this plan. Although not specified by Navy policy, it is recommended that the HWMP be updated in its entirety at least once every three years.

7.5 Facility Hazardous Waste Liaison

The Compliance Division Head will act as the Environmental Office liaison will other NAS JRB Fort Worth departments and coordinate with other Base departments, such as Fire, Safety, and Supply in matters pertaining to hazardous waste management. Such coordination will facilitate continued compliance with RCRA regulations as well as other DoD and regulatory requirements such as pollution prevention and emergency response planning.

8.0 CONTRACTOR AND VISITING DOD UNIT RESPONSIBILITIES

This section describes the responsibilities and hazardous waste training requirements for all contractors working at NAS JRB Fort Worth and visiting DoD Units temporarily assigned to NAS JRB Fort Worth.

Every person at NAS JRB Fort Worth that generates waste is responsible for waste accumulation and management in accordance with this HWMP, with Navy policy, and with all applicable federal, state, and local waste regulations. Overall management of solid and hazardous waste at NAS JRB Fort Worth is the responsibility of the Environmental Office. They provide support to all persons whose activities involve the generation of waste. Contractors and visiting DoD Units should designate a Point of Contact as Waste Coordinator immediately upon arrival at the Base. The Waste Coordinator must contact the Environmental Office prior to generating any waste. The Environmental Office will establish a SAP at your location, assist you with managing wastes, and dispose of all wastes generated. The Waste Coordinator will function as a Unit HW Coordinator, with the same duties and requirements (see Section 4.0).

Questions regarding waste management practices at NAS JRB Fort Worth should be directed to the Environmental Office at 817/782-6470.

8.1 Training Requirements for Contractors and Visiting DoD Units

Navy policy, outlined in OPANAVINST 5090.1B, requires that all personnel handling hazardous waste at Navy facilities receive training that teaches them to perform their duties in a manner ensuring compliance with hazardous waste regulations. Additional training requirements are identified in OSHA, DOT, and RCRA regulations. All contractor and visiting unit personnel with duties involving hazardous waste management must be trained in accordance with the requirements of that position. Additionally, personnel with duties involving hazardous waste management may not work unsupervised until they have completed the training. The contractor or visiting unit is responsible for ensuring its employees are properly trained in hazardous waste

management. Training requirements for Waste Coordinators are discussed in Section 4.1 and summarized in Table 4-1. An overall summary of training requirements at NAS JRB Fort Worth can be found in Section 9.0.

8.2 Container Management

All containers storing waste must be maintained in accordance with the procedures described in Section 4.2.

8.3 Record Keeping

Records that must be kept by the visiting unit or contractor Waste Coordinator include:

- Satellite Waste Container Generation Summary Logs (Section 4.4.1)
- Waste Stream Documentation Forms (Section 4.4.2)
- SAP Daily Inspection Inspection Forms (Section 4.4.3)

8.4 Spill Response and Reporting

Spill control supplies should be provided and made readily accessible to workers and emergency response personnel. Additional information on spill response and reporting is discussed in Section 4.6. Any spills must be reported immediately to the Environmental Office at 782-6470. Minor leaks and spills can be cleaned up. For spills and leaks beyond the response capabilities of the Waste Coordinator, the Base Fire Department should be contacted at 911 immediately.

9.0 PERSONNEL TRAINING

9.1 General Requirements

This section summarizes the training requirements for all Base personnel who participate in the management of hazardous waste at NAS JRB Fort Worth. The requirements for training NAS JRB Fort Worth HW management personnel at the <90-Day Hazardous Waste Storage Area and SAPs are presented in 40 CFR 262.34(a)(4) and 265.16. Training for HW emergency response personnel is required by 29 CFR 1910.120(e) and (p)(7), training for employees exposed to hazardous chemicals is required by 29 CFR 1910.1200, and training for HM/HW shipping personnel is required by 49 CFR 172.704. Table 9-1 provides a summary of hazardous waste training requirements. In addition to these federal training requirements, Navy policy as outlined in Chapters 12 and 24 of OPNAVINST 5090.1B requires that Navy personnel producing, packing, treating, transporting, or handling RCRA hazardous waste receive the following additional training: General Environmental Awareness, Command Orientation, and Hazardous Waste Generator training. The type and amount of training required is based on the job duties of the individual worker. In some cases, a specific training course may satisfy more than one training requirement. For example, Command Orientation and the command-specific environmental awareness training may satisfy Worker Right-to-Know training requirements.

Training for Unit HW Managers will be provided or arranged by the Environmental Office. Unit HW Managers are responsible for arranging for the proper training of Shop-Level Worker personnel who handle hazardous waste. Qualified personnel should conduct training. Unit HW Managers should contact the Environmental Office for a list of firms qualified to conduct hazardous waste training. The Environmental Office may be able to provide training for Shop-Level personnel on a space-available basis.

The standards for appropriate training (with the exception of OSHA training) are not based on a minimum number of hours, but on content applicable to a particular individual's job. Training may consist of a combination of classroom instruction and on-the-job training. Trained personnel must be able to effectively respond to emergencies; use, inspect, and maintain SAPs;

Table 9-1

Hazardous Waste Training Requirements

	Initial RCRA HW Training Required	Annual Review of RCRA HW Training Required	RCRA HW Training Required Before Unsupervised Work Allowed	OSHA 1910.120 (24-Hour) Initial Training Required	OSHA 1910.120 (8-Hour) Annual Training Required	OSHA 1910.1200 Training Required	DOT HM/HW Shipping Initial Training Required	Navy OPNAVINST 5090.1B Chapter 12 & 24 (General Environmental Awareness, Command Orientation and Hazardous Waste Handling Training)	DOT HM/HW Shipping (Every 3 Years) Training Required	OSHA 1910.120 Additional Offsite Instructional (16 Hours) and 3-days of Actual Field Experience Training Required	Complete RCRA Training Within 6 Months of Assignment Required	Complete DOT Shipping Training Within 90 Days of Assignment Required	Record of Training Required
Environmental Office													
Environmental Director	X	X	X	X	X	X		X			X		X
Compliance Division Head	X	X	X	X	X	X		X			X		X
HW Program Manager	X	X	X	X	X	X	X	X	X	X	X	X	X
HW Handlers	X	X	X	X	X	X	X	X	X	X	X	X	X
Other Departments and Tenants													
Unit HW Coordinators	X	X	X	X	X	X		X		X	X		X
Assistant Unit HW Coordinators	X	X	X	X	X	X		X		X	X		X
Unit Shop Level Workers	X	X	X	(see note below)	X	X		X			X		X
Safety Depart-ment Personnel	X	X	X	X	X	X		X			X		X
Industrial Hygienist	X	X	X	X	X	X		X			X		X
HAZMIN Central Distribution Center Personnel	X	X	X	X	X	X	X	X	X		X	X	X
Base Fire Station Personnel	X	X	X	X	X	X		X			X		

Note: Shop Level Workers receive only 8 hour OSHA HAZWOPER awareness training since they do not respond to releases of hazardous material outside of their work area.

and properly operate unit equipment. Personnel must also be able to recognize hazards and adequately protect themselves from exposure to hazardous substances.

9.2 Training Records

Training records for current employees must be kept until closure of the facility; training records for former employees must be kept for at least three years from the date on which the employee last worked at the facility. These records shall be made available to the USEPA or the TNRCC upon request.

The Environmental Director will maintain the following information in the training records for each employee:

- Hazardous waste unit(s) where the employee is authorized to work
- Job title, name, badge number, and payroll shop of the employee
- A position description that summarizes the requisite skills, education, other qualifications, and duties of the employee's position
- Documentation that the employee has successfully completed all required training (including on-the-job training)
- Any correspondence concerning training waivers for the employee

If the <90-Day Hazardous Waste Storage Area is closed or transferred to a contractor, a copy of the previous contractor's training records will be provided to the Administrative Contracting Surveillance Officer.

Appendix J contains a blank hazardous waste training log form. This form must be completed for each employee associated with hazardous waste management. It provides a record of each type of training received by the employee, the date(s) on which training occurred, and the number of hours allocated to each type of training. Upon completion of training for each employee, the Unit HW Coordinator must ensure that a training log for that employee is provided to the Environmental Office.

10.0 REQUIREMENTS FOR REPORTING AND RECORD KEEPING

Certain hazardous waste reports and records required under the RCRA regulations may be audited by federal or state officials and must be easily accessible. This information should be separated from purchasing, inventory, and maintenance records.

Hazardous waste records are permanent and, consequently, entries on the forms shall be made with indelible ink. Records shall be carefully preserved and filed where they can be located rapidly. Completed records shall be filed promptly and with care.

Waste stream analytical results shall be kept indefinitely. For some types of records, official approval is required before they can be discarded or destroyed. The fact that old records are not consulted every day in no way lessens their potential value.

Table 10-1 provides a summary of hazardous waste record-keeping requirements.

Table 10-1
Hazardous Waste Record-Keeping Requirements

Record Type	Purpose	Maintenance Requirement	Content	Applies to Satellite Accumulation Points	Applies to <90-Day HW Storage Area	Responsibility	Submit To	Submit By
Operating Records	Details specific actions taken, procedures implemented, and records made during the life of the facility	Life of the facility	Waste storage information (waste description, waste quantity, storage system, date received, date removed, destination, location within storage facility, cross-reference to manifest number), waste analysis results, spill reports, inspection results, actions taken to remedy inspection deficiencies, waste minimization certifications, and land disposal restriction records	No	Yes	Environmental Office HW Program Manager	NA	NA
Uniform Hazardous Waste Manifests	Documents a hazardous waste shipment from its generation to disposal destination points; all hazardous waste shipped over public highways must be accompanied by a manifest	At least 3 years; however, NAS JRB maintains indefinitely	Generator, transporter, and designated facility, name, address and phone number; DOT description; container type and number; quantity, unit weight/volume; waste number; generator, transporter, and designated facility signatures	No	Yes	Environmental Office HW Program Manager	Initial transporter	Each shipment
Exception Reports	Documents that a copy of a manifest with the handwritten signature of the owner/ operator at the designated disposal facility has not been received within 45 days of the waste being accepted by the initial transporter	At least 3 years	Legible copy of manifest for which confirmation of delivery is missing, cover letter explaining efforts taken to locate the hazardous waste, and results of the efforts	No	Yes	Environmental Office HW Program Manager	TNRCC	Not specified
Waste Analysis Results	Identifies contents of a hazardous waste to assist in making a hazardous waste determination (refer to the Waste Stream Determination Plan for details)	Indefinitely	Identity of hazardous waste components and their concentrations in the waste	Yes	Yes	Unit HW Coordinators, Environmental Office HW Program Manager	Environmental Office	NA

Record Type	Purpose	Maintenance Requirement	Content	Applies to Satellite Accumulation Points	Applies to <90-Day HW Storage Area	Responsibility	Submit To	Submit By
Monthly Summary	Summarizes waste shipped out of state	3 years	All manifests received during the month; includes quantity and classification of each waste shipped, itemized by manifest document number	No	Yes	Environmental Office HW Program Manager	TNRCC	25th of each month
Navy Annual Report	Documents all hazardous waste generated during the preceding calendar year	Not specified	Description, character, and classification of each waste; quantity generated; quantity in on-site storage as of 31 December; quantity processed or disposed at each on-site facility; method of storage, processing, or disposal; quantity shipped off site for storage, processing, or disposal; name, address, and location of each off-site facility and transporter receiving shipments	Yes	Yes	Environmental Office HW Program Manager with information provided by the Unit HW Coordinators	NFESC, SOUTHDIV	1 February of each year
Texas Annual Report	Summarizes the generation, storage, processing, and disposal of all hazardous waste for the preceding calendar year	At least 3 years	Description, character, and classification of each waste; quantity generated; quantity in on-site storage as of 31 December; method of storage, processing, or disposal; quantity shipped off site for storage, processing, or disposal; name, address, and location of each off-site facility and transporter receiving shipments; location of all SAPs	Yes	Yes	Environmental Office HW Program Manager with information provided by the Unit HW Coordinators	TNRCC	25 January of each year
Hazardous Waste Storage Records	Documents storage and inspection activities at each SAP and the <90-Day HW Storage Area	Not specified	Generator's name, waste description, waste quantities and containers, date in, date out, manifest number	Yes	Yes	Environmental Office HW Program Manager, Unit HW Coordinators	Environmental Office for use in Texas Annual Report	Not specified
Inspection Records	Documents results of inspections of SAPs and the <90-Day Hazardous Waste Storage Area	Retained as part of Operating Records	Work center name, inspection date, inspector's name, all inspection criteria, conditions found, corrective action taken and date of completion, container condition, storage safety, work practices of HW Handlers, inventory and condition of emergency/spill equipment and fire protection systems	Yes	Yes	Unit HW Coordinators, HW Program Manager, HW Handlers	Environmental Office	Not specified

Record Type	Purpose	Maintenance Requirement	Content	Applies to Satellite Accumulation Points	Applies to <90-Day HW Storage Area	Responsibility	Submit To	Submit By
Training Records	Documents training received by personnel with hazardous waste management duties; training records may accompany personnel transferred within the Navy	For current employees, until unit ceases to be used or is closed; for for-mer employees, at least 3 years from the date the person last worked at the Base	Job title and written job description for each position related to hazardous waste management and the name of the person filling the job; written description of the type and amount of initial and continuing training provided to each person filling a hazardous waste position; documentation that the training or job experience required has been completed	No	Yes	Environmental Office HW Program Manager	Environmental Office	Not specified
Land Disposal Restriction Notifications, Demonstrations, and Certifications	Determines if a waste is restricted from land disposal; accompanies the uniform hazardous waste manifest	Life of facility, permanent record	Generator name, manifest number, USEPA hazardous waste number, profile number, type of restriction, certification/signature	No	Yes	Environmental Office HW Program Manager	Initial transporter with uniform hazardous waste manifest	Each waste shipment
Certifications of Disposal	Designates the method of disposal used by the disposal firm and serves as a permanent record of a waste's proper disposal	At least 3 years	Method of disposal of the hazardous waste	No	Yes	Environmental Office HW Program Manager	NA	Not specified
Medical Surveillance Program Records	Informs health care providers of previous and current exposures of hazardous waste personnel; results made available to workers, their authorized represen-tatives, and authorized OSHA representatives	30 years after individual leaves employment at the base	Job title, initial and annual written certifi-cation by a medical examiner, physical examination dates, check-up examination dates, work restrictions based upon individual's health, record of occupational injuries and illnesses, yearly summary report of occupational injuries and illnesses, check-out examination date	No	Yes	Environmental Office HW Program Manager	Environmental Office	NA

11.0 INTEGRATED CONTINGENCY PLAN

NAS JRB Fort Worth must comply with the requirements of 40 CFR 265, Subpart D, Contingency Plan and Emergency Procedures, to accumulate hazardous waste at the <90-Day Hazardous Waste Storage Area. The NAS JRB Fort Worth ICP contains information on the procedures and equipment maintained by the Base to respond to emergency situations related to the generation and storage of hazardous wastes.

Important aspects of integrated contingency planning are summarized below:

- If a spill is discovered, the following actions should be immediately taken:
  - Evacuate the area and contain the spill if doing so does not pose a danger to health or safety; and
  - Contact the Base Fire Department at 911.
- The Fire Department is the designated Emergency Coordinator.
- The Fire Department is on 24-hour call for coordinating any emergency situation.
- Fire extinguishers and spill control equipment are readily available.
- All employees must be thoroughly familiar with proper waste handling and emergency procedures relevant to their responsibilities during normal facility operation.
- When a spill occurs, the Unit HW Coordinator will determine those wastes that are involved in the emergency by referencing the hazardous waste storage log. If containers can be approached safely, this identification will be made from the labels on the containers.
- In the event of a fire, explosion, or other release that could threaten human health outside the Base or when a spill exceeds the reportable quantity values listed in 40 CFR 302.4, the National Response Center must be notified (24-hour toll free number 1-800-424-8802). The following information must be provided to the National Response Center:
  - Name, address, and USEPA Identification Number;
  - Date, time, and type of hazardous waste involved in the incident;
  - Quantity and type of hazardous waste involved in the incident;

- Extent of injuries (if applicable); and
- Estimated quantity and disposition of recovered materials.

- The ICP must be implemented under the following circumstances, but is not limited to:
  - Fire/Explosions;
    - Fire causes release of toxic fumes;
    - Fire spreads beyond the area of ignition;
    - Fire threatens off-site areas;
    - Fire fighting agents result in contaminated runoffs; and
    - Imminent threat of explosion.

  - Spills/Leaks
    - Fire hazard due to spilled material;
    - Toxic fume hazard;
    - Groundwater being threatened;
    - Spill threatening off-site property, and
    - Spill threatening navigable water.

12.0 PROCEDURES FOR FILING FOR 30 DAY STORAGE EXTENSION FOR <90-DAY STORAGE AREA

Large-quantity generators are permitted to accumulate hazardous waste up to 90 days. A generator who accumulates hazardous waste for more than 90 days is an operator of a hazardous waste storage facility and is subject to all applicable requirements unless the generator has been granted an extension to the 90-day period. The executive director of the TNRCC, Industrial and Hazardous Waste Division, Waste Analysis Team may grant an extension, if hazardous waste must remain on site for longer than 90 days due to unforeseen, temporary, and uncontrollable circumstances. Examples of unforeseen, temporary, or uncontrollable circumstances include: 1) difficulty finding a TSDF that will accept a particular waste, 2) transporter problems, and 3) weather-related delays in shipping. Extensions of up to 30 days may be granted, at the discretion of the executive director, on a case-by-case basis.

The form to request a 30-day extension is available from the TNRCC, Waste Analysis Team at 512/239-1000. The NAS JRB Fort Worth Compliance Director or the HW Program Manager, or their designee must complete the form. In addition to general site information, a detailed explanation of the reason for the request and the preventive measures that will be taken for storage of a waste beyond 90 days must be included. Directions for submittal of the completed form are included on the form. The compliance history of the facility is reviewed by TNRCC and recommendations are requested from the TNRCC Regional Inspector. A decision is usually made within 10 days of receipt of the completed form.

NAVY CLOSED, TRANSFERRED, TRANSFERRING, ACTIVE, AND INACTIVE RANGE SURVEY
January 2000

Also submitted by INVRESTOR

I. PURPOSE OF SURVEY

The Navy is planning to use the data gathered from this survey to satisfy a number of regulatory, DoD, and fiscal requirements regarding ranges. As outlined in the draft Range Rule, the Navy will be required to develop an inventory of all closed, transferred, and transferring (CTT) ranges within 18 months of final promulgation. Recently, DoD finalized a directive that requires the Navy to develop an inventory of active and inactive ranges. In addition to these requirements, the Navy needs range data to support fiscal planning and internal/external data requests.

Because the management of all military ranges is under increasing public and regulatory scrutiny, it is imperative that information provided on the survey is correct. Therefore, installation property owners will be required to certify the data as correct and complete. Tenant commands must ensure that any ranges that they operate or have operated are included in the property owner's response. In the case of property in caretaker status, the appropriate Naval Facilities Engineering Command organization is responsible for data collection and certification.

II. TABLE OF CONTENTS

SECTION	PAGE
Certification	i
Instructions	ii
Part One General Range Information	I-1
Part Two CTT Ranges	II-1
Part Three Active & Inactive Ranges	III-1
Part Four Miscellaneous information	IV-1
Attachment One – Definitions/Acronyms	V-1
Attachment Two – Supplemental Sheets	VI-1

III. CERTIFICATION

Because the information collected by this survey will be used for a variety of purposes, including compliance with environmental regulations, the data must be as accurate as possible. To streamline the data collection process, the installation property owner is responsible for the completion and certification of this survey for all ranges, past and present, that meet the definitions outlined in this survey. Therefore, the property owner's Commanding Officer(CO) is required to certify that all information provided in the range survey is accurate and complete. In the case of regionalized installations, the CO of the installation must also sign the certification form. However, tenant commands must ensure that any ranges that they operate or have operated are included in the owner's response. In the case of property in caretaker status, the appropriate Naval Facilities Engineering Command organization is responsible for data collection and certification.

Responsible COs and Regional Commanders, as applicable, must sign and return the Certification Notice below, with the completed survey, to their Major Claimants for endorsement and submittal to Navy Ordnance Environmental Support Office no later than ~~31 March 2000~~. Mail a copy of the completed and certified surveys to:

Note: Deadline for submittal of completed survey extended to 30 April 2000 per CNO letter of 20 December 1999.

Navy Ordnance Environmental Support Office (OESO)
Attn: Code N57, Bldg D-327
23 Strauss Ave
Indian Head, MD 20646 or Fax to: 301-744-6749

Please direct any questions you may have to: Ms. Sherry McCahill, mccahillsm@ih.navy.mil, or Ms. Lois Bohne, bohnels@ih.navy.mil, at 301-744-4355 or 4534

CERTIFICATION NOTICE

Installation Name: NAS JRB Fort Worth

Regional Command (if applicable): _____

Installation Major Claimant: Commander Naval Reserve Force

Range information is: ☒ Attached ☐ Not applicable (i.e. no ranges)

I certify that the information contained herein is accurate and complete to the best of my knowledge.

C M McDonald 4 Apr 00 CAPT, USNR, CO NAS JRB Fort Worth

Signature of Commanding Officer and Date

_____

Signature of Regional Commander and Date, if applicable

NAVY CLOSED, TRANSFERRED, TRANSFERRING ACTIVE, AND INACTIVE RANGE SURVEY
JANUARY 2000

This survey applies to conventional munitions only. Please refer to Attachment One for the definition of terms used in this survey.

Part One: General Information for all ranges

I Installation Information

A. Installation Name: NAS JRB Fort Worth

B. Installation Address: NAS JRB Fort Worth
Fort Worth, Texas 76128

C. Installation UIC: 83447

D. Regional Commander (if applicable): _____

E. Major Claimant: Commander Naval Air Reserve Force

II. General Range Information.

A. Does or did the installation ever have a range (i.e. outdoor designated land or water area set aside, managed, and used to conduct research on, or to develop, test, and evaluate military munitions or to train military personnel in their use and handling)?

☒ Yes ☐ No

B. If yes, identify each range by name and status below. (Note: See Attachment One for the definitions of active, inactive, and CTT ranges and Attachment Two for supplemental table pages).

Table One – Range Status (select one)

No.	Range Name	Closed	Transferred	Transferring	Active	Inactive
1	Mobile Small Arms Range				X	
2	Pistol Range outdoor					X
3	Rifle Range outdoor	X				
4						
5						

For each **CLOSED, TRANSFERRED, OR TRANSFERRING** range identified in Table One above, complete Part Two. For each **ACTIVE OR INACTIVE** range, complete Part Three.

Part Three: Active & Inactive Range Information

Complete this section separately for each active and inactive range identified in Table One of Part One.

I Primary Points of Contact:

Points of Contact	Range POC	Environmental POC
Name	Harrah Kevin L. Hol	Wayne McKinzie
Title/Code	Armorer	Environmental Department Head
Address	NAS JRB Fort Worth	NAS JRB Fort Worth
Phone Number	(817) 782-7476 DSN: 739-7476	(817) 782-~~7646~~ 6470 DSN 739-~~7646~~ 6470
Email Address		

II Range Characteristics:

A. Range Name: Mobile Pistol Range

B. Range Status:

☒ Active ☐ Inactive

C. Range Classification (check each that applies):

☒ Small Arms Range (.50 cal. & under)

☐ Firing Range (projectile, torpedoes, etc.)

☐ Testing

☒ Training

☐ Open Burning/Open Detonation

☐ Other (please describe): _____

D. Range Type (check each that applies):

- [ ] Air to Air
- [ ] Land to Air
- [ ] Water to Air
- [ ] Air to Land
- [ ] Land to Land
- [ ] Water to Land
- [ ] Air to Water
- [ ] Land to Water
- [ ] Water to Water
- [ ] OB/OD (RCRA permitted or interim status unit)
- [ ] OB/OD (Training and/or emergency ops)
- [x] Other (please explain): Mobile Range

E. Where is/was the range located? (Include installation, town/city, county, state.)

NAS JRB Fort Worth (Installation)

Fort Worth (Town/City)

Tarrant (County)

TX (State)

(Longitude)

(Latitude)

F. What is the area of the range (in **acres** for land, **square nautical miles** for water)?

a. Impact area:

Land portion N/A

Water portion

b. Entire range (includes impact area)

Land portion N/A

Water portion

G. If wetlands are present at the range, what is the area of wetlands in each of the following (in **acres**)?

Impact area N/A

Entire range (includes impact area)

H. If the range is a water range, how many miles from shore is it located? (If the range extends through more than one selection, please check all that apply.)

☐ Less than 3 ☐ Between 3 and 12 ☐ Between 12 and 200 ☐ Over 200

I. If the range or portion of the range is within 3 miles of the shore, do any ordnance items enter the water in that portion of the range?

☐ Yes ☐ No ☐ Unknown ☐ Not Applicable

J. The enclosed geographical map shows the following:

☐ Range location ☐ Range boundaries ☐ Target locations

☐ Range areal extent including:

☐ Counties ☐ Tribal reservations ☐ Independent cities/towns/states

III Range Ownership:

A. Who is the current owner of the land/range? (Select one. Be as specific as possible.)

☒ Navy (Identify): NAS JRB Fort Worth

☐ Other Federal Agency (Identify): _____

☐ Other (Identify & explain): _____

B. If the land is not owned by the Navy, when does the lease or agreement to use the land expire? _____

C. Is the range or a portion of the range scheduled to be closed in accordance with the Base Realignment and Closure Act (BRAC)?

☐ Yes ☒ No

D. Who is the cognizant authority/range manager?

Name	John Malone (A-1)
Command	NAS JRB Fort Worth
Title/Position	Range master
Address	NAS JRB Fort Worth
Phone #	(817) 782-7779 DSN: 739-7779
Email	

E. Who are the primary users of the range? List training groups, squadrons, other services, foreign countries, etc.

NO.	USER
1	NAS Weapons Department
2	NAS Security
3	NCIS, Naval Criminal Investigative Service
4	VFA-201
5	REDCOM-11

IV Range Access:

A. How is access currently controlled? (Select all that apply.)

- [ ] No controls
- [x] Fences
- [x] Signs
- [x] Access key maintained by security/range officer
- [ ] Log-in book
- [ ] Barricaded during operations
- [ ] Office check in
- [ ] Siren/notification during operations
- [ ] Guard at gate
- [x] Patrolled by security officer or other official
- [ ] Patrolled by vessel
- [ ] Patrolled by aircraft
- [ ] Other _____

B. Have there been any documented instances of unauthorized access to the range by the public?

☒ None ☐ 1-2 instances per year

☐ 3-5 instances per year ☐ More than 5 instances per year ☐ Unknown

Please provide specific information for ranges with more than 5 instances per year.

_____

_____

V Range Use:

A. When was the range last used? (mm/yy) 12/99

B. When was the range established? (mm/yy) 03/96

C. Is the range scheduled for closure?

☐ Yes ☒ No

If yes, what is the scheduled closure date? _____

D. Does a range manual/instruction (or other operating guide) exist?

☒ Yes ☐ No

If yes, please list title/date and provide document. SOP

E. How often is the range used? (Select one.)

☐ Daily ☒ Weekly ☐ Monthly ☐ Unknown

☐ Other _____

F. Do records exist that can be considered accurate and complete?

☒ Yes ☐ No ☐ Unknown

If yes, please describe the records including the years for which they exist.

Usage documents for 1999

_____

_____

G. If records of the range's use are kept, who maintains them?

Name	John Malone
Command	NAS JRB Fort Worth
Title/Position	Range mgr.
Address	NAS JRB Fort Worth
Phone #	(817) 782-7779 DSN 739-7779
Email	

H. What type of range records are maintained? (Check all that apply.)

- [x] Munitions expenditures including:
  - [x] Types
  - [x] Quantities
  - [ ] Locations
  - [ ] Estimated dud rates
- [ ] Munitions mishaps attributed to UXO that occurred either on or off-range
- [ ] UXO clearance operations conducted on range
- [ ] All areas containing known or suspected UXO on range maps or installation master planning maps.
- [ ] Information on any rounds landing off-range that were unrecoverable/not located
- [ ] List of personnel, squadrons, other services, foreign countries, etc. that use/used the range
- [ ] Other (Please explain.) _____

I. What type of ordnance is/was used at the range? (Select all that apply.)

[x] Small Arms Ammunition (.50 cal or under)	[ ] Submunitions
[ ] Hand Grenades	[ ] Torpedoes
[ ] Rifle Grenades	[ ] Mines
[ ] Projected Grenades	[ ] Depth Charges
[ ] Mortars	[ ] Riot control agents
[ ] Bombs	[ ] Bulk propellant, propellant charges
[ ] Rockets	[ ] Bulk high explosives, demolition charges
[ ] Large rocket motors (> 1,000 lbs)	[ ] Pyrotechnics (flares, signals, simulators)
[ ] Warheads	[ ] Primers, detonators, fuzes, squibs
[ ] Projectiles	[ ] CADs/PADs
[ ] Guided Missiles	[ ] Other
[ ] Ballistic Missiles	

J. If possible, please provide the NSNs, DODICs (i.e. NALCs), and standard nomenclature of these items as well as the number used at the range per year:

NO.	DODIC/NALC	NSN	Standard Nomenclature	# CY97	# CY98	# CY99
1			9mm			
2			12 guage			
3						
4						
5						
6						
7						
8						
9						
10						

K. On average, how much ordnance is/was used at the range annually? Please provide this information in total pounds of ordnance and net explosive weight (NEW).

Total weight: about 450 lbs
NEW

L. What types of targets were/are used at the range?

☒ Stationary ☐ Mobile ☐ None ☐ Unknown

If targets are/were used, please provide details including types and locations:
Standard targets

M. What range use reports are/were forwarded to a higher command?

Please provide details including requirement reference: None

VI Range clearance:

A. Does the range have an established maintenance schedule?

☐ Yes ☒ No ☐ Unknown

If yes, please provide details:

B. Does/did the range have an established UXO, range debris, or target clearance schedule?

☐ Yes ☒ No ☐ Unknown

If yes, please provide details (including technologies used for detection, retrieval and destruction): _____

C. Are/were range debris moved from the range?

☐ Yes ☒ No ☐ Unknown

D. If yes, how is/was the range debris decontaminated? (Check all that apply.)

☐ 100% visual inspection ☐ Thermally processed – enclosed unit

☐ Thermally processed – pan ☐ Thermally processed – no containment

☐ Thermally processed - hot gas ☐ Washout ☐ Other

Please provide details: _____

E. Where does decontamination take place?

☐ On the range ☐ Off the range ☐ Both ☐ Unknown ☒ Not Applicable

F. In the past three years, has the activity recycled metal range debris through a local DRMO?

☐ Yes ☒ No ☐ Unknown ☐ Not Applicable

If yes, please provide details (including the DRMO used and volume per year):

_____

G. In the past three years, has the activity recycled metal range debris through a QRP?

☐ Yes ☒ No ☐ Unknown ☐ Not Applicable

If yes, please provide details (including the types of items recycled, any processing of these items, and volume per year): _____

H. In the past three years, has the activity recycled metal range debris through direct sales?

☐ Yes ☒ No ☐ Unknown ☐ Not Applicable

If yes, please provide details (including the types of items recycled, any processing of these items, and volume per year): _____

I. What is the position/title of the certifying individual? _____

VII Environmental Investigations/Cleanups/Responses:

A. Is the range, including the impact area, undergoing or has already undergone any type of investigation, cleanup, or response action of unexploded ordnance (UXO) or other contamination?

☐ Yes (Please elaborate.) _____

☒ No

If yes, please attach information including reason for the cleanup, regulatory authority (e.g. CERCLA, RCRA) the cleanup is/was conducted under, entity conducting the action, and anticipated/actual completion date. Include a copy of summary reports, the work plan or other reports.

B. If a response action is being taken or was taken, was it conducted under CERCLA or RCRA authorities?

☐ CERCLA ☐ RCRA ☐ Both ☐ Unknown

(Please elaborate.) _____

C. Have any investigations, samplings, or analyses of the range been conducted (i.e. soil, groundwater and surface water monitoring, air emissions assessment, impacts to endangered species and sensitive ecosystems, etc.)?

☐ Yes ☒ No

If Yes, please explain. Include media evaluated, tests conducted, results and subsequent actions taken. _____

D. Is the range currently being monitored or sampled on a periodic basis for environmental reasons?

☐ Yes ☒ No

If Yes, please provide specific details. _____

E. Are any investigations, samplings, or analyses planned for the range in the future?

☐ Yes ☒ No

If Yes, please explain. Include estimated time frame, media to be evaluated, tests to be conducted, and potential actions to be taken. _____

VIII Costs:

A. How much does it cost to maintain the range on an annual basis? (Please include the source of this funding): Total $ 6,000 a

☐ Security $_____ ☐ Maintenance $_____

☐ Safety $_____ ☐ Permit conditions $_____

☐ Labor, if not included above $_____ ☐ Other $_____

Comments: Operations funds all maintenance of this range.

B. If the range, including the impact area, is undergoing or has already undergone any type of investigation, cleanup, or response action for unexploded ordnance (UXO) or other contamination, please provide the following cost data **as of the end of FY99**:

☐ Investigation Type of Funds

☐ Complete $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ On-going $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ Planned $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

Comments _____

☐ Response Action Type _____

☐ Complete $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ On-going $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ Planned $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

Comments _____

C. If any environmental investigations, samplings, or analyses of the range have been conducted or are planned, please provide the following cost data **as of the end of FY99**.

☐ Environmental investigations, samplings, or analyses

☐ Complete $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ On-going $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ Planned $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

Comments _____

D. Please provide any other cost data that may be considered appropriate.

_____

IX Environmental Considerations:

A. Has the activity received any verbal and/or written notices from **regulators** regarding surface or ground water contamination associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

B. Has the activity received any verbal and/or written notices from the **public** regarding surface or ground water contamination associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

C. Do the activity's natural resource plans include resources located on the range?

☐ Yes ☒ No ☐ Unknown

D. Is there any information indicating the presence of any potential or known threatened/endangered species – flora and fauna – on the range?

☐ Yes ☒ No ☐ Unknown

If Yes, identify species: _____

E. Has the activity received any verbal and/or written notices from **regulators** regarding adverse impacts on sensitive ecosystems or natural resources associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

F. Has the activity received any verbal and/or written notices from the **public** regarding the adverse impacts on sensitive ecosystems or natural resources associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

G. Has the activity received any verbal and/or written notices from **regulators** regarding the permitting of range operations under any environmental media?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information regarding any such notice and the media in question. _____

H. Have any NEPA documents that address range operations been prepared?

☐ Yes ☒ No ☐ Unknown

If Yes, please list the titles of these documents. _____

X Outside Interests

A. Describe the degree of public interest in this range:

☒ None ☐ Slightly interested ☐ Very interested ☐ Extremely interested

This interest is generally:

☐ Favorable ☐ Neutral ☐ Negative

Comments: _____

B. Describe the degree of interest of any Federal land managers in the range.

☒ None ☐ Slightly interested ☐ Very interested ☐ Extremely interested

This interest is generally:

☐ Favorable ☐ Neutral ☐ Negative

Comments: _____

C. Describe the degree of interest of any Federal and State regulators, including Indian tribes with regulatory authorities, in the range:

☒ None ☐ Slightly interested ☐ Very interested ☐ Extremely interested

This interest is generally:

☐ Favorable ☐ Neutral ☐ Negative

Comments: _____

D. Are there any environmental justice issues associated with the range?

☐ Yes ☒ No ☐ Unknown

If Yes, please provide details: _____

_____

_____

Part Three: Active & Inactive Range Information

Complete this section separately for each active and inactive range identified in Table One of Part One.

I Primary Points of Contact:

Points of Contact	Range POC	Environmental POC
Name	Harrah Kevin L. A01	Wayne McKinzie
Title/Code	Armorer	
Address	NAS JRB Fort Worth	NAS JRB Fort Worth
Phone Number	Comm (817) 782-7476 DSN. 739-7476	Comm: (817) 782-6470 DSN: 739-6470
Email Address		

II Range Characteristics:

A. Range Name: Indoor/Outdoor Pistol Range

B. Range Status:

☐ Active ☒ Inactive

C. Range Classification (check each that applies):

☒ Small Arms Range (.50 cal. & under)

☐ Firing Range (projectile, torpedoes, etc.)

☐ Testing

☐ Training

☐ Open Burning/Open Detonation

☐ Other (please describe): _____

D. Range Type (check each that applies):

- [ ] Air to Air
- [ ] Land to Air
- [ ] Water to Air
- [ ] Air to Land
- [x] Land to Land
- [ ] Water to Land
- [ ] Air to Water
- [ ] Land to Water
- [ ] Water to Water
- [ ] OB/OD (RCRA permitted or interim status unit)
- [ ] OB/OD (Training and/or emergency ops)
- [ ] Other (please explain): _____

E. Where is/was the range located? (Include installation, town/city, county, state.)

NAS JRB Fort Worth (Installation)

Fort Worth (Town/City)

Tarrant (County)

Tx (State)

(Longitude)

(Latitude)

F. What is the area of the range (in **acres** for land, **square nautical miles** for water)?

a. Impact area:

Land portion .2

Water portion NONE

b. Entire range (includes impact area)

Land portion .6

Water portion NONE

G. If wetlands are present at the range, what is the area of wetlands in each of the following (in **acres**)?

Impact area N/A

Entire range (includes impact area) _____

H. If the range is a water range, how many miles from shore is it located? (If the range extends through more than one selection, please check all that apply.)

☐ Less than 3 ☐ Between 3 and 12 ☐ Between 12 and 200 ☐ Over 200

I. If the range or portion of the range is within 3 miles of the shore, do any ordnance items enter the water in that portion of the range?

☐ Yes ☐ No ☐ Unknown ☐ Not Applicable

J. The enclosed geographical map shows the following:

☐ Range location ☐ Range boundaries ☐ Target locations

☐ Range areal extent including:

☐ Counties ☐ Tribal reservations ☐ Independent cities/towns/states

III Range Ownership:

A. Who is the current owner of the land/range? (Select one. Be as specific as possible.)

☒ Navy (Identify): NAS JRB Fort Worth

☐ Other Federal Agency (Identify): _____

☐ Other (Identify & explain): _____

B. If the land is not owned by the Navy, when does the lease or agreement to use the land expire? _____

C. Is the range or a portion of the range scheduled to be closed in accordance with the Base Realignment and Closure Act (BRAC)?

☐ Yes ☒ No

D. Who is the cognizant authority/range manager?

Name	Campynella Smith
Command	DON Police
Title/Position	Assistant Chief
Address	NAS JRB Fort Worth
Phone #	(817) 782-7646
Email	

E. Who are the primary users of the range? List training groups, squadrons, other services, foreign countries, etc.

NO.	USER
1	None at this time
2	
3	
4	
5	

IV Range Access:

A. How is access currently controlled? (Select all that apply.)

- [ ] No controls
- [x] Fences
- [x] Signs
- [ ] Access key maintained by security/range officer
- [ ] Log-in book
- [ ] Barricaded during operations
- [ ] Office check in
- [ ] Siren/notification during operations
- [ ] Guard at gate
- [x] Patrolled by security officer or other official
- [ ] Patrolled by vessel
- [ ] Patrolled by aircraft
- [ ] Other _____

B. Have there been any documented instances of unauthorized access to the range by the public?

☒ None ☐ 1-2 instances per year

☐ 3-5 instances per year ☐ More than 5 instances per year ☐ Unknown

Please provide specific information for ranges with more than 5 instances per year.

_____

_____

V Range Use:

A. When was the range last used? (mm/yy) 08/99

B. When was the range established? (mm/yy) constructed mid 1950s'

C. Is the range scheduled for closure?

☐ Yes ☒ No

If yes, what is the scheduled closure date? _____

D. Does a range manual/instruction (or other operating guide) exist?

☒ Yes ☐ No

If yes, please list title/date and provide document. SOP

E. How often is the range used? (Select one.)

☐ Daily ☐ Weekly ☐ Monthly ☐ Unknown

☒ Other Inactive.

F. Do records exist that can be considered accurate and complete?

☐ Yes ☐ No ☐ Unknown

If yes, please describe the records including the years for which they exist.

_____

_____

_____

G. If records of the range's use are kept, who maintains them?

Name	Campynella Smith
Command	DGW Police
Title/Position	Assistant Chief
Address	NAS JRB Fort Worth
Phone #	(817) 782-7646
Email	

H. What type of range records are maintained? (Check all that apply.)

- [x] Munitions expenditures including:
  - [x] Types
  - [x] Quantities
  - [x] Locations
  - [x] Estimated dud rates
- [x] Munitions mishaps attributed to UXO that occurred either on or off-range
- [x] UXO clearance operations conducted on range
- [x] All areas containing known or suspected UXO on range maps or installation master planning maps.
- [x] Information on any rounds landing off-range that were unrecoverable/not located
- [x] List of personnel, squadrons, other services, foreign countries, etc. that use/used the range
- [x] Other (Please explain.) _____

I. What type of ordnance is/was used at the range? (Select all that apply.)

[x] Small Arms Ammunition (.50 cal or under)	[ ] Submunitions
[ ] Hand Grenades	[ ] Torpedoes
[ ] Rifle Grenades	[ ] Mines
[ ] Projected Grenades	[ ] Depth Charges
[ ] Mortars	[ ] Riot control agents
[ ] Bombs	[ ] Bulk propellant, propellant charges
[ ] Rockets	[ ] Bulk high explosives, demolition charges
[ ] Large rocket motors (> 1,000 lbs)	[ ] Pyrotechnics (flares, signals, simulators)
[ ] Warheads	[ ] Primers, detonators, fuzes, squibs
[ ] Projectiles	[ ] CADs/PADs
[ ] Guided Missiles	[ ] Other
[ ] Ballistic Missiles	

J. If possible, please provide the NSNs, DODICs (i.e. NALCs), and standard nomenclature of these items as well as the number used at the range per year:

NO	DODIC/NALC	NSN	Standard Nomenclature	# CY97	# CY98	# CY99
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

K. On average, how much ordnance is/was used at the range annually? Please provide this information in total pounds of ordnance and net explosive weight (NEW).

Total weight: Unknown
NEW

L. What types of targets were/are used at the range?

☒ Stationary ☐ Mobile ☐ None ☐ Unknown

If targets are/were used, please provide details including types and locations:
Standard targets

M. What range use reports are/were forwarded to a higher command?

Please provide details including requirement reference: None

VI Range clearance:

A. Does the range have an established maintenance schedule?

☐ Yes ☒ No ☐ Unknown

If yes, please provide details:

B. Does/did the range have an established UXO, range debris, or target clearance schedule?

☐ Yes ☒ No ☐ Unknown

If yes, please provide details (including technologies used for detection, retrieval and destruction): as needed

C. Are/were range debris moved from the range?

☐ Yes ☒ No ☐ Unknown

D. If yes, how is/was the range debris decontaminated? (Check all that apply.)

☐ 100% visual inspection ☐ Thermally processed – enclosed unit

☐ Thermally processed – pan ☐ Thermally processed – no containment

☐ Thermally processed - hot gas ☐ Washout ☒ Other

Please provide details: not required for this range.

E. Where does decontamination take place?

☒ On the range ☐ Off the range ☐ Both ☐ Unknown ☐ Not Applicable

F. In the past three years, has the activity recycled metal range debris through a local DRMO?

☒ Yes ☐ No ☐ Unknown ☐ Not Applicable

If yes, please provide details (including the DRMO used and volume per year):

10 barrels of metal

G. In the past three years, has the activity recycled metal range debris through a QRP?

☐ Yes ☒ No ☐ Unknown ☐ Not Applicable

If yes, please provide details (including the types of items recycled, any processing of these items, and volume per year): _____

H. In the past three years, has the activity recycled metal range debris through direct sales?

☐ Yes ☒ No ☐ Unknown ☐ Not Applicable

If yes, please provide details (including the types of items recycled, any processing of these items, and volume per year): _____

I. What is the position/title of the certifying individual? N/A

VII Environmental Investigations/Cleanups/Responses:

A. Is the range, including the impact area, undergoing or has already undergone any type of investigation, cleanup, or response action of unexploded ordnance (UXO) or other contamination?

☐ Yes (Please elaborate.) NONE

☒ No

If yes, please attach information including reason for the cleanup, regulatory authority (e.g. CERCLA, RCRA) the cleanup is/was conducted under, entity conducting the action, and anticipated/actual completion date. Include a copy of summary reports, the work plan or other reports.

B. If a response action is being taken or was taken, was it conducted under CERCLA or RCRA authorities?

☐ CERCLA ☐ RCRA ☐ Both ☐ Unknown

(Please elaborate.) _____

C. Have any investigations, samplings, or analyses of the range been conducted (i.e. soil, groundwater and surface water monitoring, air emissions assessment, impacts to endangered species and sensitive ecosystems, etc.)?

☐ Yes ☒ No

If Yes, please explain. Include media evaluated, tests conducted, results and subsequent actions taken. _____

D. Is the range currently being monitored or sampled on a periodic basis for environmental reasons?

☐ Yes ☒ No

If Yes, please provide specific details. _____

E. Are any investigations, samplings, or analyses planned for the range in the future?

☐ Yes ☒ No

If Yes, please explain. Include estimated time frame, media to be evaluated, tests to be conducted, and potential actions to be taken. _____

VIII Costs:

A. How much does it cost to maintain the range on an annual basis? (Please include the source of this funding): Total $ Inactive Range

☐ Security $_____ ☐ Maintenance $_____

☐ Safety $_____ ☐ Permit conditions $_____

☐ Labor, if not included above $_____ ☐ Other $_____

Comments: _____

_____

B. If the range, including the impact area, is undergoing or has already undergone any type of investigation, cleanup, or response action for unexploded ordnance (UXO) or other contamination, please provide the following cost data **as of the end of FY99**:

☐ Investigation Type of Funds

☐ Complete $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ On-going $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ Planned $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

Comments _____

_____

_____

☐ Response Action Type _____

☐ Complete $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ On-going $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ Planned $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

Comments _____

_____

_____

C. If any environmental investigations, samplings, or analyses of the range have been conducted or are planned, please provide the following cost data **as of the end of FY99**.

☐ Environmental investigations, samplings, or analyses

☐ Complete $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ On-going $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ Planned $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

Comments _____

D. Please provide any other cost data that may be considered appropriate.

_____

IX Environmental Considerations:

A. Has the activity received any verbal and/or written notices from **regulators** regarding surface or ground water contamination associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

B. Has the activity received any verbal and/or written notices from the **public** regarding surface or ground water contamination associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

C. Do the activity's natural resource plans include resources located on the range?

☐ Yes ☒ No ☐ Unknown

D. Is there any information indicating the presence of any potential or known threatened/endangered species – flora and fauna – on the range?

☐ Yes ☒ No ☐ Unknown

If Yes, identify species: _____

E. Has the activity received any verbal and/or written notices from **regulators** regarding adverse impacts on sensitive ecosystems or natural resources associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

F. Has the activity received any verbal and/or written notices from the **public** regarding the adverse impacts on sensitive ecosystems or natural resources associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

G. Has the activity received any verbal and/or written notices from **regulators** regarding the permitting of range operations under any environmental media?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information regarding any such notice and the media in question. _____

H. Have any NEPA documents that address range operations been prepared?

☐ Yes ☒ No ☐ Unknown

If Yes, please list the titles of these documents. _____

X Outside Interests

A. Describe the degree of public interest in this range:

☐ None ☐ Slightly interested ☒ Very interested ☐ Extremely interested

This interest is generally:

☒ Favorable ☐ Neutral ☐ Negative

Comments: Federal and Local Law enforcement used this range when it was active

B. Describe the degree of interest of any Federal land managers in the range.

☒ None ☐ Slightly interested ☐ Very interested ☐ Extremely interested

This interest is generally:

☐ Favorable ☐ Neutral ☐ Negative

Comments: _____

C. Describe the degree of interest of any Federal and State regulators, including Indian tribes with regulatory authorities, in the range:

☒ None ☐ Slightly interested ☐ Very interested ☐ Extremely interested

This interest is generally:

☐ Favorable ☐ Neutral ☐ Negative

Comments: _____

D. Are there any environmental justice issues associated with the range?

☐ Yes ☒ No ☐ Unknown

If Yes, please provide details: _____

_____

_____

Part Two: CTT Range Information

Complete this section separately for each CTT range identified in Table One of Part One.

I CTT Survey Primary Points of Contact:

Points of Contact	Range POC	Environmental POC
Name	Harrah Kevin L. Adc	Wayne McKinzie
Title/Code	Armorer	
Address	NAS JRB Fort Worth	NAS JRB Fort Worth
Phone Number	(817) 782-7476 DSN 739-7476	(817) 782-~~7476~~ 6470 DSN 739-~~7476~~ 6470
Email Address		

II Range Characteristics:

A. Range Name: Rifle Range, Outdoor

B. Range Status:

- [x] Closed
- [ ] Transferred
- [ ] Transferring

C. Range Classification (Check each that applies.):

- [x] Small Arms Range (.50 caliber & under)
- [ ] Firing Range (projectile, torpedoes, etc.)
- [ ] Testing
- [ ] Training
- [ ] Open Burning/Open Detonation
- [ ] Other (please describe): _____

D. Range Type (check each that applies):

- [ ] Air to Air
- [ ] Land to Air
- [ ] Water to Air
- [ ] Air to Land
- [x] Land to Land
- [ ] Water to Land
- [ ] Air to Water
- [ ] Land to Water
- [ ] Water to Water
- [ ] OB/OD (RCRA permitted or interim status unit)
- [ ] OB/OD (Training and/or emergency ops)
- [ ] Other (please explain): _____

E. Where is/was the range located? (Include installation, town/city, county, state.)

NAS JRB Fort Worth (Installation) — Fort Worth (Town/City)

Tarrant (County) — Tx (State)

(Longitude) — (Latitude)

F. What is the area of the range (in **acres** for land, **square nautical miles** for water)?

a. Impact area:
Land portion .2
Water portion _____

b. Entire range (includes impact area)
Land portion .7
Water portion _____

G. If wetlands are present at the range, what is the area of wetlands in each of the following (in **acres**)?

Impact area N/A

Entire range (includes impact area) _____

H. If the range is a water range, how many miles from shore is it located? (If the range extends through more than one selection, please check all that apply.)

☐ Less than 3 ☐ Between 3 and 12 ☐ Between 12 and 200 ☐ Over 200

I. The enclosed geographical map shows the following:

☐ Range location ☐ Range boundaries ☐ Target locations

☐ Range areal extent including:

☐ Counties ☐ Tribal reservations ☐ Independent cities/towns/states

III Range Ownership:

A. Who is the current owner of the land/range? (Select one. Be as specific as possible.)

☒ Navy (Identify.): NAS JRB Fort Worth

☐ Other DoD Component (Identify.): _____

☐ Other Federal Agency (Identify.): _____

☐ State, City, or Other Municipality (Identify.): _____

☐ Tribe (Identify.): _____

☐ Commercial Activity (Identify.): _____

☐ Private Individual or Organization (Identify.): _____

B. If the land is not owned by the Navy, when does/did the lease, land withdrawal, or agreement to use the land expire?

_____

C. Is/was the range or a portion of the range scheduled to be closed in accordance with the Base Realignment and Closure Act (BRAC)?

☐ Yes ☒ No

D. If the range is ***closed***, identify the date of closure. September 1996

E. If the range has been ***transferred***, identify the date of transfer and to whom it was transferred. _____

F. Is there a planned or mandated date for ***transferring*** the range from DoD control?

☐ Yes (To whom?) _____

☐ No

G. Are there any known entities, other than a DoD component, with an interest in ownership or control of the range or its resources?

☐ Yes (Identify.) _____

☒ No

H. Who is/was the cognizant authority/range manager?

Name	Campynella Smith
Command	DoD Police
Title/Position	Assistant Chief
Address	NAS JRB Fort Worth
Phone #	(817) 782-7646 DSN 739-7646
Email	

I. Who are/were the primary users of the range? List training groups, squadrons, other services, foreign countries, etc.

NO.	USER
1	NAS Security
2	US Air Force
3	
4	
5	

IV Range Access:

A. How is access currently controlled? (Select all that apply.):

- [ ] No controls
- [ ] Not controlled, used for another purpose
- [x] Signs
- [ ] Office check in
- [x] Fence
- [ ] Access key maintained by security/range officer
- [ ] Log in book
- [x] Patrolled by security officer or other official
- [ ] Patrolled by navy vessel
- [ ] Patrolled by aircraft
- [ ] Other _____

B. What are the current land uses? (Select all that apply.)

- [x] None, no access authorized
- [ ] Limited public access – wildlife refuge
- [ ] Limited public access - livestock grazing
- [ ] Public access - agriculture
- [ ] Public access – surface recreation
- [ ] Public access – vehicle parking
- [ ] Public access – surface supply storage
- [ ] Unrestricted access – commercial, residential, utility, subsurface recreational and construction
- [ ] Other _____

C. If land use is restricted, have there been any documented instances of unauthorized access by the public?

☒ None ☐ 1-2 instances per year

☐ 3-5 instances per year ☐ More than 5 instances per year ☐ Unknown

Please provide specific information for ranges with more than 3 instances per year.

_____

_____

V Range Use:

A. When was the range last used? (mm/yy) 08/96

B. When was the range established? (mm/yy) Constructed in mid 1950's

C. When in use, how often was the range used? (Select one.)

☐ Daily ☐ Weekly ☒ Monthly ☐ Unknown

☐ Other _____

D. Do records exist that can be considered accurate and complete?

☐ Yes ☒ No ☐ Unknown

If yes, please describe the records including the years for which they exist.

_____

_____

_____

E. If historical records of the range's use are kept, who maintains them?

Name	
Command	
Title/Position	
Address	
Phone #	
Email	

F. What type of range records are/were maintained? (Check all that apply.)

- [x] Munitions expenditures including:
  - [x] Types
  - [x] Quantities
  - [x] Locations
  - [x] Estimated dud rates
- [x] Munitions mishaps attributed to UXO that occurred either on or off-range
- [x] UXO clearance operations conducted on range
- [x] All areas containing known or suspected UXO on range maps or installation master planning maps.
- [x] Data on any rounds landing off-range that were unrecoverable or not located
- [x] List of personnel, squadrons, other services, foreign countries, etc. that used the range
- [x] Other (please explain) _____

G. What type of ordnance was used at the range? (Select all that apply.)

[x] Small Arms Ammunition (.50 cal or under)	[ ] Submunitions
[ ] Hand Grenades	[ ] Torpedoes
[ ] Rifle Grenades	[ ] Mines
[ ] Projected Grenades	[ ] Depth Charges
[ ] Mortars	[ ] Riot control agents
[ ] Bombs	[ ] Bulk propellant, propellant charges
[ ] Rockets	[ ] Bulk high explosives, demolition charges
[ ] Large rocket motors (> 1,000 lbs)	[ ] Pyrotechnics (flares, signals, simulators)
[ ] Warheads	[ ] Primers, detonators, fuzes, squibs
[ ] Projectiles	[ ] CADs/PADs
[ ] Guided Missiles	[ ] Other
[ ] Ballistic Missiles	

H. If possible, please provide the NSNs, DODICs (i.e. NALCs), and standard nomenclature of these ordnance items:

NO.	DODIC/NALC	NSN	Standard Nomenclature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

I. On average, how much ordnance was used at the range annually? Please provide this information in total pounds of ordnance and net explosive weight (NEW).

Total weight: Unknown
NEW _____

J. What types of targets were/are used at the range?

☒ Stationary ☐ Mobile ☐ None ☐ Unknown

If targets are/were used, please provide details including types and locations:
standard targets

K. Was range debris moved from the range?

☐ Yes ☒ No ☐ Unknown

L. If yes, how was the range debris decontaminated? (Check all that apply.)

☐ 100% visual inspection ☐ Thermally processed – enclosed unit

☐ Thermally processed – pan ☐ Thermally processed – no containment

☐ Thermally processed - hot gas ☐ Washout ☐ Other ☐ Unknown

Please provide details: _____

M. Where did decontamination take place?

☐ On the range ☐ Off the range ☐ Both ☐ Unknown ☒ Not Applicable

N. In the past three years, has the activity recycled metal range debris from this range through a local DRMO?

☐ Yes ☒ No ☐ Unknown ☐ Not Applicable

If yes, please provide details (including the DRMO used and volume per year):

_____

_____

_____

O. In the past three years, has the activity recycled metal range debris from this range through a QRP?

☐ Yes ☒ No ☐ Unknown ☐ Not Applicable

If yes, please provide details (including the types of items recycled, any processing of these items, and volume per year): _____

_____

_____

P. In the past three years, has the activity recycled metal range debris through direct sales?

☐ Yes ☒ No ☐ Unknown ☐ Not Applicable

If yes, please provide details (including the types of items recycled, any processing of these items, and volume per year): _____

_____

_____

Q. What was the position/title of the certifying individual? _____

_____

VI Environmental Investigations/Cleanups/Responses:

A. Is the range, including the impact area, undergoing or has it undergone any type of investigation, cleanup, or response action for unexploded ordnance (UXO) or other contamination?

☐ Yes (Please elaborate) _____

☒ No

If yes, please attach information including reason for the cleanup, regulatory authority (e.g. CERCLA, RCRA) the cleanup is/was conducted under, entity conducting the action, and anticipated/actual completion date. Include a copy of summary reports, the work plan or other reports.

B. If a response action is being taken or was taken, was it conducted under CERCLA or RCRA authorities?

☐ CERCLA ☐ RCRA ☐ Both ☐ Unknown

(Please elaborate) _____

C. Has any investigation, sampling, or analysis of the range been conducted (i.e. soil, groundwater and surface water monitoring, air emissions assessment, impacts to endangered species and sensitive ecosystems, etc.)?

☐ Yes ☒ No

If Yes, please explain. Include media evaluated, entity conducting the action, tests conducted, results and subsequent actions taken. _____

D. Is the range currently being monitored or sampled on a periodic basis for environmental reasons?

☐ Yes ☒ No

If Yes, please provide specific details. _____

E. Are any investigations, samplings, or analyses planned for the range in the future?

☐ Yes ☒ No

If Yes, please explain. Include estimated time frame, media to be evaluated, tests to be conducted, and potential actions to be taken. _____

_____

_____

VII Costs:

A. If the range, including the impact area, is undergoing or has already undergone any type of investigation, cleanup, or response action for unexploded ordnance (UXO) or other contamination, please provide the following cost data **as of the end of FY99**:

☐ Investigation Type of Funds

☐ Complete	$_____	☐ ERN	☐ BRAC	☐ O&MN	☐ Other	
☐ On-going	$_____	☐ ERN	☐ BRAC	☐ O&MN	☐ Other	
☐ Planned	$_____	☐ ERN	☐ BRAC	☐ O&MN	☐ Other	

Comments _____

_____

_____

☐ Response Action Type _____

☐ Complete	$_____	☐ ERN	☐ BRAC	☐ O&MN	☐ Other	
☐ On-going	$_____	☐ ERN	☐ BRAC	☐ O&MN	☐ Other	
☐ Planned	$_____	☐ ERN	☐ BRAC	☐ O&MN	☐ Other	

Comments _____

_____

_____

B. If any environmental investigations, samplings, or analyses of the range has been conducted or are planned, please provide the following cost data **as of the end of FY99**.

☐ Investigations, samplings, or analyses

☐ Complete $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ On-going $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

☐ Planned $_____ ☐ ERN ☐ BRAC ☐ O&MN ☐ Other

Comments _____

C. Please provide any other cost data that may be considered appropriate.

_____

VIII Environmental Considerations:

A. Based on sampling data, estimate the level of surface or ground water contamination as a result of range operations:

☐ Non-detectable ☐ Minimal ☐ Moderate

☐ Significant/Substantial ☐ Samples not taken ☒ Unknown

B. Has the activity received any verbal and/or written notices from **regulators** regarding surface or ground water contamination associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

C. Has the activity received any verbal and/or written notices from the **public** regarding surface or ground water contamination associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

_____

D. Based on investigations or other data, estimate any adverse impacts on sensitive ecosystems as result of past operations conducted on this range:

☒ Non-detectable ☐ Minimal ☐ Moderate

☐ Significant/Substantial ☐ No data available ☐ Unknown

E. Has the activity received any verbal and/or written notices from **regulators** regarding adverse impacts on sensitive ecosystems associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

_____

F. Has the activity received any verbal and/or written notices from the **public** regarding adverse impacts on sensitive ecosystems associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

_____

G. Is there any information indicating the presence of any potential or known threatened/endangered species – flora and fauna – on the range?

☐ Yes ☒ No ☐ Unknown

If Yes, identify species: _____

_____

H. Based on investigations or other data, estimate any adverse impacts to natural resources as result of past operations conducted on this range.

☐ Non-detectable ☐ Minimal ☐ Moderate

☐ Significant/Substantial ☐ No data available ☒ Unknown

I. Has the activity received any verbal and/or written notices from **regulators** regarding any adverse impacts to natural resources associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

J. Has the activity received any verbal and/or written notices from the **public** regarding any adverse impacts to natural resources associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

K. Estimate the potential for hazardous releases to the air as a result of past operations conducted on this range:

☒ Non-detectable ☐ Minimal ☐ Moderate

☐ Significant/Substantial ☒ Unknown

L. Has the activity received any verbal and/or written notices from **regulators** regarding hazardous releases to the air associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

M. Has the activity received any verbal and/or written notices from the **public** regarding hazardous releases to the air associated with range use?

☒ None ☐ 1 ☐ 2-3 ☐ More than 3 ☐ Unknown

Please provide specific information for ranges with any notices.

_____

_____

N. Have any NEPA documents that address range operations been prepared?

☐ Yes ☒ No ☐ Unknown

If Yes, please list the titles of these documents. _____

_____

_____

_____

IX Outside Interest

A. Describe the degree of public interest in this range:

☒ None ☐ Slightly interested ☐ Very interested ☐ Extremely interested

This interest is generally:

☐ Favorable ☐ Neutral ☐ Negative

Comments: _____

_____

_____

B. Describe the degree of interest of any Federal land managers in the range.

☒ None ☐ Slightly interested ☐ Very interested ☐ Extremely interested

This interest is generally:

☐ Favorable ☐ Neutral ☐ Negative

Comments: _____

_____

_____

C. Describe the degree of interest of any Indian tribes in the range:

☒ None ☐ Slightly interested ☐ Very interested ☐ Extremely interested

This interest is generally:

☐ Favorable ☐ Neutral ☐ Negative

Comments: _____

D. Describe the degree of interest of any Federal and State regulators in the range:

☒ None ☐ Slightly interested ☐ Very interested ☐ Extremely interested

This interest is generally:

☐ Favorable ☐ Neutral ☐ Negative

Comments: _____

E. Are there any environmental justice issues associated with the range?

☐ Yes ☒ No ☐ Unknown

If Yes, please provide details: _____

U.S. ARMY CORPS
OF ENGINEERS
Fort Worth District

FINAL

Wetland Inventory

NAVAL AIR STATION FORT WORTH,
JOINT RESERVE BASE
(NAS-JRB)

U.S. Army Corps of Engineers
Fort Worth District
Planning Division
819 Taylor St., PO Box 17300
Fort Worth, TX 76102-0300

24 February 1997

Table of Contents

Executive Summary 1

1.0 INTRODUCTION 2
- 1.1 Background
- 1.2 Objectives

2.0 DESCRIPTION OF STUDY AREA 3
- 2.1 Location
- 2.2 Environmental Conditions

3.0 WETLAND INVENTORY 6
- 3.1 Wetland Ecology
- 3.2 Federal Regulations

4.0 PROCEDURES 8
- 4.1 Existing Data Searches and Field Surveys
- 4.2 Wetland Determination

5.0 RESULTS 13
- 5.1 Non-jurisdictional Sites 13
  - *a. Blast Shield Site*
  - *b. Jennings Drive Site*
- 5.2 Waters of the United States 15
  - *a. Lake Worth*
  - *b. West Farmers Branch*
- 5.3 Jurisdictional Wetland 16
  - *Trinity River Site*

6.0 CONCLUSIONS 21

7.0 SOURCES CONSULTED 22

8.0 ACKNOWLEDGMENTS 23

List of Figures

Figure 1. Location of NAS-JRB and the Weapon Storage Area 4

Figure 2. Data form for routine wetland determination 9

Figure 3. Wetland Determination data form for the Trinity River Wetland Site 18

List of Tables

Table 1 Wetland Status of Survey Sites 14

Table 2 Dominant Plant Species in the Wetland Site 20

Attachments

[redacted] [redacted]

Executive Summary

Wetland surveys were conducted at Naval Air Station Fort Worth, Joint Reserve Base by members of the base's Environmental Department and personnel from the Environmental Division of the Fort Worth District, U.S. Army Corps of Engineers. The purpose of this study was to assess the nature and extent of wetlands at NAS Fort Worth using field surveys and existing digital spatial data. Examination of existing information pointed to the existence of some wetlands on the base. Field surveys of possible wetlands were then conducted at eight sites throughout and around the property in mid-August of 1996. Surveys followed standard Corps of Engineers procedures for wetland determinations. Surveyed sites were determined to be either non-jurisdictional sites, Waters of the United States, or jurisdictional wetlands. Survey site dimensions and geographic coordinates were digitally recorded using a global positioning system receiver. A digital data set of this collected information was integrated into Arc/Info, a Geographic Information System, for analysis and hard-copy map production. Two jurisdictional wetlands covering a total of two acres were mapped during the course of this study, although only one of these was within the base boundary. These jurisdictional wetlands were both determined to be stable, palustrine emergent wetlands with some characteristics of a scrub-shrub wetland. A total of two areas within the boundary of the base were determined to be subject to Federal wetland regulations controlling development, filling, or disturbance.

1.0 INTRODUCTION

1.1 Background

A wetlands inventory was conducted at Naval Air Station Fort Worth, Joint Reserve Base (NAS-JRB, formerly Carswell Air Force Base), to assess the status of wetlands there for planning and resource management functions. This wetlands study expands on the results of an Environmental Impact Study (EIS) at Carswell Air Force Base (U. S. Air Force, 1994). The current project also provides accurate and detailed geospatial information of the survey sites for mapping and integration into a Geographic Information System (GIS). Inventories were conducted by the Fort Worth District, U.S. Army Corps of Engineers, Environmental Division in cooperation with the Environmental Department of NAS-JRB. In addition to field surveys, digital data in the form of satellite imagery and digital ortho-photographs were used to attempt to identify wetlands on the base. Wetland information and other data collected during the course of this study was integrated into Arc/Info, a GIS software package, for analysis and map production.

1.2 Objectives

Federal regulations provide for the protection of wetlands; those areas that are the link between water and land. Wetland inventories at NAS-JRB consisted of surveying the base and surrounding areas for potential wetlands using existing satellite imagery, aerial photographs, and field surveys. Determinations of wetlands and the production of digital wetland data follows strict federal guidelines. The information from this study can be used to plan future activities that may impact these sensitive areas. The final purpose of this study is to present the extent and location of jurisdictional and non-jurisdictional wetlands and Waters of the United States at NAS-JRB, and develop a digital archive of this information suitable for use in a GIS.

2.0 DESCRIPTION OF STUDY AREA

2.1 Location

Naval Air Station Fort Worth, Joint Reserve Base (NAS-JRB), the primary study area, is located approximately five miles west of Fort Worth in Tarrant County, Texas. NAS-JRB encompasses an area of approximately 1,778 acres and is bordered to the north by Lake Worth and to the east by the West Fork Trinity River. Taxiways run along the western half of the base with buildings primarily in the eastern half. Surveys were conducted throughout the base. Surveys were also conducted on three properties adjacent to or near the base. The U.S. Federal Bureau of Prisons (FBP) owns approximately 100 acres of land adjacent to the northeast corner of NAS-JRB, and a privately-owned golf course of approximately 211 acres is situated east of the taxiways in the southeast part of the base along White Settlement Road. In addition, approximately 158 acres east and south of the golf course is under the control of the Air Force Base Conversion Agency/Carswell Redevelopment Association (AFBCA/CRA). Surveys were also conducted at an off-base Weapons Storage Area (WSA) located approximately 3 miles west of NAS-JRB near the Parker County border. The WSA contains storage buildings within a chain-link fence surrounded by scrub-shrub grassland. Access to the fenced area is restricted and NAS-JRB Environmental staff reported no potential wetlands present within the restricted area, so the survey was conducted outside the fence. Figure 1 is a diagram of NAS-JRB showing the base and adjoining properties where surveys were conducted.

2.2 Environmental Conditions

Approximately 86% of the surface area of NAS-JRB is pavement (roads, runways, parking lots, etc.) or mowed/managed grass for the airfield runways and taxiways. The remaining 14% exists as isolated pockets of natural areas, scattered trees, or bare ground along the edges of the base, and along the fence next to the West Fork Trinity River.

Portions of the Trinity River basin are the primary influence on the hydrology of the study area. The West Fork Trinity River covers parts of nine counties around the study area and drains to the southeast, terminating in Dallas County. This drainage forms the eastern border of NAS-JRB. Farmers Branch, a tributary of the West Fork, flows west under the runways,

Naval Air Station Fort Worth Joint Reserve Base

Location of NAS-JRB and adjacent properties

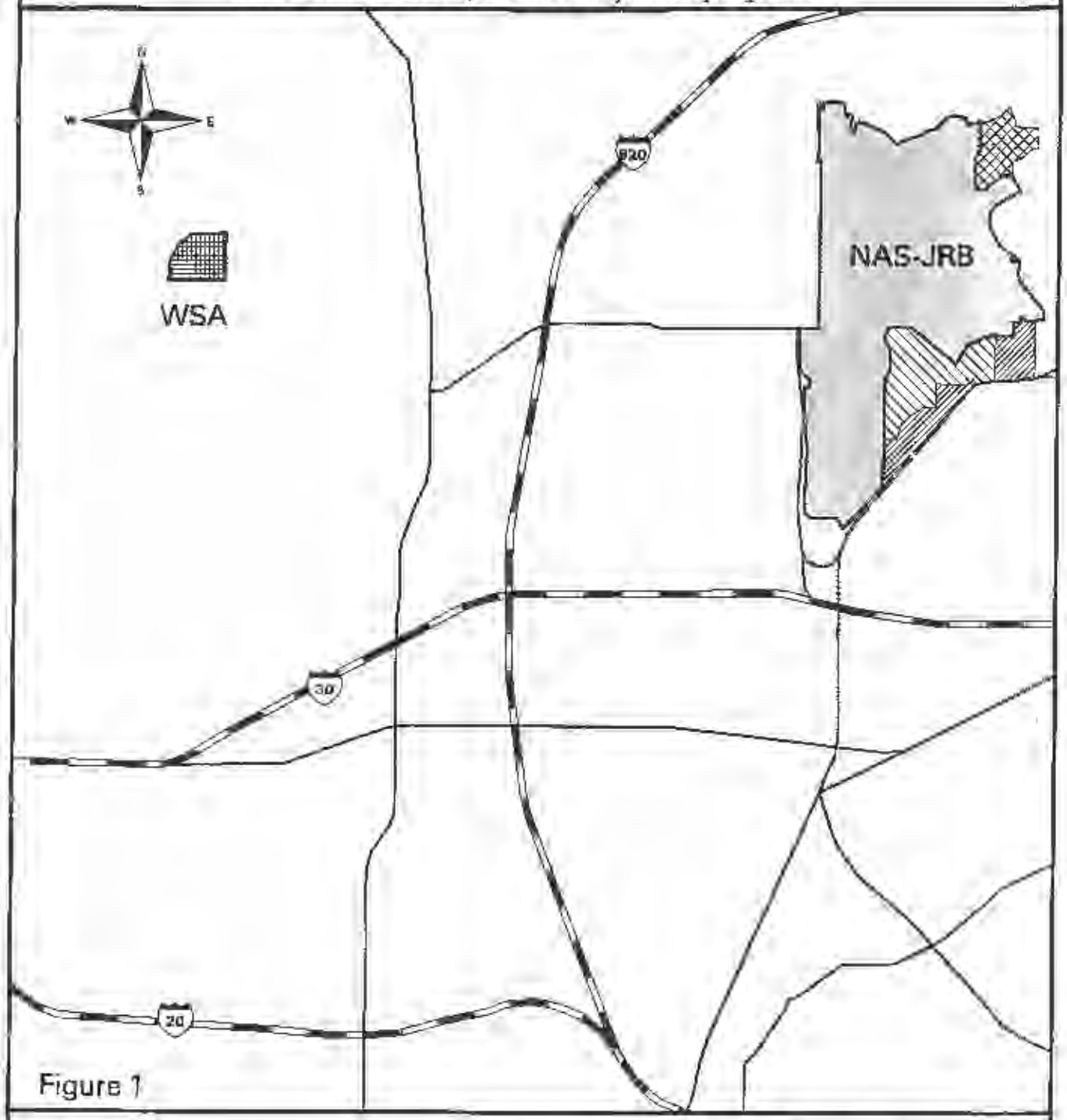
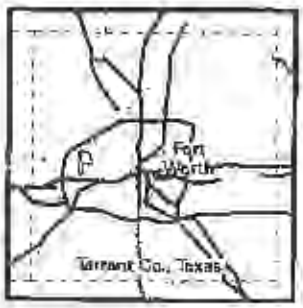


Figure 1

Legend

- NAS-JRB
- Golf Course
- AFSCA/CRA
- Federal Bureau of Prisons
- Weapons Storage Area
- Interstate Highway
- State/Local Road



continues aboveground through the golf course, and flows into the West Fork Trinity River. Lake Worth, an impoundment on the West Fork, forms the northern boundary of the base. The study area is characterized by gentle slopes and low hills with elevations decreasing eastward and towards Lake Worth. The topography is broken by occasional outcrops of limestone on some of the steeper slopes. Much of the underlying rock in the study area is early Cretaceous limestone which gives rise to characteristically alkaline, sandy to loamy soils. In the areas visited, the soil was generally shallow, sandy, loamy soils with limestone chips and gravel in the upper 12 inches of soil. The natural vegetation is primarily prairie grassland with occasional scattered shrubs and small trees.

3.0 WETLAND INVENTORY

3.1 Wetland Ecology

Wetlands are areas where frequent or prolonged inundation by water causes changes in soil characteristics and a proliferation of plant species that are adapted to living in saturated conditions. Some common wetlands such as tidal marshes and bogs are obvious to an observer, but wetlands can form wherever the environmental conditions are right to allow water to collect and change the properties of the soil. Wetlands are defined by three environmental factors; the inundation by water for a significant time during the growing season, chemically reduced soils due to oxygen-poor conditions, and vegetation adapted to a saturated environment. The process of wetland formation and succession can be considered a cyclical process. Standing water affects the amount and type of nutrients in the soil and the ability of plants to anchor themselves and acquire nutrients. Chemical reactions in the soil, due to water saturation, influence the species of plants that are able to survive there. Hydrophytic vegetation contributes to the nutrient content and color of the soil and can influence water runoff. This interrelationship of water, soil, and vegetation is central to the functions performed by wetlands. In addition to providing habitats for plants and animals (including many commercially important and endangered species), wetlands are also essential for filtering pollutants from the water supply, reducing erosion, and acting as storm buffers and flood control. Some wetlands are also popular recreation areas for fishing, boating and bird-watching.

Classification of wetland types is a continuing process. In 1979, the National Wetlands Inventory (NWI) of the U.S. Fish and Wildlife Service (U.S. FWS) published its "*Classification of Wetlands and Deepwater Habitats of the United States*" (Cowardian, et al., 1979); a management-based, hierarchical manual of aquatic and semi-aquatic systems that is still in use today. Under this classification scheme, wetlands are broadly grouped into five systems; marine (open ocean), estuarine (deep-water tidal), riverine (channel), lacustrine (large depression), and palustrine (small depression). These systems are further classified into subsystems and classes by water source and saturation, substrate type, and/or dominant vegetation. A classification scheme of this type provides a useful comparative design for defining the different types of wetland systems.

3.2 Federal Regulations

In the United States, wetlands are considered a subset of Waters of the U.S., a designation which includes territorial oceans, tidal and non-tidal river channels, all navigable waterways and their tributaries, lakes, permanent and intermittent streams, prairie potholes, and other special aquatic sites and their associated wetlands. Several legislative items have been important in the development of wetland protection programs. Executive Order 11990 (1977) tasked all federal agencies to consider the protection of wetlands in their policies, an action which prompted a major policy review in many agencies. More recently, the Wetland Conservation provisions (Swampbuster) of the 1985 and 1990 farm bills (Food Securities Act) encouraged farmers to protect wetlands in order to qualify for U.S. Department of Agriculture farm benefits. However, it was the Federal Water Pollution Control Act of 1972 (as amended) and its 1977 Amendments (collectively known as the Clean Water Act) that were responsible for establishing programs that became the central focus for wetland conservation. Section 404 of the Clean Water Act provides for the regulation of dredge and fill material into Waters of the U.S., including wetlands.

Wetlands that are protected and regulated under Section 404 are termed jurisdictional wetlands; those that are exempt are non-jurisdictional wetlands. Under Section 404, permits are required for those activities that would adversely impact the quality and/or functioning of jurisdictional wetlands through filling, dredging, construction, or development. Regulatory compliance involves locating and delineating these wetlands at project sites, and attempting to find practical alternatives to their destruction. If no alternatives are practical, project coordinators must provide compensation in the form of restoration and/or creation of new wetlands. Activities would be prohibited if destruction of the wetland would seriously degrade the quality of the surrounding water. Permits for regulated activities are issued by the U.S. Army Corps of Engineers, and are issued as either individual or general permits. Individual permits are issued, following review, for single, small-scale projects that would have minimal environmental effects on jurisdictional wetlands. General permits, either regional or nationwide, may be issued to minimize unnecessary red tape for a large-scale or on-going projects, or for projects that are very similar in nature but geographically diverse. These general permits may expire after a certain period of time. Certain activities, primarily related to agriculture, silviculture, or ranching practices are exempt from federal wetland regulations.

4.0 PROCEDURES

4.1 Existing Data Searches and Field Surveys

Landsat Thematic Mapper (TM) satellite imagery, a seven band color representation of geographic features, was examined to attempt to identify wetlands at NAS-JRB. Larger bodies of water such as Lake Worth were readily apparent, but the low resolution of the imagery (25 meters) made the localization of small emergent wetlands impossible. Examination of a black and white digital ortho-photograph of the area produced similar results. Although large bodies of water are apparent and general land-use characteristics are visible on the ortho-photograph, precise determination of wetland properties and boundaries was not possible. Imagery with better resolution was not available at the time of the wetland surveys.

Field surveys of possible wetlands (as identified by personnel from the Environmental Department at the base) were conducted by base personnel and members of the Environmental Division of the Fort Worth District Corps of Engineers to determine the status of these possible wetlands. Surveys were conducted on the afternoons of 13 August 1996 and 26 August 1996. Surveyed areas included the entire Naval Air Station, the adjacent Federal Bureau of Prison land, and the Off-base Weapon Storage Area. Only those sites located within the boundary of NAS-JRB are discussed in the results. Field notes were taken at each site identifying the surrounding environmental conditions, nearby drainages, and topography of the land. Information pertinent to a wetland determination, including the status of the hydrology, soil, and vegetation of the site, was recorded on a standard data form taken from the 1987 *Corps of Engineers Wetland Delineation Manual* (Figure 2). In general, the size of the surveyed wet areas prohibited a precise delineation of wetland boundaries. Site boundaries were measured with a 100 foot measure using vegetation and saturated soils as a guide. A Rockwell PLGR Global Positioning System (GPS) receiver was used to obtain latitude and longitude coordinates at relevant points in the surveyed areas for future incorporation into Arc/Info. Photographs were taken with a 35 mm Pentax K1000 camera (ISO 100 speed film) where it was deemed appropriate to document characteristics of the site. From the field surveys, a site was determined to be a non-jurisdictional site, a Water of the U.S. or a jurisdictional wetland.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: _____ Applicant/Owner: _____ Investigator: _____	Date: _____ County: _____ State: _____
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____
Field Observations
Confirm Mapped Type? Yes No

Taxonomy (Subgroup): _____

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes	No	(Circle)
Wetland Hydrology Present?	Yes	No	
Hydric Soils Present?	Yes	No	

(Circle)
Is this Sampling Point Within a Wetland? Yes No

Remarks:

Approved by HQUSACE 3/92

4.2 Wetland Determination

To positively identify an area as a wetland, at least one indicator for hydrology, hydric soils, and hydrophytic vegetation must be present. In addition, a qualitative analysis of the surveyed area is used to determine if natural wetland conditions exist, or if the surveyed area shows wetland characteristics that are the result of artificial disturbances. While a disturbed site may exhibit all the properties wetland hydrology, soils, and vegetation, it may not be fulfilling the functions of a true wetland, and may not fall under jurisdictional control. Determinations follow procedures in the *Corps of Engineers Wetland Delineation Manual* (1987).

Wetland hydrology is defined by inundation of the area to a depth of 12 inches for a period of time during the growing season. Flooded conditions promote the growth of anaerobic (oxygen-poor) organisms which in turn alter the characteristics of the soil and influence the surrounding vegetation. Wetland hydrology is best indicated by the presence of standing water or saturated (spongy) soils although there are several other indicators that can point to the existence of water inundation when the area appears to be dry. These indicators include sediment deposits, existing drainage patterns, and water marks on trees. Secondary indicators of wetland hydrology include oxidized root canals, water-stained leaves, and the presence of hydric soils and dominant hydrophytic vegetation.

Soils which have been water-logged for enough time become oxygen poor, a condition that influences the type and rates of chemical reactions in the soil and the availability of nutrients for uptake by vegetation. These chemical reactions in wetlands alter the color and mineral content of the soil, conditions which can be used as wetland indicators. Hydric soils are identified in several ways. The Natural Resource Conservation Service (NRCS, formerly the Soil Conservation Service) has identified and mapped soil types throughout the U.S. The NRCS Soil Survey of Tarrant County, Texas allowed preliminary identification of the soil type in each of the surveyed areas. Munsell Soil Color Charts use soil color characteristics to classify soil as hydric or upland. Soil samples from test pits are compared with color chips in the Munsell chart which define three variables for the color: hue (color), value (lightness or darkness), and chroma (brightness). Certain combinations of these variables indicate hydric soils. Color values are also assigned to mottling (marbling) within a soil sample. In general, soil colors with a low chroma designation are likely to be hydric. Other

characteristics of hydric soils include a sulfitic or methanic odor, or gleying, a grey-green coloration due to high concentrations of reduced iron.

Vegetation in saturated, oxygen-poor environments must have adaptations to aid oxygen and nutrient uptake by the roots. The primary adaptation in herbaceous wetland plants is numerous air spaces (aerenchyma) in roots and stems which allow diffusion of oxygen directly from the atmosphere to the roots. In woody plants, adaptations may take the form of "knees," roots that exist above the soil, to fulfill this oxygen requirement. The *National List of Plant Species that Occur in Wetlands* (1988) is the result of the combined efforts of biologists, botanists, and resource managers to define wetland vegetation. Not only does it identify those plant species that are adapted to living in saturated soils, but it provides an indication of the frequency with which a particular species can be found in a wetland system. This list (and the State and Regional Lists that were developed from the National List), is useful in determining the probability that an area is a wetland based on the vegetation. The South Plains, Region 6 list (Reed, 1988) was used during the course of this study.

5.0 RESULTS

The final goal of this survey was to identify wetlands at Naval Air Station Fort Worth, Joint Reserve Base, and categorize them as non-jurisdictional sites, Waters of the United States, or jurisdictional wetlands. Six of the sites surveyed would be subject to federal regulations protecting wetlands. Three of these, the off-base Weapons Storage Area jurisdictional wetland, Farmers Branch main channel (a Water of the U.S.), and the Farmers Branch spillway (a Water of the U.S.) are not located within the boundaries of NAS-JRB, and are not included in the results section. Table 1 is a table of the survey sites within NAS-JRB, their wetland status, a NWI classification of wetland type, and the total area of the site. Attachment A at the back of this report is a map of the locations of these surveyed sites.

5.1 Non-jurisdictional Sites

Non-jurisdictional sites are either areas that do not meet all three requirements of a wetland (hydrology, soil, and vegetation), or wetlands which for some reason do not fall under regulatory control. Several drainage ditches along many of the roads, and artificially ponded areas near some of the buildings were noted. These areas are occasionally flooded by rainfall or rainwater runoff, but do not meet the three criteria of a true wetland. As non-jurisdictional areas, they were not delineated further in this study. Additional sites surveyed during the course of this study did not meet one or several criteria of wetlands are were also classified as non-jurisdictional areas.

5.1a Blast Shield Site

Located in a grassy strip between the blast shields on the east edge of Taxiway 180, and South Apron 161, this site actually consists of two separate wet areas. Their total combined area is less than half an acre, and both are located directly above a water main between two manhole covers. The site is characterized by saturated soils, and some hydrophytic vegetation such as cattails *(Typha latifolia)* and a sedge (*Carex* sp.). Further examination showed some hydric soil characteristics including a slight sulfitic odor, but the soil color did not meet the conditions of hydric soils. In addition, there is no obvious source of water

Table 1.	Wetland Status of Survey Sites		
Site	**Wetland Status**	**NWI Classification**	**Area (acres)**
Blast Shield	non-jurisdictional site	-	0.4
Jennings Drive	non-jurisdictional site	-	0.03
Lake Worth	Water of the U.S.	Lacustrine, unconsolidated bottom	3,560 (total acreage)
West Farmers Branch	Water of the U.S.	Riverine, unconsolidated and/or rock bottom	0.5
Trinity River Seep	jurisdictional wetland	Palustrine emergent	1.3

drainage into the area; the topography is quite flat, and the site is surrounded on all sides by runway pavements and roads. The proximity of several water mains in the vicinity, including one directly below the site, and the clear absence of any upland drainage pattern suggests that the wet area was formed by artificial means, possibly a pipe leak.

5.1b Jennings Drive Site

This site, located on the northwest corner of Jennings Drive and Knights Lake Road, follows an existing drainage ditch east along Jennings Dr., under the paved entrance to a parking lot, and extends about 100 feet along Knights Lake Rd. This site is quite small, with a total area of approximately 1,151 ft^2 (3/100ths of an acre). As in the blast shield site, there are saturated soils, ponding of water in the area, and the remains of cattails (*Typha* sp.) that had been mowed by base personnel. Also similar to the blast shield site, the soils do not meet the criteria of wetland soils, and the source of the water flow is unknown. Due to the absence of hydric soils, the area was not classified as a jurisdictional wetland.

5.2 Waters of the United States

Waters of the U.S. are classified as any territorial open water, navigable waterway, or permanent or intermittent waterway or lake. They are regulated under Section 404 of the Clean Water Act and fall under the regulatory control of the local Corps of Engineers District.

5.2a Lake Worth

The north boundary of NAS-JRB ends above the mean water level of Lake Worth, an impoundment on the West Fork Trinity River. Constructed in 1914 by the U.S. Army Corps of Engineers, the lake has a surface area of approximately 3500 acres (1,416 ha) and an average depth of eight to ten feet (U.S. Army Corps of Engineers, 1989). The lake dam is located at the southeast end of the lake just east of NAS-JRB. The primary use of Lake Worth is municipal water supply, although its uses have extended to include recreational boating, fishing, and picnicking. The lake is lacustrine, open water, unconsolidated bottom body of water.

5.2b West Farmers Branch

Technically part of the Farmers Branch drainage system, this area is geographically separated from the rest of the drainage by the runways. A 1994 Environmental Impact Study by the Air Force (U.S. Air Force, 1994) determined this area along the west boundary of NAS-JRB, just south of Air Force Plant 4 to be a jurisdictional wetland by virtue of being a permanent waterway (Water of the U.S.). A windshield survey of the area during the course of this study reaffirmed the status of this site.

5.3 Jurisdictional Wetland

Two jurisdictional wetlands were identified during the course of this study, however, only one was located within the boundary of NAS-JRB. This site along the Trinity River shows characteristics of wetland hydrology, hydric soils, and hydrophytic vegetation. Table 2 identifies the dominant plant species in this area, and the Region 6 indicator of wetland status. Developmental activities here would be subject to regulatory control under Section 404 of the Clean Water Act.

Trinity River Site

The Trinity River wetland is the only natural wetland found on the base. It encompasses an area of just over an acre along the fence that forms the boundary between NAS-JRB and the Trinity River floodplain. Water trickles down from several points upland, through a small stand of shrubs and low trees, over a steep incline that runs through the wetland, and down to the floodplain. The seeping water had ponded in several places, facilitating wetland formation. Bisecting the upper portion of the wetland is what appears to be an old road bed, approximately 30 feet wide, and elevated somewhat above the surrounding wetland. This discontinuity does not seem to affect the wetlands on either side; water easily flows over the road bed and down the incline in at least two places. The road bed would not, therefore, be a significant upland "island in the wetland from a conservation point of view. With this in mind, the wetland boundary was made to include part of this road.

Characteristics of this wetland include obvious wetland hydrology; saturated soils and about a foot of slow flowing water in a small drainage adjacent to the road bed. The permanence of

the hydrology is suggested by the presence of Mosquito Fish (*Gambusia sp.*) and watercress (*Rorippa sp.*) in the drainage. Anecdotal evidence suggests that the source of water for the seep is a natural spring originating at the west side of the installation that had been paved over and re-routed through underground pipes to its present location. Soils at this site are hydric soils with gleying present and oxidized root canals present in the upper 12 inches of soil. Wetland vegetation at this site includes a preponderance of species that usually occur in wetlands (67 - 99 percent of the time under natural conditions). Species present include two types of cattails (*Typha* sp.), seedbox (*Ludwigia* sp.), Marsh Flatsedge (*Cyperus pseudovegetus*), and Curly Dock (*Rumex crispus*). Figure 3 is the data form for the wetland determination for the Trinity River Site. Table 2 is a list of the dominant plant species found within this wetland, and each plant's status as a wetland species in the Region 6 National List of Plant Species that Occur in Wetlands. The wetland is classified as a palustrine emergent wetland, grading to a scrub-shrub wetland in its southern half. It appears to be very stable, and has existed there for several years according to base personnel. Current plans call for protection and maintenance of this wetland, to promote an awareness of this site as a unique natural resource.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Spring Site Applicant/Owner: Investigator:	Date: Aug 13 96 County: Tarrant State:
Do Normal Circumstances exist on the site? Yes (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: Transect ID: Plot ID:

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Ludwigia	herb	obl	9. Iva annua	herb	FAC
2. Eleocharis caruel	herb	facw	10. Ipomoea purpurea	vine	FAC
3. Sesbania macrocarpa	herb	facw	11.		
4. Typha latifolia	herb	obl	12.		
5. Typha angustifolia	herb	obl	13.		
6. [illegible]	herb	facw	14.		
7. Rumex crispus	herb	facw	15.		
8. Rorippa [illegible]	herb	obl	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: 0-12 (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: _____ (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ✓ Inundated
- ✓ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ✓ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ✓ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name (Series and Phase): Frio Drainage Class: _____

Field Observations Confirm Mapped Type? Yes No

Taxonomy (Subgroup): _____

Profile Description:

Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-10	A	10YR 3/2	10YR 5/6	few	
10+	B	10YR 3/2			

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ✓ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes	No (Circle)	(Circle)
Wetland Hydrology Present?	Yes	No	
Hydric Soils Present?	Yes	No	Is this Sampling Point Within a Wetland? Yes No

Remarks:

Approved by HQUSACE 3/92

Table 2.	Dominant Plant Species in the Wetland Site			
Site	**Scientific Name**	**Common Name**	**Stratum**	**Indicator**[†]
Trinity River Site	*Cyperus pseudovegetus*	Marsh Flatsedge	herb	facw
	Echinochola crusgalli	Barnyard Grass	herb	facw
	Ipomoea purpurea	Common Morning-glory	vine	fac
	Iva annua	Annual Sumpweed	herb	fac
	Ludwigia sp.	seedbox	herb	obl
	Rorippa sp.	yellow-cress	herb	obl
	Rumex crispus	Curly Dock	herb	facw
	Sesbania macrocarpa	Sesbania	herb	facw
	Typha angustifolia	Narrow-leaf Cattail	herb	obl
	Typha latifolia	Broad-leaf Cattail	herb	obl

[†] Source: *National List of Plant Species That Occur in Wetlands: South Plains (Region 6).* U.S. Fish and Wildlife Service, Biological Report.

OBL Occurs in wetlands > 99% of the time under natural conditions (estimated)

FACW occurs in wetlands 67% to 99% of the time under natural conditions (estimated)

FAC occurs in wetlands 34% to 66% of the time under natural conditions (estimated)

FACU occurs in wetlands 1% to 33% of the time under natural conditions (estimated)

UPL occurs in wetlands < 1% of the time under natural conditions (estimated)

6.0 CONCLUSIONS

Jurisdictional areas, in the form of Waters of the U.S. and palustrine emergent wetlands, exist on property owned and/or managed by Naval Air Station Fort Worth, Joint Reserve Base. Although only covering approximately one acre, the palustrine emergent wetland represents a unique natural environment at NAS-JRB. Both this area and the unconsolidated bottom riverine and lacustrine systems are protected from disturbance under Section 404 of the federal Clean Water Act. Protection and maintenance of these areas, as is underway at NAS-JRB, is essential to their continuing existence and enjoyment by base personnel.

7.0 SOURCES CONSULTED

Cowardian, Lewis M., Virginia Carter, Francis C. Golet, and Edward T. LaRoe, 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service Publication FWS/OBS-79/31, Washington, DC.

Environmental Laboratory, 1987. *Corps of Engineers Wetland Delineation Manual*, Technical Report Y-87-1. U.S. Army Waterways Experiment Station, Vicksburg, MS.

Mitsch, William J., and James G. Gosselink, 1986. *Wetlands*. Van Nostrand Reinhold. New York, N.Y.

Smith, R. D., Ammann, A., Bartoldus, C., and Brinson, M. M., 1995. *An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices*. Technical Report WRP-DE-9, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

U.S. Army Corps of Engineers, 1989. *Special Project Report, Lake Worth Silt Removal, Fort Worth, Texas*. U.S. Army Corps of Engineers, Fort Worth District, Fort Worth, TX.

U.S. Department of Agriculture, 1996. *Field Indicators of Hydric Soils in the United States, Version 3.1*. Natural Resources Conservation Service.

U.S. Department of Agriculture, 1995. *Tarrant County, Texas Soils Map*. Soil Conservation Service.

Reed, P.B., Jr. 1988. *National List of Plant Species that Occur in Wetlands: South Plains (Region 6)*. U.S. Fish and Wildlife Service, Biological Report 88(26.6), 94 pp.

U. S. Air Force, 1994. *Disposal and Reuse of Carswell Air Force Base, Texas*. Final Environmental Impact Statement.

8.0 ACKNOWLEDGMENTS

Support for this wetland project was provided by members of the U.S. Army Corps of Engineers, Fort Worth District (CESWF) and the Environmental Department of the Naval Air Station Fort Worth, Joint Reserve Base (NAS-JRB). Ms. Ellen M. Haas, CESWF Planning Division, was primary author and GIS specialist. Mr. Ishmael Williams, CESWF Planning Division, provided technical assistance and field work support. Mr. David Madden, CESWF, Operations Division was the wetland specialist for the wetland determinations. Mr. J. D. Davis, NAS-JRB Environmental Department was the primary contact at the Naval base and responsible for coordinating all activities at the base and the off-base Weapon Storage Area. Additional support was provided by Mr. Al Filesi, NAS-JRB Environmental Department, and Mr. Pat Cline, Southland Division NAFAC-ENGCON, Charleston.

File: 17G
A.F.

189000

NAVAL AIR STATION
FORT WORTH JRB
CARSWELL FIELD
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 189

File:
A.F. 171.3
189
189001

BRAC Cleanup Plan (BCP)

Carswell Air Force Base,

(Currently known as Naval Air Station Fort Worth Joint Reserve Base, Carswell Field)

Fort Worth, Texas

Implementing President Clinton's Decision to Promote Early Reuse of Closing Bases by Expediting Environmental Cleanup

April 1995

189002

BRAC Cleanup Plan (BCP) Carswell Air Force Base*, Fort Worth, Texas

Implementing President Clinton's Decision to Promote Early Reuse of Closing Bases by Expediting Environmental Cleanup

April 1995

*Carswell Air Force Base was realigned in October 1994. The Navy is responsible for the operation of the base within the fenced perimeters. The portion of the base for which the Navy is responsible is referred to as the Naval Air Station Fort Worth Joint Reserve Base. In this document, the entire property is referred to as Carswell Air Force Base.

189003

TAB

ACRONYMS

List of Acronyms

AAFES	Army and Air Force Exchange Service
ACC	Air Combat Command
ACM	Asbestos Containing Material
AF	Air Force
AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AFCEE	Air Force Center for Environmental Excellence
AFFF	aqueous film-forming foam
AFRES	Air Force Reserve
AGE	aerospace ground equipment
ANSC	area of no suspected contamination
AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirements
ASC	Aero Systems Center
AST	aboveground storage tank
BCP	BRAC Cleanup Plan
BCT	BRAC Cleanup Team
BEC	BRAC Environmental Coordinator
BRAC	Base Realignment and Closure
BW	Bomb Wing
CAFB	Carswell Air Force Base
CAM	Continuous Automated Monitoring
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFC	chlorinated fluorocarbon
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
CRA	Carswell Redevelopment Authority
CRP	Community Relations Plan
CWA	Clean Water Act
DBCRA	Defense Base Closure and Realignment Act of 1988 and Defense Base Closure and Realignment Act of 1990, collectively
DD	Decision Document
DEIS	Draft Environmental Impact Statement
DERA	Defense Environmental Restoration Account
DOD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
DSMOA	Defense-State Memorandum of Agreement
EBS	environmental baseline survey
EC-CR	environmental compliance/closure-related

EC-MR	environmental compliance - maintenance related
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPC	Environmental Protection Committee
ES	Executive Summary
°F	degrees Fahrenheit
FBOP	Federal Bureau of Prisons
FEIS	Final Environmental Impact Statement
FFA	Federal Facility Agreement
FOST	Finding of Suitability to Transfer
FS	feasibility study
FW	Fighter Wing
FY	fiscal year
HQ	Headquarters
HRS	Hazardous Ranking System
IRA	interim remedial action
IRP	Installation Restoration Program
IRPIMS	Installation Restoration Program Information Management System
JRB	Joint Reserve Base
LTM	Long-Term Monitoring
LTRO	long-term remedial operation
MCL	maximum contaminant level
µg/l	micrograms per liter
mg/l	milligrams per liter
MOA	Memorandum of Agreement
MOGAS	leaded motor gasoline
MSL	mean sea level
N/A	Not Available
NA	Not applicable
NAS	Naval Air Station
NAS Fort Worth JRB	Naval Air Station Fort Worth Joint Reserve Base
NCTCOG	North Central Texas Council of Governments
NEPA	National Environmental Policy Act, as amended
NFA	no further action
NFADD	No Further Action Decision Document
NFRAP	No Further Response Action Planned
NHPA	National Historic Reservation Act
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List

NPS	National Park Service
NRHP	National Register of Historic Places
NTU	normalized turbidity unit
OL	Operating Location
OPR	Office of Primary Responsibility
OU	operable unit
OWS	oil/water separator
PA	preliminary assessment
PA/SI	preliminary assessment/site investigation
PCB	polychlorinated biphenyl
pCi/l	picocuries per liter
pH	measure of acidity and alkalinity
POI	Points of Interest
POL	petroleum, oil, and lubricant
PP	proposed plan
ppb	parts per billion
PST	petroleum storage tank
QA/QC	quality assurance/quality control
RA	remedial action
RAB	Restoration Advisory Board
RAMP	Radon Assessment and Mitigation Plan
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act, as amended
RD	remedial design
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RFI RP	RCRA Facility Investigation Remediation Plan
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
ROI	Region of Influence
RP	Remediation Plans
RPM	Remedial Project Manager
SAC	Strategic Air Command
SARA	Superfund Amendments and Reauthorization Act
SCS	Site Characterization Summary
SHPO	State Historic Preservation Officer
SI	site inspection
SWMU	solid waste management unit
TBD	to be determined
TCE	trichloroethylene
TDPW	Texas Department of Parks and Wildlife
TNRCC	Texas Natural Resource Conservation Commission

TPM	Technical Project Manager
TRC	Technical Review Committee
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
TWC	Texas Water Commission
US	United States
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
WHCA	White House Communications Agency
WIMS-ES	Work Information Management System - Environmental Subsystem
WSA	weapons storage area

189007

189008

TAB

SUMMARY

CARSWELL AIR FORCE BASE BRAC CLEANUP PLAN

EXECUTIVE SUMMARY

Introduction

As part of President Clinton's Five-Part Plan to expedite environmental cleanup at closure bases, this Base Realignment (BRAC) Cleanup Plan (BCP) was developed as a road map for execution of the cleanup. All information required for Carswell Air Force Base (AFB) to meet an ultimate cleanup goal of calendar year 2013 is contained.

A BRAC Cleanup Team (BCT) has been established to develop and maintain this plan and to implement the environmental restoration activities required for property disposal. The BCT includes representatives from the U.S. Environmental Protection Agency (EPA), Texas Natural Resource Conservation Commission (TNRCC), and various other restoration and compliance decision makers.

This BCP contains the status, management and response strategy, and action items related to the ongoing Carswell Air Force Base environmental restoration and associated compliance programs. These programs support full restoration of the base property, which is necessary to meet the requirements for property disposal and reuse activities associated with the closure of the installation. The scope of the BCP considers the following regulatory mechanisms: the Base Closure and Realignment Act; National Environmental Policy Act; Comprehensive Environmental Response, Compensation and Liability Act, as amended by the Community Environmental Response Facilitation Act; Resource Conservation and Recovery Act (RCRA); and other applicable laws.

The BCP is a planning document, and the information and assumptions presented may not necessarily have complete approval from the U.S. Air Force and/or federal and state regulatory agencies. The BCP is a dynamic document that will be regularly updated to reflect the current status and strategies of remedial actions. This document is the first in a series of updates/modifications and represents conditions and strategies as of April 1995.

Status of Disposal, Reuse, and Interim Lease Process

Carswell AFB officially closed on 30 September 1993. A portion of the base property, the cantonment, has been retained by the Air Force. The 1993 Defense Base Closure and Realignment Act (DBCRA) allowed for the retained cantonment to be expanded. A portion of the base was occupied by the 301 Tactical Fighter Wing Air Force Reserve. On 1 October 1994 the base was realigned and turned over to the Navy. It was renamed the Naval Air Station (NAS) Fort Worth, Joint Reserve Base (JRB) Carswell Field.

A Draft Disposal Plan is undergoing revision and will reflect the 1993 DBCRA decisions. The schedule for completion has not been determined.

The Air Force is in the process of issuing several small interim leases. Presently the golf course is the only interim lease.

Status of Environmental Restoration Program

Carswell AFB is not a National Priorities List (NPL) installation. The base has 19 Installation Restoration Program (IRP) sites and 1 site that may be included in the IRP. These 19 sites are grouped into three operable units (OU) based on previously designated reuse parcels. Eight sites are approved for No Further Action (NFA), and two sites are in approved remedial action (RA). Of the remaining sites, two are in remedial investigation (RI) (Landfill 6, Airfield Groundwater), three are in RA (POL Tank Farm, Flightline Ditch, Fire Training Area No. 2), one is in an RI/feasibility study (Base Service Station), one is undergoing a focused RI (Unnamed Stream), three are in a remedial design phase that has been delayed (Landfills 4, 5, Waste Burial Area), one is currently being monitored with an interim removal to take place in fiscal year (FY) 1994 (Off-Site Weapons Storage Area). OU 1 will be cleaned up first as Parcel A has been identified as the area having the highest reuse priority. OU 1 also contains the Airfield Groundwater site, which presents the greatest health threat due to off-site migration of contaminants. A Record of Decision (ROD) is planned for OU 1 in FY 1995. Treatment technology involving groundwater pumping and treating, along with air stripping should be in place by FY 1996. OU 2 will receive second priority as Parcel B. Contained in Parcel B is the Base Service Station Site. This site presents a serious problem due to off-site migration to the Trinity River. An ROD for this site is planned for FY 1995 with groundwater pump and treat being the proposed technology. OU 3 has not been identified as being a major health threat with the Low-Level Radium Disposal Site being the only IRP site in the area. However, due to the sensitivity of the contaminants, this site will undergo an interim removal in FY 1994. An ROD is expected before the end of FY 1994. The technology used for this site will consist of removal and off-site disposal of the source.

Most IRP sites are regulated under the base RCRA Part B permit issued by the U.S. EPA Region VI, with the TNRCC as lead regulatory agency.

Restoration-related compliance activities projects include closure or removal of underground and aboveground storage tanks, closure of active RCRA units, polychlorinated biphenyl (PCB) and asbestos management, wastewater discharge permit maintenance, oil/water separator cleanup, and Freon removal.

Cost

The total estimated cost for cleanup of Carswell AFB is $184 million. This includes all studies, designs, RAs, early removals, and long-term remedial operations (LTROs).

Key Restoration and Transferability Strategies and Schedules

Carswell AFB closed on 30 September 1993. The Environmental Impact Analysis Process for hase disposal and reuse is in progress and the draft Environmental Impact Statement was released for public review in February 1993 and distributed in Fehruary 1994 for public review. The ROD, scheduled for publication in June 1994, will support the disposal decisions hased on both the 1990 and 1993 DBCRA. In April 1993, the Secretary of the Air Force declared excess and surplus the off-base property known as Kings Branch to accelerate its disposal for civilian residential use.

Environmental restoration efforts have considered closure and reuse. An Environmental Baseline Survey (EBS) was prepared in December 1993 to determine the environmental condition of all base property. The EBS supported accelerated disposal of the surplus Kings Branch parcel. Environmental-condition-of-property determinations were conducted for specific parcels to support interim leases. A strategy to develop and maintain basewide environmental-condition-of-property and suitability-of-transfer maps has not been developed.

The strategy for transfer of responsibilities for base restoration and compliance activities from current management under the Air Combat Command to the Air Force Base Conversion Agency (AFBCA), Operating Location (OL) H, is detailed in a Memorandum of Agreement.

A draft Partnering Agreement between the OL-H and Air Force Plant 4 has been finalized. This agreement established responsibilities to he assigned during the remediation portion of the Air Force Plant 4 IRP for the trichloroethylene groundwater plume migrating from Air Force Plant 4 towards Carswell AFB property.

The BCP strategies are in the initial stages of development, and several technical/management guidelines need to be established to ensure that the environmental restoration objectives can be successfully integrated with the property transfer goals in an expeditious manner. Program restoration schedules currently extend through 2013.

Summary of Current BRAC Cleanup Plan Action Items

Table ES-1 provides a listing of recommendations and issues associated with environmental restoration, compliance, and technical/management action items guidance that require further evaluation and implementation by the BCT. A bottom-up review of this plan was conducted on 16 February 1994 with representatives of the BCT present. The BCT has found a number of ways to accelerate and cut costs. Over $10 million will be saved at five sites by using the Texas Risk Reduction Rules as opposed to total removal and disposal of contaminated soils. The clean up can be accomplished in 6 to 10 months instead of 2 to 3 years.

Table ES-1. BCT Action Items

Action Item	Program Review Item	Status: Complete	Status: In Progress	Status: To Be Performed
RESTORATION ACTIVITIES				
- Identify additional sites for interim actions, as appropriate	17, 19	X		
- Complete and implement CRP	14	X		
- Complete and maintain administrative record	14		X	
- OL-H to become member of AF Plant 4 TRC	14	X		
- Research and implement thermal treatment for POL-contaminated soils	15, 25		X	
- Assess environmental condition of off-base properties	9		X	
- Develop process to update and maintain environmental-condition-of-property map	9, 28		X	
- Identify and map areas suitable for transfer	9, 28	X		
COMPLIANCE ACTIVITIES				
- Develop pipeline removal/abandonment strategy	16	X		
- Designate essential and nonessential ASTs	16	X		
- Determine number and location of hazardous waste accumulation points to be closed	16, 18	X		
- Ensure tenant compliance with RCRA	16, 18	X		
- Review tenant hazardous waste management and spill prevention and response plans	16, 18	X		
- Disclose asbestos status to lessees	16	X		
- Disclose location of PCB capacitors to lessee/recipient	16, 20	X		
- Update annual PCB location documents	16, 20	X		
- Sample and prepare report for NPDES	16, 18	X		
- Disclose need for radon investigations	16	X		
- Identify OWSs for reuse	16, 18	X		
- Identify and apply for air emissions credits	16	X		
- Use recovered Freon as credit against Freon removal costs	16			X
MANAGEMENT AND ADMINISTRATIVE SUPPORT ACTIVITIES				
- Establish and maintain central data file (IRPIMS)	21			X
- Determine usability of historical data sets	21			X
- Implement data quality management for current and future projects	20		X	
- Identify and fill data gaps	22		X	
- Establish background concentrations of elements for use in risk assessments	23		X	
- Evaluate anticipated land use as criterion in risk assessment assumptions	28		X	

Community Involvement

A Restoration Advisory Board was formed on 26 January 1994 and is functioning well. Community representatives have been involved in the cleanup process and have been very approving of our efforts regarding clean up.

Compliance Program

The Environmental Compliance Program at Carswell AFB consists of removal of PCB transformers, underground storage tanks, hydrant fueling system, lead-based paint and chlordane surveys, and residual hazardous waste removals. These items will be addressed in FY 1995 with a cost in excess of $9.6 million. In addition, there are several sites requiring investigation and potential remediation that will be included as part of the Environmental Compliance-Closure Related Program. These include an Old Base Refueling Site, Grounds Maintenance Yard, Recreational Vehicle Parking Area, and Aerospace Museum Site. The cost of investigation and potential design and remediation will exceed $13 million and will extend through FY 1998 (including) LTRO.

Cultural Resources

The Historic Buildings Survey is complete. Facilities eligibilities for inclusion in the National Register of Historic Places include Building 218 (Golf Clubhouse), Building 233 (Golf Course Maintenance Shop), Building 260 (Hyde House), and Structure 1809 (Concrete Water Tower).

Natural Resources

Two jurisdictional wetlands and six non-jurisdictional wetland areas have been identified. There is no pending mitigation action that will require funding during FY 1994. There are no threatened or endangered (aquatic or biotic) species known or suspected to exist on the installation or its off-base property.

Technical/Regulatory Issues

A major regulatory issue was the possible inclusion of Carswell AFB on the NPL. It has been determined that Carswell AFB is not a NPL site. A second issue is the new requirement by the TNRCC to reinvestigate 48 solid waste management units (SWMUs) once designated as NFA sites in the RCRA Facilities Assessment, January 1989.

Summary of Items to Complete

It is imperative that the BCT continue to meet on a monthly basis to discuss the progress of the Airfield Groundwater Site Characterization and the reinvestigation of the 48 SWMUs as requested by the TNRCC.

189011

THIS PAGE INTENTIONALLY LEFT BLANK

189015

TAB

TABLE OF CONTENTS

189616

Table of Contents

Chapter Page

1 Introduction and Summary 1-1
1.1 Environmental Response Objectives 1-2
1.2 BCP Purpose, Updates, and Distribution 1-3
1.3 BRAC Cleanup Team/Project Team 1-3
1.4 Brief History of Installation 1-5
1.5 Off-Base Property/Tenants 1-17

2 Property Disposal and Reuse Plan 2-1
2.1 Status of Disposal Planning Process 2-1
2.2 Relationship to Environmental Programs 2-4
2.3 Property Transfer Methods 2-4
2.3.1 Federal Transfer of Property 2-4
2.3.2 No-Cost Public Benefit Conveyance 2-5
2.3.3 Negotiated Sale 2-5
2.3.4 Widening of Public Highways 2-5
2.3.5 Donated Property 2-5
2.3.6 Interim Leases 2-5
2.3.7 Competitive Public Sale 2-6
2.3.8 Ingrants and Outgrants 2-6

3 Installation-Wide Environmental Program Status 3-1
3.1 IRP Status 3-1
3.1.1 IRP Sites 3-1
3.1.2 Installation-Wide Source Discovery and Assessment Status 3-6
3.2 Compliance Program Status 3-8
3.2.1 Storage Tanks 3-8
3.2.2 Hazardous Materials/Waste Management 3-15
3.2.3 Solid Waste Management 3-15
3.2.4 Polychlorinated Biphenyls (PCBs) 3-15
3.2.5 Asbestos 3-15
3.2.6 Radon 3-15
3.2.7 RCRA Facilities (SWMUs) 3-16
3.2.8 NPDES Permits 3-16
3.2.9 Oil/Water Separators 3-16
3.2.10 Air 3-16
3.3 Status of Natural and Cultural Resources 3-16
3.3.1 Threatened and Endangered Species (State and Federal) 3-18
3.3.2 Sensitive Habitats 3-19
3.3.3 Wetlands 3-21
3.3.4 Surface Waters 3-21
3.3.5 Floodplains 3-23
3.3.6 Paleontological Resources 3-23

Table of Contents (Continued)

180217

Chapter Page

3.3.7 Historic Structures 3-23
3.3.8 Prehistoric Sites 3-24
3.3.9 Traditional Resources 3-25
3.4 Environmental Condition of Property 3-25
3.4.1 Areas Where No Storage, Release, or Disposal Has Occurred 3-27
3.4.2 Areas Where Only Storage Has Occurred 3-27
3.4.3 Areas Where Storage, Release, Disposal, and/or Migration Has Occurred, but Require No Remedial Action 3-27
3.4.4 Areas Where Storage, Release, Disposal, and/or Migration Has Occurred, and All Remedial Actions Have Been Taken 3-27
3.4.5 Areas Where Storage, Release, Disposal, and/or Migration Has Occurred, and Action is Underway, but Not Final 3-29
3.4.6 Areas Where Storage, Release, Disposal, and/or Migration Has Occurred, but Required Response Actions Have Not Been Taken 3-29
3.4.7 Unevaluated Areas or Areas Requiring Additional Evaluation 3-29
3.4.8 Suitability of Installation Property for Transfer by Deed 3-29
3.5 Status of Community Involvement 3-29

4 Installation-Wide Strategy for Environmental Restoration 4-1
4.1 Zone/OU Designation and Strategy 4-1
4.1.1 Zone Designations 4-1
4.1.2 OU Designations 4-1
4.1.3 Sequence of OUs 4-3
4.1.4 Early Actions Strategy 4-4
4.1.5 Remedy Selection Approach 4-5
4.2 Compliance Strategy 4-6
4.2.1 Storage Tanks 4-6
4.2.2 Hazardous Materials/Waste Management 4-8
4.2.3 Solid Waste Management 4-8
4.2.4 Polychlorinated Biphenyls (PCBs) 4-9
4.2.5 Asbestos 4-9
4.2.6 Radon 4-9
4.2.7 RCRA Facilities (SWMUs) 4-10
4.2.8 NPDES Permits 4-10
4.2.9 Oil/Water Separators 4-10
4.2.10 Air 4-11

4.3 Natural and Cultural Resources Strategy 4-11
4.3.1 Threatened and Endangered Species (State and Federal) 4-11

189013

Table of Contents
(Continued)

Chapter Page

4.3.2 Sensitive Habitats 4-11
4.3.3 Wetlands 4-12
4.3.4 Surface Waters 4-12
4.3.5 Floodplains 4-12
4.3.6 Paleontological Resources 4-12
4.3.7 Historic Structures 4-12
4.3.8 Prehistoric Sites 4-12
4.3.9 Traditional Resources 4-12
4.3.10 Other Applicable Categories 4-12
4.4 Community Involvement/Strategy 4-13
4.5 Environmental Condition and Suitability for Transfer Study 4-13

5 Environmental Master Schedules 5-1
5.1 Environmental Restoration Program 5-1
5.1.1 Response Schedules 5-1
5.1.2 Requirements by Fiscal Year 5-4
5.2 Compliance Programs 5-4
5.2.1 Master Compliance Schedules 5-4
5.2.2 Requirements by Fiscal Year 5-7
5.3 Natural and Cultural Resources 5-7
5.3.1 Natural and Cultural Resources Schedule(s) 5-7
5.3.2 Requirements by Fiscal Year 5-7
5.4 BCT Meeting Schedule 5-7

6 Technical and Other Issues to be Resolved 6-1
6.1 Data Usability 6-1
6.1.1 BCT Action Items 6-1
6.1.2 Rationale 6-1
6.1.3 Status/Strategy 6-1
6.2 Information Management 6-2
6.2.1 BCT Action Items 6-2
6.2.2 Rationale 6-3
6.2.3 Status/Strategy 6-3
6.3 Data Gaps 6-3
6.3.1 BCT Action Items 6-3
6.3.2 Rationale 6-3
6.3.3 Status/Strategy 6-4
6.4 Background Levels 6-4
6.4.1 BCT Action Items 6-4
6.4.2 Rationale 6-4
6.4.3 Status/Strategy 6-4

Table of Contents
(Continued)

Chapter		Page
6.5	Risk Assessments	6-5
	6.5.1 BCT Action Items	6-5
	6.5.2 Rationale	6-5
	6.5.3 Status/Strategy	6-5
6.6	Basewide Remedial Action Strategy	6-5
6.7	Interim Monitoring of Groundwater and Surface Water	6-5
6.8	Excavation of Contaminated Materials	6-6
6.9	Protocols for Remedial Design Reviews	6-6
6.10	Conceptual Models	6-6
6.11	Cleanup Standards	6-6
6.12	Initiatives for Accelerating Cleanup	6-6
6.13	Remedial Actions	6-8
6.14	Review of Selected Technologies for Application o8 Expedited Solution	6-8
6.15	Hot Spot Removals	6-8
6.16	Identification of Clean Properties	6-8
6.17	Overlapping Phases of the Cleanup Process	6-8
6.18	Improved Contracting Procedures	6-8
6.19	Interfacing with the Community Reuse Plan	6-8
6.20	Bias for Cleanup Instead of Studies	6-8
6.21	Expert Input on Contamination and Potential Remedial Actions	6-10
6.22	Presumptive Remedies	6-10
6.23	Partnering (Using Innovative Management, Coordination, and Communication Techniques)	6-10
6.24	Updating the EBS and Natural/Cultural Resources Documentation	6-10
6.25	Implementing the Policy for On-Site Decision Making	6-10

Appendix A	Fiscal Year Funding Requirements/Costs
Appendix B	Installation Environmental Restoration Documents Summary Tables
Appendix C	Decision Document/ROD Summaries
Appendix D	No Further Response Action Planned (NFRAP) Summaries
Appendix E	Conceptual Site Model Data Summaries
Appendix F	Additional Information
Appendix G	RACER Estimates

189000

List of Figures

Figure		Page
1-1	Location of Past Hazardous Substance Activities	1-9
1-2	Off-Base Parcels	1-18
1-3	Existing Off-Base Land Use	1-33
2-1	Disposal and Reuse Parcels	2-2
3-1	Site and OUs Currently Under Investigation	3-5
3-a	Sensitive Habitats	3-20
3-b	Cultural Resources	3-26
3-2	Environmental Condition of Property	3-28
3-3	Suitability of Property for Transfer	3-31
4-1	Sequence and Primary Document Timeline for OUs	4-2
5-1	Projected Master Restoration Schedule	5-2
5-3	Projected Master Schedule for Closure-Related Compliance Programs	5-6
5-4	Projected Schedule for Natural and Cultural Resources Activities	5-8
F-1	Location of Non-Air Force Tenants	F-1
F-2	Proposed Action	F-2
F-3	Concentrations of Principle Contaminants-Trichloroethylene Groundwater Plume	F-3

189021

List of Tables

Table		Page
1-1	Current BRAC Cleanup Team/Project Team Members	1-4
1-2	History of Installation Operations	1-6
1-3	Hazardous Waste Generating Activities	1-10
1-4	Off-Base Properties	1-17
1-5	On-Base Tenant Units	1-19
1-6	Property Acquisition Summary	1-21
2-1	Reuse Parcel Data Summary	2-3
2-2	Existing Legal Agreements/Interim Leases	2-5
2-3	Ingrants in Effect at Base Closure	2-6
2-4	Outgrants in Effect at Base Closure	2-7
3-1	Preliminary Location Summary	3-2
3-2	Site Summary	3-3
3-3	Early Actions Status	3-6
3-4	Mission/Operational-Related Compliance Projects	3-7
3-5	Closure-Related Compliance Projects	3-7
3-6	Compliance Early Action Status	3-8
3-7	Underground Storage Tank Inventory	3-9
3-8	Aboveground Storage Tank Inventory	3-12
3-9	Threatened, Endangered, and State Ranked Species Potentially Occurring in the Vicinity of Carswell AFB	3-19
3-10	Historical and Cultural Resource Sites	3-24
4-1	Relationship Between IRP Sites, OUs, and Parcels	4-3
4-2	Cleanup Sequence	4-4
4-3	Environmental Restoration Planned Early Actions	4-5
4-4	Environmental Compliance Planned Early Actions	4-7
5-1	BCT Team Meeting Schedule	5-8
6-1	Future Land Use Risk Assessment for Development of Remedy Selections	6-7
6-2	Human Health Standards	6-9
6-3	Surface Water Standards	6-9
A-1	Restoration Summary-DERA	A-1
A-2	Restoration Summary-Compliance	A-4
A-3	Restoration Summary-BRAC	A-7
A-4	Environmental Compliance Summary	A-10
A-5	Natural/Cultural Resources Summary	A-12
A-6	Total Environmental Program Summary	A-13
A-7	IRP Cost Summary for Carswell AFB	A-14
B-1	Project Deliverables	B-1
B-2	Site Deliverables	B-3
B-3	Technical Documents/Data Loading Status Summary	B-4
E-1	Conceptual Site Model Data Summary, Site TBD, Chemical Standards Summary	E-2
E-2	Summary of Background Concentrations, Vicinity of Carswell AFB, Texas	E-3
E-3	Total Metal Results for Background Groundwater Locations	E-4

180622

TAB

CHAPTER 1.0

189023

Chapter 1
Introduction and Summary

As a result of past waste and resource management practices at Carswell Air Force Base (AFB), some areas have become contaminated by various toxic and/or hazardous compounds. In response, an environmental restoration program has been initiated at the base. In addition, compliance with applicable laws and regulations ensures that present waste and resource management practices conducted by the Air Force and property lessees are carried out in a manner that protects human health and the environment.

The purpose of this Base Realignment and Closure (BRAC) Cleanup Plan (BCP) is to summarize the current status of the Carswell AFB environmental restoration and associated environmental compliance programs, and present a comprehensive strategy for implementing response actions necessary to protect human health and the environment. This strategy integrates activities being performed under the Installation Restoration Program (IRP) and the associated environmental compliance programs to support restoration of the base. The BCP is a dynamic document that will be regularly updated to incorporate newly obtained information and reflect the completion or change in status of any remedial actions (RAs). This BCP was prepared with information available as of April 1995.

This BCP is a planning document. Information, schedules, and RAs presented in this BCP do not necessarily represent those that have been or will be approved by the Air Force or federal and state regulatory agencies. It was necessary to make certain assumptions and interpretations to develop the estimates. As additional data becomes available, implementation programs and cost estimates could be dramatically altered. Such changes would then be reflected in future updates to the BCP.

Chapter 1 describes the objectives of the environmental restoration program, explains the purpose of the BCP, introduces the BRAC Cleanup Team (BCT) formed to review the program, and provides a brief history of the base.

Chapter 2 summarizes the current status of the Carswell AFB property disposal planning process and describes the relationship of the disposal process with other environmental programs.

Chapter 3 summarizes the current status and past history of the Carswell AFB IRP and environmental compliance programs, community relations activities that have occurred to date, and the environmental condition of base property.

Chapter 4 describes the basewide strategy for environmental restoration, including the strategies for dealing with each operable unit (OU) on base. This chapter also includes plans for addressing waste sources managed under the underground storage tank (UST) program hazardous waste management program, and other associated compliance programs related to restoration, base closure, leases, and the military area interactions.

Chapter 5 provides master schedules of planned and anticipated activities to be performed throughout the duration of the environmental restoration program, including associated compliance activities.

Chapter 6 describes specific technical and/or administrative issues to be resolved and presents a strategy for resolving these issues.

In addition to the main text, the following appendices are included in this document:

- Appendix A - tables presenting restoration and compliance funding requirements, as well as a summary table of past costs for the environmental restoration program
- Appendix B - technical documents and data loading summary, listings of previous environmental restoration program deliverables by program and by site
- Appendix C - summaries of decision documents (DDs) for which an RA was selected
- Appendix D - summaries of each DD for each site or OU for which a no further action (NFA) decision has been made
- Appendix E - working conceptual models for sites, zones, or OUs
- Appendix F - a property acquisition summary, maps of non-AF tenants, proposed actions, and TCE concentrations, as well form 1391s for Carswell AFB.

1.1 Environmental Response Objectives

The objectives of the base closure environmental restoration program at Carswell AFB are as follows:

- Protect human health and the environment.
- Strive to meet reuse goals established by service and community.
- Comply with existing statutes and regulations.
- Conduct all IRP activities in a manner consistent with Section 120 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and Community Environmental Response Facilitation Act (CERFA).
- Establish priorities for environmental restoration and restoration-related compliance activities so that property disposal and reuse goals can be met.
- Initiate selected removal actions to control, eliminate, or reduce risks to manageable levels.
- Characterize health and safety risks associated with releases of hazardous substances, pollutants, contaminants, or hazardous wastes related to property transactions by parcel.
- Coordinate Carswell AFB environmental cleanup with Air Force (AF) Plant 4 IRP through effective project management and technical information exchange.

- Effectively transfer the management and execution of the IRP and environmental compliance/closure-related (EC-CR) program to the Air Force Base Conversion Agency (AFBCA).

1.2
BCP Purpose, Updates, and Distribution

This BCP presents, in summary fashion, the status of the Carswell AFB environmental restoration and compliance programs and the comprehensive strategy for environmental restoration and restoration-related compliance activities. The BCP lays out the response action approach at the installation in support of base closure. In addition, the BCP defines the status of efforts to resolve technical issues and identifies specific strategies, BCT action items, and waste implementation schedules for environmental restoration activities, so that continued progress and implementation of property transfers can occur.

1.3
BRAC Cleanup Team/Project Team

A BCT has been established to develop and maintain the BCP and to implement the environmental restoration activities required for property disposal. The BCT includes representatives from environmental restoration and compliance program decision makers, and technical, operation, and administrative specialists.

The AFBCA has established an Operating Location (OL) for each closing base. OL-H is a team of AFBCA representatives assigned to perform the following for Carswell AFB: coordinate closure activities, maintain a caretaker force, and serve as an Air Force liaison supporting base property disposal and interim leases. OL-H will remain the on-site responsible party for areas outside the 301 Tactical Fighter Wing (FW) area until the disposal of all base properties is complete.

The BCT will consist of representatives from the AFBCA/OL-H; the Air Force Center for Environmental Excellence (AFCEE); the U.S. Environmental Protection Agency (EPA) Region VI; the Texas Natural Resource Conservation Commission (TNRCC), the Carswell Redevelopment Authority (CRA); the U.S. Army Corps of Engineers (COE), Fort Worth District, and Aero Systems Center and various contractors. The BCT is led by the BRAC Environmental Coordinator (BEC). The BEC has been at AFBCA/OL-H since May 1993. Table 1-1 lists the team members and specifies their roles and responsibilities. The BCT works to ensure that regulatory preferences are considered in the restoration and compliance activities. Because most base environmental restoration is regulated under a state-issued Resource Conservation and Recovery Act (RCRA) Part B permit, the TNRCC has become the lead regulatory agency in reviewing documents, briefing the progress of the IRP and compliance activities, and determining appropriate response actions.

Table 1-1. Current BRAC Cleanup Team/Project Team Members

(BRAC CLEANUP TEAM MEMBERS)			
Name	Title	Phone	Role/Responsibility
Mr. Frank Grey	AFBCA/OL-H	(817) 731-8973, Ext. 17	Chief Environmental Engineer
Mr. Gary Baumgarten	U.S. EPA Region VI	(214) 655-6749	EPA Regulator
Mr. Geoff Meyer	TNRCC	(512) 239-2577	State Regulator
CORE TEAM MEMBERS			
Mr. Ray Leach	CRA	(817) 377-8062	Program Manager
Cpt. Joe Feaster	HQ AFCEE/ESB	(210) 536-5275	AFCEE Team Chief
Mr. Olen Long	AFBCA/OL-H	(817) 731-8973	OL-H Chief
Ms. Debbie Perrin	COE, Ft. Worth District	(817) 334-3221	Project Manager
Mr. Randy Varner	301 TFW, Carswell AFB	(817) 782-6277	Environmental Chief, 301 Tactical FW
CONSULTING MEMBERS			
Mr. John Doepker	ASC/EMVR	(513) 255-7716	AF Plant 4, RPM
Mr. Randy Tarbell	AFCEE/CCR-D	(214) 767-4672	Program Manager
Mr. Ray Hatch	HQ AFBCA/SW	(703) 696-5540 DSN 226-5540	Program Manager, SW Region
Mr. Felix Amerasinghe	HQ AFBCA/SW	(703) 696-5543 DSN 226-5543	Environmental Engineer, SW Region
Mr. Dave Bragg	Booz, Allen, Hamilton	(210) 927-4300	Program Manager
Cmdr Ed Cox	NAS Dallas	(214) 266-6811	Environmental Officer
Mr. Ed Lohr	South NAVFAC	(803) 743-0355	Program Manager
Mr. Gregory Perry	TANG	(214) 269-3581	Program Manager
Mr. Carl Loop	South NAVFAC	(803) 743-0528	Program Manager
Lt John Gorman	NAS Dallas	(214) 266-6811	Environmental Officer
Mr. Galen Robbins	NAS Dallas	(214) 266-6811	Compliance Manager
Mr. Tim Sewell	TNRCC	(214) 298-6171	State Regulator
Mr. Allan Posnick	TNRCC	(512) 239-2332	State Regulator
Mr. Lon Biasco	U.S. EPA Region VI	(214) 655-6673	U.S. EPA Regulator
Mr. Thomas Edwards	Attorney General's Office		State Official
Mr. Nadira Kabir	TNRCC	(512) 239-2331	State Regulator
Cpt. James Rogers	COMNAVRESFOR	(504) 948-5711	Environmental Officer
LCDR Michael W.S. Hayes	COMNAVRESFOR	(504) 948-5303	Legal Council

The initial BCT meeting of the BCT was conducted on 12 January 1994. An Environmental Protection Committee (EPC) has also been formed. These meetings provide a forum to discuss ongoing restoration and compliance status and issues between the 301 Tactical FW, AFBCA, and other BCT meetings.

1.4
Brief History of Installation

Carswell AFB is located in north-central Texas in Tarrant County, 8 miles west of downtown Fort Worth. The base property, totaling 2,555 acres, consists of the main base and two noncontiguous parcels (see Section 1.5). The main base comprises 2,264 acres and is bordered by Lake Worth to the north, the West Fork of the Trinity River and Westworth Village to the east, Fort Worth to the northeast and southeast, White Settlement to the west and southwest, and AF Plant 4 to the west. The area surrounding Carswell AFB is mostly suburban, including the residential areas of the cities of Fort Worth, Westworth Village, and White Settlement.

The existing land uses in the immediate vicinity of the base include industrial, commercial, residential, and recreational uses. Off-base land use is shown in Appendix F.

The land uses west of the base are predominantly residential and industrial. These include single-family residences, supporting commercial centers, AF Plant 4, and an industrial complex in White Settlement.

The predominant development south of the base is the commercial area located at the Interstate 30 and State Highway 183 interchange. This area includes a discount-oriented retail center, a regional shopping mall, and a convenience center.

Various types of residential development occur southeast of the base, north of Interstate 30. South of River Oaks Boulevard and Roaring Springs Road are country club estates and upscale townhouses. Further south are middle- to upper-income, single-family housing, and multi-family units mixed with commercial office development. Single-family housing is also found on the eastern side of the base, from the Kings Branch housing tract north to Meandering Road.

Public/recreational land uses occur north of the base, surrounding Lake Worth. Public access along the southern shore of Lake Worth is currently restricted due to Carswell AFB activities. A fish hatchery, YMCA camp, and private recreation lands occur along the West Fork of the Trinity River, northeast of the base.

The area surrounding the Off-Site Weapons Storage Area (WSA) is primarily rural. A residential development is located south of White Settlement Road.

Carswell AFB is located within the Grand Prairie section of the Central Lowlands Physiographic Province. The area is characterized by broad terrace surfaces sloping gently

Table 1-2. History of Installation Operations

Period	Type of Operation	Weapon Systems	Hazardous Substance Activities	Map Reference (see Figure 1-1)
Pre-1941	Woods and pastures	None	Unknown	1
1941-1946	Bomber training base	B-24, B-25, B-26, B-32	Most waste oils, recovered fuels, spent solvents and cleaners burned at fire training areas; some disposed of through contractor removal, landfill disposal, and discharge to storm and sanitary sewer	2
1946-1948	Bomber training base	B-29		2
1948-1958	Bomber training base	B-36B, B-36D		2
1958-1964	Bomber training base and air refueling operations	B-52D, B-58, KC-135		2
1964-1968	Bomber training base and air refueling operations	B-52D, KC-135		2
1968-1971	Bomber training base and air refueling operations	B-52D, KC-135, FB-11		2
1971-1985	Bomber training base and air refueling operations	B-52D, KC-135, F-4	Most waste oils, spent solvents, and cleaners disposed of through contractor removal; recovered JP-4 stored and burned at fire training area, some wastes disposed of in landfills or sanitary drains	2, 3
1975-1982	B-52D, KC-135, F-4	B-52D, KC-135, F-4	Most waste oils, spent solvents and cleaners removed through service contract; recovered JP-4 stored and burned at fire training area; PD-680 discharged to OWS	2, 3, 4
1982-1992	B-52D, B-52H, KC-135, F-4	B-52D, B-52H, KC-135, F-4	Waste oils, solvents, and cleaners collected and stored at accumulation points and disposed of through DRMO; recovered JP-4 stored and burned at fire training area; waste oils and PD-680 recovered from OWS and disposed of through DRMO	2, 3, 4, 5

eastward, interrupted by westward-facing escarpments. The topography of the base is fairly flat, except for areas near Farmers Branch Creek and the Trinity River. Elevations average 650 feet above Mean Sea Level (MSL) and range from 550 feet above MSL in the east to 690 feet above MSL in the southwest.

The climate in the Fort Worth region is subtropical with mild winters and hot, humid summers. The average annual precipitation is 31.5 inches, with the majority falling between April and October. The average annual temperature is 66 degrees Fahrenheit (°F). July is the hottest month with an average monthly temperature of 86°F, while January is the coldest month with an average monthly temperature of 45°F. Temperature changes are rapid and often change 20° to 30° in several hours. The average annual relative humidity is 63 percent.

Prevailing winds are primarily southerly from March through November and northerly from December through February; the average wind speed is 8 knots. Severe thunderstorms with windspeeds of 65 knots and hail storms are common. Climate conditions in summer make tornado formations possible, although there is more property damage each year due to hail than to tornadoes.

In 1984, the IRP was initiated at Carswell AFB and began with a program records search conducted by CH_2M Hill, Inc. Since 1984, Air Force IRP studies have been conducted by several contractors, and have focused on the identification and characterization of waste disposal areas and solid waste management units (SWMUs) identified in the installation's RCRA Part B permit.

Pursuant to the Defense Base Closure and Realignment Act (DBCRA) of 1990, Carswell AFB was selected for closure and associated property disposal during Round II Base Closure Commission deliberations. This announcement initiated the closure and the disposal and reuse planning processes. Drawdown activities were initiated in 1992 and all 7 Bomb Wing (BW) aircraft were relocated by January 1993. The base officially closed on 30 September 1993. On 1 October 1994 the base was realigned and the Navy assumed control of the base. Carswell AFB was officially renamed the Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB), Carswell Field. The AFBCA remains responsible for the cleanup of the base.

The area now known as Carswell AFB was originally a modest dirt runway built to service an aircraft manufacturing plant located where AF Plant 4 is now. When it was established in 1942, the installation was referred to as the Tarrant Field Airdrome and was originally under the jurisdiction of the Gulf Coast Army Air Field Training Command. Its mission was to provide transition training for the B-24 bomber pilots and it has served as a heavy bomber base ever since. The Strategic Air Command (SAC) assumed control of the installation in 1946 and the base served as headquarters for the Eighth Air Force. The base was renamed Carswell AFB in 1948 in honor of Fort Worth native, Major Horace S. Carswell. At that time, the 7 BW became the base host unit. In 1951, Headquarters 19 Air Division was located at Carswell AFB where it remained until September 1988, the longest tenure of any air division in SAC. Carswell AFB became home base for its first B-52s and KC-135s in 1956.

The Air Combat Command (ACC) assumed control of the base in 1992 with the disestablishment of SAC.

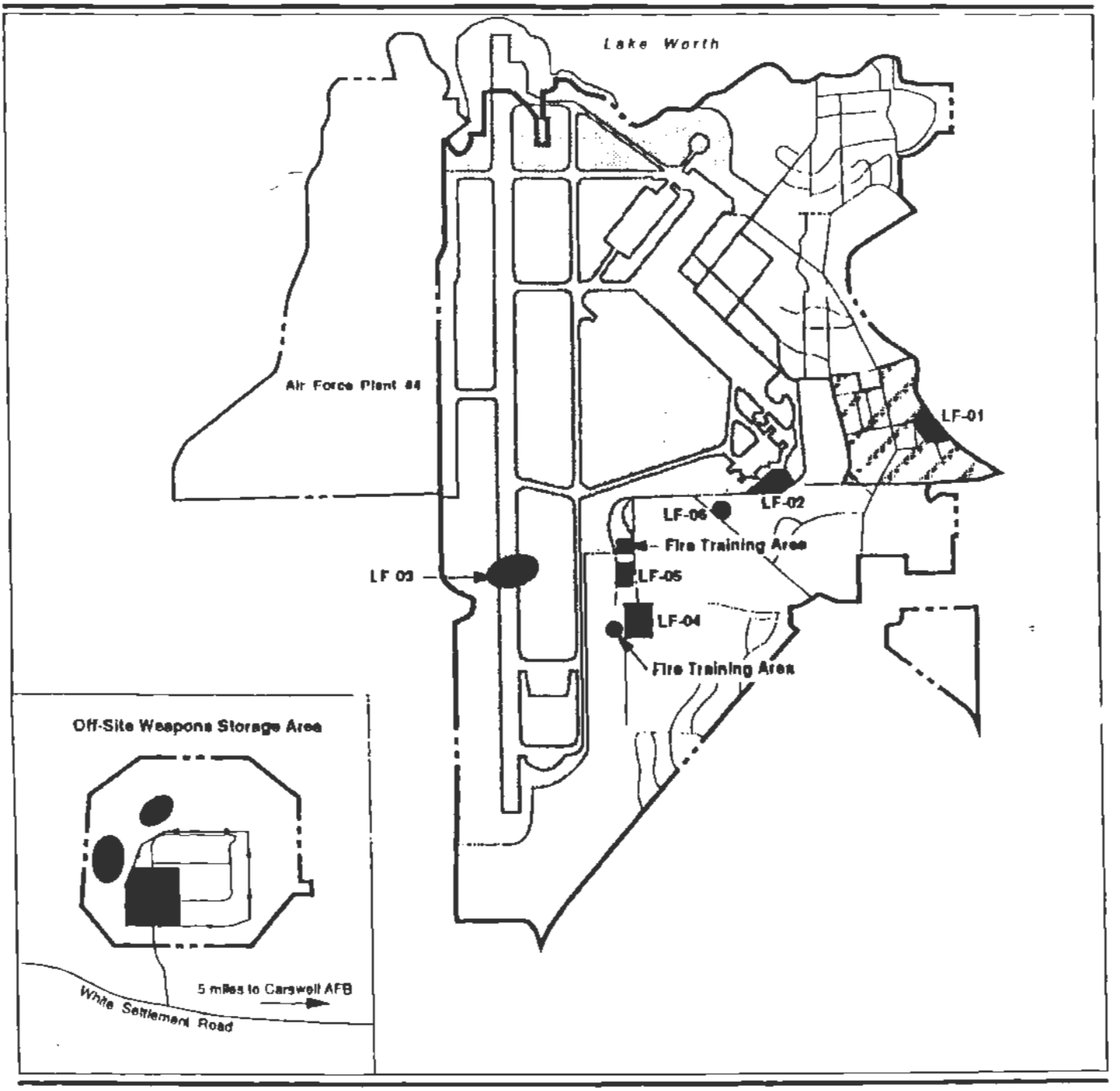
The majority of the base property was acquired in the 1940s with most of the property acquired from the city of Fort Worth in 1941; additional property including most of the south base, the hospital area, and the Off-Site WSA was acquired during the 1950s. Kings Branch and south base residential areas were acquired in 1960. Several miscellaneous additional properties totaling 22.06 acres have been acquired since 1970. Table 1-6 summarizes base property acquisition.

Wastes have been generated and disposed of at Carswell AFB since the beginning of industrial operations in 1942 (Table 1-2). Information regarding wastes was obtained from 7 BW records. The locations of past hazardous substance activities are shown in Figure 1-1. The major industrial operations at Carswell AFB now include: maintenance of jet engines, aerospace ground equipment (AGE), fuel systems, weapons systems, and pneudraulic systems; maintenance of general and special purpose vehicles; aircraft corrosion control; and nondestructive inspection activities. All of these operations generate wastes, primarily oils, recoverable fuels, spent solvents, and cleaners. Table 1-3 provides examples of hazardous waste-generating activities to provide a historical perspective. The years 1990 to 1992 are covered in the table.

The total quantity of waste oils, recoverable fuels, spent solvents, and cleaners that was generated during the 1970s and early 1980s is estimated to be approximately 55,000 gallons per year. Prior to the 1970s, the waste quantities were probably less because fewer aircraft were maintained at the base. Smaller amounts of liquid wastes are associated with pest and weed control activities at the base. Some of the chemicals used or in use are anticoagulant, baygon, diazinon, malathion, chlordane, organophosphate, and monosodium arsenate. Used containers are triple rinsed, punctured, and disposed of in dumpsters, along with the bags. Rinse waters from container and equipment rinsing are discharged to a tank. The full tank is pumped out for proper disposal. Before 1981, the rinse waters were discharged into a dry well sump. This sump has been identified as a potentially contaminated site.

Practices for past and present industrial waste disposal are summarized below:

- 1942-1970: The majority of waste oils, recovered fuels, spent solvents, and cleaners were burned at the fire department training areas during practice exercises. Some waste oils and spent solvents were disposed of through contractor removal, while some waste paints (contaminated with thinners and solvents), waste oils, and PD-680 are suspected of having been disposed of in the base landfills. Some waste oils, recovered fuels, spent solvents, and cleaners were also discharged to sanitary and storm sewers. These discharges primarily occurred at the wash racks. In 1955, an oil/water separator was installed to recover waste materials discharged from the wash racks. Materials from the oil/water separators were pumped out and disposed of through contractor removal. Discharge from the oil/water separators was, and still is, into the sanitary sewers.



EXPLANATION

- Airfield and Aviation Support Areas Acquired in 1940s
- Industrial Area Acquired in 1940s
- General Areas of Waste Disposal on Property Acquired in 1950s
- Fire Training Area used 1942 to 1962
- Fire Training Area used since 1963
- LF-04 Landfill Number
- Base Boundary
- Air Force Plant #4 Boundary

0 650 1300 2600 Feet

Location of Past Hazardous Substance Activities

Figure 1-1

Table 1-3. Hazardous Waste Generating Activities
Page 1 of 7

Facility (Building)/Use	Unit	Activity	Name of Waste Material	Generation Rate	Disposition	Years Generated
1015/Test Cell			Floor finish	2 gallons/month	Base disposal contract	1990-1992
			Hydraulic fluid	1 gallon/month	Base disposal contract	1990-1992
			JP-4	20 gallons/month	Base disposal contract	1990-1992
			Aircraft soap	1 gallon/month	Base disposal contract	1990-1992
			Engine gas path cleaner	2 gallons/month	Base disposal contract	1990-1992
			7808, 1010 Oil	5 gallons/month	Base disposal contract	1990-1992
1027/Aircraft Corrosion Control			Aircraft soap	55 gallons/month	Base disposal contract	1991, 1992
			PD-680	325 gallons/month	Base disposal contract	1991, 1992
1048/Maintenance Dock Fuel System			Methyl ethyl ketone rags	Unknown	DRMO	1990-1992
			PD-680	Unknown	Base disposal contract	1990-1992
			Isopropyl alcohol	Unknown	Base disposal contract	1990-1992
			Engine oil	Unknown	Base disposal contract	1990-1992
			Hydraulic fluid	Unknown	Base disposal contract	1990-1992
1050/Maintenance Hangar			PD-680	55 gallons/month	Base disposal contract	1990-1992
			Hydraulic fluid	0.25 gallon/month	Base disposal contract	1990-1992
			Lube oil	Unknown	Base disposal contract	1990-1992
			Citrikleen	Unknown	Base disposal contract	1990-1992
			Nickel/cadmium batteries	Unknown	DRMO	1992
			Spill residue	Unknown	DRMO	1992
1055/Avionics Shop			Freon/dump fluid	Unknown	Base disposal contract	1991
			PD-680	Unknown	Base disposal contract	1990
			PD-680	9.2 gallons/month	Base disposal contract	1991
1059/Hazardous Storage			Methyl ethyl ketone	Unknown	Base disposal contract	1991
			Media bead waste	Unknown	DRMO	1991
			Paint waste	Unknown	Base disposal contract	1991
			Cleaning compound	Unknown	DRMO	1991
			Paint stripper	Unknown	Base disposal contract	1991
			Water soluble oil	Unknown	Base disposal contract	1991
			Speedy Dry	Unknown	DRMO	1991
			Sand blaster waste	Unknown	DRMO	1991
1060			Paint	50 gallons/month	Base disposal contract	1990-1992

159032

Table 1-3. Hazardous Waste Generating Activities
Page 2 of 7

Facility (Building)/Use	Unit	Activity	Name of Waste Material	Generation Rate	Disposition	Years Generated
1060 (Continued)			Hydrofluoric acid	0.125 gallon/month	Base disposal contract	1990-1992
			Alodine	10 gallons/month	Base disposal contract	1990-1992
			Paint remover	3 gallons/month	Base disposal contract	1990-1992
			Aircraft soap	10 gallons/month	Base disposal contract	1990-1992
			Surface stripper	3 gallons/month	Base disposal contract	1990-1992
			Methyl ethyl ketone	20 gallons/month	Base disposal contract	1990-1992
			Hot tank stripper	53.3 gallons/month	Base disposal contract	1990-1992
			Media bead waste	Unknown	DRMO	1991
			Water soluble oil	Unknown	Base disposal contract	1991
1140/Auto Hobby Shop			Safety Kleen	433.3 gallons/month	Base disposal contract	1990-1992
			Motor oil	250 gallons/month	Base disposal contract	1990-1992
			PD-680	55 gallons/month	Base disposal contract	1990-1992
1189/Headquarters Group			Potassium ferrocyanide	Unknown	DRMO	1990, 1991
			Perchloroethylene	Unknown	Base disposal contract	1990, 1991
			Methylene chloride	Unknown	DRMO	1990, 1991
1191/Vehicle Maintenance Shop			Paint and thinners	10 gallons/month	Base disposal contract	1990-1992
			Engine oil	150 gallons/month	Base disposal contract	1990-1992
			Safety Kleen	41.7 gallons/month	Base disposal contract	1990-1992
			Transmission and hydraulic fluid	50 gallons/month	Base disposal contract	1990-1992
			Antifreeze	50 gallons/month	Base disposal contract	1990-1992
			Battery acid	25 gallons/month	Base disposal contract	1990-1992
			Automotive fuel	20 gallons/month	Base disposal contract	1990-1992
			7808 Synthetic oil	Unknown	Base disposal contract	1990-1992
1194/Refueling Vehicle Shop			Antifreeze	5.8 gallons/month	Base disposal contract	1990-1992
			PD-680	4.6 gallons/month	Base disposal contract	1990-1992
			Transmission fluid	2 gallons/month	Base disposal contract	1990-1992
			JP-4	416.7 gallons/month	Base disposal contract	1990-1992
			Engine oil	20 gallons/month	Base disposal contract	1990-1992
			Safety Kleen	25 gallons/month	Base disposal contract	1990-1992
			Aircraft soap	10 gallons/month	Base disposal contract	1990-1992
1215/Base Engineering Administration			Miscellaneous items	Unknown	DRMO	1992
1250/Hazardous Storage			Miscellaneous items	Unknown	DRMO	1991

Table 1-3. Hazardous Waste Generating Activities
Page 3 of 7

Facility (Building)/Use	Unit	Activity	Name of Waste Material	Generation Rate	Disposition	Years Generated
1251/Warehouse			Miscellaneous items	Unknown	DRMO	1990, 1992
1320/Base Engineering Maintenance Shop			Antifreeze	13 gallons/month	Base disposal contract	1990-1992
			Gas and diesel	9 gallons/month	Base disposal contract	1990-1992
			Battery acid	30 gallons/month	Base disposal contract	1990-1992
			7808 oil	13 gallons/month	Base disposal contract	1990-1992
			PD-680	9 gallons/month	Base disposal contract	1990-1992
			Transmission fluid	Unknown	Base disposal contract	1990-1992
1410/Jet Engine Maintenance Shop			JP-4	15 gallons/month	Base disposal contract	1990-1992
			PD-680	30 gallons/month	Base disposal contract	1990-1992
			7808 oil	27 gallons/month	Base disposal contract	1990-1992
			Multi-Sheen	5 gallons/month	Base disposal contract	1990-1992
			Carbon remover	10 gallons/month	Base disposal contract	1990-1992
			Hydraulic fluid	2 gallons/month	Base disposal contract	1990-1992
			Safety Kleen	31.7 gallons/month	Base disposal contract	1990-1992
			SE-377C	25 gallons/month	Base disposal contract	1990-1992
			Finger print remover	Unknown	Base disposal contract	1992
			Calibrating fluid	Unknown	Base disposal contract	Unknown
1413/Hazardous Storage			Carbon remover	Unknown	Base disposal contract	1991
			JP-4	Unknown	Base disposal contract	1991
			PD-680	Unknown	Base disposal contract	1991
			7808 synthetic oil	Unknown	Base disposal contract	1991
			Fingerprint remover	Unknown	Base disposal contract	1991
			Safety-Kleen	Unknown	Base disposal contract	1991
1414/Aircraft Support Equipment Shop Storage Facility			Antifreeze	80 gallons/month	Base disposal contract	1990-1992
			Gas, diesel, JP-4	165 gallons/month	Base disposal contract	1990-1992
			Citrikleen	55 gallons/month	Base disposal contract	1990-1992
			PD-680	80 gallons/month	Base disposal contract	1990-1992
			Hydraulic fluid	55 gallons/month	Base disposal contract	1990-1992
			Motor and synthetic oil	150 gallons/month	Base disposal contract	1990-1992
			Stop bath	5 gallons/month	Base disposal contract	1990-1992

Table 1-3. Hazardous Waste Generating Activities
Page 4 of 7

Facility (Building)/Use	Unit	Activity	Name of Waste Material	Generation Rate	Disposition	Years Generated
			Emulsifier	18.3 gallons/month	Base disposal contract	1990-1992
			Fixer	5 gallons/month	Base disposal contract	1990-1992
			Developer	23.3 gallons/month	Base disposal contract	1990-1992
			Dye penetrant	18.3 gallons/month	Base disposal contract	1990-1992
			Mercury batteries	Unknown	DRMO	1992
1415/Hazardous Storage			Diesel	Unknown	Base disposal contract	1991
			Motor gasoline	Unknown	Base disposal contract	1991
			Paint waste	Unknown	Base disposal contract	1991
			PD-680	Unknown	Base disposal contract	1991
			Hydraulic fluid	Unknown	Base disposal contract	1991
			Antifreeze	Unknown	Base disposal contract	1991
			JP-4	Unknown	Base disposal contract	1991
			7808 synthetic oil	Unknown	Base disposal contract	1991
			Engine oil	Unknown	Base disposal contract	1991
1418/Weapons and Release System Shop			PD-680	9.2 gallons/month	Base disposal contract	1991, 1992
1420/Aircraft Support Equipment Shop Storage Facility			PD-680	20 gallons/month	Base disposal contract	1990-1992
			Methyl ethyl ketone	0.04 gallon/month	Base disposal contract	1990-1992
			Soap	10 gallons/month	Base disposal contract	1990-1992
			Thinner	1.25 gallons/month	Base disposal contract	1990-1992
			Brake and hydraulic fluid	20 gallons/month	Base disposal contract	1990-1992
			7576 synthetic oil	Unknown	Base disposal contract	1992
			Cutting fluid	Unknown	Base disposal contract	1992
			Naphtha	Unknown	Base disposal contract	1992
			Lead-based paint	Unknown	Base disposal contract	1992
1425/Fire Station			Antifreeze	10 gallons/month	Base disposal contract	1990-1992
			Engine oil	40 gallons/month	Base disposal contract	1990-1992
			Hydraulic and transmission fluid	15 gallons/month	Base disposal contract	1990-1992
			Safety Kleen	7 gallons/month	Base disposal contract	1990-1992
1435/Aircraft Support Equipment Shop Storage Facility			Diesel	Unknown	Base disposal contract	1992
			Motor gasoline	Unknown	Base disposal contract	1992

Table 1-3. Hazardous Waste Generating Activities
Page 5 of 7

Facility (Building)/Use	Unit	Activity	Name of Waste Material	Generation Rate	Disposition	Years Generated
1435 Aircraft Support Equipment Storage Facility (Continued)			Paint waste	Unknown	Base disposal contract	1992
			PD-680	Unknown	Base disposal contract	1992
			Hydraulic fluid	Unknown	Base disposal contract	1992
			Antifreeze	Unknown	Base disposal contract	1992
			JP-4	Unknown	Base disposal contract	1992
			7808 synthetic oil	Unknown	Base disposal contract	1992
			Engine oil	Unknown	Base disposal contract	1992
1436/Hazardous Storage			Hydraulic fluid	Unknown	Base disposal contract	1991
			PD-680	Unknown	Base disposal contract	1991
			7808 synthetic oil	Unknown	Base disposal contract	1991
			Cutting fluid	Unknown	Base disposal contract	1991
			Naphtha	Unknown	Base disposal contract	1991
			Methyl ethyl ketone	Unknown	Base disposal contract	1991
			Lead-based paint	Unknown	Base disposal contract	1991
			Brake fluid	Unknown	Base disposal contract	1991
1602/Jet Engine Maintenance Shop			PD-680	Unknown	Base disposal contract	1990-1992
			JP-4	Unknown	Base disposal contract	1990, 1991
			Hydraulic fluid	Unknown	Base disposal contract	1990, 1991
			Oil	Unknown	Base disposal contract	1992
			Epoxy thinner	Unknown	Base disposal contract	1992
			Lacquer thinner	Unknown	Base disposal contract	1992
			Methyl ethyl ketone	Unknown	Base disposal contract	1992
			Epoxy stripper	Unknown	Base disposal contract	1992
1615/Specified Headquarters			Reverse bath	106.7 gallons/month	Base disposal contract	1990-1992
			Conditioner	106.7 gallons/month	Base disposal contract	1990-1992
			Fixer	106.7 gallons/month	Base disposal contract	1990-1992
			Bleach	106.7 gallons/month	Base disposal contract	1990-1992
			Stabilizer	106.7 gallons/month	Base disposal contract	1990-1992
			First developer	106.7 gallons/month	Base disposal contract	1990-1992
			Color developer	106.7 gallons/month	Base disposal contract	1990-1992

Table 1-3. Hazardous Waste Generating Activities

Facility (Building)/Use	Unit	Activity	Name of Waste Material	Generation Rate	Disposition	Years Generated
1617/Training Aid Shop			Sodium persulfate etchant	4.6 gallons/month	Base disposal contract	1990-1992
			Solid paint waste, flammable	8.3 gallons/month	DRMO	1990-1992
			Combustible gas (aerosol)	2.1 gallons/month	DRMO	1990-1992
			DFD 12G developer	2.1 gallons/month	Base disposal contract	1990-1992
			Waste paint and thinners	12.5 gallons/month	Base disposal contract	1990-1992
1618/Hazardous Storage			Sodium persulfate	Unknown	Base disposal contract	1991
			Solid paint waste	Unknown	Base disposal contract	1991
			Combustible gas	Unknown	Base disposal contract	1991
			DFD 12G developer	Unknown	Base disposal contract	1991
1628/Aircraft Support Equipment Shop Storage Facility			Mean Green soap	55 gallons/month	Base disposal contract	1990-1992
			Battery acid	6 gallons/month	Base disposal contract	1990-1992
			Engine oil	55 gallons/month	Base disposal contract	1990-1992
			Methyl ethyl ketone	1 gallon/month	Base disposal contract	1990-1992
			PD-680	80 gallons/month	Base disposal contract	1990-1992
			Synthetic oil	41.7 gallons/month	Base disposal contract	1990-1992
			Antifreeze	5 gallons/month	Base disposal contract	1990-1992
			Hydraulic, transmission, and brake fluid	10 gallons/month	Base disposal contract	1990-1992
			Paint remover	9.2 gallons/month	Base disposal contract	1990-1992
			Paint and thinners	10 gallons/month	Base disposal contract	1990-1992
1643/Maintenance Dock			Paint remover	8.3 gallons/month	Base disposal contract	1990-1992
			PD-680	98.3 gallons/month	Base disposal contract	1990-1992
			Mean Green soap	1 gallon/month	Base disposal contract	1990-1992
			Carbon remover	0.7 gallon/month	Base disposal contract	1990-1992
			JP-4	50 gallons/month	Base disposal contract	1990-1992
			Hydraulic fluid	16 gallons/month	Base disposal contract	1990-1992
			7808 synthetic oil	Unknown	Base disposal contract	1991
			Nickel/cadmium batteries	Unknown	DRMO	1992
			Methyl ethyl ketone	Unknown	Base disposal contract	Unknown
			Poly thinner	Unknown	Base disposal contract	Unknown
3367/Hazardous Storage			Paint waste	Unknown	Base disposal contract	1991
			Phosphoric acid	Unknown	Base disposal contract	1991

Table 1-3. Hazardous Waste Generating Activities
Page 7 of 7

Facility (Building)/Use	Unit	Activity	Name of Waste Material	Generation Rate	Disposition	Years Generated
3369/Shop			Paint waste	Unknown	Base disposal contract	1990
			Phosphoric acid	Unknown	Base disposal contract	1990
4210/Assembly Shop			Alodine	Unknown	Base disposal contract	1990, 1992
			Methyl ethyl ketone	Unknown	Base disposal contract	1990, 1992
			Toluene	Unknown	Base disposal contract	1990, 1992
			Freon	Unknown	Base disposal contract	1990, 1992
			Hydraulic fluid	Unknown	Base disposal contract	1990, 1992
4213/Hazardous Storage			Alodine	Unknown	Base disposal contract	1991
			Methyl ethyl ketone	Unknown	Base disposal contract	1991
			Toluene	Unknown	Base disposal contract	1991
			Freon	Unknown	Base disposal contract	1991
			Hydraulic fluid	Unknown	Base disposal contract	1991
4214/Hazardous Storage			Paint waste	Unknown	Base disposal contract	1991
4215/Surveillance Inspection Shop			Paint waste	Unknown	Base disposal contract	1990
8503/Surveillance Inspection Shipping			Paint waste	Unknown	Base disposal contract	1990
8512/Hazardous Storage			Paint waste	Unknown	Base disposal contract	1991

- 1970-1975: During this period, most waste oils, spent solvents, and cleaners were disposed of by contractor removal. A private contractor would pump the materials from oil/water separators and from 55-gallon drums and bowsers. Recovered JP-4 was still stored at the fire department training area and burned in practice exercises. Recovered JP-4 was also reused. Some waste paints (contaminated with thinners and solvents), waste oils, and PD-680 are suspected of having been disposed of in the base landfills. Some waste oils, solvents, and cleaners were discharged into sanitary drains. This primarily occurred at the wash racks that discharge to the oil/water separator. This oil/water separator was routinely pumped out by a private contractor and the recovered materials removed from the base by the contractor.
- 1975-1982: The majority of waste oils, spent solvents, and cleaners were disposed of by service contract, either directly or through the Defense Reutilization and Marketing Office (DRMO). Recovered JP-4 was stored at the fire department training area and burned during practice exercises; recovered JP-4 was also reused. PD-680 used at the wash racks was discharged to the oil/water separator, which discharges to the sanitary sewers.
- 1982-Present: Waste oils, solvents, and cleaners are collected in 55-gallon drums and temporarily (less than 90 days) stored at 12 hazardous waste accumulation points located throughout the flightline area. They are subsequently disposed of by contractor removal through DRMO. Recovered JP-4 fuel was stored at the fire department training area for subsequent burning in practice exercises or reuse. Removal of waste oils and PD-680 (Type II) from oil/water separators is also handled by an off-base contractor through DRMO.

Table 1-4. Off-Base Properties

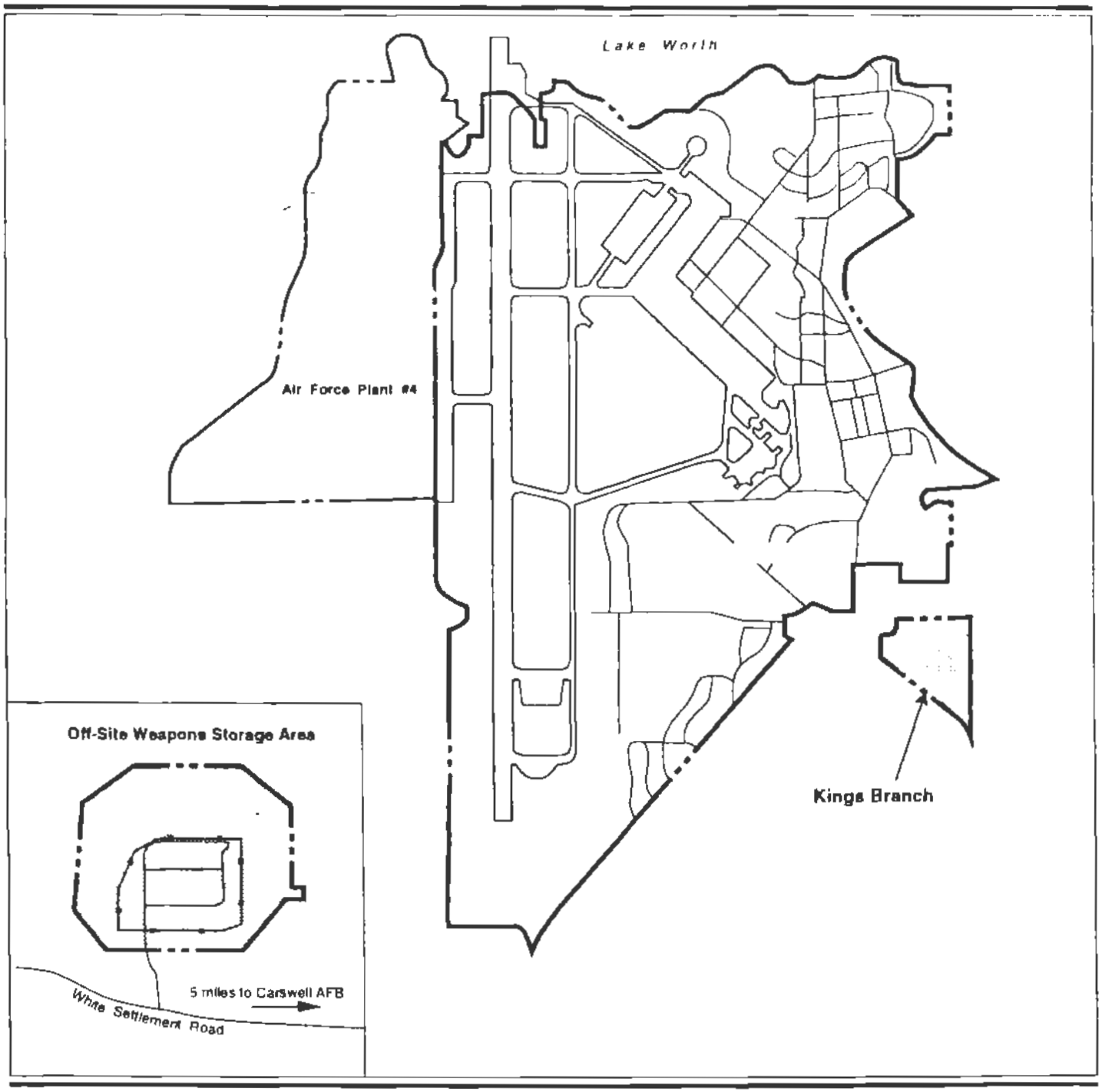
Description	Acreage	Date of Acquisition	Environmental Status	Location	Remarks
Off-Site WSA	247	1960	IRM	5 miles west of Carswell	FY 1994
Kings Branch residential area	47	1955	Lead Paint Survey	Southeast of the main base	FY 1994

1.5
Base Property/Tenants

Base Properties. Carswell AFB includes the main base, the Off-Site WSA, and a noncontigous parcel commonly known as the Kings Branch residential area.

The Off-Site WSA consists of 247 acres located approximately 5 miles west of the main base. This property was acquired in 1960. The Off-Site WSA contains 11 weapon storage igloos and is considered an industrial land use. This site is surrounded by a restrictive easement required for explosive safety quantity distances.

The Kings Branch residential area consists of 47 acres southeast of the main base acquired in 1955. The housing in this area has not been used for 6 years and is in varying stages of



EXPLANATION

Off-Base Parcels

Base Boundary

Air Force Plant #4 Boundary

0 650 1300 2600 Feet

Off-Base Parcels

Figure 1-2

disrepair. Property acquisition records for base parcels are summarized in Table F-1; their locations are shown on Figure 1-2. The environmental status of the off-base property is summarized in Table 1-4.

Associate Units/Non-Air Force Tenants. Table 1-5 lists the significant Air Force and non-Air Force organizations on the base that were identified from base real property records. The Carswell AFB mission is to provide the required support for its tenants to maintain combat readiness. The following sections describe the major tenants and their missions:

Table 1-5. On-Base Tenant Units

Unit	Location
19 Air Division	Departed
7 Bombardment Wing	Departed
7 Combat Support Group	Departed
415 Field Training Detachment	Departed
2048 Communications Squadron	Departed
Detachment 22, 26 Weather Squadron	Departed
301 Tactical Fighter Wing (AFRES)	
U.S. Air Force Regional Hospital Carswell	Closed
AAFES	Open
BX-Mart	Open
Marine Air Group 41	Bldg 1050 and Bomber Row
Marine Air Traffic	
Navy	
Federal Bureau of Prisons	Hospital Area
White House Communications	

- 19 Air Division: Assigned units were capable of conducting strategic warfare, sustained and effective air refueling, missile warfare, and strategic reconnaissance.
- 7 Bombardment Wing: Developed and maintained a combat-ready force capable of conducting strategic warfare as directed by ACC.
- 7 Combat Support Group: Provided housekeeping and service functions vital to the operation of the installation. Served as monitor and community point of contact for all Air Installation Compatible Use Zone affairs.

- 415 Field Training Detachment: Provided job-oriented system, associate and air crew familiarization training on specific weapons systems, and associated aerospace ground equipment.
- 2048 Communications Squadron: Provided communications/electronics services required to support the missions of ACC at Carswell AFB, and to provide the operational management of the Automated Weather Network Management Center.
- Detachment 22, 26 Weather Squadron: Provided or arranged for aerospace environmental staff and operational support services required by the Air Force and other U.S. Government agencies and activities in the Carswell AFB area.
- 301 Tactical Fighter Wing (Air Force Reserve [AFRES]): Provided training for reservists to achieve the capability for worldwide deployment and to be prepared, upon mobilization, to deploy with sufficient personnel, aircraft, and equipment to execute directed tactical fighter missions designed to destroy enemy forces, supplies, equipment, communications systems, and installations with conventional weapons within the limits of weapons systems capabilities.
- U.S. Air Force Regional Hospital, Carswell: Provided medical services for all authorized personnel.
- Army and Air Force Exchange Service (AAFES) and Base Exchange.
- Air Force Commissary Service.

Table 1-6. Property Acquisition Summary

Tract No.	Previous Land Owner	Acreage		Acquisition Date
		Fee Land	Easement Land	
1	CITY OF FORT WORTH, TEXAS	967.12		1941
A-3	CLYDE BURNS	0.34		1942
14	MORTON L. CROSBY, ET UX	4.68		1942
15	JACK KNIGHT, ET UX	4.76		1942
C-18	MRS J. P. BROWN	0.57		1942
C-21	BILLIE MAE PHILLIPS, ET VIR	0.92		1942
C-22	HENRY BARNETT, ET UX	0.72		1942
C-25	JACK L. HILL, ET UX	0.57		1942
C-28	F. F. SEBASTIAN, ET UX	0.11		1942
C-29	CLARENCE M. SEBASTIAN, ET UX	0.11		1942
C-35	GEORGE FRY, ET UX	0.45		1942
2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 18, 23, 8-3, C-15, C-16, C-17, C-19, C-20, C-23, C-24, C-26, C-27, C-30, C-32, C-33, C-34, C-36, C-37, D-54, D-60, D-66, D-73, D-93, D-96, E-102, E-104, E-106, E-108, E-111, E-130, E-139, E-150, E-151, E-154, E-164, E-166	WILLIAM A. BAILEY, ET AL	77.18		1942
E-167, E-169, E-192, F-172, F-175, F-178, F-180, F-182, F-184, F-185, F-189, F-194, F-201, F-203, F-215, F-216, F-217, F-222, F-225 & F-241	WILLIAM A. BAILEY, ET AL	14.21		1942
D-50	JACK KNIGHT, ET UX	12.17		1942
D-51	WALTER E. ECKERT, ET UX	0.20		1942
D-52	GEE F. MARTIN, ET UX	0.10		1942
D-53	EULA M. FULLER	0.21		1942
D-55	R. O. ISHAM, ET UX	0.75		1942
D-57	ROY SNELSON	0.13		1942
D-58	NORMAN D. CARDWELL, ET UX	0.14		1942
D-59	CLYDE HACK	0.19		1942
D-61	BOB Q. GUTHRIE, ET UX	0.28		1942

Table 1-6. Property Acquisition Summary

Tract No.	Previous Land Owner	Acreage		Acquisition Da
		Fee Land	Easement Land	
D-62	ROBERT R. WAND, ET UX	0.49		1942
D-63	F. M. STRIPLING, ET UX	0.55		1942
D-64	J. D. KOLDIN, ET UX	0.60		1942
D-65	JOHN CLYDE NOLEN, ET UX	0.60		1942
D-67	H. M. FELLER, ET AL	0.29		1942
D-68	M. L. PARTRIDGE, ET UX	0.54		1942
D-69	EDDIE FAY ELLIS, ET UX	0.36		1942
D-70	J. W. SIMMONS, ET UX	0.19		1942
D-71	LOYD HALL, ET UX	0.50		1942
D-72	J. H. STAMPS, ET UX	0.12		1942
D-74	JOSEPH E. NICKS	0.08		1942
D-75	ARON FOSTER, ET UX	0.39		1942
D-76	E. I. SCOTT, ET UX	0.39		1942
D-77	TOM QUINN, ET UX	0.20		1942
D-78	ST. ELMO BROCK, ET UX	0.10		1942
D-79	J. W. COPPS, ET UX	0.10		1942
D-80	C. T. GILLESPIE, ET UX	0.10		1942
D-81	R. P. HOLDEN, ET UX	0.20		1942
D-84	OTIS D. KELLEY, ET UX	0.10		1942
D-85	V. N. PARRIS, ET UX	0.39		1942
D-86	J. H. HURD, ET UX	0.23		1942
D-87	SCOTTIE H. SHIPE, ET UX	0.10		1942
D-88	WILLARD WILSON, ET UX	0.07		1942
D-89	CHARLES B. AUBREY, ET UX	0.46		1942
D-90	J. E. WILLIAMS, ET UX	0.32		1942
D-91, D-92	JETER LAYMANCE, ET UX	0.57		1942
D-94	JOHN E. DAVIS, ET UX	0.19		1942
D-95	WILLIAM F. THORNBURG, ET UX	0.19		1942
D-97	L. A. ADAMSON, ET UX	0.19		1942
D-98	F. M. NORMAN, JR., ET UX	0.19		1942
D-99	OSCAR L. BUTCHER, ET UX	0.59		1942
D-100	SAMUEL B. SNYDER, ET UX	0.61		1942
E-101	J. L. HOWINGTON, ET UX	0.66		1942
E-103	JULIA HENSLEY	0.32		1942
E-105	ELIZABETH CROCKER	0.19		1942
E-107	WILLIE T. SEATON, ET UX	0.96		1942
E-109	GERTA V. SMITH	1.27		1942
E-110	S. T. CASTLEBERRY, ET UX	1.27		1942
E-112	JAMES B. SAVAGE, ET UX	0.63		1942
E-113	LEONARD A. STOUT, ET UX	0.63		1942
E-114	G. A. WATERS, ET UX	0.63		1942
E-115	LESLIE W. SMITH, ET UX	0.32		1942
E-116	JOHN S. HAGER	0.32		1942
E-117	FAYTE E. BLOCKER, ET UX	0.63		1942

Table 1-6. Property Acquisition Summary				
		Acreage		
Tract No.	Previous Land Owner	Fee Land	Easement Land	Acquisition Date
E-118	W. F. SOUTH, ET UX	0.32		1942
E-119	ROBERT FLINCHUM, ET UX	0.32		1942
E-120	JOHN L. SAVAGE, ET UX	1.26		1942
E-121	F. M. GOODE, ET UX	0.59		1942
E-122	W. K. RAGSDALE, ET UX	0.59		1942
E-123	J. L. HAIGHT, JR, ET UX	0.59		1942
E-124	ROY W. LOBB, ET UX	0.59		1942
E-125	JOHN B. HETHERLY, ET UX	0.59		1942
E-126	MARY L. HETHERLY	0.59		1942
E-127	CARL A. WATERS, ET UX	0.59		1942
E-128	JOHN D. WILSON, ET UX	0.59		1942
E-129	DAN BEARDEN, ET UX	0.59		1942
E-131	ARTHUR LEE BELL, ET UX	0.59		1942
E-132	THOMAS R. CALLENDER	0.59		1942
E-133	C. V. GREEN, ET UX	0.29		1942
E-134	HENRY A. MORRIS, ET UX	0.29		1942
E-135	O. O. JONES, ET UX	0.59		1942
E-136	RUEL RAY REEVES, ET UX	0.29		1942
E-138	L. A. RUSSELL, ET UX	0.29		1942
E-140	DELBERT EUGENE MCDONALD,	0.59		1942
E-141	C. B. ARRINGTON, ET UX	0.59		1942
E-142	J. M. HARVEY, ET UX	0.74		1942
E-143	W. H. VALENTINE, ET UX	0.74		1942
E-144	SAMUEL B. SNYDER, ET UX	0.95		1942
E-145	T. B. HILL, ET UX	0.48		1942
E-146	MARY DICKEY ESTATE	0.24		1942
E-147	JAMES E. PYE, ET UX	0.24		1942
E-148	HOBART H. HARKINS, ET UX	0.24		1942
E-149	ETTA M. BROWN	0.24		1942
E-152	JAMES V. ARNOLD, ET UX	0.24		1942
E-153	S. H. SNYDER, ET UX	0.48		1942
E-155, F-188	WILLIAM C. STEVENSON, ET UX	0.56		1942
E-156	WILLIE H. FIELDER	0.24		1942
E-157	MARY FRANCES PHILLIPS, ET AL	0.24		1942
E-158	F. C. MINOR, ET UX	0.24		1942
E-159	ANNIE STURGES MACK, ET AL	0.24		1942
E-160	IVY E. DUNN, ET UX	0.24		1942
E-161	CHARLES A. GURLEY, ET UX	0.24		1942
E-162	EMMETT L. WILLIAMS, ET UX	0.24		1942
E-163	BERNARD SPRINGER, ET AL	0.51		1942
E-165	JOHN B. PRIDDY, ET AL,	0.37		1942
E-168	WM J. STAPP, JR., ET UX	1.84		1942
E-170	GEORGE D. HOWARD, ET UX	0.60		1942
F-171	MARVIN O. WRAY, ET UX	0.63		1942

Table 1-6. Property Acquisition Summary

Tract No.	Previous Land Owner	Acreage		Acquisition Da
		Fee Land	Easement Land	
F-173	JOHN A. MORSCHAUSER, ET UX	0.63		1942
F-174	WADE H. STAGGS, ET UX	0.31		1942
F-176	J. R. GRIFFIN, ET UX	0.31		1942
F-177	R. W. HAMILTON, ET AL	0.31		1942
F-179	PRESTON E. WILES	0.31		1942
F-181	B. W. CANNON	0.31		1942
F-183	E. M. BOWMAN, ET UX	0.33		1942
F-186	A. C. EASTERWOOD, ET UX	0.32		1942
F-187	HAROLD A. SOUCY	0.63		1942
F-190	ELISHA M. JONES	0.32		1942
F-191	SCOTT E. RUTHERFORD, ET UX	0.32		1942
F-193	DORA MAE HALL	0.32		1942
F-195	JAMES A. THOMAS, ET UX	0.30		1942
F-196	NELS NELSON, ET UX	0.63		1942
F-197	F. M. WILLETT, ET UX	0.32		1942
F-198	J. F. CRAWFORD , ET UX	0.32		1942
F-199	W. O. HARGROVE	0.32		1942
F-200	DANIEL D. WARREN, ET UX	0.32		1942
F-202	HERMAN T. HALLMARK, ET UX	0.32		1942
F-204	EDWARD R. SEELY, ET UX	0.59		1942
F-205	JASPER O. ATWOOD, ET UX	0.59		1942
F-206	WALLACE W. GILLESPIE, ET UX	0.29		1942
F-207	WAYNE C. REED, ET UX	0.88		1942
F-208	JACK O'DELL, ET UX	0.59		1942
F-209	JOHN PERRY PHELPS, ET UX	0.29		1942
F-210	ALLIE C. OTT, ET AL	0.29		1942
F-211	TRENT L. BEARDEN	0.59		1942
F-212	E. J. GERLICH	0.30		1942
F-213	PERCY J. THOMPSON, ET UX	0.29		1942
F-214	J. F. CRAWFORD, ET UX	0.59		1942
F-218	R. L. STEVENS, ET UX	0.88		1942
F-219	W. R. SLOCUM, ET UX	0.29		1942
F-220	PIERCE SLOCUM, ET UX	0.29		1942
F-221	J. H. ROBERTSON, ET UX	0.29		1942
F-223	CARL J. TRAVIS, ET UX	0.59		1942
F-224	E. L. SHACKELFORD, ET UX	0.29		1942
F-226, F-229	GUY T. MUIR, ET UX	0.58		1942
F-227	C. B. MALONE	0.59		1942
F-228	BEN HEAD, ET UX	0.59		1942
F-230	FLOYD SPEER, ET UX	0.29		1942
F-231	ROBERT HEAD, ET UX	0.58		1942
F-232	WM J. STAPP, JR, ET AL	3.11		1942
F-233	VERNON D. HALLUM, ET UX	2.50		1942
F-234	GROVER R. HUBER, ET UX	1.25		1942

Table 1-6. Property Acquisition Summary

Tract No.	Previous Land Owner	Acreage		Acquisition Date
		Fee Land	Easement Land	
F-235	G. C. WILLIAMS, ET UX	1.25		1942
F-236	LEONARD JACK, ET UX	0.63		1942
F-237	W. F. ADAMS, ET UX	0.63		1942
F-238	S. B. SUTTLE, ET UX	1.25		1942
F-239	FRED F. ADAMS, ET UX	0.63		1942
F-240	L. A. WRIGHT, ET UX	0.63		1942
F-242	WALTER S. SNOW, ET UX	2.50		1942
F-243	F. M. COLE, ET UX	1.25		1942
F-244	J. MORRIS, ET UX	1.25		1942
F-245	M. E. MORRIS, ET UX	2.50		1942
F-246	ERA ELLEN TRAVIS	2.14		1942
F-247	J. M. TRAVIS, ET UX	3.22		1942
F-137	V. T. KENNEMER	0.29		1942
G-249	ELIAS HILWIE, ET UX	7.91		1942
G-250	J. E. HELM, ET AL	5.88		1942
G-251	R. O. ALEXANDER, ET UX	2.97		1942
G-252	F. R. ALLEN, ET UX	3.04		1942
16	J. R. STAUDT, ET UX	2.20		1943
17	ST. ELMO BROCK, ET UX	1.83		1943
19	G. D. HOWARD, ET UX	5.87		1943
20	JOHN B. PRIDDY, ET UX	3.74		1943
21	C. R. NICHOLSON, ET UX	4.20		1943
22	IDA PENNINGTON	3.05		1943
24	JACK M. BROWNE	2.00		1943
25	WILLIAM DWIGHT DOBSON, ET	0.29		1943
26	HAROLD V. JOHNSON, JR., ET	3.51		1943
27	CARL BRUNER, ET UX	0.31		1943
28	AMON G. CARTER	3.24		1943
29	AMON G. CARTER	0.77		1943
30	RAYMOND E. BUCK, ET UX	0.56		1943
31	J. F. COOK	3.38		1943
254, 255 & 267E	CITY OF FORT WORTH, TEXAS	3.60	8.63	1945
FH-1	LEO BREWSTER, ET UX	6.00		1947
FH-2	HARRY FIFER, ET AL	7.05		1947
FH-3	BARBARA KRUPKA	5.13		1947
FH-4	ROBERT E. LEE, ET UX	5.50		1947
FH-5	A. I. GOLDBERG, ET UX	5.46		1947
FH-6	W. T. SANSOM, ET UX	5.46		1947
FH-8	JESSIE ELLIOT HARWELL	38.83		1947
FH-9	MRS JOE FARMER BURGER, ET	11.00		1947
	TOTAL	1311.15	8.63	1942-1949
267E	JOHN GRAY, ET AL		0.22	1950

Table 1-6. Property Acquisition Summary

Tract No.	Previous Land Owner	Acreage Fee Land	Acreage Easement Land	Acquisition Da
256, 256-1, 261E, 262E, 263E & A-185E	CITY OF FORT WORTH, TEXAS	34.12	32.97	1951, 1955 1958 & 195
257	W. F. CHARBONNEAU, ET UX	70.00		1951
A-100	WHITESETTLEMENT CEM.,	7.30		1952
A-101 & E-505	NOEL R. BAILEY, ET UX	14.85		1952 & 195
A-109	MRS MARY FAIN	19.30		1952
A-102	GATLIN MITCHELL, ET UX	22.90		1953
A-103	WILLARD M. WHITE, ET UX	5.00		1953
A-104	W COULSTING, ET UX	56.20		1953
A-105, A-107	E. W. JACKSON, ET UX	57.56		1953
A-106	J. A. JUNGE, JR., ET UX	1.94		1953
A-108, A-120	MARY FAIN	3.47		1953
A-114, A-115	BESSIE HERZ, ET VIR	9.46		1952, 195
A-110, A-137, A-178, E-503, E-518 & E- 540	TARRANT COUNTY, ET AL	25.66		1952, 1953, 1955 &1956
A-112	R. L. GARLOCK, SR., ET AL	96.70		1953
A-113, A-116, A-145, A-177, A-179, A-180, A-182, A-183	G. L. DEARING, ET UX	18.71		1953
A-117, A-119	ROY ALLEN, ET UX	1.57		1953
A-118	C. E. WATSON, ET UX	0.25		1953
A-121	LENARD PEMBERTON, ET UX	0.29		1953
A-124	ODIS DAVIS, ET UX	0.25		1953
A-125	S. H. CARLTON, ET UX	0.63		1953
A-127	DILLON D. HARDEE	0.50		1953
A-128	A. W. COSTEPHENS, ET UX	0.53		1953
A-129	EARL THOMAS, JR, ET UX	0.25		1953
A-130	JACK F. DOBBS, ET UX	0.50		1953
A-131	HAROLD L. BUSBY	0.25		1953
A-132	GLENDORA BRUMBAUGH, ET VIR	0.25		1953
A-133	PAUL STEVENS, ET UX	0.25		1953
A-134	DEWEY ROSE, ET UX	0.25		1953
A-135	GEORGE E. BRACKETT, JR., ET	0.50		1953
A-138 & A-159-1	F. L. CARMICHALL, ET UX	24.79		1953 & 195
A-139	JOHN HENRY COOK, ET AL	1.60		1953
A-140	HARRY B. KAHN, JR, ET UX	1.00		1953
A-141	MARVIN BROWDER, ET UX	2.04		1953
A-142	DONALD H. CHISM, ET UX	4.51		1953
A-143	WORTHAM R. BELL, ET UX	1.00		1953
A-144	CITY OF WHITE SETTLEMENT	0.20		1953
A-146	R. L. CARLOCK, SR., ET AL	0.19		1953

Table 1-6. Property Acquisition Summary

Tract No.	Previous Land Owner	Acreage		Acquisition Date
		Fee Land	Easement Land	
A-147	JOHN E. DEARING	0.10		1953
A-148	E. D. DEARING, ET UX	0.58		1953
A-149	FRED E. KIRSCHNER, ET UX	0.29		1953
A-151	W. S. TURNER, ET UX	0.29		1953
A-152	R. G. COX, ET UX	0.29		1953
A-153	A. F. MORRIS, ET UX	0.29		1953
A-154	SMITH BUSBY, ET UX	0.29		1953
A-155	L. F. CADDELL, ET UX	0.58		1953
A-156	B. W. PEDERSON, ET UX	0.29		1953
A-157	LUM PHIFER, ET UX	0.29		1953
A-158	LEON C. HOBBS, ET UX	0.31		1953
A-159	R. L. CARMICHALL, ET UX	1.54		1953
A-160	D. R. JOHNSON, ET UX	0.03		1953
A-162	LESTER J. CORMIER, ET UX	0.73		1953
A-163	JUANELL DOWNE, ET AL	0.43		1953
A-164	ALVIN BREWER, ET UX	0.13		1953
A-165	J. C. HARRELL, ET UX	0.25		1953
A-168	J. A. HOLLEY, ET UX	0.50		1953
A-169	VIRGINIA KNIGHT, ET VIR	0.25		1953
A-170	WILLIAM LEO DURHAM, ET UX	0.50		1953
A-171	I. L. ROSE, ET UX	0.25		1953
A-172	J. F. PRATER, ET UX	0.25		1953
A-173	J. B. WILLIAMS, ET UX	0.25		1953
A-174	OLLIE P. BRIGHT, ET UX	0.50		1953
A-175	R. P. KUNKLE, ET UX	0.50		1953
A-176	W. A. GARDNER, ET UX	0.25		1953
A-181	R. L. CARLOCK, JR, ET UX	0.77		1953
A-126	A. H. CORDER	0.25		1954
A-136	LOUIS A. WEURDIG, ET UX	0.52		1954
A-150	W. E. GARRISON, ET UX	0.29		1954
A-161	JOHN C. G. HOLOWAY, ET UX	0.25		1954
B-257E	J.N. CASEY, ET UX		0.25	1954
B-213E	BILLY J. GRIFFITH, ET AL		0.23	1954
C-313E	J.H. COX, ET UX		0.25	1954
E-504	PATRICIA HOWARD HARRIS	10.00		1954
E-506	WILLIAM G. FULLER, ET UX	13.87		1954
E-507	BARBARA K. FULLER	5.00		1954
E-508	DR. ROBERT C. BOTTS, ET UX	6.18		1954
E-509	W.R. GRANDY, JR., ET AL	5.00		1954
E-511	NORRIS S. MEFFORD, ET UX	13.25		1954
E-512	ARNOLD C. WARD, ET UX	2.00		1954
E-513	WILLIAM W. BROWN, ET UX	1.75		1954
E-517	CHAUNCEY A. PRADE, JR. ET UX	5.10		1954
E-519	CHARLES F. CLAYTON, ET UX	12.11		1954

Table 1-6. Property Acquisition Summary

Tract No.	Previous Land Owner	Acreage		Acquisition Da
		Fee Land	Easement Land	
E-520	JOHN THOMAS FENNER, ET UX	1.00		1954
E-521 & E- 523	M.M. ROBERTSON, ET AL	6.20		1954
E-525	RAYMOND E. BUCH, ET UX	29.10		1954
E-526	WILLIAM DWIGHT DOBSON, ET	6.61		1954
E-529	HOMER PRIDDY, ET UX	3.47		1954
E-530	DATE M. HYDE	13.54		1954
E-531	SIDNEY T. OATES, ET UX	12.20		1954
E-533	LOIS TRIGG	3.22		1954
E-534	EVELYN OATES, ET VIR	1.67		1954
E-535	WAYNE O. RICHARDSON, ET UX	0.54		1954
E-536	GARLAND B. FRANKLIN, ET UX	0.61		1954
E-542, A-178-1, A-184 & A-194	STATE OF TEXAS, ET AL	5.23		1954 & 195
E-543, B-285 & B-209E	STATE OF TEXAS	1.98	101.00	1954, 1958 1959
E-544	H.R. HAMM, ET UX	0.19		1954
F-600	O.L. BUTCHER, ET VIR	0.42		1954
F-601	E.T.C. MILLER, ET UX	0.42		1954
F-602	AUDRY CARLISLE, ET AL	0.42		1954
F-603	MARIE GLASGOW, ET AL	0.42		1954
F-604	JESSIE S. McGEE, ET UX	0.42		1954
F-605	JAMES T. FINLEY, ET UX	0.42		1954
F-606	ALVIE J. STAFFORD, ET UX	0.42		1954
F-607	ELGIN K. MUELSCHEN, ET UX	0.42		1954
F-608	ELVAL MAE MITCHELL, ET AL	0.42		1954
F-609	JOHN K. PETTY, ET UX	0.84		1954
F-611	MATTIE BADGETT GLASGOW, ET	0.55		1954
F-612	MARTHA ANN BARRY	0.42		1954
F-613	M.A. WILSON, ET UX	0.84		1954
F-614	JIMMIE Z. MILLER, ET UX	0.42		1954
F-615	W.A. TURNER, ET UX	0.42		1954
F-616	W.P. BEARDEN, ET UX	0.26		1954
F-617	HAROLD V. GREEN, ET UX	0.16		1954
F-618	R.W. BUCHANAN, ET AL	0.21		1954
F-619	HUBERT WOLFORD, ET UX	0.63		1954
F-620	WILLIAM IRA BUSH, ET UX	0.21		1954
F-621	JAMES E. RICHARDS, ET UX	0.21		1954
F-623	RUBY LUCELLE BISHOP, ET VIR	0.42		1954
F-624	E.V. LAMEY, ET UX	1.12		1954
F-625	JESSE A. BUTCHER, ET UX	0.84		1954
F-626	GEORGE A. RUSHING, ET AL	0.25		1954
F-628	J.J. PRESCOTT, ET UX	0.23		1954
F-629	ROBERT M. ROONEY, ET UX	0.12		1954
F-630	WILLIAM EMBLETON, ET UX	0.14		1954

Table 1-6. Property Acquisition Summary				
		Acreage		
Tract No.	Previous Land Owner	Fee Land	Easement Land	Acquisition Date
F-631	R.W. BUCHANAN, ET UX	0.12		1954
F-632	L.V. GILES, ET UX	0.23		1954
F-633	CLIFFORD F. WEST, ET UX	0.14		1954
F-634	W.S. DRISKILL, ET UX	0.23		1954
F-635	G.T. GARRETT, ET UX	0.14		1954
F-636	CHARLES H. KERR, ET UX	0.23		1954
F-637	D.A. SNEDECKER, ET UX	0.14		1954
F-638	JOHN T. WEEK, ET AL	0.16		1954
F-639	DOROTHY McCASKILL	0.11		1954
F-640	A.J. MULLINS, ET UX	0.17		1954
F-641	L.L. LEDBETTER, ET UX	0.15		1954
F-642	J.C. SIMMS, ET UX	0.16		1954
F-643	BUDDY GERALD WHITE, ET UX	0.14		1954
F-644	CARL IMES, ET UX	0.19		1954
F-645	JOHN POPE JR., ET AL	0.13		1954
F-646	FLORENCE FRANKLIN, ET VIR	0.19		1954
F-647	H.G. BURGER, ET UX	0.37		1954
A	DEPARTMENT OF COMMERCE	1.67		1955
A-111, B-204E, B-289E & B-285E	TEXAS ELECTRIC SERVICE CO.	1.29	31.52	1955 & 1959
B-201E	JOHN H. COOK, ET UX		17.33	1955
B-214E	HILLCREST BAPTIST CHURCH		0.46	1955
B-215E	RUSSELL ODOM		0.24	1955
B-216E	GORDON B. JOHNSTON, ET UX		0.48	1955
B-217E	JESS L. BRAY, ET UX		0.37	1955
B-218E	CLYDE E. JONES, ET UX		0.37	1955
B-219E	ALVIN O. WOOD, ET UX		0.25	1955
B-220E	JAMES R. THURSTON, ET UX		0.25	1955
B-225E	A.B. COHRON, ET UX		0.19	1955
B-226E	JOE G. WILLIAMS, ET UX		0.37	1955
B-228E	D.L. PYBURN, ET UX		0.75	1955
B-230E	J. FOREST OLIVER, ET UX		0.24	1955
B-231E	A.B. COHRON		0.24	1955
B-232E	NELLIE MAY BURCHFIELD		0.48	1955
B-234E	VIRGIL S. HOLBROOK, ET UX		0.25	1955
B-235E	HENRY L. HOLBROOK		0.25	1955
B-236E	MRS. A.C. DUNN		0.25	1955
B-237E	C.E. CARLISLE, ET UX		0.25	1955
B-238E	G.H. CLANTON, ET UX		0.24	1955
B-239E	J.E. PARTEN, ET UX		0.50	1955
B-241E	E.H. BRAUCHT, ET UX		1.10	1955
B-242E	THOMAS O. DICKINSON, ET UX		0.90	1955
B-243E	JOHN H. UNDERWOOD		0.44	1955
B-244E	J.W. SHOEMAKER, ET UX		0.33	1955

Table 1-6. Property Acquisition Summary

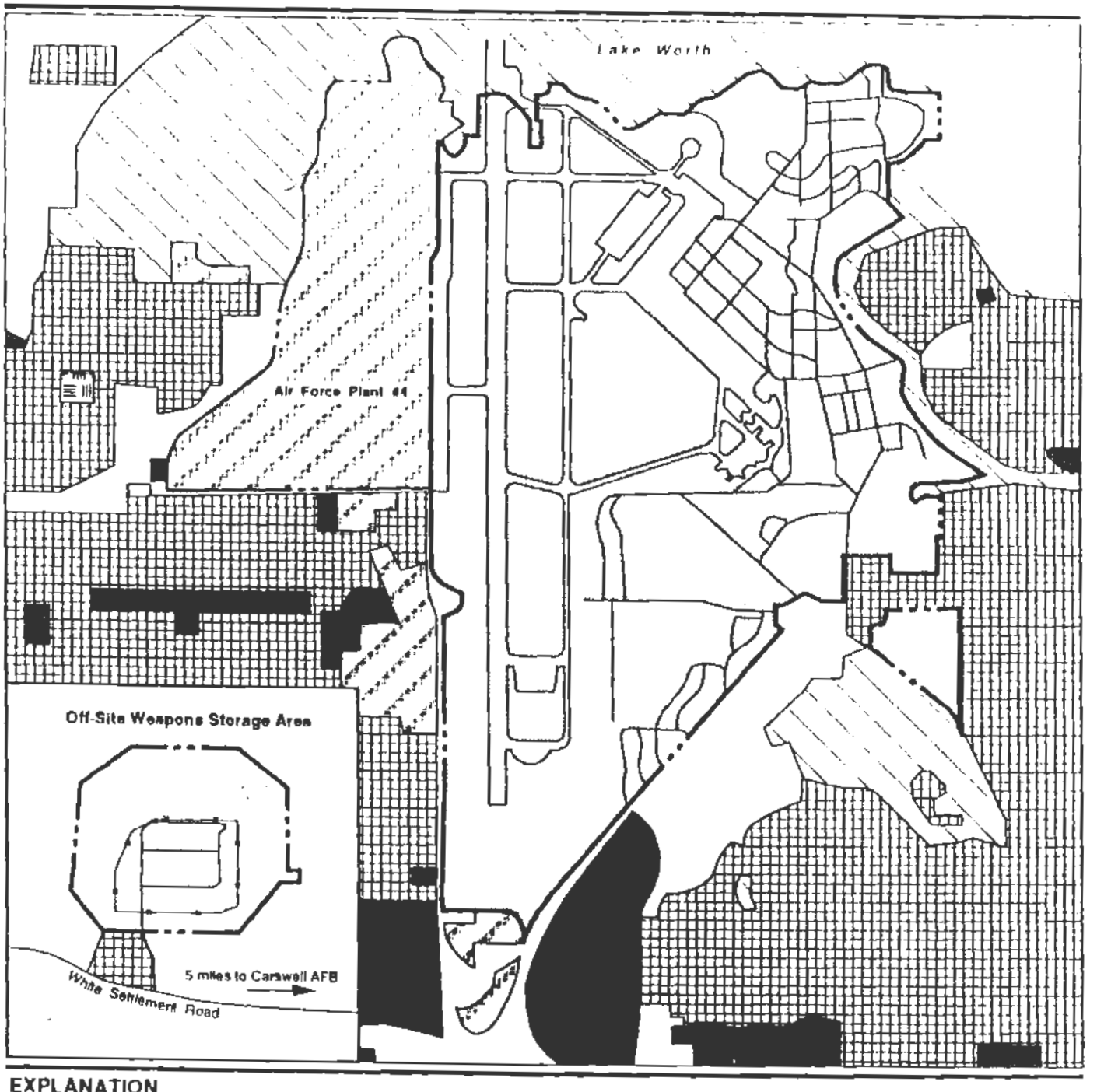
Tract No.	Previous Land Owner	Acreage		Acquisition Da
		Fee Land	Easement Land	
B-245E & C-302E,	E.E. COLEMAN, ET UX		0.59	1955
B-246E	J.D. WATTS, ET UX		0.92	1955
B-247E	GEORGIANA GARRISON		0.36	1955
B-249E & B-260E	MAMIE O. SCOTT, ET VIR		0.61	1955
B-250E	W.E. BARTON, ET UX		1.07	1955
B-251E	M.E. WAGNER, ET UX		0.71	1955
B-252E	BERTHA SHARP, ET VIR		0.70	1955
B-253E	CHESTER H. SEGER, ET UX		0.35	1955
B-255E	E.C. JORDAN, ET UX		0.25	1955
B-256E	MARY E. STATUM		0.25	1955
B-258E	W.E.BARTON, ET UX		0.25	1955
B-259E	B. DORSETT, ET UX		0.50	1955
B-261E	ROBBIE LOUISE PADGETT, ET AL		0.75	1955
B-262E	J.J. BAKER, ET UX		0.50	1955
B-263E	HARRY McDOUGAL, ET UX		0.75	1955
B-264E	L.B. SMITH, ET UX		0.50	1955
B-265E	S.A. SPRAY, ET AL		0.25	1955
B-266E	MARY E. STATUM		0.25	1955
B-267E	JIMMIE HOGG, ET UX		0.25	1955
B-269E	L.R. TERRY, ET AL		0.50	1955
B-271E	F.A. BIRD, ET UX		0.50	1955
B-273E	B.E.GROSS, ET AL		0.25	1955
B-278E	CLIFFORD L. WILLIAMS, ET UX		0.50	1955
B-280E	L.H. WILLIAMS, ET UX		0.50	1955
B-281E	H.M. WILLIAMS, ET UX		0.25	1955
B-283E	R.D. VEATCH, ET UX		0.25	1955
B-293E	LASSITER LANE, ET UX		0.19	1955
C-303E	J.P. JENNINGS, ET UX		0.25	1955
C-306E	J.N. SWANCY, ET UX		0.25	1955
C-311E	S.J. TAYLOR		0.50	1955
C-312E	ROY GINN, ET UX		0.50	1955
C-314E	H.O. MIDDLETON, ET UX		0.25	1955
C-316E	MRS. ORA LEE SMOTHERS		0.25	1955
C-317E	J.E. SMOTHERS, JR., ET AL		0.50	1955
C-318E	JESS REYNOLDS, ET UX		0.25	1955
C-321E	STELLA JENNINGS JACQUE		0.24	1955
C-323E	DELTA R. PAUL		0.24	1955
C-324E	GUY E. JARVIS, ET UX		0.24	1955
C-325E	I.E. KENNELLY		0.24	1955
C-326E	O.B. AWTREY, ET UX		0.24	1955
C-328E, C-349E, D-440E, D-455E & D-400E	R.O. BERKE, ET AL		2.97	1955 & 195
C-332E & D-410E	ALEXANDER KUZMICKEY, ET UX		1.09	1955

189053

Table 1-6. Property Acquisition Summary				
		Acreage		
Tract No.	Previous Land Owner	Fee Land	Easement Land	Acquisition Date
C-334E	J.C. JACKSON, ET UX		0.76	1955
C-335E	G.J. BURK, ET UX		0.25	1955
C-337E	L.C. LEE, ET UX		0.25	1955
C-338E	K.H. WITHROW, ET UX		0.25	1955
C-340E	DOUGLAS E. HISSIGNS, ET UX		0.30	1955
C-341E, C-342E & D-403E	THE FAIR-WAY CO.		0.80	1955 & 1956
C-343E	W.T. REYNOLDS, JR. ET UX		0.25	1955
C-372E	ANN S. HILDEBRANDT, ET VIR		0.25	1955
E-501	W. COULSTING, ET UX	54.80		1955
E-502	RHEA J. VERNON, ET UX	10.00		1955
E-510	WILLARD M. WHITE, ET UX	3.00		1955
E-514	WILLIAM A. BRATTON, JR., ET	3.11		1955
E-515	ED McDANIEL, ET UX	2.27		1955
E-516	VICTOR H. McDANIEL, ET UX	1.54		1955
E-522	C.R. SANDIDGE	2.00		1955
E-524	J.B. HONTS, ET UX	0.53		1955
E-532	EUGENE SERGI, ET UX	0.31		1955
E-537	GRACE COZBY	22.75		1955
E-538	MATTIE BELLE McNAUGHTON	6.49		1955
F-627	RIVER OAKS WATER CO.	3.27		1955
G-700, G-700E1 & E2	FIRST NATIONAL BANK OF FORT WORTH, TRUSTEE	247.00	232.95	1955
G-701E	VANDERVOORT'S, INC.		29.00	1955
F-649E	AMON G. CARTER FOUNDATION		0.96	1956
A-167-1	MARTHA FRANCES COOK, ET AL	23.60		1958
B-292E	WILLIAM BRYCE, ESTATE	0.13		1958
B-200E, B-290E & B-291E	J.M. LEONARD, TRUSTEE		67.89	1958
E-545	WESTWORTH VILLAGE, TEXAS	0.31		1958
B-202E	TOM COOK, ET UX		6.25	1959
	TOTAL	1055.77	553.89	1950-1959
A-185E	CITY OF WHITE SETTLEMENT		0.92	1960
B-203E, B-285E, B-286E, B- 287E & B-288E	WILLIAM BRYCE, ESTATE		52.94	1960
B-206E	TARRANT COUNTY, ET AL		6.39	1960
E-546, E- 547 & E-548	RAYMOND E. BUCK, JR., TRUSTEE, ET AL	135.64		1960
F-622 & 264E	CITY OF FORT WORTH, TEXAS	4.58	6.21	1960 & 1961
A-184E	STATE OF TEXAS		5.17	1964
J	DEPARTMENT OF THE ARMY	5.38		1968

Table 1-6. Property Acquisition Summary

Tract No.	Previous Land Owner	Acreage Fee Land	Acreage Easement Land	Acquisition Da
	TOTAL	145.60	71.63	1960-1969
550 & 551	CITY OF WESTWORTH VILLAGE	6.04		1971
552E	ESTEBAN CONTRERAS ET UX		0.09	1973
		6.04	0.09	1970-1979
195	MAYFLOWER OFFICE &	1.77		1983
194	STATE OF TEXAS	1.12		1984
555	FORT WORTH I.S.D., ET AL	9.00		1986
556	M BANK FORT WORTH, TRUSTEE,	3.17		1986
557	CITY OF WESTWORTH VILLAGE	0.96		1987
558E	MIRANDA LEONARD, ET AL		0.02	1989
	TOTAL	16.02	0.2	1980-1989
258	CITY OF FORT WORTH, TEXAS	66.90	Acres under lease	
	Total Of Acres Fee & Easement	2595.44	634.35	3229.79



EXPLANATION

- Industrial
- Institutional (Education)
- Commercial
- Residential
- Public/Recreation
- Vacant Land
- Base Property
- Base Boundary
- Air Force Plant #4 Boundary

0 650 1300 2600 Feet

Existing Off-Base Land Use

Figure 1-3

189056

THIS PAGE INTENTIONALLY LEFT BLANK

180657

TAB

CHAPTER 2.0

Chapter 2
Property Disposal and Reuse Plan

2.1
Status of Disposal Planning Process

The DBCRA of 1990 authorized the closure of Carswell AFB with the retention of an area for continued Air Force operations. As a result, Carswell AFB officially closed on 30 September 1993. A portion of the base property has been retained by the Air Force and is unavailable for disposal. The retained area supports continued operations of the 301 Tactical FW; Air Force Plant 4 run-up stations and treatment, storage, and disposal (TSD) activities. The Environmental Impact Analysis Process (EIAP) for base disposal and reuse was initiated in fall 1991. A draft Disposal and Reuse Environmental Impact Statement (EIS) was released for public review in February 1993.

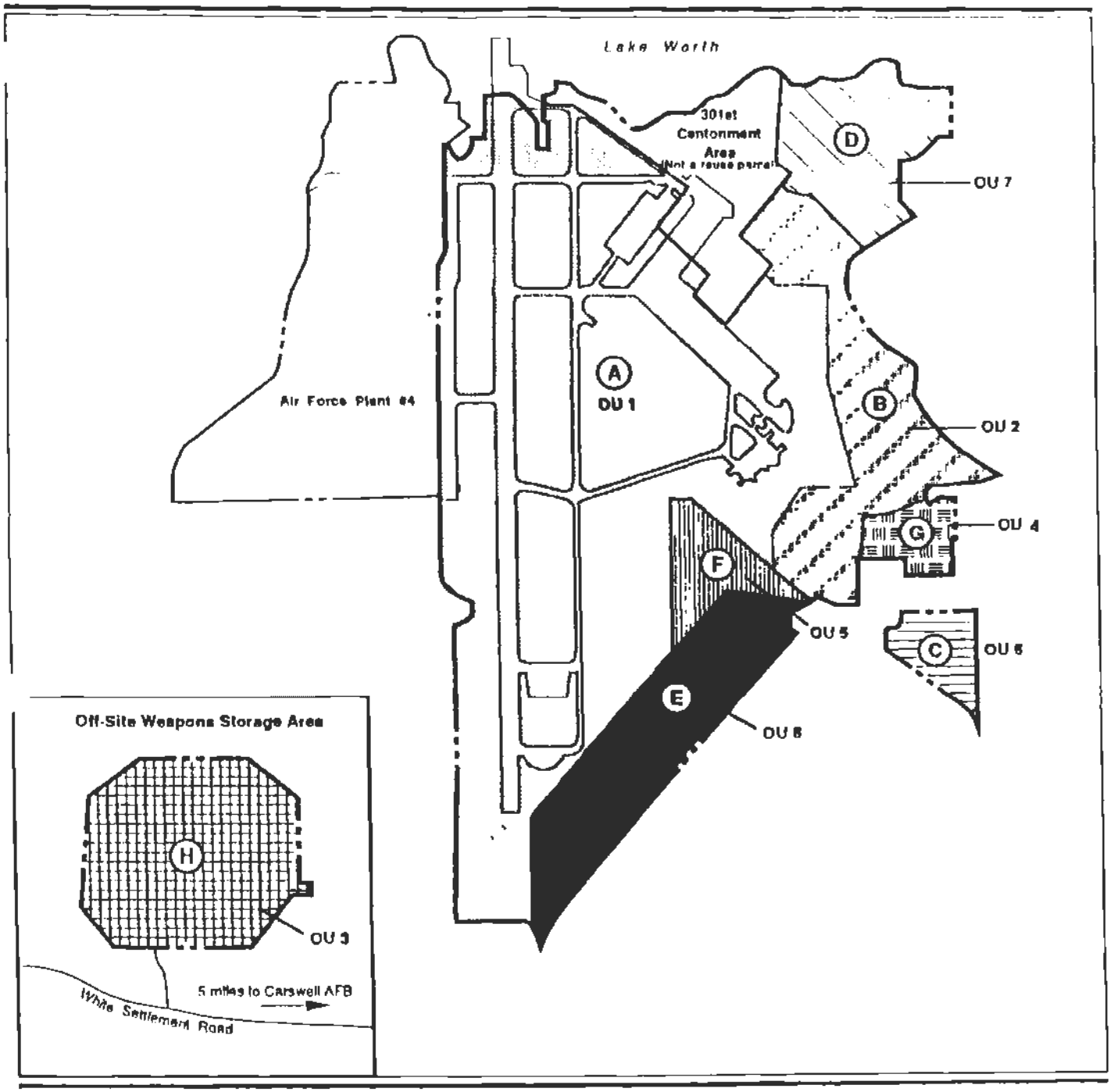
The DBCRA of 1993 was negotiated and the Act was signed on 30 September. DBCRA of 1993 recommendations will allow for the relocation of several Department of Defense (DOD) organizations to Carswell AFB. The draft EIS will be revised to include analysis of the bed-down and operations of NAS Fort Worth JRB. The draft EIS will be distributed in March 1994 for public review.

The partial Record of Decision (ROD), scheduled for publication in August 1995, will support the disposal decisions based on both 1990 and 1993 DBCRA decisions.

An additional disposal-related decision was made in April 1993, whereas the Secretary of the Air Force declared excess and surplus the off-base property known as Kings Branch to accelerate its disposal for civilian use.

The CRA, comprising Tarrant County and the cities of Fort Worth, White Settlement, and Westworth Village, was formed to coordinate the redevelopment efforts associated with the reuse of Carswell AFB. The CRA has incorporated the reuse plans of Federal Bureau of Prisons (FBOP) into their reuse proposal for the property available for disposal. Their plan also accounts for the additional property retained by DOD due to the 1993 DBCRA recommendations. The CRA comprehensive reuse plans focus on a naval air station, a federal medical center complex, and various industrial, commercial, residential, and recreational uses. The military land uses would include approximately 1,820 acres, the federal prison would consist of 99 acres, and the remaining civilian uses would total 640 acres.

To support the disposal process, disposal parcels will be defined based on the CRA reuse plans and the DBCRA decisions. These parcels will reflect general types of reuse, but may not necessarily reflect the land use zones identified in the Disposal and Reuse EIS (Figure 2-1).



EXPLANATION

(A) Parcel Designation

Base Boundary

Air Force Plant #4 Boundary

0 650 1300 2600 Feet

Disposal and Reuse Parcels

Figure 2-1

Table 2-1. Reuse Parcel Data Summary

Parcel	Acres	Priority[a]	Description and Proposed Reuse	Known IRP Sites	Projected Transfer Date	Transfer Mechanism	Recipient
A	1,240	High	Airfield operations and support facilities; will be industrial/aviation	OT-18[b], DP-17, LF-06, LF-04, LF-05, FT-09, SD-10, ST-14, WP-07	October 1995	N/A	Navy
B	305	High	Base support operations; will be mixed use: commercial/ industrial	LF-01, ST-16, SD-13	October 1995	N/A	Navy
C	47	High	Housing; proposed reuse to remain residential	None	October 1995	N/A	Navy
D	150	High	Housing, medical; proposed reuse is commercial/ industrial/institutional	None	October 1995	N/A	Navy
E	230	High	Housing; reuse to be commercial	None	October 1995	N/A	Navy
F	145	Medium	Golf course; to remain golf course	(c)	October 1995	N/A	Navy
G	47	Low	Horse stables/outdoor recreation; proposed for outdoor recreation use	None	October 1995	N/A	Navy
H	247	High	Weapons storage; proposed reuse undecided	OT-15 (SWMUs 60 and 65)	October 1995	N/A	Navy

Notes: (a) This table reflects prioritization based on BRAC Round II requirements and is subject to change following BRAC Round III.
(b) This site may be impacted by the AF Plant 4 TCE plume.
(c) No known IRP sites.

Figure 2-1 and Table 2-1 indicate the types of reuse and the priority for disposal for each reuse parcel defined prior to the 1993 DBCRA recommendations. Disposal methods and associated schedules have not been established and are pending further disposal planning decisions.

The Draft Disposal Plan is undergoing revision by the General Services Administration and will reflect the 1993 DBCRA decisions. The schedule for completion has not been determined. When these disposal planning decisions are finalized, Figure 2-1 and Table 2-1 will be revised.

2.2
Relationship to Environmental Programs

The requirements for complying with CERCLA §120(h)(3)(B)(i) and the possibility of residual contamination are being factored into the property disposal and reuse process.

CERCLA §120(h)(3)(B)(i), as amended by CERFA, requires the identification of uncontaminated parcels with regulatory concurrence, and allows transfer by deed of remediated parcels at the point when the successful operation of an approved remedy has been demonstrated to the U.S. EPA. CERFA also provides that the identification of uncontaminated parcels shall consider petroleum products, as well as CERCLA-hazardous substances, and not be considered complete until concurrence by the state of Texas. This means that any required remedial and/or removal response actions must be selected and implemented for such contaminated properties before transfers to private parties can occur.

Because of the need to delineate between areas suitable for transfer and those that are not, the BCT is developing an environmental-condition-of-property map for the installation (see Section 3.4). This map will allow BCT members and other interested parties to visualize contaminated areas and Areas of No Suspected Contamination (ANSCs) and the relationship of these areas to disposal and reuse parcels. Several ANSCs have been identified to date that may be suitable for near-term property disposal to other parties. Contaminated areas and areas of suspected contamination are the subject of ongoing environmental response activities. The BCP strategy and schedule herein is designed to streamline necessary responses associated with these areas to expedite disposal and reuse decision making.

The Carswell AFB environmental restoration program strategies are being considered during the disposal and reuse decision to address the possibility of residual contamination and the need for easements, covenants, land use restrictions, and institutional controls. Areas on base where hazardous substances, pollutants, or contaminants are expected to remain above levels that allow for unlimited use and unrestricted exposure will constrain or delay future use of those areas. Table 2-1 presents a summary of the known IRP sites within each reuse parcel defined prior to the 1993 DBCRA recommendations. Development of the approximate timetable for disposal will require further decisions by the BCT and further remedial investigation (RIs).

2.3
Property Transfer Methods

2.3.1
Federal Transfer of Property

No property has been identified for transfer.

2.3.2
No-Cost Public Benefit Conveyance

No property has been identified for transfer.

2.3.3
Negotiated Sale

No property has been identified for transfer.

2.3.4
Widening of Public Highways

No property has been identified for transfer.

2.3.5
Donated Property

No property has been identified for transfer.

2.3.6
Interim Leases

One interim lease was signed and executed on 31 January 1994 for the golf course and there are two interim leases pending, one for office space and one for 20 homes. Table 2-2 presents existing legal agreements and interim leases.

Table 2-2. Existing Legal Agreements/Interim Leases

Title of Interim Lease/ Legal Agreement/ Proponent	Building No./ Areas	Date of Agreement	Reuse Parcel[1]	Type of Use	Status of Lease Agreement
Lease with CRA	Golf course	02/01/94	F	Recreation	Signed 31 January 1994
License with CRA	Building 260		G	Office space	Application pending
Lease with ARI	20 homes Kings Branch Area		C	House Handicap Individuals	Projected Date of Signature 30 Apr 94
Permit with the Federal Bureau of Prisons	Hospital Area		D	Federal Medical Center Complex with a Minimum Security Work Camp	Projected Date of Signature 30 Apr 94

2.3.7
Competitive Public Sale

No property has been identified for transfer.

2.3.8
Ingrants and Outgrants

At closure, airfield usage was reduced to continuing activities associated with the 301 Tactical FW, Air Force Plant 4, and other military transient operations. The retained area included reuse of the existing 301 Tactical FW facilities, as well as the existing firing ranges, WHCA facilities, noise suppression facility (Hush House), noncommissioned officers club, various supply/warehouse and fuel storage facilities, and engine run-up stations. The remaining base property was vacated and maintained in caretaker status. The land leases on the north side of the base were retained as ingrants for aviation safety and mission activities (Table 2-3). The restrictive easement associated with the Off-Site WSA was also retained for potential reuse. In addition, the Air Force held ingrants to use property outside the base boundaries for purposes other than avigation and safety easements. These primarily included lease of property adjacent to Lake Worth and right-of-way easements for utilities.

Table 2-3. Ingrants in Effect at Base Closure

Document Number	Expiration Date	Description/Location	Responsible Party
DACA 1443ENG7287	02/11/2013	Buried Cable	City of Fort Worth
DACA 635730020	06/30/1996	Use of land and facilities in case of war	Midwest Oklahoma Development Authority
DACA 635880313	06/30/2012	Control of lake front	City of Fort Worth
DACA 639700147	04/05/3000	Safety Zone	City of Fort Worth
DACA 639740077	Indefinite	Electrical Power Line	City of Westworth Village
DACA 639820045	Indefinite	Buried Cable	Texas State Highway Dept
DACA 639890247	02/11/13	Solid State Instrument Landing System & Ceilometer Facility and R-O-W	City of Fort Worth
DA44-4-43-ENG-7284	2/11/13	Submerged Cable	City of Fort Worth
DACA639850008	2/11/13	Submerged Cable	City of Fort Worth
220-W-100-85	Indefinite	Install Water Line	State Dept. of Hwys & Public Transportation
Info contained in Table 1-4	12/20/2005	Approach lights	City of Fort Worth
Info contained in Table 1-4	Indefinite	Avigation easement	City of Fort Worth and various property owners
Info contained in Table 1-4	Indefinite	On-base WSA safety easement	City of Fort Worth
Info contained in Table 1-4	Indefinite	Off-site WSA safety easement	Various Property Owners

The Air Force typically outgrants a number of leases, easements, and licenses to other agencies and organizations for use of the base property. At closure, the majority of these outgrants were for utilities (Table 2-4).

Table 2-4. Outgrants in Effect at Base Closure

Document Number	Expiration Date	Description/Location	Responsible Party
DA41443ENG5132	Perpetual	Telephone Lines	Southwestern Bell
DA41443ENG5135	Perpetual	Transmission Lines	Texas Electric CO.
DA41443ENG5134	Perpetual	Transmission	Texas Electric Co.
DA41443ENG5147	Perpetual	Water line	City of Fort Worth
DA41443ENG5494	Perpetual	Telephone line	Southwestern Bell
DA41443ENG5707	Perpetual	Gas line	Lone Star Gas Co.
DA41443ENG5849	Perpetual	Utility row	Texas Electric Co.
DA41443ENG6039	02/16/2011	Sewer line	City of Lake Worth
DA41443ENG6076	03/12/2060	Road	City of Fort Worth
DA41443ENG6153	11/20/2011	Electric lines (overhead)	Texas Electric Co.
DA41ENG5146	Perpetual	Water pipeline	City of Fort Worth
DACA 6317550192	01/31/1995	Telephone poles	Southwestern Bell
DACA 632680227	Perpetual	Sewer line	City of White Settlement
DACA 632690217	12/22/2068	Fence	TC Water Contracting
DACA 632720440	Perpetual	Sewer Line	City of White Settlement
DACA 632740034	7/26/23	Sewer Line	City of White Settlement
DACA 632840551	03/04/2009	Jet fuel pipe	Carswell Pipeline Co.
DACA 632850661	06/11/2015	Petroleum pipeline	Carswell Pipeline Co.
DACA 633810513	10/31/1995	Cattleguards	Private Individual
DACA 639890504	11/29/2088	Electrical line	City of Fort Worth
USAF CRS391001	01/01/2042	Electric service	Texas Electric Co.
DACA631790559	3/1/95	Credit Union	
DACA63-2-87-0502	2/16/61	Sewer line	
DACA633770504	Presently under renewal	Museum (Aerospace)	
DA-41-443ENG6037	2/16/11	Sewer Line	
DA-41-443ENG5495	Permanent	Telephone Line	Southwestern Bell
USAF-SAC-CRS-4-91-002	6/30/96	Sewer	City of White Settlement

183785

THIS PAGE INTENTIONALLY LEFT BLANK

189.66

TAB

CHAPTER 3.0

189067

Chapter 3
Installation-Wide Environmental Program Status

This section provides a summary of the current status of environmental restoration projects and ongoing compliance activities at Carswell AFB. It also summarizes the status of community involvement to date and describes the environmental condition and suitability for transfer of the base property. Table 3-2 lists 19 IRP sites currently being investigated; it also lists the study area, parcel location designation for each site, and may be cross-referenced to the reuse map presented in Figure 2-1. A total of 80 former and/or current USTs and 75 aboveground storage tanks have also been identified by the base. Storage tanks are not listed on Tables 3-1 and 3-2 but are discussed in Section 3.2. The sites that are currently undergoing investigations (including USTs) are included in Figure 3-1. The following sections include a brief history of the IRP as it applies to the base, the current status of restoration projects, and the installation-wide source discovery and assessment status.

3.1
IRP Status

The ongoing IRP is under a DOD and state Defense-State Memorandum of Agreement (DSMOA), which is a financial reimbursement agreement between DOD and the state of Texas. There are no other agreements (i.e., Federal Facility Agreements [FFAs]) with federal or state agencies in effect to establish response mechanisms, schedules, and responsibilities. The base does have a Hazardous Waste Part B permit issued by the TNRCC in February 1991 that establishes requirements and procedures for investigating RCRA SWMUs. Most base IRP sites are also SWMUs and are regulated under this permit. A draft Partnering Agreement between AFBCA/OL-H and AF Plant 4 has been finalized. This agreement establishes the roles, responsibilities, and other procedures to be implemented during remediation of trichloroethylene (TCE)-contaminated groundwater for the AF Plant 4 IRP.

The base has been reevaluated under Hazardous Ranking System (HRS) II for possible listing on the National Priorities List (NPL). It has been determined that the base will not be included as an NPL site. The base has actively followed IRP and RCRA guidelines in the identification, assessment, and restoration of its hazardous waste-contaminated sites. An IRP program has been in place since 1984, and the base has worked closely with U.S. EPA Region VI and the TNRCC as lead regulatory agency on restoration of its IRP sites.

3.1.1
IRP Sites

Carswell AFB currently has 19 IRP sites. A Phase I - Records Search conducted in 1984 identified 15 sites requiring further evaluation. An additional four sites have been identified since then through subsequent IRP investigations and other base activities. The East Area Groundwater Site is suspected of being contaminated due to the presence of IRP sites, but is not currently considered its own site. Thirteen of these sites are also RCRA SWMUs. Table

3-2 provides a brief description of these sites and Figure 3-1 shows their geographic locations. (Table 3-1 contains a listing of Points of Interest [POIs] and their status.) Figure 3-1 also shows an extensive TCE-contaminated groundwater plume. This IRP site is the responsibility of the adjacent AF Plant 4 and is not a Carswell AFB IRP site. The TCE plume is managed under the FFA for AF Plant 4, which is an NPL site.

Table 3-1. Preliminary Location Summary

		PA/SI Report Results/Findings			
POI Number	**Description**	**PA**	**SI**	**Findings**	**Final Determination**
94-6501	Grounds Maintenance Yard	X	X	Heavy contamination from hydrocarbons	Additional investigation
95-8021	RV Parking Area	X		Potential contamination from hydrocarbons	Additional investigation
95-8020	Base Refueling Area	X		Evidence of contamination in groundwater	Additional investigation
95-8000	Southwest Aerospace Museum	X	X	High probability of contamination due to metals	Additional investigation
94-7106	Airfield Groundwater	X		Suspected hydrocarbon contamination	Additional investigation
95-8022	Golf Course Maintenance Area	X	X	Sampling confirms contamination	RA proposed

IRP sites are grouped into three OUs based on pre-1993 DBCRA-recommended reuse parcels. OU 1 (Parcel A) consists of nine sites in the flightline area; OU 2 (Parcel B) comprises four sites in the East Area Groundwater Site; OU 3 consists of a site in the Off-Site WSA, which is reuse Parcel H. The remaining six sites have not been assigned to an OU because they were closed prior to the use of OUs at Carswell AFB. Three of these six sites (LF-02, LF-03, and WP-11) are former SWMUs that were eliminated during the RCRA Facility Assessment (RFA). The other three sites, OT-15 (SWMU 65), FT-08, and OT-12 have NFAs approved by the TNRCC.

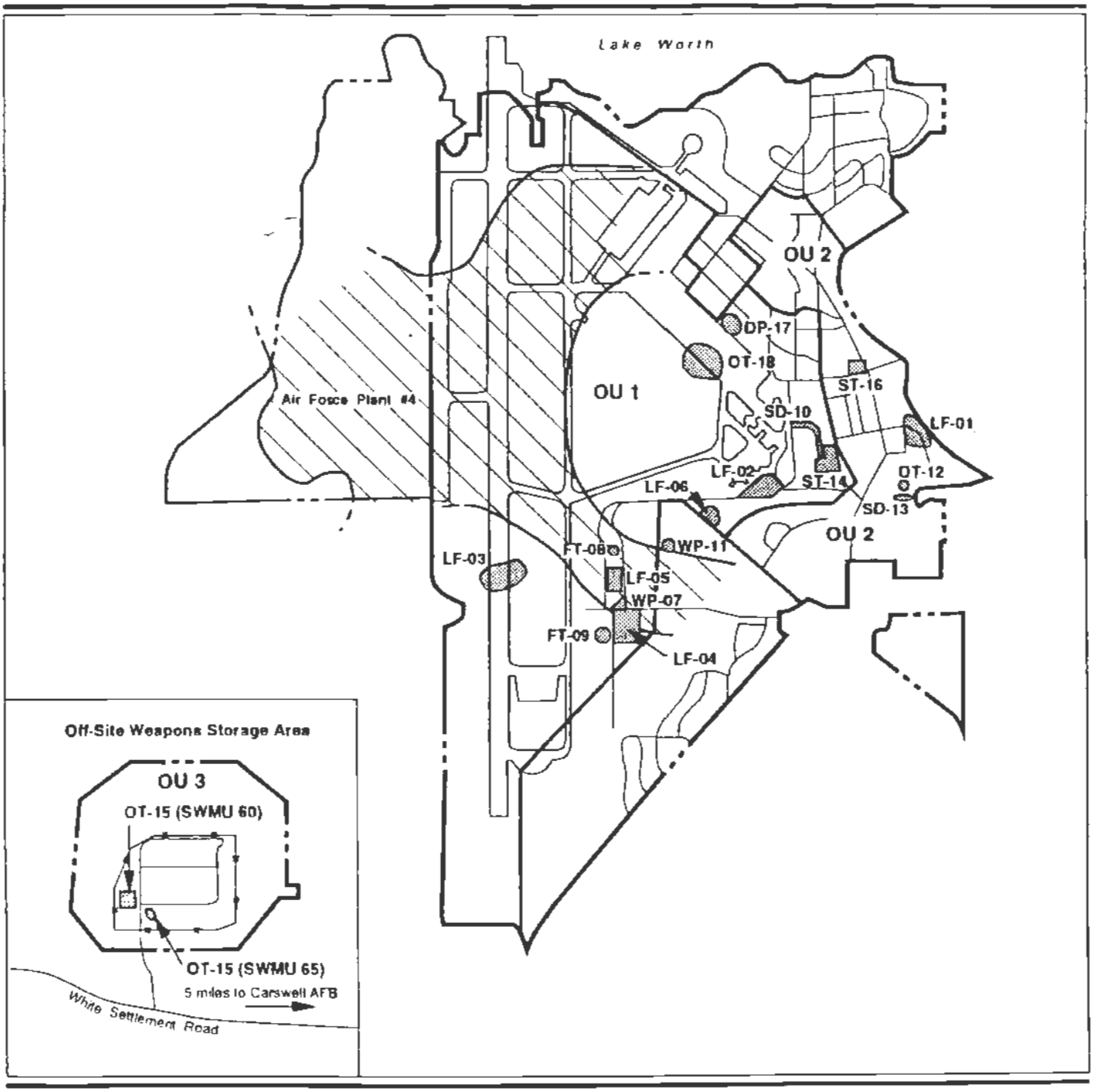
Sites LF-01 and DP-17 have been approved for NFA. Two sites in OU 1, FT-09 and SD-10, are in the RA phase for removal of contaminated soils. Sites LF-06 and OT-18 are currently in RI, Site ST-14 is in the remedial design (RD) phase, Site ST-16 is in the remedial investigation/ feasibility study (RI/FS) phase, and Site SD-13 is undergoing a Focused RI. Sites LF-04, LF-05, and WP-07 were in the RD phase, which was deferred in December 1991. OT-15 (SWMU 65) was discussed in the previous paragraph. Site OT-15 (SWMU 60) is currently being monitored and is programmed for an interim removal action this year. The status of the East Area Groundwater Site is listed as unknown because it will be evaluated through investigations of other sites. The East Area Groundwater Site is listed in Table 3-2 as an IRP site on the assumption that known IRP sites in the area have resulted in groundwater contamination.

Table 3-2. IRP Site Summary
Page 1 of 2

Project No.	Study Area OU	Site No.	WIMS-ES/Alias	Description	Material Disposed of	Date of Operation	Status	Risk to Human Health & the Environment *	Regulatory Mechanism	NFA	IRP Phase Completed
N/A	2	1	LF-01	Landfill 1	Unknown	1942-1989	NFA approval	None	RCRA/TNRCC	X	PA, SI
N/A	N/A	2	LF-02	Landfill 2	Construction rubble and materials	1952-1956	No action per RCRA/TNRCC Facility Assessment March 1989, PA, SI, 1988	None	RCRA/TNRCC	X	PA, SI
N/A	N/A	3	LF-03	Landfill 3	Construction rubble, fill area, and small amount of hazardous waste	1950-1952	No action per RCRA/TNRCC Facility Assessment March 1989, PA, SI 1988	None	RCRA/TNRCC	X	PA, SI
95-7104	1	4	LF-04	Landfill 4	Paint, thinners, strippers, cadmium batteries, waste solvents, burned wastes	1956-1973	RD delayed December 1991, PA, SI, RI/FS 1989	Medium	RCRA/TNRCC		PA, SI, RI, FS
95-7101	1	5	LF-05	Landfill 5	All types of flightline waste and refuse	1963-1975	RD delayed December 1991, PA, SI, RI, 1989	Medium	RCRA/TNRCC		PA, SI, RI, FS
93-7005	1	6	LF-06	Landfill 6	Construction rubble and possible drums of hydraulic fluid	1975-1978	RI/FS, 1994, PA, SI, 1989	Low	RCRA/TNRCC		PA, SI
95-7105	1	10	WP-07	Waste Burial Area	Buried drums containing cleaning solvents and leaded sludge from flightline	1960s	RD delayed December 1991 IRA Aug 1991, PA, SI, RI/FS - 1989	Medium	RCRA/TNRCC		PA, SI, RI, FS, IRA
N/A	N/A	11	FT-08	Fire Training Area 1	Waste oils and fuels were burned	Prior to 1963	NFA approved 17 December 1991, PA, SI, RI 1989	None	RCRA/TNRCC	X	PA, SI, RI, FS
90-5005	1	12	FT-09	Fire Training Area 2	Waste oils and solvents were burned; unused JP-4 was observed	1963-1989	RA, Risk Assessment FY 1994, PA, SI, RI/FS 1989	Low	RCRA/TNRCC		PA, SI, RI, FS, RA, ROD
95-7012	2	N/A	N/A	East Area Groundwater Site	Metals and hydrocarbons, possible solvents	1942?	Unknown, site characterization required	Medium	RCRA/TNRCC		PA, SI
90-5003	1	13	SD-10	Flightline drainage ditch	Petroleum, aircraft soap, and oils have migrated from flightline	Unknown construction date but used to present	RA, further site characterization required, PA, SI, RI/FS, RD 1989	Low	RCRA/TNRCC		PA, SI, RI, FS, RA, ROD

Table 3-2. IRP Site Summary
Page 2 of 2

Project No.	Study Area OU	Site No.	WIMS-ES/Alias	Description	Material Disposed of	Date of Operation	Status	Risk to Human Health & the Environment *	Regulatory Mechanism	NFA	IRP Phase Completed
N/A	N/A	14	WP-11	Pesticide rinse area	Rinse water from pesticide spray equipment	Unknown start-up date; no longer in use	No action per RCRA/TNRCC Facility Assessment - March 1989, PA, SI, RI 1989	None	RCRA/TNRCC	X	PA, SI, RI, P
N/A	N/A	15	OT-12	Entomology dry well	Pesticide and herbicide-contaminated rinse water	1965-1981	NFA approved 17 December 1991	None	RCRA/TNRCC	X	PA, SI, RI, FS
94-7016	2	16	SD-13	Unnamed stream	Hydrocarbons	1965-Present	Focused RI - 1994, PA, SI 1988	Low	RCRA/TNRCC		PA, SI, RI, FS
93-7009	1	17	ST-14	POL tank farm	JP-4	Early 1960s	RD/RA, Treatability Study 1994, PA, SI 1988	Low	RCRA/TNRCC		PA, SI, RI, FS
94-7007	3	NA	OT-15	WSA	Radium	1957-1969	Being monitored. Programmed for IRA FY 94, PA, SI, RI 1987	Low	RCRA/TNRCC		PA, SI, IRA, RI, FS
94-7206	2	NA	ST-16	Base service station	Hydrocarbons	Early 1970s	RI/FS 1994, PA, SI 1988	High	CERCLA/ Petroleum storage tanks/TNRCC		PA, SI, RI, FS
94-7106	1	NA	OT-18	Airfield groundwater	JP-4		RI/FS FY 94	Medium	CERCLA		PA, SI
N/A	1	NA	DP-17	Waste oil dump	Oils, solvents, unknown	Mid-70s	NFA approved	None	CERCLA	X	PA, SI
N/A	N/A	NA	OT-15	WSA disposal site	Waste cleaner, solvents, and thinners, TCE		NFA approved 17 June 1991, PA, SI, RI/FS 1987	Low	RCRA/TNRCC	X	PA, SI, RI/FS



EXPLANATION

IRP Site

Probable TCE Groundwater Contamination Plume - 5ppb level (Plume boundary not fully characterized)

Base Boundary

Air Force Plant #4 Boundary

0 650 1300 2600 Feet

Site and OUs Currently Under Investigation

Figure 3-1

All 13 IRP sites that are also SWMUs are regulated under the state-issued RCRA permit. Sites ST-16, OT-18, and DP-17 are not SWMUs and are currently regulated under the Texas Solid Waste Disposal Act. Because Site ST-16 involves a leaking UST, it is also regulated under state petroleum storage tank (PST) regulations.

Table 3-3. Early Actions Status

IRP Site No.	Action	Purpose	Status
WP-07	Removed buried drums and contaminated soil	Remove contaminant source and associated soil contamination	Removal conducted between August and October 1991. Risk assessment pending
ST-14	Installed bioventing system	Remove source area of petroleum contamination	Ongoing
OT-15	Remove pipes containing low-level radioactive material	Remove source of contamination	To begin FY 1994
LF-04	Pilot plant installed	Data collection	In progress
LF-05	Pilot plant installed	Data collection	In progress

3.1.2
Installation-Wide Source Discovery and Assessment Status

An Environmental Baseline Survey (EBS) of Carswell AFB was completed in early January 1994. Through the EBS and other ongoing restoration and compliance activities, additional sites of potential contamination that require further assessment may be identified. At this time there are five sites being evaluated for possible inclusion in the base IRP. A grounds maintenance yard, Recreational Vehicle Parking Area, Base Refueling Site, Golf Course Maintenance Area, and former air museum site are undergoing preliminary assessments (PAs).

Remedial and Interim Action Projects. Interim actions to reduce or control known contamination have been conducted as emergency removals at two IRP sites. These actions are summarized in Table 3-3. Early actions are defined as those eliminating the source of contamination thereby expediting cleanup and property transfer.

Site WP-07 is a waste burial area that contained drums of cleaning solvents and leaded sludge. The drums and associated contaminated soil were removed in 1991; however, the site still requires a risk assessment. Final RD will be completed along with Sites LF-04 and LF-05 pending results of a pilot treatment system, which is currently in place.

Phase II IRP investigations at the petroleum, oil, and lubricants (POL) tank farm (Site ST-14) revealed the presence of free-product JP-4 on the surface of groundwater. A skimmer system was installed in a well in August 1992, but the skimmer system did not collect any free product and was removed in April 1993. This site is currently in the interim remedial action (IRA) phase using a bioventing system.

Table 3-4. Mission/Operational-Related Compliance Projects

Project	Status	Regulatory Program
There are no Mission/Operational-Related Compliance Projects for which AFBCA is responsible. All mission-related compliance projects are the responsibility of the 301 Tactical FW, which has a separate cantonment area. The following projects are the most recent FY 1994 requirements for 301 Tactical FW.		

Project #	Description
93-6104	Construct Dikes (1174)
93-4006	Facility Response Plan
94-6203	USTs Leak Testing
93-0028	Upgrade USTs
94-4001	Test AST Berms
92-0094	Construct ASTs
93-6208	Close Groundwater Monitoring Wells

Table 3-5. Closure-Related Compliance Projects

Project	Status	Regulatory Program
USTs	80 total	TNRCC
	8 scheduled for removal	
	7 removed in 1993	
	44 recommended for removal	
	20 remain open for use	
	5 temporarily closed	
	1 reuse status unknown	
Hydrant Refueling System	To be removed FY 1994	TNRCC
ASTs	75 total	TNRCC
	7 recommended for removal	
	3 remaining open for use	
	20 reuse status unknown	
Closure of RCRA Units	Closure of the following facilities:	Texas RCRA Program
	TSD	
	4 active accumulation points	
	12 inactive accumulation points	
Asbestos	Abatement of Child Development Center (Building 390) (Completed)	TSCA
PCB	Disposal of 8 transformers in storage area	TSCA
	Retrofilling 2 transformers	
	Replacement and disposal of 4 transformers	
	Replacement and disposal of 8 capacitors	
OWSs	Cleaning and inspection of 12 separators	TNRCC
	Removal of any separators found to have leaked during inspection	
Air	Removal of CFCs from air conditioners in buildings to be demolished	Office of the Air Quality TNRCC
SWMUs	5 active, non-IRP SWMUs with approved RAs	TNRCC

189074

3.2
Compliance Program Status

Compliance activities for storage tanks and the closure of active and deactivated hazardous waste accumulation points and TSD facilities are conducted under the EC-CR Program. A Memorandum of Agreement (MOA) has been signed by Headquarters (HQ) AFBCA, AFBCA/OL-H, 7 BW/CC, 301 Tactical FW (AFRES), HQ AFRES/CE, and HQ ACC/CEV. This MOA delineates responsibilities of all parties involved in the transfer of Carswell AFB from ACC to AFBCA. Other compliance activities managed by the base address hazardous materials and waste management, asbestos, polychlorinated biphenyls (PCBs), water discharges, drinking water, radon, oil/water separators, and air emissions. The status of compliance projects at Carswell AFB is shown in Tables 3-4 and 3-5. Table 3-6 summarizes the status of compliance-related removal and interim actions.

Table 3-6. Compliance Early Action Status

Site No.	UST No.	Action	Purpose	Status
ST-16	1518-1	UST and piping removed, soil stockpiled	Eliminate source of contamination	Site undergoing further characterization
ST-16	1518-2	UST and piping removed, soil stockpiled	Eliminate source of contamination	Site undergoing further characterization
N/A	N/A	45 IRP drums removed	Storage time elapsed	Waste disposed of off-base
OT-15	N/A	Waste dump removed	Potential contaminant source	Sampling results negative, site clean
N/A	N/A	Asbestos removed, Child Development Center	Eliminate source of friable asbestos	Complete
N/A	N/A	11 O/Ws cleaned	To determine if contaminants exist	Complete

3.2.1
Storage Tanks

There are 80 USTs on base at the present time with four tank removal projects planned. A project to remove 53 USTs has been funded. Of the remaining USTs, 17 will remain open for use by the 301 Tactical FW, 5 tanks will be temporarily closed and turned over to the reuse authority, and 3 tanks will remain open and will be used by AFBCA. The status of the remaining tank is to be determined. The status of these USTs is provided in Table 3-7.

Aboveground Storage Tanks

There are 75 aboveground storage tanks on the installation. A listing of the tanks and known disposition is provided in Table 3-8.

Table 3-7. Underground Storage Tank Inventory
Page 1 of 3

Tank Number	Site No. Parcel	Facility	Year Installed	Capacity (Gallon) [a] Tank Material	Substance Stored	Status [b]	Comments	Future Actions
233-1	A	233	1954	Unknown	Propane	Active		
1015-1	A	1015	1967	3,000	JP-4	Active		
1027-1	A	1027	Unknown	Unknown	Unknown	Unknown		
1040-1	A	1040	1955	400	Diesel	Active		
1049-1	A	1049	1982	Unknown	Unknown	Removed		
1050-1	A	1050	1982	15,000	Heating Fuel	Active		
1064-1	A	1064	1988	10,000	Diesel	Active		
1064-2	A	1064	1988	10,000	MOGAS	Active		
1064-3	A	1064	1988	10,000	MOGAS	Active		
1064-4	A	1064	1988	10,000	Diesel	Active		
1140-1	A	1140	Unknown	800	Crankcase Oil	Removed		
1140-2	A	1140	Unknown	800	Crankcase Oil	Removed		
1145-1	A	1145	1985	1,000	Waste Oil	Removed		
1158-1	A	1158	1956	Unknown	Unknown	Unknown		
1163-1	A	1163	Unknown	Unknown	Unknown	Unknown		
1170-1	A	1170	1961	2,000	JP-4	Active		
1170-2	A	1170	1961	2,000	JP-4	Active		
1187-1	A	1187	1991	Unknown	Unknown	Unknown		
1191-1	A	1191	1983	500	Waste Oil	Active		
1194-1	A	1194	1983	2,000	Waste Oil	Active		
1212-1	A	1212	1985	Unknown	Unknown	Unknown		
1411-1	A	1411	1964	4,000	MOGAS	Removed		
1411-2	A	1411	1963	2,000	Diesel	Active		
1411-3	A	1411	1963	2,000	JP-4	Active		
1411-4	A	1411	1963	2,000	MOGAS	Active		
1420-1	A	1420	1985	2,000	Waste Oil	Active		
1420-2	A	1420	1983	4,000	Heating Fuel	Unknown		
1423-1	A	1423	1976	500	Waste Oil	Active		
1425-1	A	1425	1955	1,000	Diesel	Active		
1427-1	A	1427	Unknown	500	Diesel	Active		

Notes: (a) Numbers in parentheses refer to number of tanks, if more than one.
(b) Inactive status refers to temporarily out of service or permanently abandoned in place.
(c) Unable to locate.

Table 3-7. Underground Storage Tank Inventory
Page 2 of 3

Tank Number	Site No. Parcel	Facility	Year Installed	Capacity (Gallon)[a] Tank Material	Substance Stored	Status[b]	Comments	Future Actions
1518-1	A	1518	1972	10,000 (4)	MOGAS	Removed		
1518-2	A	1518	1970	600	Waste Oil	Inactive		
1627-1	A	1627[c]	Unknown	1,000	MOGAS	Removed		
1627-2	A	1627[c]	Unknown	1,000	Diesel	Removed		
1627-3	A	1627[c]	Unknown	2,000	JP-4	Removed		
1628-1	A	1628	1981	1,000	MOGAS	Removed		
1628-2	A	1628	1981	1,000	Diesel	Removed		
1628-3	A	1628	1981	2,000	JP-4	Removed		
1629-1	A	1629	1980	500	Diesel	Inactive		
1643-1	A	1643	1982	8,500	Heating Fuel	Active		
1643-2	A	1643	1980	5,000	Heating Fuel	Removed		
1658-1	A	1658	Unknown	275	Diesel	Removed		
1749-1	A	1749	1981	7,830	Diesel	Removed		
1750-1	A	1750	1957	20,000	Diesel	Unknown		
1750-2	A	1750	1986	20,000	Diesel	Inactive		
1750-3	A	1750	1986	8,000	Diesel	Active		
3000-1	A	3000	1985	15,000 (2)	Diesel	Active		
3001-1	A	3001	1959	20,000 (2)	Heating Fuel	Active		
3001-2	A	3001	1958	10,000	Diesel	Active		
3190-1	A	3190	1980	2,000	Heating Fuel	Active		
3359-1	A	3359	1979	2,000	Diesel	Active		
3360-1	A	3360	1978	5,000	Diesel	Active		
4101-1	A	4101	Unknown	500	Diesel	Removed		
4102-1	A	4102	1980	315	Diesel	Inactive		
4102-2	A	4102	1980	100	Heating Fuel	Active		
4111-1	A	4111	1979	500	Diesel	Active		
4115-1	A	4115	1968	600	Diesel	Removed		
4127-1	A	4127	1959	500	Diesel	Active		
4135-1	A	4135	1991	380	Diesel	Removed		
4130-1	A	4136	1991	300	Diesel	Active		

Notes: (a) Numbers in parentheses refer to number of tanks, if more than one.
(b) Inactive status refers to temporarily out of service or permanently abandoned in place.
(c) Unable to locate.

Table 3-7. Underground Storage Tank Inventory
Page 3 of 3

Tank Number	Site No. Parcel	Facility	Year Installed	Capacity (Gallon)[a] Tank Material	Substance Stored	Status[b]	Comments	Future Actions
4141-1	A	4141	1959	250	Diesel	Active		
4143-1	A	4143	1964	500	Diesel	Active		
4145-1	A	4145	1981	500	Diesel	Active		
4150-1	A	4150	1951	25,000 (6)	Diesel	Inactive		
4152-1	A	4152	1951	25,000 (6)	JP-4	Inactive		
4153-1	A	4153	1953	25,000 (6)	JP-4	Inactive		
4154-1	A	4154	1951	25,000 (6)	JP-4	Inactive		
4155-1	A	4155	1955	1,000	Diesel	Active		
4170-1	A	4170	1952	25,000 (6)	JP-4	Removed		
4171-1	A	4171	1976	5,000	Diesel	Active		
4205-1	A	4205	1984	550	Waste Oil	Removed		
4210-1	A	4210	1985	1,000	Waste Oil	Inactive		
4210-2	A	4210	1985	8,000	Waste Oil	Inactive		
4210-3	A	4210	1985	6,000	Heating Fuel	Active		
4215-1	A	4215	1985	2,000	Heating Fuel	Active		
4216-1	A	4216	1983	5,000	Diesel	Active		
8505-1	A	8505	Unknown	Unknown	Unknown	Removed		
8514-1	A	8514	Unknown	Unknown	Unknown	Unknown		
8514-2	A	8514	1957	1,200	Diesel	Active		
8515-1	A	8515[c]	Unknown	1,000	Diesel	Removed		

Notes: (a) Numbers in parentheses refer to number of tanks, if more than one.
(b) Inactive status refers to temporarily out of service or permanently abandoned in place.
(c) Unable to locate.

Table 3-8. Aboveground Storage Tank Inventory
Page 1 of 2

Facility	Size[a]/Contents	Status
Boat House	500/Unknown	Removed
233	250/Butane	Active
234	500/MOGAS	Active
234	500/Diesel	Active
262	250/MOGAS	Active
262	250/Diesel	Active
262	250 (3)/Propane	Inactive
1000	275/Diesel	Inactive
1002	250 (4)/Diesel	Inactive
1015	5,000/Carbon dioxide	Inactive
1026	Unknown (3)/Liquid oxygen	Inactive
1026	Unknown (4)/Liquid nitrogen	Inactive
1027	5000/Detergent	Active
1027	8,000/Heating Fuel	Active
1050	55/Diesel	Inactive
1058	750 (2)/JP-4	Active
1062	25/Diesel	Active
1156	840,000/JP-4	Active
1157	840,000/JP-4	Active
1159	4,920,000/JP-4	Active
1161	2,000 (2)/AFFF	Inactive
1170	75/Diesel	Active
1187	Unknown/Unknown	Inactive
1194	275/Waste Oil	Active
1202	250/Propane	Active
1202	55 (4)/Various	Active
1212	55 (4)/Unknown	Active
1215	25/Diesel	Active
1256	5,000/MOGAS	Removed
1259	11,580/MOGAS	Removed
1261	11,580/MOGAS	Removed
1263	11,580/Diesel	Removed

Notes: (a) Numbers in parentheses refer to the number of tanks, if more than one.

Table 3-8. Aboveground Storage Tank Inventory
Page 2 of 2

Facility	Size[a]/Contents	Status
1264	11,580/MOGAS	Removed
1265	11,580/MOGAS	Removed
1320	55 (6)/Various Oils	Removed
1418	50/Diesel	Active
1423	100/Diesel	Active
1425	37/Diesel	Inactive
1425	100/Diesel	Active
1504	25/Diesel	Active
1510	275/Diesel	Active
1658	55/Diesel	Active
1720	300/Diesel	Active
1730	275/Diesel	Active
1750	110 (2)/Diesel	Inactive
1765	25/Diesel	Inactive
1807	Unknown/Chlorine	Inactive
3000	250 (2)/Diesel	Active
3106	Unknown/Chlorine	Inactive
4101	500/Diesel	Removed
4114	6 (2)/Diesel	Active
4120	6/Diesel	Active
4141	25 (2)/Diesel	Inactive
4146	2,500/JP-4	Active
4150	275/Diesel	Inactive
4152	275/Diesel	Inactive
4153	275/Diesel	Inactive
4154	275/Diesel	Inactive
4155	30/Diesel	Active
4155	275/Diesel	Inactive
4175	275/Diesel	Inactive
4205	5,000/CO_2	Inactive
8503	100 (2)/Propane	Inactive

Note: (a) Numbers in parentheses refer to the number of tanks, if more than one.
Source: Carswell AFB, n.d., UST/AST Inventory.

3.2.2
Hazardous Materials/Waste Management

Compliance activities conducted by the base include hazardous material/waste management in accordance with Texas RCRA requirements. At Carswell AFB, there are seven active hazardous waste accumulation points, four satellite hazardous waste accumulation points, one Texas Class I waste accumulation point, and one RCRA-permitted TSD facility. One satellite hazardous waste accumulation point and 12 hazardous waste accumulation points have been deactivated but not formally closed. A RCRA closure plan for the accumulation points is being prepared at this time.

3.2.3
Solid Waste Management

Carswell AFB currently has no active on-base landfills. Solid waste is hauled off base by a licensed contractor to the Lincrest Landfill. In the past, solid waste was disposed of at nine different locations on base. These sites are being investigated under the IRP.

3.2.4
Polychlorinated Biphenyls (PCBs)

The base survey has identified 89 PCB-containing transformers. Fifty-four transformers have been removed from service and disposed of through DRMO. Eight other transformers have been removed from service and are being stored in a vault for later disposal. Two transformers are scheduled for retrofilling and four replacement transformers have been ordered and will be installed when they arrive. In addition, the survey has identified one oil switch and eight capacitors that contain PCBs. The oil switch has been removed from service. Eight capacitors, currently in service, are located inside the airfield lighting vault and are to be removed in FY 1994.

3.2.5
Asbestos

A basewide asbestos survey was completed on 13 November 1992, and the Asbestos Management and Asbestos Operating Plans have been updated. The base plans to remove asbestos from the inactive Child Development Center.

3.2.6
Radon

A basewide radon survey was completed in January 1992. Of the 644 samples taken, 25 showed a concentration greater than or equal to the 95 percent confidence level for a 4.4 picocurie per liter (pCi/l) exposure. The 25 samples were taken in 21 base housing units, the Transient Living Facility, and one dormitory.

3.2.7
RCRA Facilities (SWMUs)

An RFA conducted in 1989 identified 68 SWMUs. The state-issued RCRA Part B permit lists 20 SWMUs that require RCRA Facilities Investigation (RFIs). All other SWMUs are currently considered closed by the TNRCC. Of the 20 active sites, 15 (SWMUs 18, 19, 20, 21, 22, 23, 24, 28, 53, 62, 63, 64, 65, 67, and 68) are also IRP sites and are discussed in Section 3.1.1. The remaining five sites, SWMUs 16, 32, 35, 36, and 61, have RFI Remediation Plans that have received notices to proceed from the TNRCC. SWMUs 16, 32, 36, and 61 are waste accumulation areas and are included in the discussion of waste accumulation areas under Hazardous Materials/Waste Management. SWMU 35 is an oil/water separator and is included in the discussion of oil/water separators.

3.2.8
NPDES Permits

A National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit is maintained by the base and requires weekly sampling of six locations and quarterly reporting. Wastewater is treated by the city of Fort Worth's Wastewater Treatment Facility. The base is included in a storm water management permit application prepared by the Air Force and submitted to U.S. EPA HQ. The OL is also responsible for monitoring stream emissions at nine locations along the Trinity River and Farmers Branch Creek. The OL is responsible for sampling and testing the drinking system to meet EPA and TNRCC requirements for safe drinking water.

3.2.9
Oil/Water Separators

Eleven oil/water separators on Carswell AFB were pumped and cleaned during spring 1993. In addition, a statement of work to inspect and test the separators is being prepared.

3.2.10
Air

Carswell AFB has no permits to operate. The base has contacted the Office of Air Quality, TNRCC to determine the feasibility of obtaining emission credits for equipment shut down because of the base closure. The statement of work for a contract to recover the air conditioner Freon from base housing units has been prepared. The contract should be released by April 1993.

3.3
Status of Natural and Cultural Resources

The Region of Influence (ROI) for biological resources includes all areas on the base (including the Off-Site WSA), and sensitive habitats located near the base and the off-base

easement areas surrounding the Off-Site WSA. These are the areas within which potential impacts could occur and that provide a basis for evaluating the level of impact to biological resources.

Information on the affected environment was obtained from a reconnaissance survey of the base in early June 1992, supplemented by a U.S. Fish and Wildlife Service (USFWS) threatened and endangered species input dated 1 April 1992, the Texas Parks and Wildlife Department Special Species and Other Significant Features input dated 8 May 1992, and additional concerns raised by the USFWS in a letter dated 6 August 1992. Aerial photographs taken in November 1990 and the 1986 Carswell AFB Base Comprehensive Plan were also used to assist in the biological analysis. An extensive literature search was conducted and field verified.

For this analysis, the ROI is synonymous with the Area of Potential Effect as defined by regulations implementing the National Historic Preservation Act (NHPA). The ROI for the analysis of cultural resources at Carswell AFB minimally includes all areas within the base boundaries (including the Off-Site WSA and the Kings Branch housing area), whether or not certain parcels would be subject to ground disturbance or other impacts.

The conveyance of federal property to a private party or nonfederal agency constitutes an undertaking, or a project that falls under the requirements of cultural resources legislative mandates. Any historic properties located on that property would then cease to be protected by federal law. However, impacts resulting from conveyance could be mitigated by placing preservation covenants on the lease or disposal document. Reuse activities within designated parcels would require the reuser to comply with the requirements contained in the preservation covenants.

Numerous laws and regulations require federal agencies to consider the effects of a proposed project on cultural resources. These laws and regulations stipulate a process for compliance, define the responsibilities of the federal agency proposing the action, and prescribe the relationship among other involved agencies (e.g., State Historic Preservation Office [SHPO] and the Advisory Council on Historic Preservation).

Only those potential historic properties determined to be significant under cultural resource legislation are subject to protection or consideration by a federal agency. The quality of significance, in terms of applicability to National Register of Historic Places (NRHP) criteria and of integrity, is determined in consultation with the SHPO; the process is discussed in Appendix E, Methods. Significant cultural resources, either prehistoric or historic in age, are referred to as "historic properties."

In compliance with the NHPA, the Air Force has initiated the Section 106 review process with the Texas SHPO (Texas Historical Commission). Record and literature searches were performed using documents from SHPO Carswell AFB in June 1992.

3.3.1
Threatened and Endangered Species (State and Federal)

The Air Force has conducted informal consultations with the USFWS and the Texas Department of Parks and Wildlife (TDPW) concerning threatened and endangered species potentially occurring in the vicinity of Carswell AFB. These two agencies identified 12 bird, 2 reptile, and 1 sensitive plant species potentially occurring in Tarrant County (Table 3-9, although no state- or federal-listed threatened or endangered species is known to permanently live on Carswell AFB.

The TDPW identified the auriculate false foxglove plant as historically being present in Tarrant County. However, no suitable habitat exists within the ROI for this plant and TDPW believes the plant may have been extirpated from the state. None of the federal-listed plant species for Texas are known to occur within 100 miles of Tarrant County.

Of the 12 listed bird species that may occur in Tarrant County, 10 are migrants attracted by Lake Worth. These migrants include the Arctic peregrine falcon (threatened), American peregrine falcon (endangered), bald eagle (endangered), piping plover (threatened), reddish egret (federal candidate, Category 2 and state-threatened), whooping crane (endangered), wood stork (state-threatened), brown pelican (endangered), white-faced ibis (federal candidate, Category 2 and state-threatened), and the interior least tern (endangered). None of these migrants are expected to reside in the vicinity of the main base or at the Off-Site WSA. Two other federal-endangered bird species require specific habitats that are not present within the ROI. The golden-cheeked warbler (endangered) needs old, mature juniper stands; the black-capped vireo (endangered) requires a specific habitat structure of wooded thickets and live oaks.

Two federal-listed candidate reptile species may occur in Tarrant County. One is the Texas horned lizard, which lives on grassy hillsides. The other is the Texas garter snake, which prefers prairie seeps and wet grassy swales. There is a slight potential that these reptile species could be present in the 4-acre, unmowed, horse pasture on the eastern side of the main base. The garter snake may also reside along the drainages on the main base, but prefers grassy areas to woody vegetation. Neither of the species were observed on the main base or at the Off-Site WSA. Suitable habitat has been fragmented on the base and much of it bad been repeatedly mowed or heavily grazed; as a result, tbe grassland habitat on Carswell AFB is not expected to contain either of the Category 2 reptiles. These same reptile species are not expected to occur in the fenced WSA, but may be present in the pasture lands outside the fences.

Table 3-9 Threatened, Endangered, and State Ranked Species Potentially Occurring in the Vicinity of Carswell AFB

		Status	
Common Name	**Species Name**	**Federal**	**State**
Piping plover	*Charadrius melodus*	T	T
Golden-cheeked warbler	*Dendroica chrysoparia*	E	E
Reddish egret	*Egretta rufescens*	C2	T
American peregrine falcon	*Falco peregrinus anatum*	E	E
Arctic peregrine falcon	*Falco peregrinus tundrius*	T	T
Whooping crane	*Grus americana*	E	E
Bald eagle	*Haliaeetus leucocephalus*	E	E
Wood stork	*Mycteria americana*	-	T
Brown pelican	*Pelecanus occidentalis*	E	E
White-faced ibis	*Plegadis chichi*	C2	T
Interior least tern	*Sterna antillarum*	E	E
Black-capped vireo	*Vireo atricapillus*	E	E
Texas horned lizard	*Phrynosoma cornutum*	C2	T
Texas garter snake	*Thamnophis sirtalis annectens*	C2	-
Auriculate false foxglove	*Agalinis auriculata*	C2	X*

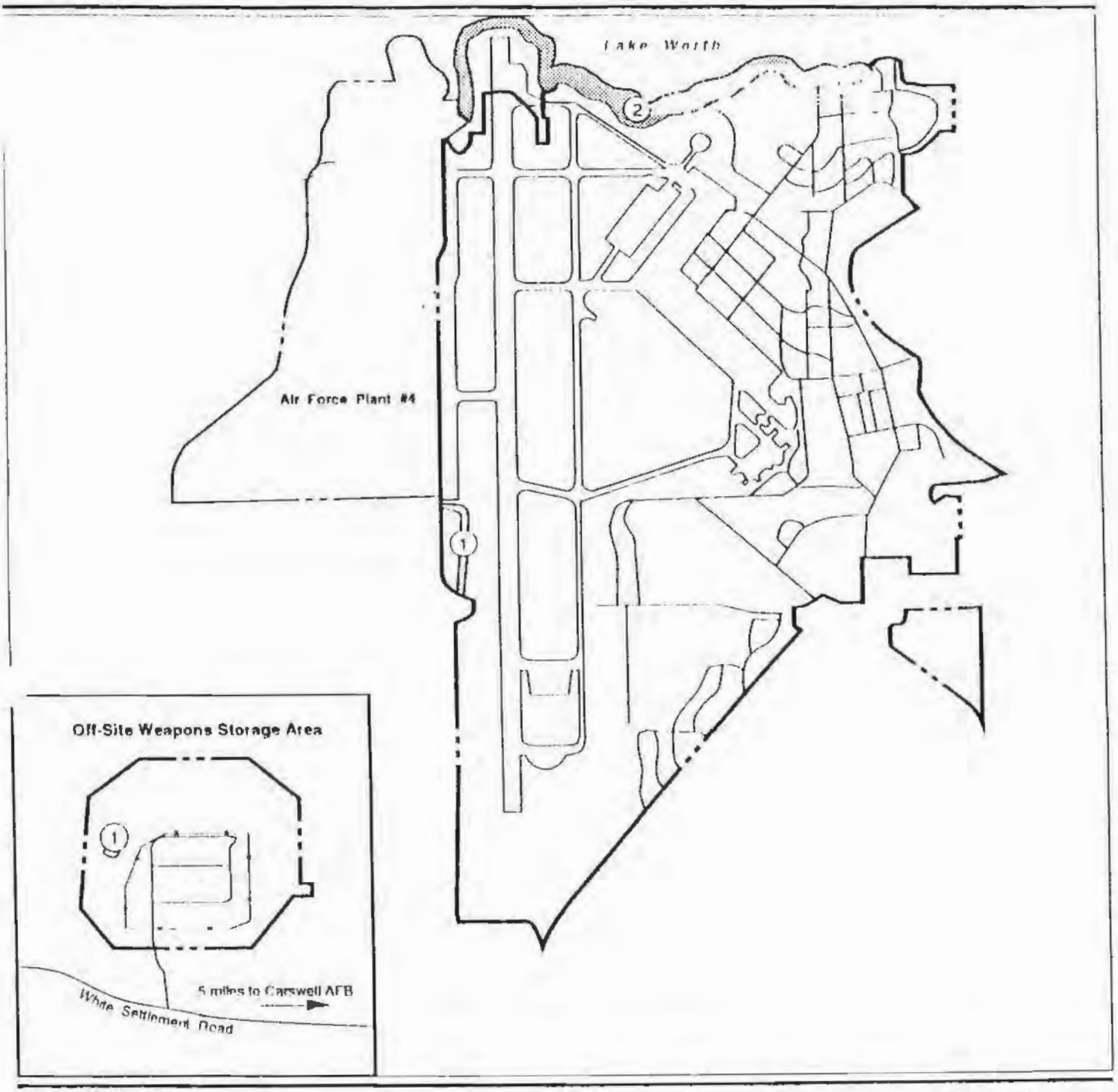
Notes: E = Listed as endangered.
T = Listed as threatened.
C = Candidate, Category 2. Information indicates that proposing to list as endangered or threatened is possibly appropriate, but substantial data on biological vulnerability and threats are not currently known to support immediate preparation of rules. Further biological research and field study is necessary to ascertain status and/or taxonomic validity.
X = Apparently extirpated from state.
* Global rank: Globally imperiled, very rare, 6 to 20 occurrences (endangered throughout range).

Source: Texas Parks and Wildlife Department, 1992; U.S. Fish and Wildlife Service, 1991, 1992.

3.3.2 Sensitive Habitats

Sensitive habitats include those areas that can potentially restrict the reuse of the land, such as wetlands under the jurisdiction of the Clean Water Act (CWA) (discussed under Section 3.3.3, Wetlands), plant communities that are designated as unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, or crucial summer/winter habitat that are of agency concern). This includes areas associated with a protected species, or those areas critical for a life need of a species or population.

The shore of Lake Worth is considered sensitive habitat due to its importance to migratory birds, including state- and federal-listed species (Figure 3-a). The great blue heron rookeries by the Fort Worth Nature Center are sensitive nesting areas along the northern banks of Lake Worth. The birds are especially vulnerable to human intrusion during the nesting season. These rookeries are protected as sensitive wildlife areas by the TDPW.



EXPLANATION

Sensitive Habitats

- (1) Jurisdictional Wetlands
- (2) Migratory Bird Habitat
- Base Boundary
- Air Force Plant #4 Boundary

0 650 1300 2600 Feet

Figure 3-a

3.3.3
Wetlands

Carswell AFB has a total of 0.6 acre of jurisdictional wetlands designated by COE (see Figure 3-a). Wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Areas that are periodically wet, but do not meet all three criteria (hydrophytic vegetation, hydric soils, and wetland hydrology), may still be jurisdictional wetlands subject to Section 404 of the federal CWA if they qualify as problem wetlands.

Drainage ditches are not considered as "waters of the United States" and are not classified as "jurisdictional" for protection under Section 404 of the CWA by the Fort Worth COE.

Although water flows through Farmers Branch Creek and is found in various small ponds on the golf course, very little wetland vegetation is associated with these areas. Likewise, wetland vegetation along Lake Worth is infrequent and usually emergent when present. These areas do not support enough wetland cover to be classified as jurisdictional wetlands.

Jurisdictional wetland areas on base are found in the natural drainage stream southeast of AF Plant 4, totaling approximately 0.5 acre, and on the west side of the Off-Site WSA, totaling approximately 0.1 acre. The Off-Site WSA wetland is of low quality in value due to its lack of species diversity. The rest of the hydrophytic vegetation at the Off-Site WSA is located in man-made drainage ditches and, therefore, does not qualify as jurisdictional wetlands.

3.3.4
Surface Waters

Carswell AFB and all of Tarrant County are located within the Trinity River watershed. Surface water resources in the vicinity of the base include the West Fork, and Kings Branch of the Trinity River, Farmers Branch Creek, Lake Worth, two ponds located in the golf course area, and one small pond in the Off-Site WSA.

The amount of water the Trinity River receives is controlled by the watershed runoff from impervious areas during storms, by releases and overflows from the series of man-made reservoirs along the forks and tributaries by natural runoff, and by the discharge of effluent from sewage treatment plants. Lake Worth, a man-made reservoir on the West Fork of the Trinity River, is located north of Carswell AFB and is owned and operated by the city of Fort Worth. These waters are used for public water supply and recreation. Lake Worth covers an area of 3,558 acres and is 12 miles long. The lake has a conservation storage capacity of 38,130 acre-feet (or approximately 12.4 billion gallons).

Surface water is the main source of water in the vicinity of Carswell AFB. The City of Fort Worth Water Department is the primary supplier to the areas surrounding and including the

base. Water from the Farmers Branch Creek is used to irrigate the on-base golf course. White Settlement and Sansom Park obtain water from 12 and 9 groundwater wells, respectively, but when required, they purchase surface water from Fort Worth to supplement their water supplies. Carswell AFB purchased 0.93 million gallons per day (MGD), 0.77 MGD, and 0.76 MGD of water from Fort Worth in 1989, 1990, and 1991, respectively. The availability of surface water was adequate at the time of closure.

The potential for contamination of surface water is present at several locations on Carswell AFB. Potential for migration of hazardous contaminants through the surface water is considered high, primarily due to the proximity of identified sites to Farmers Branch Creek and Lake Worth. In addition, shallow groundwater carrying dissolved contaminants may discharge to these surface waters.

Surface drainage at Carswell AFB is collected by the storm drainage system and routed into the sewer system, or as outfall into Lake Worth. An underground drainage culvert conducts surface runoff generated from areas west of the base eastward to Farmers Branch Creek.

The Trinity River drainage area has been identified by the Governor of Texas as the Dallas/Fort Worth designated area for water quality management planning. This action was taken pursuant to Section 208 of the federal CWA. In addition, the North Central Texas Council of Governments (NCTCOG) was formally designated as the "208" area-wide water quality management planning agency. The NCTCOG is required to maintain a continuing area-wide planning process and to develop annual water quality management plans that are tailored to the water resource needs of the area. The TNRCC is the state-level agency charged with the protection of Texas waters.

The NCTCOG has implemented the Continuous Automated Monitoring (CAM) system. Two monitoring stations are located along the West Fork of the Trinity River, downstream from Carswell AFB. In 1992, results of analyses of water from the first CAM station downstream from the base showed that 100 percent of the samples were below the criteria value of 5.5 miligrams per liter (mg/l) for dissolved oxygen, and that measure of acidity and alkalinity (pH) values range from 6.6 to 9.8 due to the presence of substantial attached algal communities. The U.S. EPA secondary drinking water standard for pH is a range from 6.5 to 8.5 (which is a guideline, not a requirement).

The waters of Lake Worth are moderately hard, and contain slightly elevated salt levels during the warm summer season. Historically, Lake Worth has experienced problems with high sediment loads. Lake Worth was included in the 1990 Nonpoint Source Report for having known problems with sedimentation from agricultural and vacant lands (NCTCOG, 1992a). The sedimentation problems have been reduced by using Eagle Mountain Lake as a sediment trap.

Storm water runoff from the base that is not routed to the base or city sewer system is discharged into Lake Worth. The outfall is permitted under the NPDES and monitoring results document compliance with permit discharge limitations.

3.3.5
Floodplains

Portions of Carswell AFB lie within the 100-year floodplain; these areas occur along the peripheries of the West Fork of the Trinity River, Lake Worth, Farmers Branch Creek, the Off-Site WSA, and Kings Branch. Localized flooding occurs during heavy rainfall along the northern base perimeter and local depressions.

3.3.6
Paleontological Resources

During the Cretaceous period (65 to 145 million years ago), most of Texas was covered by an enlarged Gulf of Mexico. As a result, paleontological remains from this period are common to the Carswell AFB area. Literature searches and field reconnaissance in June 1992 confirmed the presence of fossils along the western boundary of the base and at the Off-Site WSA. Identified fossil types include cephalopods (ammonites), bivalves (*Cyprimeria, Gryphaea, Ostrea*), and worm tubes (*Serpula*). There are no listed or eligible National Natural Landmarks on the base.

3.3.7
Historic Structures

The historic period in Texas began in the sixteenth century with the arrival of the Spanish and the construction of numerous presidios and missions. Anglo-American settlement began in the nineteenth century as the Chisholm Trail opened west through Fort Worth, the last major stop before cattle herds were driven north to Kansas.

Early settlement in Tarrant County and the area that is now Carswell AFB, began with homesteading in the late 1850s by the Farmer, Thompson, and other families. Buck Oaks Farm, (Building 250), built by the Buck family in 1932, is located within the boundary of Carswell AFB and is currently the only NRHP-listed property on the base. Other residences and the Thompson family cemetery, which is on a parcel of privately owned land that pre-dates the establishment of the base, are also located within the Carswell AFB boundaries.

During the National Park Service (NPS) survey in 1990, four historic sites were identified (Table 3-b), all of which date from the Anglo-American period of settlement and none of which were considered eligible to the NRHP, with SHPO concurrence. The sites include:

- CAFB-01 - a dwelling foundation footing
- CAFB-02 - a bridge/water crossing
- CAFB-04 - a trash dump/scatter
- CAFB-05 - a trash dump.

First called the Tarrant Field Airdrome, Carswell AFB was authorized in early 1942, as a result of World War II; construction was completed by December of that year and the base was placed under the jurisdiction of the Gulf Coast Army Air Field Training Command. Numerous temporary wood-frame, mobilization-type facilities were built throughout the base during the World War II period, some of which are still utilized. Facilities constructed at the Off-Site WSA were built in 1956 and the Kings Branch area of Wherry-style housing was constructed in 1951.

Texas Tech University conducted an Historic Buildings Survey of Carswell AFB between September 1991 and May 1992; 31 buildings, 1 structure (a concrete water tower), and the Thompson family cemetery were evaluated and photographed during the survey. Of these 33 properties, the survey concluded that 4 could be eligible to the NRHP. The four properties include:

- Building 218 - Golf Clubhouse
- Building 233 - Golf Course Maintenance Shop
- Building 260 - Hyde House
- Structure 1809 - Concrete Water Tower.

Subsequent to the Texas Tech survey, changes in Air Force policy regarding the eligibility of some World War II and Cold War facilities have necessitated a reevaluation of Carswell AFB buildings and structures. A revision of the initial survey report is currently in progress, and a final determination on NRHP-eligible properties will be coordinated with the Texas SHPO and incorporated into the text of the Final EIS (FEIS).

Table 3-10 Historical and Cultural Resource Sites

Site Number	Description
Prehistoric Site:	
41TR125 (CAFB-03)	One non-diagnostic, isolated, secondary chert flake
Historic Sites:	
CAFB-01	A granite-and-mortar residential dwelling foundation footing, approximately 0.60 meter x 0.60 meter, which extends approximately 0.60 meter below the ground surface
CAFB-02	A partially destroyed bridge or water crossing constructed of concrete, approximately 6 meters x 3 meters
CAFB-04	A light scatter of historic debris, which includes nails, melted glass, metal plate fragments, drain fragments, and plumbing fixtures
CAFB-05	A trash dump containing cement slabs, bricks, brass fitting, and melted bottle glass fragments .

3.3.8 Prehistoric Sites

The physiography and climate of north-central Texas have supported a cultural resources chronology that extends into the past for nearly 12,000 years. Some of the earliest known

archaeological sites in North America have been discovered in this region, including a 9,000-year-old burial site near Leander and the Lewisville Site located along the Trinity River (Texas Historical Commission, 1985). The three major divisions of prehistory represented in this region are: the Paleo-Indian Period (10,000-6000 B.C.), the Archaic Period (6000 B.C. - A.D. 500), and the Late Prehistoric Period (A.D. 500 - A.D. 1500).

In April 1990, the Texas SHPO toured Carswell AFB to assess the status of cultural resources. Observations confirmed that many areas of the base have been heavily altered by previous construction activities and that many archaeological sites in those areas have been destroyed. The SHPO recommended, however, that three potentially sensitive areas of the base be surveyed.

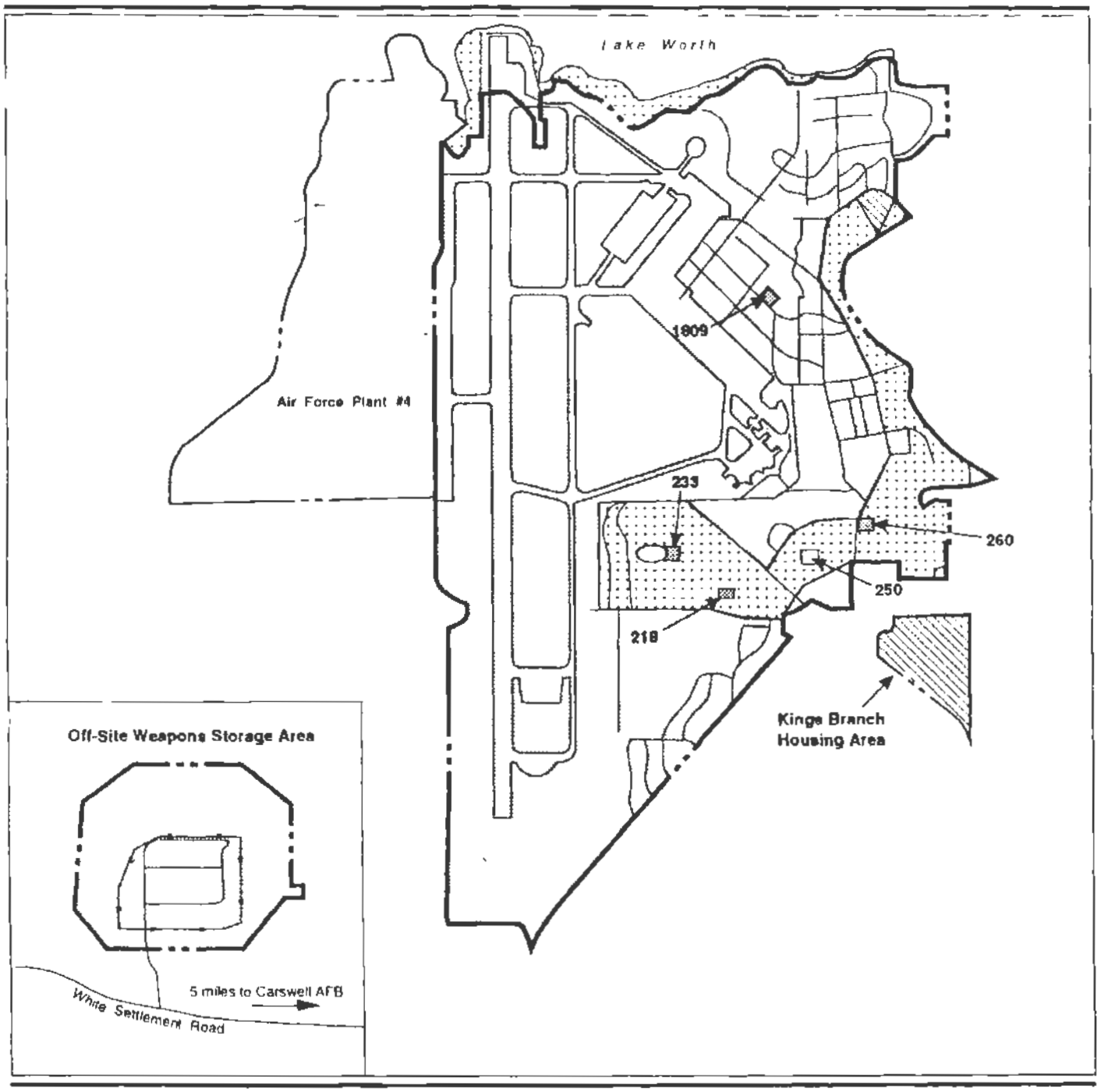
In November 1990, the NPS, Rocky Mountain Region, intensively surveyed approximately 320 acres that incorporated these sensitive areas (Figure 3-b Five sites were identified; only one site was prehistoric (Site 41TR125 [CAFB-03]) (see Table 3-10) Neither the prehistoric nor the four historic sites were considered eligible to the NRHP. The SHPO concurred with the findings on the five sites, and concluded that no further archaeological investigations would be required for Carswell AFB. The only other cultural resources survey of the base was of the Kings Branch housing area (36 acres) and a 9-acre tract adjacent to the Noncommissioned Officers' club in the northeast corner of the base; no cultural resources were identified during this survey (see Figure 3-b).

3.3.9
Traditional Resources

In historic times, the area of Carswell AFB was inhabited by the Comanche, the Kiowa-Apache, the Tonkawa, and the Caddo Indian tribes. Currently, the majority of Native Americans that live in the state of Texas are nonnative, with most descendants of the native tribes residing in Oklahoma and Kansas.

3.4
Environmental Condition of Property

To date, IRP investigations on the environmental integrity of soils and groundwater at Carswell AFB have revealed isolated occurrences of contamination by fuels and other chemicals beyond the TCE plume encroaching from AF Plant 4. As a result, feasibility studies (FSs) and RAs are in place or are being planned to remediate areas of known contamination. In addition, Carswell AFB released a final EBS early last calendar year. An internal working draft of the EBS was released for Air Force review in September 1993. An environmental-condition-of-property map (Figure 3-2) has been developed that incorporates information from these environmental site characterizations. Figure 3-2 indicates the current status of the environmental condition of the reuse parcels at Carswell AFB. The environmental condition of property is described under three major headings: areas of known contamination, ANSCs, and unevaluated areas. The EBS describes the environmental condition of base property in the following seven areas:



EXPLANATION

- Base Boundary
- Air Force Plant #4 Boundary
- Leased Property

- Cultural Resources Survey (U.S. Air Force, 1988)
- Cultural Resources Survey (NPS, 1990)
- Properties that may be eligible to the NRHP (Buildings 218, 233, 260, and structure 1809)*
- Buck Oaks Farm - NRHP Listed (Building 250)
- Area reviewed by SHPO and determined to require no Cultural Resources Survey

*Study in Progress

Cultural Resources

Figure 3-b

- Category 1 - Areas where no storage for 1 year or more, release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas).
- Category 2 - Areas where only storage of hazardous substances or petroleum products has occurred (but no release, disposal, or migration from adjacent areas has occurred).
- Category 3 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, but at concentrations that do not require a removal or RA.
- Category 4 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, and all RAs necessary to protect human health and the environment have been taken.
- Category 5 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, removal and/or RAs are under way, but all required RAs have not yet been taken.
- Category 6 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, but required response actions have not yet been implemented.
- Category 7 - Areas that are unevaluated or require additional evaluation.

3.4.1
Areas Where No Storage, Release, or Disposal Has Occurred

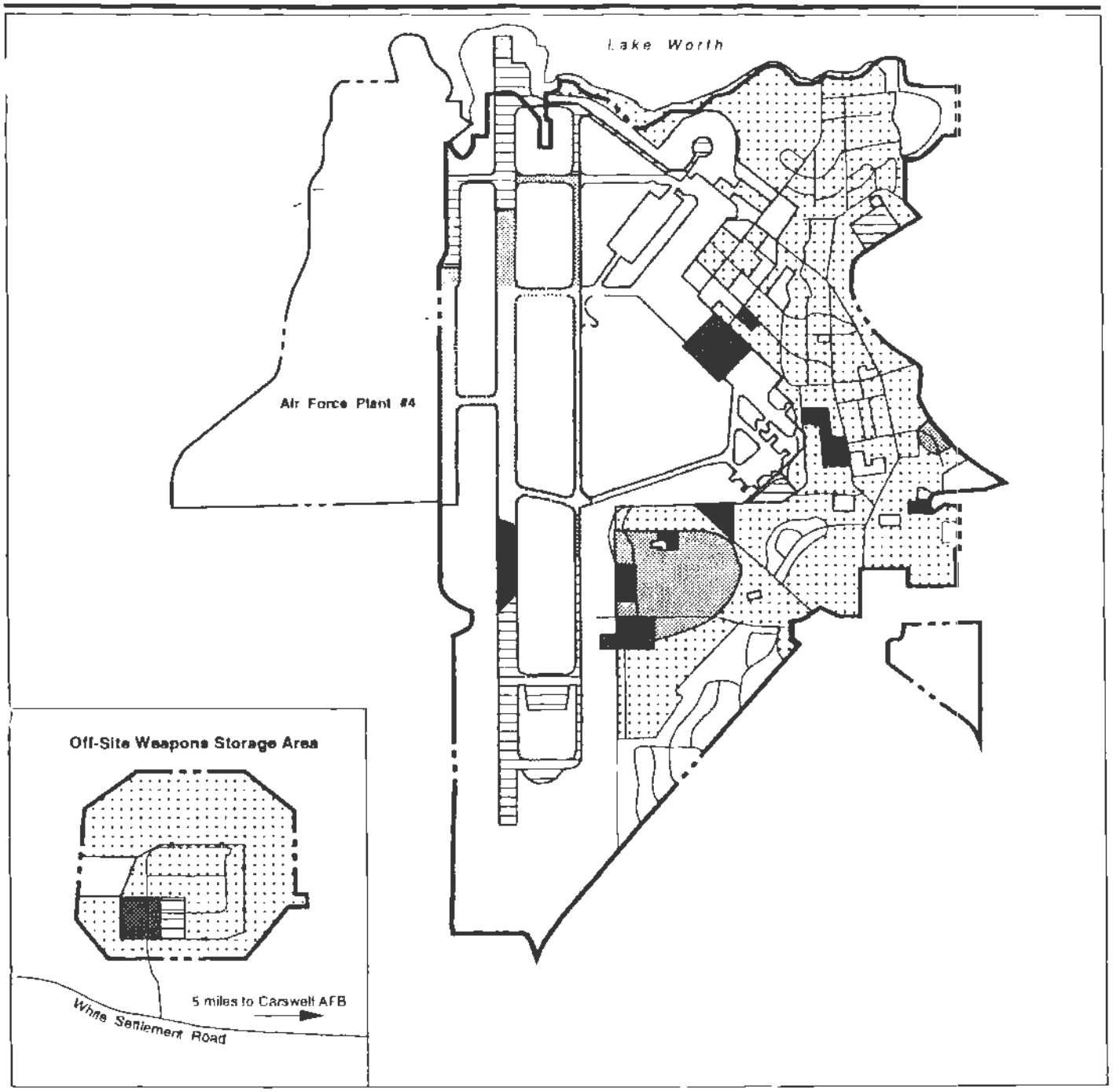
Carswell AFB property, shown on Figure 3-2 as uncontaminated property, are areas of the base where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas); and areas of the base where only storage of hazardous substances or petroleum products has occurred (but no release, disposal, or migration from adjacent areas has occurred). Category 1 properties on Carswell AFB consist of family housing areas located in the southeastern part of the base, and also the entire off-site Kings Branch residential area.

3.4.2
Areas Where Only Storage Has Occurred

Category 2 properties encompass most of the eastern part of the base and most of the Off-Site WSA.

3.4.3
Areas Where Storage, Release, Disposal, and/or Migration Has Occurred, but Require No Remedial Action

Paved runways and taxiways at the north and south ends of the airfield area are classified as Category 3. Two separate IRP areas along the eastern base boundary and an IRP site at the Off-Site WSA are also Category 3 properties.



EXPLANATION

- Uncontaminated Property (Category 1)
- Hazardous substance stored, no release (Category 2)
- Hazardous substance release, below action levels (Category 3)
- Hazardous substance release, all actions have been taken (Category 4)
- Hazardous substance release, not all actions have been taken (Category 5)
- Hazardous substance release, no actions taken (Category 6)
- Areas requiring additional evaluation (Category 7)
- Base Boundary
- Air Force Plant #4 Boundary

Note: Information current as of November 12, 1993 and is subject to revision

Environmental Condition of Property

Figure 3-2

3.4.4
Areas Where Storage, Release, Disposal, and/or Migration Has Occurred, and All Remedial Actions Have Been Taken

Two small separate areas of Category 4 properties are associated with IRP sites in the south-central part of the base, and a portion of the southern half of the main runway overlying an IRP site is also Category 4.

3.4.5
Areas Where Storage, Release, Disposal, and/or Migration Has Occurred, and Action is Underway, but Not Final

Category 5 properties include the paved runways and taxiways in the central part of the airfield area, which overlie the TCE plume; an area overlying the TCE plume east of the flightline area in the south-central part of the base; and an IRP site along the eastern base boundary.

3.4.6
Areas Where Storage, Release, Disposal, and/or Migration Has Occurred, but Required Response Actions Have Not Been Taken

Several parcels scattered around the central, eastern, and southern portions of the base and the southwest corner of the fenced part of the Off-Site WSA (all associated with IRP sites) are classified as Category 6.

3.4.7
Unevaluated Areas or Areas Requiring Additional Evaluation

The majority of Category 7 properties are the unpaved areas of the airfield in the western part of the base; and an adjacent, large area with an aircraft apron and associated facilities in the central part of the base. The hospital area in the northeast corner of the base and the firing range on the eastern base boundary are Category 7. Several other small parcels, generally associated with specific facilities in the eastern half of the base, and the Explosive Ordnance Disposal (EOD) range in the western part of the Off-Site WSA are also Category 7 properties.

3.4.8
Suitability of Installation Property for Transfer by Deed

Areas determined to be suitable for transfer by deed have not been identified on a basewide basis by the BCT. Development of a comprehensive suitability-of-transfer map (Figure 3-3) is pending disposal decisions for each parcel. Further investigations on base and for adjacent off-base properties to determine the environmental condition of the property, as well as remedy selection decisions to be made by the BCT, are also pending.

A Finding of Suitability to Transfer (FOST) for Parcel C is being developed and is pending results of the EBS and completion of the associated National Environmental Policy Act (NEPA) as amended documentation.

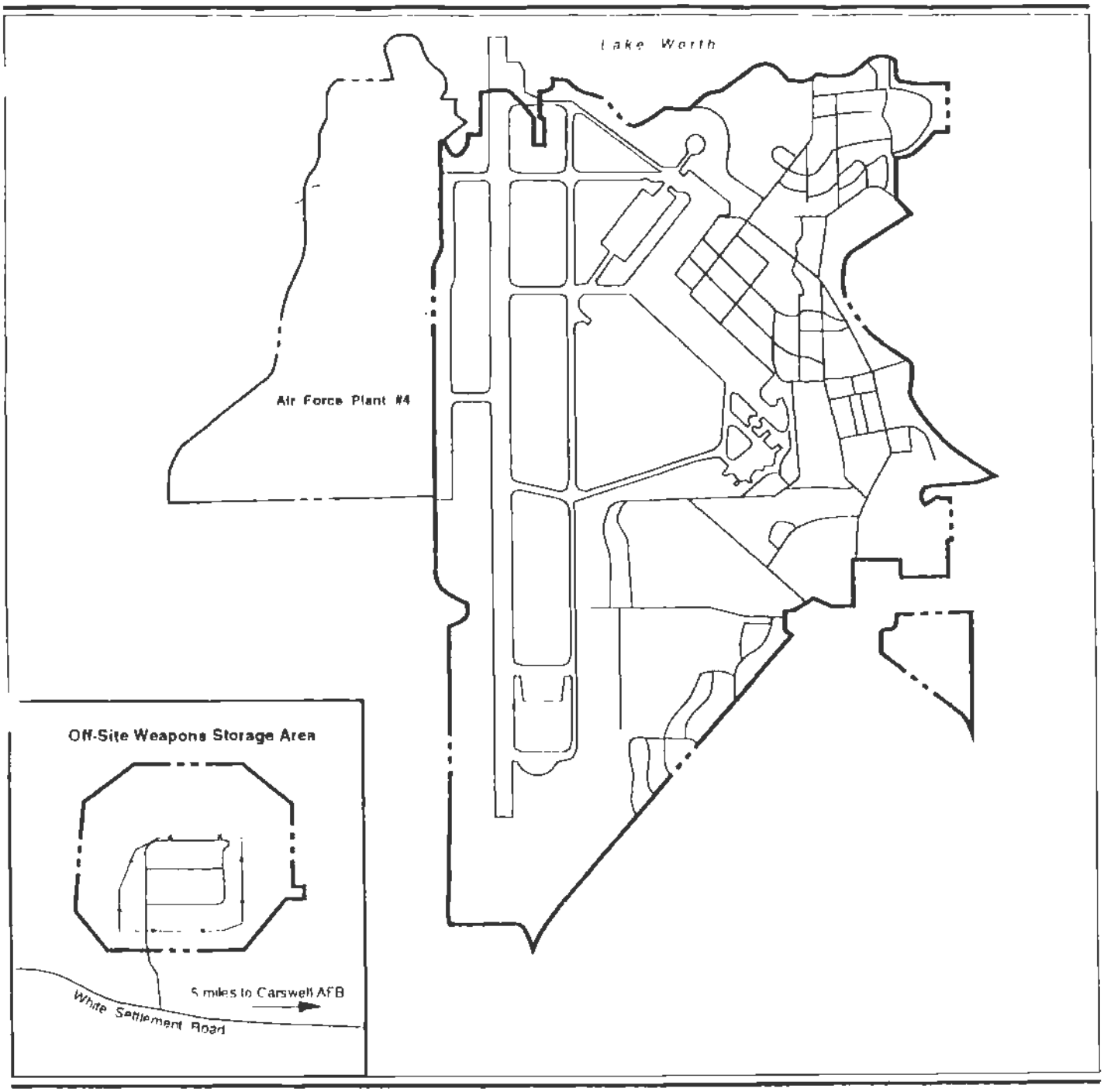
3.5
Status of Community Involvement

Several procedures have been implemented at Carswell AFB to promote proactive community relations. An Environmental Advisory Group was formed in July 1992 to brief the status of ongoing IRP and compliance activities, and other related disposal and reuse issues. Advisory Group members include representatives from Carswell AFB, AF Plant 4, AFBCA, TNRCC, U.S. EPA Region VI, AFCEE, COE, CRA, and city/state officials and their technical support staff. Five meetings were held between July 1992 and February 1993. Since AFBCA took over the environmental program, a Restoration Advisory Board (RAB) has been formed and will have regular meetings, superseding the Environmental Advisory Group. The impetus for the change came in President Clinton's Five-Point Plan and the guidance centered therein.

Communications regarding the TCE-contaminated groundwater plume that has migrated beneath Carswell AFB are performed under the AF Plant 4 IRP. AF Plant 4 has formed a Technical Review Committee (TRC) and has a Community Relations Plan (CRP), in accordance with their FFA. The TRC and CRP provide a means to promote community involvement and positive relations in the ongoing AF Plant 4 IRP activities, including the TCE-contaminated groundwater plume remediation. The RAB will be integrated into the TRC meetings at AF Plant 4.

An Administrative Record has been prepared for the Carswell AFB IRP. A copy of the Administrative Record is on base. Copies of the restoration-related documents are located in the local library (White Settlement Public Library) and in downtown Fort Worth to encourage public review of ongoing IRP activities. A CRP has been developed by the COE Fort Worth District. The final draft of the CRP was received March 1994. The plan identified the objectives and techniques to provide information concerning ongoing IRP activities and promote positive community relations.

The public scoping process and the Draft EIS (DEIS) public review process were conducted in support of the disposal and reuse EIAP. Public notification through press releases and correspondence, interviews, and formal meetings were implemented to solicit public involvement and to provide inputs to the EIS. An EIS for the Disposal and Reuse of Carswell AFB will be filed with the U.S. EPA in May 1994. The EIS will include a discussion of RAs for IRP sites where this is known.



EXPLANATION

Suitability of Property for Transfer

— - - — Base Boundary

— - - — Air Force Plant #4 Boundary

0 650 1300 2600 Feet

Figure 3-3

189697

TAB

CHAPTER 4.0

Chapter 4
Installation-Wide Strategy for Environmental Restoration

This section describes and summarizes the installation-wide environmental restoration and compliance strategy for Carswell AFB. The base has had an active environmental restoration program since 1984. Since base closure was announced in 1990, base restoration activities have considered closure issues.

Additional sites are currently being evaluated for addition to the base environmental restoration program. SWMU sites would be managed and restored under the Texas Solid Waste Disposal Act. Non-SWMU sites would be initially managed as IRP sites. Because the base is not an NPL site, the environmental restoration program is not required to be conducted under CERCLA. Most of the base's IRP sites are also SWMUs listed on the state-issued Part B permit, which requires investigations and documentation be conducted in compliance with the Texas RCRA-authorized program. Under the permit, the TNRCC acts as the lead regulatory agency for SWMUs. The base has a good working relationship with the regulators in the TNRCC, and, for this reason, IRP sites that are initially managed under CERCLA would likely be remediated under the Texas Solid Waste Disposal Act.

4.1
Zone/OU Designation and Strategy

4.1.1
Zone Designations

IRP sites were grouped into OUs based on 1990 DBCRA-recommended reuse parcels. Investigative zones were not established for the base. Figure 4-1 presents the OU composition and deliverable dates.

4.1.2
OU Designations

Strategy. Carswell AFB OUs ensure that the environmental investigation activities will be organized and managed in a consistent manner with the property reuse and disposal activities. These OUs correspond to the disposal and reuse parcels; these parcels may change in response to the 1993 DBCRA recommendations. OU 1 is geographically the same as reuse Parcel A. OU 2 consists of sites in Parcel B, and OU 3 is the same as Parcel H. Any future IRP sites would be placed into an OU based on their geographic locations in a reuse parcel. Table 4-1 depicts the relationship between IRP sites, OUs, and parcels.

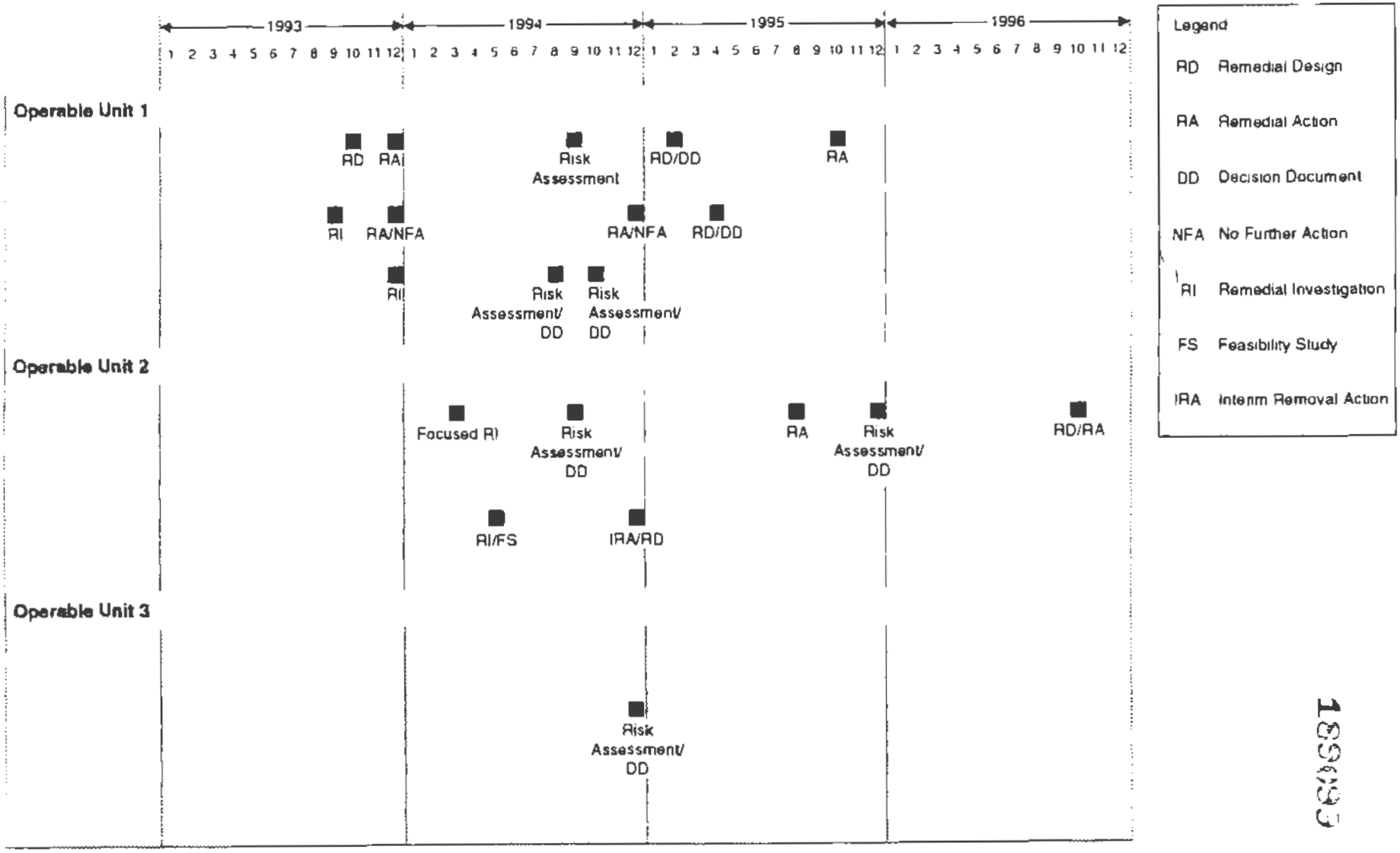


Figure 4-1
Sequence and Primary Document Timeline for OUs

4-2 *Carswell Air Force Base, Texas - April 1994*

189693

Table 4-1. Relationship Between IRP Sites, OUs, and Parcels

Operable Unit (Zone)	Parcel	Site
OU 1	A	LF-04
OU 1	A	LF-05
OU 1	A	LF-06
OU 1	A	WP-07
OU 1	A	FT-09
OU 1	A	SD-10
OU 1	A	ST-14
OU 1	A	OT-18
OU 1	A	DP-17
OU 2	B	LF-01
OU 2	B	SD-13
OU 2	B	ST-16
OU 2	B	East Area Groundwater Site
OU 2	G	None
OU 3	H	OT-15
OU 5	F	None
OU 6	C	None
OU 7	D	None
OU 8	E	None
N/A		LF-02
N/A		LF-03
N/A		AF Plant 4
N/A		FT-08
N/A		WP-11
N/A		OT-12
N/A		OT-15

Actions/Recommendations. None at this time.

Office of Primary Responsibility (OPR): Not applicable

Schedule: Not applicable

4.1.3 Sequence of OUs

Strategy. Reuse parcel priorities are considered in determining the sequence and schedule of ongoing and new restoration activities within each OU. However, sites are generally managed individually with consideration given to reuse parcel priority. Figure 4-1 presents the

sequence and primary document timeline for OUs. The sequence for cleanup of OUs is listed in Table 4-2.

Table 4-2. Cleanup Sequence

		Environmental		Cleanup	Reconcile
A	1	Medium	High	1	LF-04
A	1	Medium	High	1	LF-05
A	1	Low	High	1	LF-06
A	1	Medium	High	1	WP-07
A	1	Low	High	1	FT-09
A	1	Low	High	1	SD-10
A	1	Medium	Low	1	ST-14
A	1	Medium	High	1	07-18
A	1	None	High	1	DP-17
B	2	None	High	2	LF-01
B	2	Medium	Low	2	SD-13
B	2	High	High	2	ST-16
B	2	Medium	Medium	2	East Gate 12
G	2	None	Low	None	None
H	3	Low	Low	3	OT-15
F	5	Low	Medium	3	Golf Course
C	6	Low	Low	3	Housing
D	7	Low	High	3	Medical
E	8	Low	Low	3	Housing

Actions/Recommendations. None at this time.

OPR: Not applicable

Schedule: Not applicable

4.1.4 Early Actions Strategy

Strategy. RAs are implemented on an as-needed site basis to expedite restoration activities and to minimize potential risks to human health and the environment. Interim actions to remove contaminated soils are scheduled for 1994 for Sites LF-06 and SD-13. These actions will be proactive source cleanups while conducting investigations and risk assessments on groundwater. An RA to remove contaminated groundwater at Site ST-16, scheduled for summer 1993 in response to a Notice of Violation (NOV) issued to the base for a hydrocarbon leak into the Trinity River, has been delayed due to a need for more site characterization. The removal of low-level radium source of radioactive contamination at Site OT-15 (SWMU 60) is currently underway.

In addition to IRP site RAs, 80 drums containing hazardous drill cuttings and purge water generated during CERCLA Phase II and RI/FS investigations were removed between October 1993 and August 1994.

A treatability study will be conducted by AFCEE in 1993 as part of an RD on Site ST-14. This study will involve bioventing soil contaminated by hydrocarbons. This site is now in the RA phase, with RA continuing until the year 2000. Table 4-3 summarizes the planned removal actions and the treatability study.

Table 4-3. Environmental Restoration Planned Early Actions

Site	Action	Objective	Time Frame
LF-06	Remove contaminated soil (possible buried drums of hydraulic fluid, construction rubble) while conducting investigations and risk assessments on groundwater	Proactive contaminant source cleanup	Removal scheduled for 1995
SD-13	Remove contaminated soil (hydrocarbons) while conducting investigations and risk assessments	Proactive contaminant source cleanup, may also remove sources of contamination groundwater in the East Area Groundwater Site	Removal scheduled for 1994
ST-16	Remedial action to groundwater in response to NOV issued for a hydrocarbon leak into the Trinity River	Remediate leak	Summer 1994
OT-15	Remove radium source	Remediate radioactive contamination	Removal scheduled for 1994
Site No.	**Treatability Description**	**Objective**	**Time Frame**
ST-14	Biovent soil contaminated by hydrocarbons	Eliminate contamination in support of property transfer	To be performed in 1993/1994

Actions/Recommendations. The BCT will continue to identify sites for interim removal actions.

OPR: Remedial Project Manager (RPM), AFBCA/OL-H

Schedule: Ongoing

4.1.5 Remedy Selection Approach

Strategy. Alternative RAs will be selected based on the following criteria:

- Reuse

- Concentration and distribution of contaminants at the site
- Technical feasibility and effectiveness of the possible remedial alternatives
- Estimated cost of each alternative
- Regulatory compliance.

The remedy selection approach for POL-contaminated soils includes bioventing and in-situ remediation depending on the site. Bioventing will be considered for sites with large volumes of contaminated soils.

Actions/Recommendations. The BCT will research the thermal treatment process, prepare a package on it, request funding for implementation, and request an AFCEE contract for the work.

OPR: BEC, AFCEE

Schedule: In progress

4.2 Compliance Strategy

Basic compliance strategies to be used during the reuse and disposal of parcels from Carswell AFB have been developed. The strategies are detailed below.

Under the MOA signed by all involved parties in the transfer of Carswell AFB from ACC to AFBCA, the environmental compliance responsibilities were distributed. AFBCA will be responsible for IRP and EC-CR programming, budgeting, and execution; selecting environmental management and support personnel to comprise OL-H; monitoring IRP and EC-CR programs; and preparing environmental procedures and guidance to the base. OL-H will assume IRP and EC-CR project management and programming responsibilities, provide environmental technical support, and ensure all environmental hazards are identified and remedied. OL-H assumed responsibility for all IRP and environmental compliance responsibilities with the 30 September 1993 closure. The 301 Tactical FW (AFRES) will continue to operate in compliance with all federal, local, state, and Air Force rules, regulations, and policies. Specific compliance actions are listed in Table 4-4.

4.2.1 Storage Tanks

Underground Storage Tanks

Strategy. The UST strategy is to remove all nonessential USTs and leave in place 17 USTs for use by the 301 Tactical FW and 5 tanks for use by the final recipients of the land. Three additional tanks will be left in place for use by the AFBCA. The pipelines servicing the hydrant fueling system will be emptied and removed when the hydrant system is removed. Where the pipeline is inaccessible, it will be emptied, tested for leaks, and abandoned in place in accordance with the TNRCC regulations.

Actions/Recommendations. The BCT should consider cost effectiveness in determining the appropriate pipeline removal/abandonment strategy.

OPR: AFBCA/OL-H, AFCEE, TNRCC

Schedule: Complete

Table 4-4 Environmental Compliance Planned Early Actions

Site	UST No.	Action	Objective	Time Frame
Parcel A	1015-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	1040-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	1064-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	1064-2	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	1194-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	1411-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	1420-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	1425-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	1427-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	3359-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	3360-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4102-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4111-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4115-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4127-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4-141-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4143-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4145-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4150-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4152-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4153-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4153-2	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4154-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4155-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4171-1	Removal	Compliant with EPA and TNRCC	FY 1994
Parcel A	4210-1	Removal	Compliant with EPA and TNRCC	FY 1994

Aboveground Storage Tanks

Strategy. The compliance strategy for aboveground storage tanks is to remove nonessential tanks and drain essential tanks before transfer to AFBCA. The pipeline servicing the essential aboveground storage tanks will remain in use. Pipelines servicing nonessential tanks will be emptied and removed.

Actions/Recommendations. The CRA should determine which aboveground storage tanks are essential so that nonessential tanks can be removed.

OPR: AFBCA/OL-H, AFCEE, CRA

Schedule: Complete

The BCT should consider the cost effectiveness in determining the appropriate pipeline removal/abandonment strategy.

4.2.2
Hazardous Materials/Waste Management

Strategy. All of the hazardous waste accumulation, satellite accumulation, and the Texas Class I waste accumulation points, except for the three accumulation points operated by the 301 Tactical FW and one accumulation point operated by AFBCA/OL-H, will be closed in accordance with Texas regulations.

The AFBCA/OL-H will maintain the hazardous waste permit and will assume responsibility for hazardous waste generated by other military tenants. AFBCA/OL-H will control the TSD with DRMO as the operating agent. The TSD is scheduled to close on 1 January 1994. At that time, it will be closed in accordance with RCRA regulations. AFBCA/OL-H will also review all Spill Prevention and Response Plans and Hazardous Waste Management Plans for both military and nonmilitary tenants. Compliance with RCRA regulations will be ensured by inspections conducted by AFBCA/OL-H.

Actions/Recommendations. The BCT should validate and verify the number and location of hazardous waste accumulation points to be closed. The BCT will ensure that the hazardous waste accumulation points, and the TSD area are closed in accordance with RCRA regulations. In addition, the BCT will ensure the requirements levied under the Hazardous Waste Generator's Permit are fulfilled.

OPR: AFBCA/OL-H, AFCEE

Schedule: FY 1995

AFBCA/OL-H will review the Hazardous Waste Management Plans and Spill Prevention and Response Plans required from tenants. AFBCA/OL-H will also conduct inspection of all tenants to ensure compliance with RCRA requirements.

OPR: AFBCA/OL-H, AFCEE

Schedule: FY 1995

4.2.3
Solid Waste Management

There are no solid waste facilities operating at Carswell AFB.

4.2.4
Polychlorinated Biphenyls (PCBs)

Strategy. Except for the eight capacitors at the airfield, the base was PCB-free upon transfer to AFBCA. The vault where the capacitors are located will be marked in accordance with the Toxic Substances Control Act (TSCA). If new PCB equipment is found after transfer, the equipment will be removed from service and disposed of in accordance with TSCA.

Actions/Recommendations. AFBCA should transmit the location of the eight PCB capacitors to the runway lessee and/or recipient of the runway. AFBCA should also update the annual PCB location documents required by U.S. EPA until the runway is transferred to the final recipient.

OPR: AFBCA/OL-H

Schedule: Complete

4.2.5
Asbestos

Strategy. If reuse requires asbestos removal because the asbestos is accessible and friable, the AFBCA/OL-H will remove the asbestos as required by Texas regulations and DOD policy.

Actions/Recommendations. AFBCA should transmit the asbestos conditions to the lessee and recipients of building.

OPR: AFBCA/OL-H, AFCEE

Schedule: Complete

4.2.6
Radon

Strategy. Since the Radon Assessment and Management Plan (RAMP) indicated there was no immediate problem with radon, the Air Force does not plan on completing any further investigations. AFBCA will ensure the deed of transfer will carry a disclosure of the requirement for radon investigations within 3 years.

Actions/Recommendations. AFBCA/OL-H should include a disclosure statement in the deed of transfer to communicate the need for further radon investigation.

OPR: AFBCA/OL-H, AFCEE

Schedule: Complete

4.2.7
RCRA Facilities (SWMUs)

Strategy. Continue with the present strategy where 15 SWMUs are being addressed as IRP sites and 5 SWMUs have RFI Remediation Plans (RPs) with approval to proceed.

Actions/Recommendations. Ensure funding and coordination to enable closure through the respective programs.

OPR: AFBCA/OL-H

Schedule: Complete

4.2.8
NPDES Permits

Strategy. AFBCA/OL-H has assumed responsibility for the NPDES discharge permits and the industrial water discharge permit. They will ensure the NPDES discharges are tested and the quarterly report is sent to the U.S. EPA. AFBCA/OL-H will assume responsibility for the water distribution system at Carswell AFB and will require lessees and the final recipients of the parcels to obtain their own industrial wastewater discharge permit. They will ensure that TNRCC drinking water requirements are met.

Actions/Recommendation. AFBCA/OL-H should obtain a contractor or hire qualified personnel to perform the sampling and to prepare the report as required by the NPDES permit and TNRCC drinking water requirements.

OPR: AFBCA/OL-H, AFCEE

Schedule: This action has been completed.

4.2.9
Oil/Water Separators

Strategy. The basic strategy is to leave all oil/water separators in place. All separators will be pumped, cleaned, and inspected for leaks. In addition, samples will be taken from the area surrounding the separator and tested. If either the inspection or sample analysis indicates the separator leaked, a determination will be made to either fix or remove the separator. The option chosen will depend on the condition of the separator and the extent of leakage; however, the contamination will be remediated. An assessment on 11 oil/water separators was completed in October 1994. The assessment recommended upgrades of several units.

Actions/Recommendations. AFBCA/OL-H should identify the oil/water separators that will not be required for reuse. This action will be coordinated with the Navy.

OPR: AFBCA/OL-H, AFCEE, Navy

Schedule: This action has been completed.

1891 G

4.2.10
Air

Strategy. AFBCA/OL-H plans on using the banked emissions credits to help offset emissions from equipment operated by tenants and the final recipients of the land.

Actions/Recommendations. AFBCA/OL-H should determine what emission credits are available and apply for credit.

OPR: AFBCA/OL-H, AFCEE, 301 Tactical FW

Schedule: Currently being worked with 301 Tactical FW

The recovered air conditioner Freon will be used as credit against the cost of removing the Freon from the air conditioners.

OPR: AFBCA/OL-H, AFCEE

Schedule: Ongoing

4.2.11
Lead-Based Paint

Strategy. AFBCA/OL-H plans to survey housing units at Kings Branch and Wherry areas.

Actions/Recommendations. Results of the lead-based paint survey will be made available to potential owners. Remediation will be performed prior to transfer pursuant to Air Force Policy.

Schedule: Complete

4.3
Natural and Cultural Resources Strategy

4.3.1
Threatened and Endangered Species (State and Federal)

No state- or federal-listed threatened or endangered species are known to live on Carswell AFB; therefore, no negative effects are expected.

4.3.2
Sensitive Habitats

Sensitive great blue heron rookeries to the north of the base, across from Lake Worth, should be disturbed as little as possible by overflights or human intrusion.

4.3.3 Wetlands

Wetland impacts under 10 acres typically qualify under the nationwide permit for wetland deposition and fill. The COE should be notified of impacts to any amount of wetlands to ensure these wetlands qualify for inclusion under the nationwide permit. Otherwise, a permit under Section 404 of the CWA may be required for wetland fill.

4.3.4 Surface Waters

Surface waters are continuously monitored through NPDES sampling. Stream discharges are also monitored on a quarterly basis. This information is reported to U.S. EPA on a regular basis.

4.3.5 Floodplains

No areas impacted by floodplains exist at Carswell AFB.

4.3.6 Paleontological Resources

No significant paleontological resources have been identified within the boundary of Carswell AFB.

4.3.7 Historic Structures

No significant historic archaeological sites have been identified within the boundary of Carswell AFB. An historic structures inventory is complete and has been coordinated with the Texas SHPO. Results will be incorporated into the text of the FEIS.

4.3.8 Prehistoric Sites

No significant prehistoric sites have been identified within the boundary of Carswell AFB.

4.3.9 Traditional Resources

No significant traditional resources have been identified within the boundary of Carswell AFB.

4.3.10 Other Applicable Categories

None.

189110

4.4
Community Involvement/Strategy

Strategy. The strategy for community relations for restoration-related activities is documented in the CRP. RAB meetings will continue to be held to inform the local community of restoration and compliance issues and activities. In addition, community involvement for AF Plant 4 remediation activities beneath Carswell AFB will continue to be incorporated into AF Plant 4 CRP and TRC meetings.

Actions/Recommendations. The AFBCA/OL-H will complete and implement the CRP for the Carswell AFB IRP. In addition, the AFBCA/OL-H will complete and maintain the Administrative Record and annotated bibliography for Carswell AFB and AF Plant 4 restoration-related documents. The OL-H will become a member of the AF Plant 4 TRC to promote communications and ensure appropriate coordination of remediation activities on the base property.

OPR: AFBCA/OL-H

Schedule: Ongoing

4.5
Environmental Condition and Suitability for Transfer Strategy

Strategy. A basewide EBS was completed in early 1994 to determine the environmental condition of the base property and to identify areas requiring further study. The EBS identified the extent of groundwater contamination beneath the base property based on existing documentation of past releases by AF Plant 4 and Carswell AFB. It is recognized that as restoration and compliance activities proceed, the environmental condition of parcels will likely change status. Determination of the current environmental condition of property will continue to be performed by the Project Team on an as-needed basis for a specific property or parcel of land to support interim leases.

In addition, a strategy to develop and maintain a basewide suitability-for-transfer map has been established. Determinations by the BCT will continue on an as-needed basis in response to interim lease applications. The parcel-specific strategy will consider a set of criteria to determine whether a plot is:

- Suitable for transfer by deed with restrictions/notifications or other institutional control due to residual contamination that exists after the RA is completed or after the RA has been initiated and demonstrated
- Suitable for transfer by deed with no restrictions
- Not suitable for transfer, but may be leased with specific lease restrictions
- Not suitable for transfer or lease.

Actions/Recommendations. As the results of environmental investigations and remediation activities become available, the BCT should develop a process to update and maintain the

status of the environmental condition for each parcel or property. In addition, an assessment of off-base properties will be performed to determine the condition of adjacent properties, in accordance with CERFA.

OPR: AFBCA/OL-H

Schedule: Ongoing

189112

TAB

CHAPTER 5.0

189113

Chapter 5
Environmental Master Schedules

This chapter presents the Carswell AFB master schedule of anticipated environmental restoration and compliance activities. Planned restoration activities are graphically summarized in Figure 5-1 and compliance activities are summarized in Figure 5-3.

5.1
Environmental Restoration Program

5.1.1
Response Schedules

The planned environmental restoration schedule for Carswell AFB is summarized in Figure 5-1. This schedule is based upon the following general assumptions:

- Funding for the FY 1994 program will be approved and projects funded by the quarter they are to be accomplished.
- Contract award will occur within 90 days of receipt of funding.
- The RD phase contractor will write the DD and be the inspector for the RA.

Assumptions for specific sites are listed below.

Landfill-04 (LF-04), Landfill-05 (LF-05), and Waste Burial Site-07 (WP-07):

- Risk Assessment result is worst case (i.e., sites require capping).
- Draft Risk Assessment will be completed in FY 1994 and the RD will be initiated immediately thereafter, if appropriate.
- All three sites will be under the same contract.
- AF Plant 4 is responsible for groundwater beneath these sites.

OT-15 (SWMU 60): WSA

- The buried radium disposal tubes are the only source of contamination.

SD-13: Unnamed Stream

- Focused RI/FS will be completed in spring 1994.
- Soil contamination will require remediation (worst case).
- Groundwater contamination will be addressed under the East Area Groundwater Site IRP site, if established.

ST-16: Base Service Station

- Site is source of leak into Trinity River.
- Soil contamination is worst case with groundwater contamination.

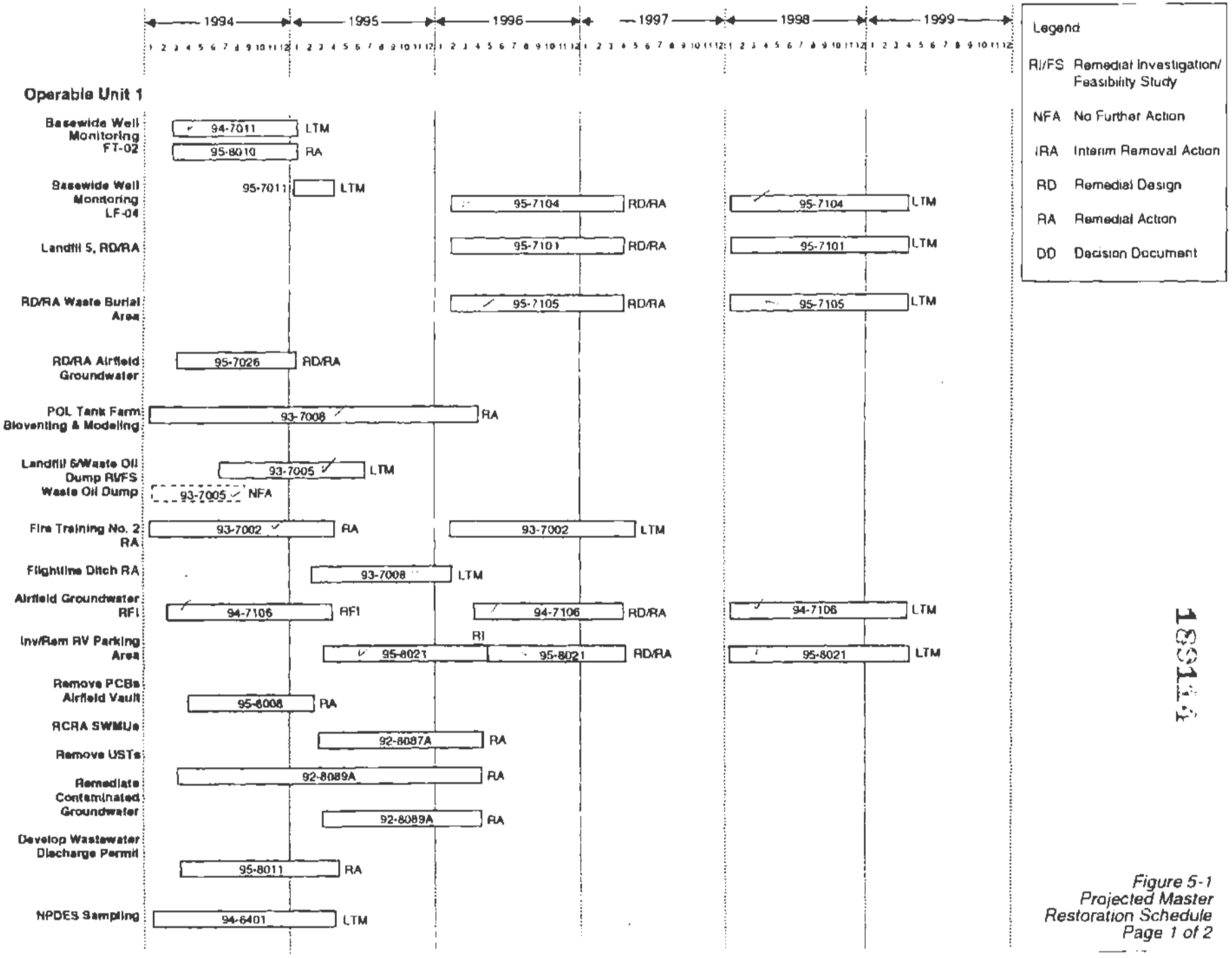


Figure 5-1
Projected Master Restoration Schedule
Page 1 of 2

189177

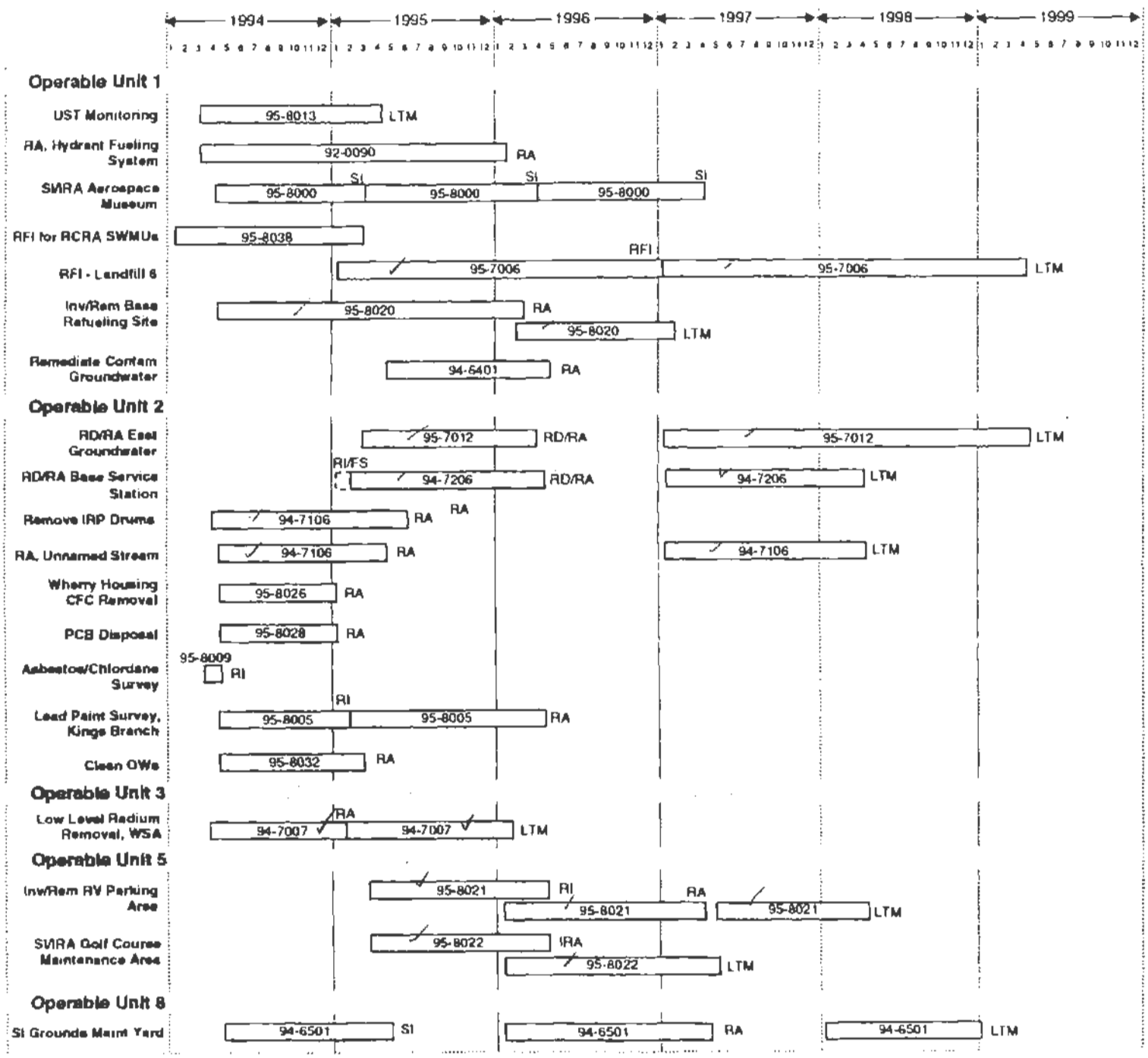


Figure 5-1
Projected Master Restoration Schedule
Page 2of 2

ST-14: POL Tank Farm

- Treatability study is successful.

East Area Groundwater Site:

- Groundwater in the area is contaminated.

LF-06: Landfill-06

- Groundwater is not contaminated.
- IRA may result in NFA.

5.1.2
Requirements by Fiscal Year

Anticipated funding requirements for restoration activities through FY 1996 is shown in Appendix A, Table A-1.

5.2
Compliance Programs

5.2.1
Master Compliance Schedules

The compliance schedules for Carswell AFB are summarized in Figures 5-3. They are based upon the following assumptions:

Removal of USTs:

- USTs did not leak and do not require soil remediation.

Closure of TSD area:

- Hazardous waste can be disposed of by 31 December 1993.

Closure of hazardous waste accumulation points:

- No groundwater or soil contamination.

PCB Retrofilling:

- PCB concentration will be reduced to less than 50 parts per million with two fillings.

PCB Replacement:

- Transformers will be manufactured and installed prior to base closure.

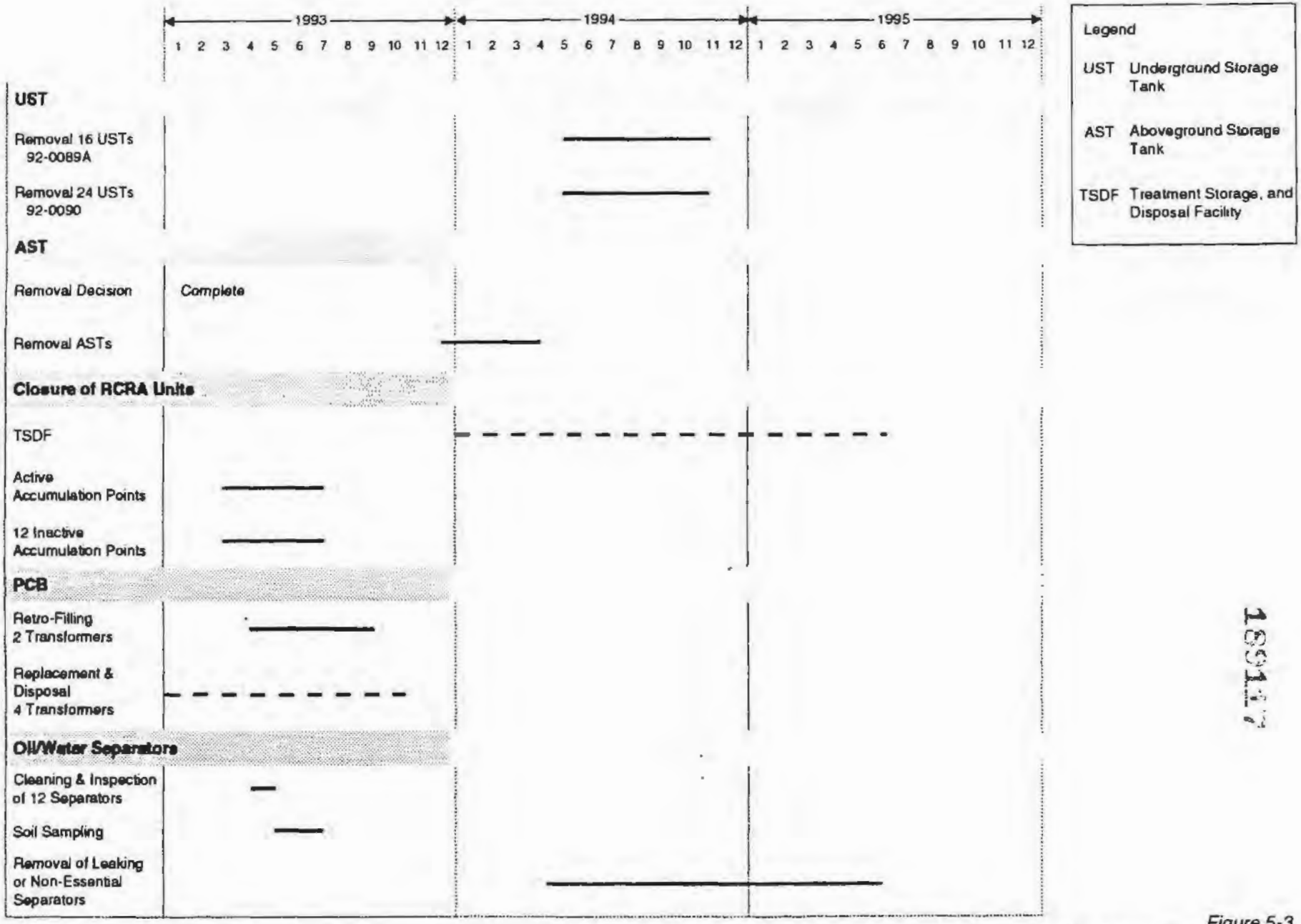


Figure 5-3
Projected Master Schedule for Closure-Related Compliance Programs
Page 1 of 2

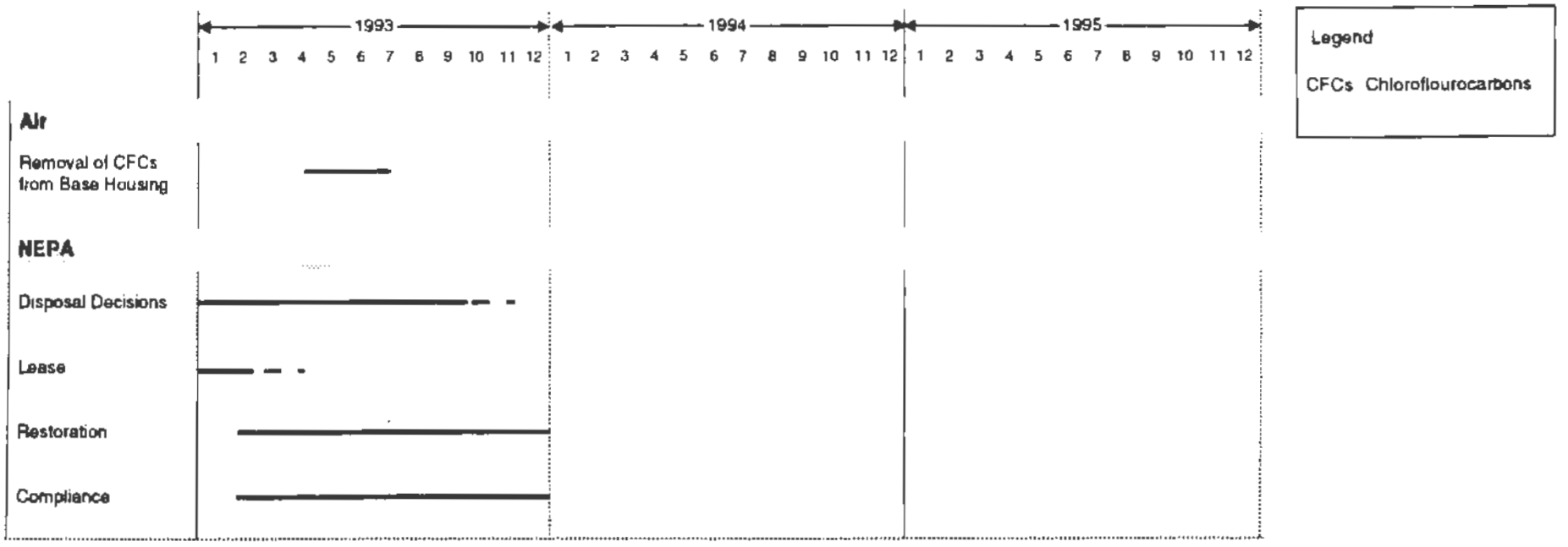


Figure 5-3
Projected Master Schedule for
Closure-Related Compliance Programs
Page 2 of 2

1891115

Oil/Water Separator Soil Assessment:

- A delivery order was issued in June 1993.

Oil/Water Separator Removal:

- Nonessential separators will be identified as a result of the oil/water separator assessment.

Air:

- Chlorinated fluorocarbon (CFC) removal contract will be awarded by 1 August 1993.

5.2.2
Requirements by Fiscal Year

Funding requirements for compliance activities through FY 1993 are shown in Appendix A, Table A-2.

5.3
Natural and Cultural Resources

5.3.1
Natural and Cultural Resources Schedule(s)

See Figure 5-4.

5.3.2
Requirements by Fiscal Year

See Table A-3 in Appendix A.

5.4
BCT Meeting Schedule

BCT meetings will be required for the ongoing restoration and compliance activities. It is recommended that regularly scheduled meetings involving the CRA, regulators, AF Plant 4, 301 Tactical FW, OL-H, and other relevant participants be held to meet the objectives of the Partnering Agreement and MOA, as well as to ensure timely and coordinated decisions and promote communications. In the meantime, the OL-H will continue to attend the AF Plant 4 TRC meetings to facilitate communications.

The RAB meetings will be held on a quarterly basis starting in January 1994. Future agenda items include: BCP status, restoration activity status, compliance activities status, programming/funding status and requirements, and CERCLA §120(h) considerations. When completed, Table 5-1 will show the BCT meeting schedule.

Table 5-1. BCT Team Meeting Schedule

1994		1995		1996	
Date	**Topic**	**Date**	**Topic**	**Date**	**Topic**
12 January	BCT	24 January	BCT	11 January	BCT
26 January	RAB	15-16 February	BCT	11 January	RAB
3 February	BCT	18 May	BCT	8 February	BCT
1 March	RAB	18 May	RAB	14 March	BCT
19 May	BCT	8 June	BCT	4 April	RAB
10 June	BCT	8 June	RAB	11 April	BCT
14 July	RAB	10 August	BCT	9 May	BCT
29 August	BCT	7 September	RAB	13 June	BCT
5 September	RAB	5 October	RAB	1 August	RAB
26 September	BCT	12 October	BCT	8 August	BCT
31 October	BCT	9 November	BCT	12 September	BCT
10 November	BCT	14 December	BCT	10 October	BCT
	BCT			7 November	RAB
				14 November	BCT
				12 December	BCT

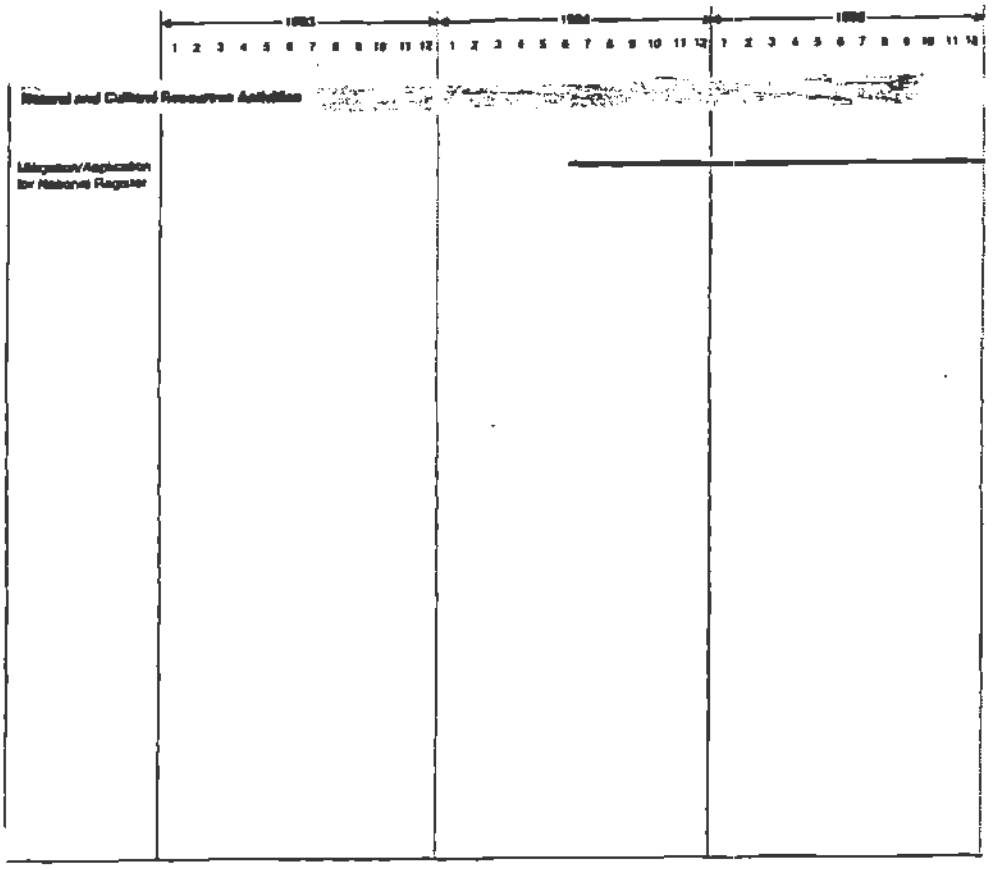


Figure 5-4
Projected Schedule for Natural and Cultural Resources Activities

189121

TAB

CHAPTER 6.0

Chapter 6
Technical and Other Issues to be Resolved

This section summarizes technical and other issues that are yet to be resolved. These issues include information management; the usability of historical data; data gaps; natural (background) levels of elements and compounds in soil, groundwater, surface water, and sediments; risk assessment; and cleanup standards.

6.1
Data Usability

This section summarizes unresolved issues pertaining to the validity of using historical data sets in the base environmental program.

6.1.1
BCT Action Items

The following actions are necessary to determine the usability of historical data sets in the base environmental restoration program:

- Begin to evaluate historical data sets at the base against *The Handbook to Support Installation Restoration Program Statements of Work, Volume I, Remedial Investigations/Feasibility Studies* and other accepted validation procedures for usability in risk assessments and hydrogeologic characterizations of source and groundwater target areas
- Continue to ensure the usefulness of data collected during current and future project phases by continuing to implement and reformulate data quality management procedures.

6.1.2
Rationale

Historical analysis data can contribute to the completion of site characterizations and risk assessments by filling data gaps. Current and future data from each data collection system (e.g., laboratories, field laboratories, field screening techniques) are critical to the completion of site characterization efforts, risk assessments, and ultimately, the selection of RAs to protect human health and the environment.

6.1.3
Status/Strategy

The BEC is aware that documents and other historical data sources do not meet Service Center Handbook or U.S. EPA criteria for use because of poor documentation and/or quality. An assessment of documents is needed to determine whether:

- Technical specifications were followed
- Accurate and precise data collection was accomplished

- Both field and laboratory documentation were sufficient to document what is known about the data.

The outcome of this assessment will be used to determine the potential use of data or to identify sampling locations that are required to fill data gaps.

Strategies for ensuring the usability of current or future data include the following:

- For current and future field efforts, the AFBCA/OL-H will continue to follow the structured data collection and documentation process (including electronic formats) in the Service Center Handbook and the *IRPIMS Data Loading Handbook*.
- The BEC, in conjunction with the Service Center representative, will ensure that the field and laboratory audit process will continue to be implemented to allow for project compliance assessment, real-time project quality management, and problem-solving through the use of corrective actions.
- The use of field/mobile laboratories, field screening techniques, and other special analytical techniques will be considered and evaluated to facilitate data collection. Each different data collection system shall be evaluated on a case-by-case basis and an assessment made on the intended use of data and of the adequacy of both the field and laboratory quality assurance/quality control (QA/QC) systems.

6.2
Information Management

This section summarizes issues that need to be resolved with regard to managing information gathered and used in the base environmental restoration and compliance programs.

6.2.1
BCT Action Items

The following actions are necessary to ensure that an effective information management system is in place for the base environmental restoration program:

- Establish an on-site central data file. This central file will be a natural extension to the existing IRP Information Management System (IRPIMS) sampling and analysis database, and will also include non-IRP data (e.g., past and present land use, natural resources).
- Require all contractors working at the base to submit all data to the central file in a standardized electronic format. Maintain one integrated database to ensure comprehensive data storage and retrieval.
- Use the central file clearinghouse to distribute quality assured data in standard formats to parties with the need a for basewide perspective in activities at the base, including contractors, Air Force decision makers, and regulators.
- Improve the data analysis capabilities within the base so that data can be analyzed as received. Thus, the results of recent field and laboratory work can be fed back into the

planning loop more quickly, helping to redirect field efforts as they happen and determine when enough data are available to support a decision.

6.2.2
Rationale

Given the number of agencies and contractors associated with the base environmental restoration programs at both Carswell AFB and AF Plant 4, it is important that all parties involved be able to share data for decision making. The establishment and maintenance of an electronic database containing sampling, analytical, and other non-IRP data is the most efficient method of sharing data among parties.

6.2.3
Status/Strategy

Historical data have been submitted by AFCEE for loading into the IRPIMS; seven documents have been submitted. One document has been loaded, five were loaded by November 1993, and the loading status of the remaining document is to be determined. Remaining restoration documents will be submitted for loading, but the schedule for submittal is unknown at this time. The data loading summary status is shown in Appendix B, Table B-1.

6.3
Data Gaps

This section summarizes unresolved issues pertaining to the determination and collection of data needed to complete the Carswell AFB environmental restoration program.

6.3.1
BCT Action Items

The Carswell AFB BCT will ensure that data gaps are identified and filled as needed to conduct the Carswell AFB environmental restoration program. BCT meetings and coordination between the TNRCC and the AF Plant 4 TRC will be used to reach consensus on field sampling efforts needed in FY 1993/1994 to resolve data gaps.

6.3.2
Rationale

Effective identification and filling of data gaps will permit the development of conceptual site models for a risk assessment. However, conceptual model summaries need to be prepared by the BCT for inclusion in the BCP as Appendix E. Effective analysis of data gaps will also facilitate the completion of investigations and risk assessments so that ANSCs and target areas can be delineated.

6.3.3
Status/Strategy

The historic data source review to determine data usability is currently in progress. It may identify data gaps created where data are determined to be not usable. Strategies for identifying and filling data gaps are as follows:

- Identify data gaps from previous studies and let new contracts to collect the additional data required.
- BCT meetings will be used to resolve data gap issues for the field season. A BCT meeting with federal and state regulators will be scheduled to reach a consensus on a scope of work for filling remaining data gaps.

6.4
Background Levels

This section summarizes unresolved issues pertaining to the determination of natural (background) concentrations of elements and compounds in the environment of Carswell AFB.

6.4.1
BCT Action Items

The BCT will establish background concentrations of elements in the environment for use in baseline risk assessment computations and comparison with potential site contaminants. This will ensure that background concentrations are known and are available for performing risk assessments as required for the Carswell AFB environmental restoration program.

6.4.2
Rationale

Background concentration values of elements in soil, groundwater, surface water, and sediments need to be determined before risk assessments can be conducted. The values must be representative of what is naturally occurring and must he concurred with by U.S. EPA and state regulators.

6.4.3
Status/Strategy

A proposed procedure to determine background concentrations is currently under development and will be submitted to the TNRCC for review. The background levels will be determined from historic data collected during the RFIs and IRP site investigations using U.S. EPA and state of Texas-approved procedures and work plans.

189126

6.5
Risk Assessments

This section summarizes unresolved issues pertaining to the completion of risk assessments required to complete the Carswell AFB environmental restoration and associated compliance programs.

6.5.1
BCT Action Items

The BCT is evaluating the role of anticipated land use as a criterion in selecting assumptions in the exposure assessment. A key to the selection of assumptions is to summarize contaminants of concern along with current and future land uses.

6.5.2
Rationale

Because land use affects the number and type of exposure pathways, anticipated or known land uses must be considered when making assumptions about exposure in risk assessments.

6.5.3
Status/Strategy

The BEC has conducted risk assessments on a case-hy-case basis; however, no formal strategy for performing risk assessments has been established. A strategy will be established to develop risk assessments to support remedy selection during RD or treatability studies. Assessments will consider future land use, technologies, and the AF Plant 4 IRP.

The BEC will work with the CRA, 301 Tactical FW, AFCEE and other base tenants to ensure that the retained cantonment land uses and reuse decisions are incorporated into risk assessments and RAs.

6.6
Basewide Remedial Action Strategy

Table 6-1 outlines each site, the risks associated with each site, and current and anticipated use of the area.

6.7
Interim Monitoring of Groundwater and Surface Water

Monitoring is scheduled to begin in the third quarter of FY 1994 and continue through FY 1995.

6.8
Excavation of Contaminated Materials

Activities will begin per schedule of restoration activities on a project-specific basis.

6.9
Protocols for Remedial Design Reviews

To be performed in conjunction with project schedules.

6.10
Conceptual Models

Continue to develop conceptual model data summaries for inclusion in Appendix E.

6.11
Cleanup Standards

Texas state cleanup standards for hazardous waste or constituents in soils are found in Subchapter 5: Risk Reduction Standards, TNRCC, 18 Texas Register 3842 (1993) (codified at 31 Texas Administration Code §335.551-335.569). In the absence of federal- or state-mandated cleanup standards for specific hazardous wastes or constituents in soils, the approach for providing remediation criteria for contaminated soils is either through the conduct of a risk assessment specific to a site or the use of more generic guidance levels. The *Interim Final RCRA Facility Investigation (RFI) Guidance, Volume I of IV, Development of an RFI Work Plan and General Considerations for RCRA Facility Investigations* (U.S. EPA 30/SW-89-031, Waste Management Division, Office of Solid Waste, May 1989) provides health-based guidance criteria concentrations for a number of hazardous compounds and elements based on oral and inhalation exposure routes. These health-based criteria are provided for known carcinogens (Table 8-6 of the RFI guidance) and systemic toxicants (Table 8-7 of the RFI guidance). The criteria are subject to change and will be confirmed by the appropriate regulatory agency prior to use. For many compounds listed in Table 6-2 of the RFI guidance, no guidance levels have been developed. Cleanup standards for human health and other criteria are summarized in Tables 6-2 and 6-3.

6.12
Initiatives for Accelerating Cleanup

Initiatives to accelerate cleanup have been incorporated into the IRP. Response actions have been accelerated as much as is currently feasible without development of new technologies. Attempts to further accelerate cleanup activities may adversely affect the integrity of current and planned response actions.

Table 6-1. Future Land Use Risk Assessment for Development of Remedy Selections

		Contaminants					
Site ID	Risks	Groundwater	Soil	Surface/ Sediment	Current Use	Adjacent Uses	Anticipated Uses
LF-01	None	None	None	None	None	Residential	Residential
LF-02	None	None	None	None	None	Industrial	Industrial
LF-03	None	None	None	None	None	Flightline ops	Flightline ops
LF-04	Medium	TCE, metals	TCE, metals	None	None	Flightline ops	Flightline ops
LF-05	Medium	TCE, metals	TCE, metals	None	None	Flightline ops	Flightline ops
LF-06	Medium	Hydrocarbons	Hydrocarbons	None	Parking	Golf course	Parking
W-P07	Medium	TCE, metals	TCE, metals	None	None	Flightline ops	Flightline ops
FT-08	None	None	None	None	None	Flightline ops	Flightline ops
FT-09	Low	Hydrocarbons	Hydrocarbons	Hydrocarbons	None	Flightline ops	Flightline ops
SD-10	Low	Hydrocarbons, Metals	Hydrocarbons, Metals	Hydrocarbons, Metals	Storm drainage	Flightline ops	Flightline ops
WP-11	None	None	None	None	None	Golf course	Golf course
OT-12	None	None	None	None	White house comm.	Firing Range	Firing Range
SD-13	Low	Hydrocarbons	Hydrocarbons	Hydrocarbons	Drainage	Firing Range	None
ST-14	Low	Hydrocarbons	Hydrocarbons	None	POL storage	POL storage	POL storage
OT-15	Low	Radium	None	None	Abandoned	Abandoned	Possible storage
ST-16	High	Hydrocarbons	Hydrocarbons	None	None	Dorms, industrial	Industrial
DP-17	None	None	None	None	None	Maintenance	Flightline maintenance
OT-18	Medium	TCE, Hydrocarbons	Hydrocarbons	None	Airfield ops	Airfield ops	Airfield ops
OT-15 (Disposal site)	None	None	None	None	None	None	Possible storage

189123

6.13
Remedial Actions

RA sites have been identified for the FY 1994 through FY 1996 years. The goal is to have all sites into RA by calendar year 2000.

6.14
Review of Selected Technologies for Application of Expedited Solutions

AFBCA/OL-H is currently working with the AFCEE in order to determine and select the best available technologies.

6.15
Hot Spot Removals

6.16
Identification of Clean Properties

Will be identified after sites have been undergoing remedial efforts.

6.17
Overlapping Phases of the Cleanup Process

In some instances, RD/RA phases will be performed concurrently with IRA phases.

6.18
Improved Contracting Procedures

The majority of contracts will be managed by the AFCEE.

6.19
Interfacing with the Community Reuse Plan

A community relations plan was developed; however, the base will be occupied by the Navy in FY 1996.

6.20
Bias for Cleanup Instead of Studies

Studies have been shortened in an effort to proceed with action.

Table 6-2. Human Health Standards

Contaminant	Concentration Level (μg/l)

Table 6-3. Surface Water Standards

Constituent/Parameter	Concentration Limit/Criteria
Criteria for Domestic Water Support Waters	
Radionuclides	

6.21
Expert Input on Contamination and Potential Remedial Actions

AFCEE is currently exploring these items through various environmental firms under contract.

6.22
Presumptive Remedies

Several remedies are being explored as part of the remedial process.

6.23
Partnering (Using Innovative Management, Coordination, and Communication Techniques)

Partnering has been ongoing with AF Plant 4 since FY 1993. Regulatory involvement consists of EPA, TNRCC, and local agencies.

6.24
Updating the EBS and Natural/Cultural Resources Documentation

A final EBS was distributed for comment October 93.

6.25
Implementing the Policy for On-Site Decision Making

As part of the BCT, decision making was identified as an integral part of the overall effort.

189130

TAB

APPENDIX A

189133

Appendix A

Fiscal Year Funding Requirements/Costs

189135

TAB

APPENDIX B

189135

Appendix B

Installation Environmental Restoration Documents Summary Tables

Table B-1. Project Deliverables
Page 1 of 2

Year	Phase	Project Title	Report #	Sites Examined	Deliverable Date/By Whom
1984	I	Records Search	1	LF-01, LF-02, LF-03, LF-04, LF-05, LF-06, WP-07, FT-08, FT-09, SD-10, WP-11, OT-12, ST-16, SD-13, ST-14, OT-15 (SWMU 65)	February 1984, CH_2M Hill
1986	II	Phase II, Stage 1	2	LF-01, LF-03, LF-04, LF-05, WP-07, FT-08, FT-09, SD-10, OT-12, SD-13, ST-14, OT-15 (SWMU 65)	October 1986, Radian Corporation
1989	RFA	RCRA Facility Assessment PR/VSI Report	3	LF-01, LF-02, LF-03, LF-04, LF-05, LF-06, WP-07, FT-08, FT-09, SD-10, WP-11, OT-12, SD-13, ST-14, OT-15 (SWMU 65), OT-15 (SWMU 60)	March 1989, A.T. Kearney, Inc.
1989	RI/FS	Remedial Investigation/Feasibility Study, Stage 2	4	LF-01, LF-03, LF-04, LF-05, WP-07, FT-08, FT-09, SD-10, OT-12, SD-13, ST-14, OT-15 (SWMU 65), ST-16	April 1989, Radian Corporation
1990	RI/FS	Decision Paper	5	FT-08	April 1990, Radian Corporation
1990	RI/FS	Decision Paper	6	FT-09	April 1990, Radian Corporation
1990	RI/FS	Decision Paper	7	SD-10	April 1990, Radian Corporation
1990	RI/FS	Decision Paper	8	OT-15 (SWMU 65)	April 1990, Radian Corporation
1991	RI/FS	Decision Paper	12	OT-12	May 1991, U. S. Air Force
1991	RFI	RCRA Facility Investigation Work Plans	13	LF-01, LF-04, LF-05, WP-07, FT-08, FT-09, SD-10, OT-12, SD-13, OT-15 (SWMU 65)	May 1991, COE
1991	NFADD	Request for Dismissal	14	FT-08, OT-12	July 1991, COE
1991	RI/FS	Remedial Investigation for East Area Groundwater Site	16	LF-01, SD-13, ST-14, ST-16	October 1991, Radian Corporation
1991	RI/FS	Feasibility Study for East Area Groundwater Site	17	LF-01, SD-13, ST-14, ST-16	October 1991, Radian Corporation
1991	RI/FS	Remedial Investigation for Flightline	18	LF-04, LF-05, WP-07, FT-09	October 1991, Radian Corporation

189137

Table B-1. Project Deliverables
Page 2 of 2

Year	Phase	Project Title	Report #	Sites Examined	Deliverable Date/By Whom
1991	RI/FS	Feasibility Study for Flightline	19	LF-04, LF-05, WP-07	October 1991, Radian Corporation
1991	RFI	RCRA Work Plan	20	SD-13	October 1991, COE
1992	RFI	RCRA Facility Investigation Remediation Plan	21	WP-07	January, 1993, COE
1992	RFI	RCRA Facility Investigation Work Plan	22	LF-06	April, 1992, COE
1990	RI/FS	Decision Paper	9	ST-16	April 1990, Radian Corporation
1991	RI/FS	Decision Paper	10	LF-02	May 1991, U.S. Air Force
1991	RI/FS	No Further Action Decision Document	15	LF-01	September 1991, U.S. Air Force
1991	RI/FS	Decision Paper	11	WP-11	May 1991, U.S. Air Force

169133

Table B-2. Site Deliverables

Site ID (WIMS-ES)	PA/SI	RI/FS	RD/RA	Close Out	IRA	LTM	NFRAP	DD
LF-01	1, 2, 3	4, 16, 17	13					15[a]
LF-02	1, 3[a]							10[b]
LF-03	1, 2, 3[a]	4						
LF-04	1, 2, 3	4, 18, 19	13					
LF-05	1, 2, 3	4, 18, 19	13					
LF-06	1, 3		22					
WP-07	1, 2, 3	4, 18, 19	13, 21					
FT-08	1, 2, 3	4	13					5[a], 14
FT-09	1, 2, 3	4, 18	13					6[c]
SD-10	1, 2, 3	4	13					7[c]
WP-11	1, 3[a]							11[b]
OT-12	1, 2, 3	4	13					12[a], 14
SD-13	1, 2, 3	4, 16, 17	13, 20					
ST-14	1, 2, 3	4, 16, 17						
OT-15 (SWMU 60)	3							
OT-15 (SWMU 65)	1, 2, 3	4	13					8[a]
ST-16	1	4, 16, 17						9[d]
OT-18								
DP-17								
East Area Groundwater Site								

Notes:
(a) NFA approved.
(b) RFA had previously eliminated site from further evaluation.
(c) RA approved.
(d) Not approved.

1891.33

Table B-3. Technical Documents/Data Loading Status Summary

Date	Title	Sites	Contractor	Service Center	IRPIMS Status
10/86	IRP Phase II, Stage 1	LF-01, LF-03, LF-04, LF-05, WP-07, FT-08, FT-09, SD-10, OT-12, SD-13, ST-14, OT-15 (SWMU 65)	Radian Corp.	AFCEE	Loaded
10/88	IRP Phase II, Stage 2 (Interim)	LF-01, LF-03, LF-04, LF-05, WP-07, FT-08, FT-09, SD-10, OT-12, SD-13, ST-14, OT-15 (SWMU 65), ST-16	Radian Corp.	AFCEE	Estimated completion of loading, November 1993
4/89	IRP Phase II, Stage 2	LF-01, LF-03, LF-04, LF-05, WP-07, FT-08, FT-09, SD-10, OT-12, SD-13, ST-14, OT-15 (SWMU 65), ST-16	Radian Corp.	AFCEE	Estimated completion of loading, November 1993
5/89	IRP Phase II, Stage 2, WSA-1	OT-15 (SWMU 65)	Radian Corp.	AFCEE	Estimated completion of loading, November 1993
9/90	IRP Stage 2 Feasibility Studies and Remedial Investigations (Interim)	LF-01, LF-04, LF-05, WP-07, FT-09, SD-13, ST-14, ST-16	Radian Corp.	AFCEE	Estimated completion of loading, November 1993
10/91	IRP Stage 2 Feasibility Studies and Remedial Investigations (Interim)	LF-01, LF-04, LF-05, WP-07, FT-09, SD-13, ST-14, ST-16	Radian Corp.	AFCEE	Estimated completion of loading, November 1993
4/90	IRP Remedial Investigation/ Feasibility Study Decision Paper, Site 13	SD-10	Radian Corp.	AFCEE	To be determined

189141

TAB

APPENDIX C

189142

Appendix C

Decision Document/ROD Summaries

189143

Appendix C
Decision Document/ROD Summaries

Carswell Air Force Base has 19 Installation Restoration Program sites. Decision Documents (DDs) for which a remedial action was given a notice to proceed by the Texas Water Commission were prepared for two sites, FT-09 and SD-10. Summaries of the DDs for these sites are presented in this Appendix. A listing of DDs is presented in Appendix B, Table B-1, Project Deliverables.

US Air Force Installation Restoration Program
Remedial Investigation/Feasibility Study
Study Site 12, Carswell AFB, Texas
Decision Paper

April 1990

Site History/Description:

Site FT-09, the Fire Department Training Area 2, is located between the north-south taxiway and the radar facility. It is a gravel-lined fire ring with a low earthen berm. Fire training exercises have been performed here since 1963. Two tanks at the site have been used to store flammable liquids associated with fire training exercises, an aboveground tank to store fuel, and an underground tank to store waste oils and solvents.

Soil samples analyzed during IRP RI/FS revealed benzene, ethyl benzene, xylenes, 2-methylnaphthalene, 4-methylphenol, phenol, and naphthalene in the surface soils beneath the site, and in a sand strata 24 feet beneath the surface just above the water table. Petroleum hydrocarbons were detected in the groundwater.

Although this site did not pose an immediate and direct health hazard, remedial action was recommended to reduce the risks associated with the site. The alternative control measures that were considered are listed below:

1. No further action.
2. Excavate 2 feet of contaminated soil within the berm and aerate on site.
3. Excavate 2 feet of contaminated soil within the berm and dispose of it in a landfill.
4. Excavate 2 feet of contaminated soil within the berm and incinerate off site.
5. Excavate soil within the berm to bedrock and dispose of it in a landfill.
6. Excavate 2 feet of contaminated soil within the berm and aerate on site; treat deeper soil in situ.
7. Excavate 2 feet of contaminated soil within the berm and dispose of it in a landfill; treat deeper soil in situ.

Selection of Alternative 2 was recommended for the remedial action for this site.

Selected Remedial Action:

The Texas Water Commission gave a notice to proceed on Alternative 2.

Performance Standards or Goals: Not applicable.

Institutional Controls: Not applicable.

US Air Force Installation Restoration Program
Remedial Investigation/Feasibility Study
Site 13, Carswell AFB, Texas
Decision Paper

April 1990

Site History/Description:

Site SD-10, the Flight Line Drainage Ditch, received runoff from the flight line area and discharge from the aircraft wash racks and from the fuel systems shop. The ditch is entrenched 5 feet below surrounding land surfaces, and is partially unlined and partially lined with concrete.

Soil and sediment samples from the ditch were collected during IRP remedial investigation/feasibility studies. Analysis revealed low concentrations of volatile and semivolatile organic compounds in the unlined portion of the ditch, concentrations of petroleum hydrocarbons in all soil samples, and above normal and expected concentrations of cadmium, lead, selenium, and arsenic.

Although the ditch did not pose an immediate and direct health hazard, remedial action was recommended to reduce risks associated with the site. The alternative control measures that were considered are listed below:

1. No further action.
2. Excavate the contaminated soil and dispose of it in a landfill.
3. Excavate the contaminated soil and incinerate it.

Selection of Alternative 2 and installation of a concrete liner in the unlined portion of the ditch to prevent further contamination were recommended for the remedial action for this site.

Selected Remedial Action:

The Texas Water Commission gave a notice to proceed on an additional alternative to excavate the contaminated soil and treat it on base.

Performance Standards or Goals: This section not applicable.

Institutional Controls: This section not applicable.

189146

THIS PAGE INTENTIONALLY LEFT BLANK

189147

TAB

APPENDIX D

189145

Appendix D

No Further Response Action Planned (NFRAP) Summaries

Appendix D
No Further Response Action Planned (NFRAP) Summaries

Carswell Air Force Base has 19 Installation Restoration Program sites. Decision Documents (DDs) for which no further response actions were approved by the Texas Natural Resources Conservation Commission were prepared for Sites FT-08, OT-12, and OT-15 (solid waste management system 65). Summaries of the (DDs) for these sites are presented in this appendix. A listing of DDs is presented in Table B-1, Project Deliverables.

189150

Decision Summary
Technical Document To Support
No Further Action
US Air Force Installation Restoration Program
Site 11, Fire Department Training Area 1
Carswell AFB, Texas

April 1990

Site History/Description:

Site FT-08 was the primary fire training pit used prior to 1963. It is located in the southern part of Carswell AFB. Waste oils, contaminated fuels, and solvents were burned here during training exercises several times a month. The site is now a level, gravel-surfaced area, and is covered with grass.

Remedial investigations of the site included installing monitoring wells, sampling soil and groundwater, and geophysical surveys. The investigations indicated that volatile organic compounds were not detected within the upper zone groundwater, water quality parameters and metal concentrations were within expected and typical ranges, and low levels of TCE were found in soils at the center and north of the site.

A baseline risk assessment was performed to determine the criteria for site remediation. The assessment determined there was no substantial current or future risk to public health from this site. The recommended alternative was no further action for this site.

Selected Remedial Action:

The Texas Water Commission approved no further action for this site on 17 December 1991.

Performance Standards or Goals: This section not applicable.

Institutional Controls: This section not applicable.

US Air Force Installation Restoration Program
Remedial Investigation/Feasibility Study
Carswell AFB, TX
Decision Paper
Site OT-12, Entomology Dry Well

16 May 1991

Site History/Description:

Site OT-12, the Entomology Dry Well, was used for disposal of insecticide rinseate between 1965 and 1981. The site is located in the east base area near the location of the entomology shed which was removed in 1981. Insecticides that were mixed in the shed included malathion, diazinon, dursban, and chlordane. The site has been regraded and its exact location is unknown.

Investigations at Site OT-12 indicated that chlordane and endrin aldehyde were detected in the soil concentrations below maximum contaminant levels. Based on the random low levels of pesticides found in the soil and the lack of pesticides found in the groundwater, the site was recommended for no further action. An alternative action, removal and disposal of contaminated soil was discussed, but because contamination was below U.S. EPA standards, it was not considered.

Selected Remedial Action:

The Texas Water Commission approved no further action for this site on 17 December 1991.

Performance Standards or Goals: This section not applicable.

Institutional Controls: This section not applicable.

189152

US Air Force Installation Restoration Program
Remedial Investigation/Feasibility Study
Weapons Storage Area, Carswell AFB, Texas
Decision Paper

April 1991

Site History /Description:

Site OT-15 (SWMU 65), the Weapons Storage Area (WSA) Disposal Site, is located at the Off-Site WSA, approximately 5 miles west of the main base. The facility was constructed in 1956, and includes two munitions inspection shops, 16 storage buildings, a radioactive waste disposal facility, and an explosive ordnance disposal range. An estimated 5 gallons to 10 gallons a year of waste cleaners and solvents (paint thinners and TCE) were disposed of on the ground behind the inspection shop.

Soil samples were collected from the ditch behind the inspection shop and analyzed as part of IRP RI/FS Stage 2 investigations. Principle contaminants at the site are antimony, selenium, and several volatile and semivolatile organic compounds. These occur in very low concentrations in the shallow soils of the ditch. The baseline risk assessment conducted during the RI/FS indicated that the site did not pose an immediate and direct health hazard, but remedial action was recommended to reduce risks associated with the site. The alternative control measures that were considered and evaluated are listed below:

1. No action.
2. Excavate contaminated soil and dispose of it in a landfill.
3. Excavate contaminated soil and incinerate it.

Selection of Alternative 2 was recommended as the remedial action for this site.

Selected Remedial Action:

Upon review of the DD, The Texas Water Commission approved Alternative 1 for this site on 17 June 1991.

Performance Standards or Goals: This section not applicable.

Institutional Controls: This section not applicable.

189153

TAB

APPENDIX E

189154

Appendix E

Conceptual Site Model Data Summaries

189155

Appendix E
Conceptual Site Model Data Summaries

To date, conceptual site models have not been developed. As remedial investigations continue, conceptual site models will be developed and incorporated into this Base Realignment and Closure Cleanup Plan.

Table E-1. Conceptual Site Model Data Summary, Site TBD, Chemical Standards Summary

					Contaminants, Chemical Standards, Exceedences, and Potential Restoration Goals					
Current Site ID (Past Site ID)	Site Description and Source Characterization	Background Concentrations[1]	Pathway Description	Potential Receptors	Media/Contaminant	ARAR	Source	Exceedence of ARAR	Risk-Based Restoration Goal[2]	Technology-Based Restoration Goal[3]

Table E-2. Summary of Background Concentrations, Vicinity of Carswell AFB, Texas
Tabulated March, 1994

	Soils			Sediment			Surface		
	No. Detect	Number Nondetect	Maximum	Number Detects	Number Nondetect	Maximum	Number Detects	Number Nondetect	Maximum

Table E-3. Total Metal Results for Background Groundwater Locations

	Unfiltered Results				Filtered Results		
Metal	Frequency of Detection	Maximum Concentration (μg/l)	Location of Maximum	Turbidity (NTUs)	Frequency of Detection	Maximum Concentration (μg/l)	Location of Maximum

189156

189159

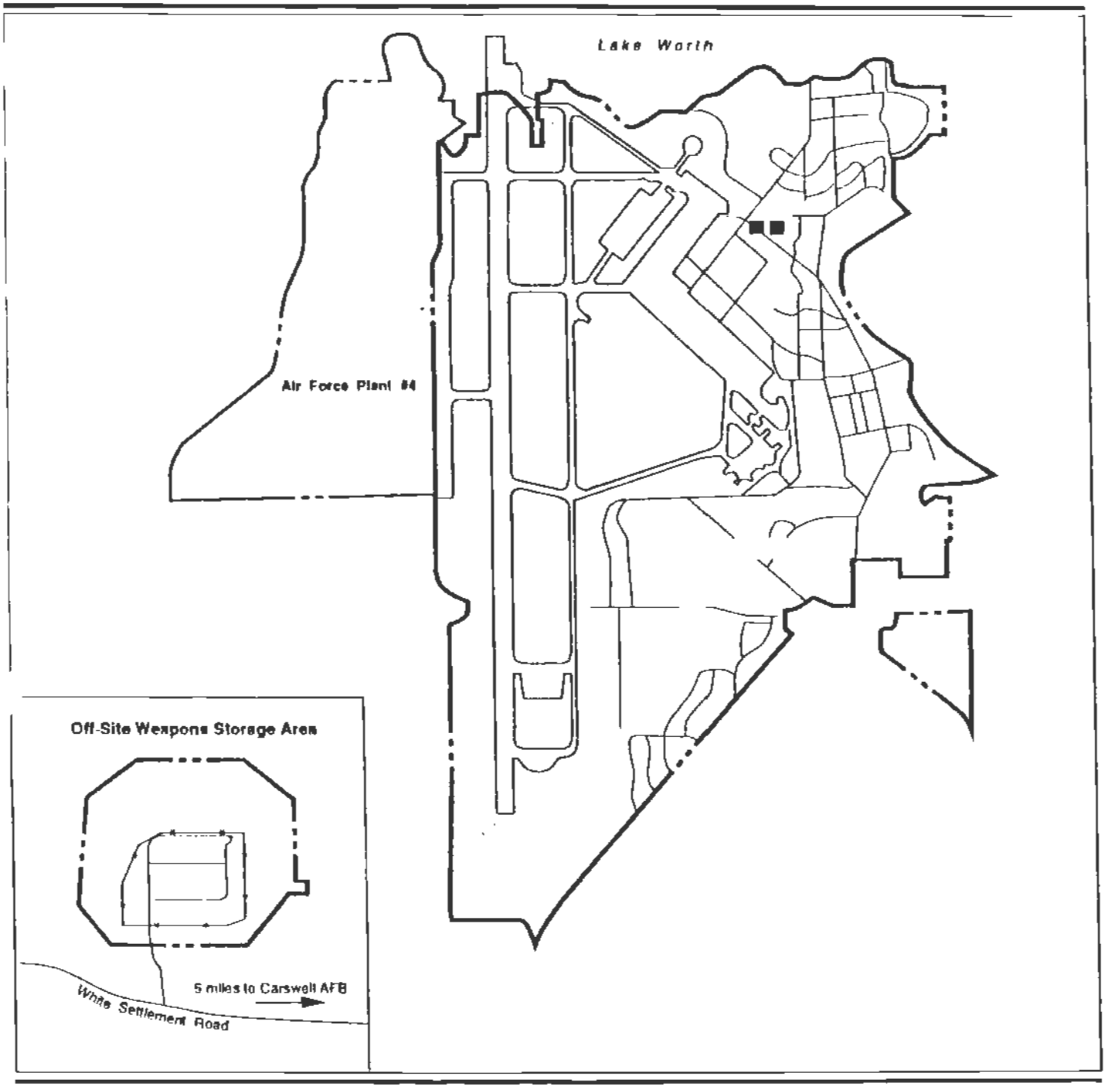
TAB

APPENDIX F

189150

Appendix F

Additional Information



EXPLANATION

■ Location of AAFES

— - - — Base Boundary

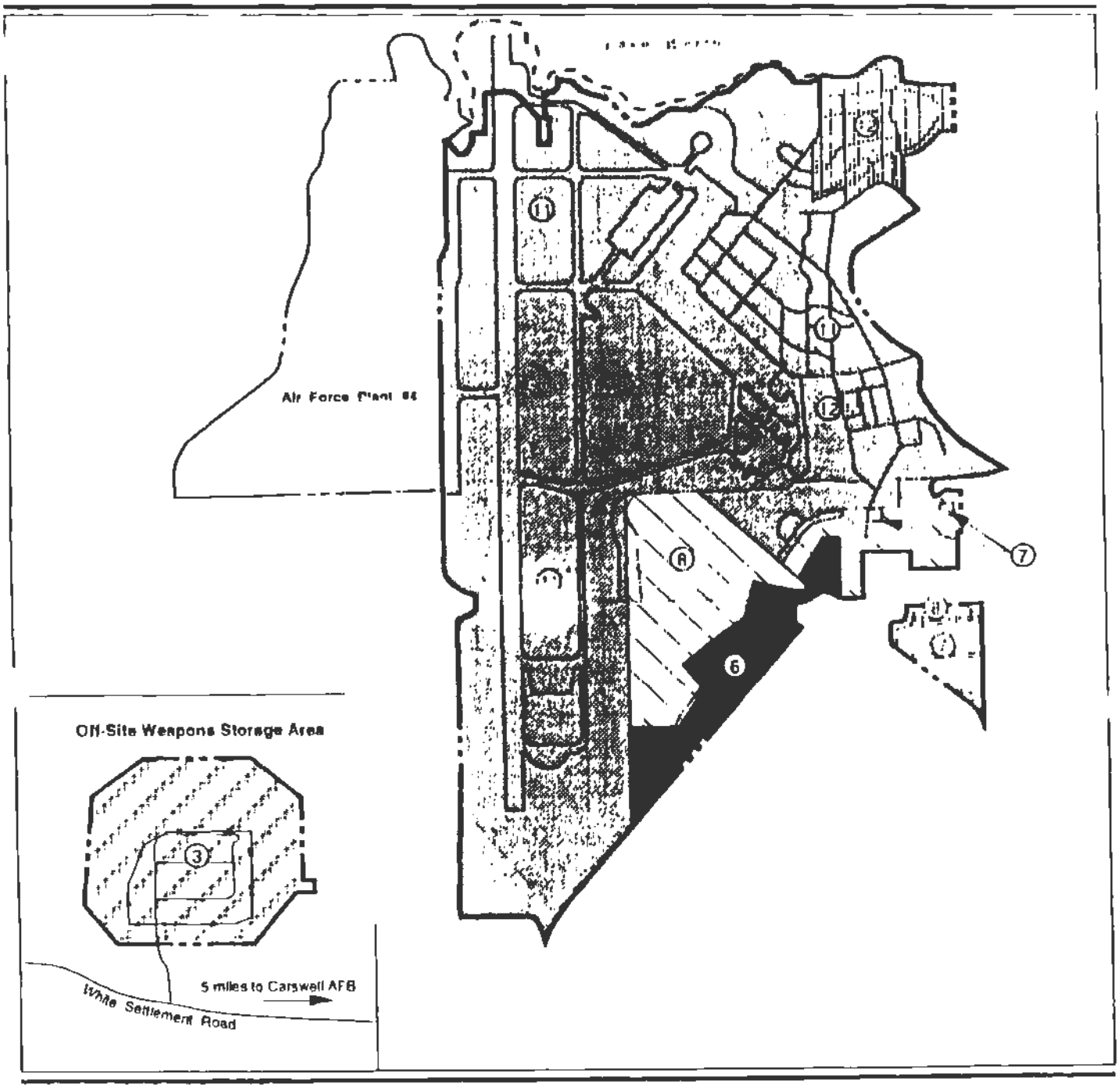
— - - — Air Force Plant #4 Boundary

0 650 1300 2600 Feet

Location of Non-Air Force Tenants

Figure F-1

189182



Proposed Action

EXPLANATION

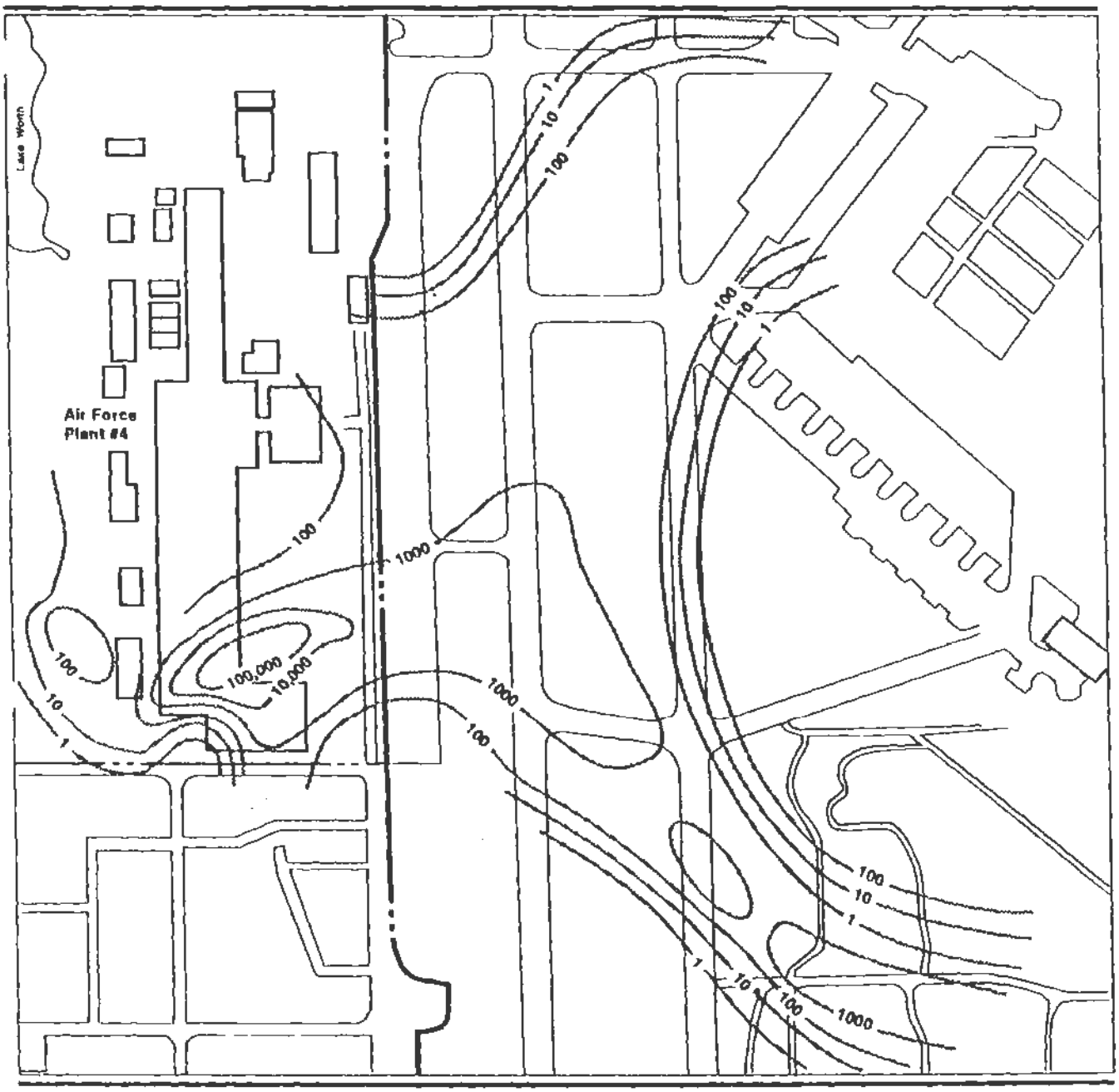
- 1 Airfield*
- 2 Aviation Support*
- 3 Industrial
- 4 Institutional (Medical)*
- 5 Institutional (Education)*
- 6 Commercial
- 7 Residential
- 8 Public Facilities/ Recreation
- 9 Agriculture*
- 10 Vacant Land*
- 11 Military
- 12 Institutional (Prison)
- Base Boundary
- Air Force Plant #4 Boundary
- Leased Property

0 650 1300 2600 Feet

* Standard land use designation not applicable to this figure.

Figure F-2

189163



EXPLANATION

TCE Concentration Contours (ug/L)

Base Boundary

Air Force Plant #4 Boundary

Concentrations of Principle Contaminants - Trichloroethylene Groundwater Plume

0 300 600 1200 Feet

Figure F-3

189184

THIS PAGE INTENTIONALLY LEFT BLANK

189165

TAB

APPENDIX G

189186

Appendix G

RACER Estimates

189168

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

189159

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

File: 17G
A.F.

217070

NAVAL AIR STATION
FORT WORTH JRB
CARSWELL FIELD
TEXAS

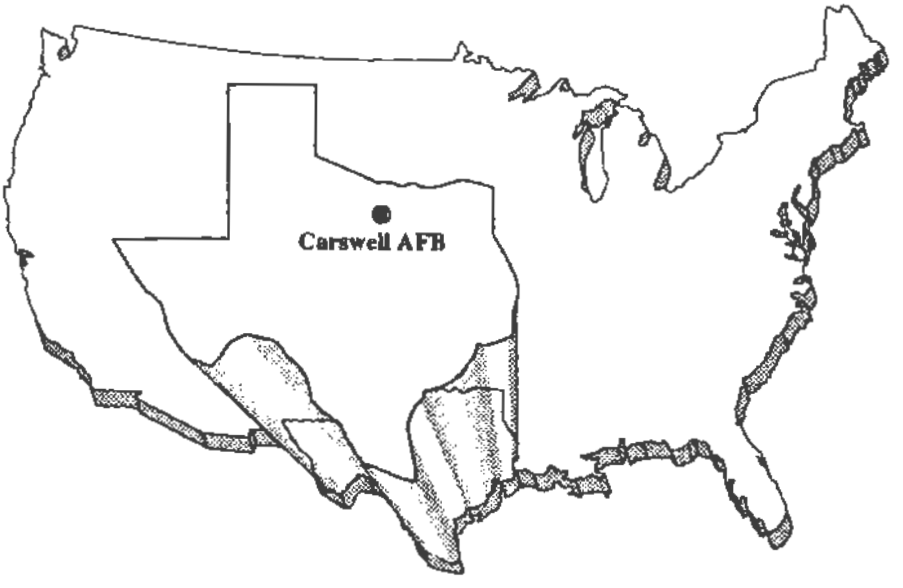
ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 217

File:
A.F. 17A26 217

BASEWIDE ENVIRONMENTAL BASELINE SURVEY CARSWELL AIR FORCE BASE, TEXAS

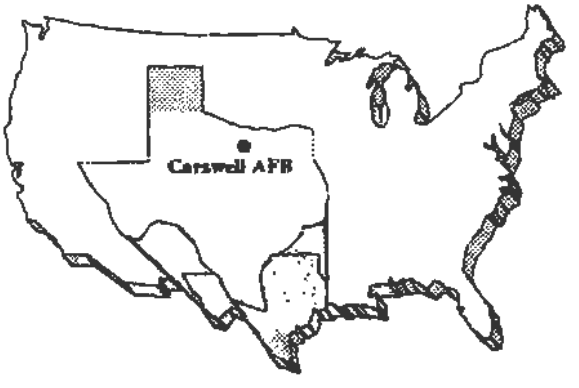
December 1993



BASEWIDE ENVIRONMENTAL BASELINE SURVEY
CARSWELL AIR FORCE BASE,
TEXAS

DECEMBER 1993

417613



SUMMARY

SUMMARY

This Environmental Baseline Survey (EBS) was prepared to document the physical condition of real property at Carswell Air Force Base (AFB), Texas resulting from the storage, use, and disposal of hazardous substances and petroleum products and their derivatives over the installation's history, and to establish a baseline for use by the Air Force in making decisions concerning real property transactions. The preparation of an EBS is required by Department of Defense (DOD) policy before any property can be sold, leased, transferred, or acquired. Although primarily a management tool, this EBS will also be used by the Air Force in meeting its obligations under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 United States Code Section 9620(h), as amended by the Community Environmental Response Facilitation Act (CERFA), Public Law 102-426.

This EBS is based on information obtained through a records search, interviews, and visual inspections. The records search included a review of all available Air Force and other agency records, including environmental restoration and compliance reports, audits, surveys, and inspection reports; an analysis of aerial photographs; and a review of recorded chain of title documents for the property. Interviews with current and former employees and visual inspections of the base property and facilities were also conducted. The EBS also includes an assessment of the environmental condition of off-base properties immediately adjacent to or relatively near the base that could pose environmental concern and/or affect the subject property. Physical inspections were conducted on contiguous properties where access was obtained from the owner or operator.

Based on an analysis of the available data, property on Carswell AFB was classified into one of seven categories:

- Category 1 - Areas where no storage, release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)

- Category 2 - Areas where only storage of hazardous substances or petroleum products has occurred (but no release, disposal, or migration from adjacent areas has occurred)

- Category 3 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, but at concentrations that do not require a removal or remedial action

- Category 4 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, and all remedial actions necessary to protect human health and the environment have been taken

- Category 5 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, removal and/or remedial actions are under way, but all required remedial actions have not yet been taken

- Category 6 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, but required response actions have not yet been implemented

- Category 7 - Areas that are unevaluated or require additional evaluation.

Property in the first four categories would be eligible for deed transfer. Property in the last three categories would not be considered for transfer until all necessary actions have been taken and the property has been reclassified into one of the first four categories. Leases would be considered on a case-by-case basis for properties within the last three categories.

ON-BASE PROPERTY FINDINGS

Property Categorization Resources

The following resources were used in property categorization. Each resource was categorized individually; findings for each resource were then reviewed to obtain the overall property category.

Category 2 through 7 properties were identified based upon the methodology presented in Chapter 2. All remaining areas were determined to be Category 1.

Areas that stored hazardous materials and/or generated hazardous waste were considered Category 2 unless a suspected or confirmed release was identified. These include dormitories and offices where it is likely that household or office products containing hazardous substances were stored.

Category 3 designations for the airfield were based upon existing documentation (e.g., personnel interviews, visual site inspections, written information). No known spills occurred within these areas; however, based on the activities that took place over time, minor releases associated with aircraft operations may have occurred. Contaminant levels, if present, are considered to be below action levels.

Areas where known or suspected contamination has occurred were classified as Category 4 through 7 properties based upon the current program status. In addition, new areas of potential contamination identified as a result of this EBS were classified as Category 7.

Hazardous Materials/Petroleum Products Management. Hazardous materials were stored and used at Carswell AFB in connection with flightline, mission support, base support, and various industrial operations. The most commonly used hazardous materials included jet and motor fuels, other types of petroleum products, paints, thinners, adhesives, cleaners, lead-acid batteries, pesticides, hydraulic fluids, and halogenated and nonhalogenated solvents. Hazardous materials were stored or used at 146 locations throughout the base.

Hazardous Waste/Petroleum Waste Management. Hazardous waste and waste petroleum products were stored at 75 locations throughout the base, including satellite accumulation points and accumulation points, storage tanks, and oil/water separators.

IRP Sites Identified to Date. To date, 19 active sites have been identified for inclusion in the Carswell AFB IRP. These are grouped into three Operable Units. In addition, a groundwater contamination plume is known to have migrated onto the eastern portion of the base from Air Force Plant #4. Remediation of contamination associated with this plume is the responsibility of Air Force Plant #4.

Storage Tanks. Past and present locations of underground and aboveground storage tanks were identified. Storage tanks at Carswell AFB have been used to store various petroleum products or wastes, and other miscellaneous products. There have been 79 aboveground storage tanks, and 107 underground storage tanks utilized at Carswell AFB. In addition, Carswell AFB operated a hydrant fueling system and three bulk fuel storage areas.

Oil/Water Separators. Past and present locations of oil/water separators were identified. There have been 29 oil/water separators utilized at Carswell AFB. Wastewater was discharged to the sanitary sewer.

Pesticides. Pesticides were stored and mixed at three locations on the base: the Entomology Shop (Facility 1213); the golf course maintenance area (Facility 234); and a pavement and grounds facility (Facility 1339).

Medical/Biohazardous Waste. Medical/biohazardous waste at Carswell AFB was generated at three locations: the hospital, the dental clinic, and the veterinary clinic. Waste was disposed of off base. Any photochemical wastes generated from medical or dental X-ray procedures were sent through silver recovery units prior to discharge to the sanitary sewer.

Ordnance. Carswell AFB operated a small explosive ordnance disposal (EOD) range beginning in the late 1950s. The EOD range will be cleared of all unexploded ordnance prior to disposal of that parcel.

Two small arms firing ranges (Facilities 1340 and 1341) are located near the confluence of the Trinity River and Farmers Branch.

Three Weapons Storage Areas (WSAs) were utilized by the base. The off-site WSA is located 5 miles west of the main base and consists of 11 concrete storage igloos and numerous munitions maintenance facilities. A second WSA is located on the north end of the base near Lake Worth and consists of 16 storage igloos and support facilities. The Air Launch Cruise Missile Storage Area is located in the central flightline area.

The firing range will remain in operation for use by the 301st Fighter Wing (FW) military and law enforcement personnel.

All ordnance will be removed from the off-site WSA as well as the WSA located in the central flightline area. The northern WSA will be utilized to support 301st FW operations.

Wastewater Discharges. Wastewater discharges are routinely monitored by the city of Forth Worth, and storm water is monitored by DOD personnel in accordance with a National Pollutant Discharge Elimination System (NPDES) permit.

Radioactive and Mixed Wastes. The hospital dispensed oral doses of chemotherapeutic drugs and engaged in radiation treatment. Minute amounts of residual remaining after treatment were diluted and disposed of through the sanitary sewer.

Currently the off-site WSA has a low-level radioactive waste disposal site at the west end of the site (Installation Restoration Program [IRP] Site OT-15). Monitoring is underway to identify the contamination source.

Solid Waste. Carswell AFB currently has no active on-base landfills. Solid waste is hauled off base by a private contractor. In the past, solid waste was disposed of at nine different locations on base that are currently being investigated under the IRP.

Disclosure Resources

Disclosure resources (asbestos, polychlorinated biphenyls [PCBs], radon, and lead-based paint) were not used in property categorization.

Asbestos. A basewide asbestos survey was conducted in November 1992. The survey identified asbestos-containing material in 101 buildings.

Polychlorinated Biphenyls. All transformers with 50 parts per million (ppm) or more PCBs have been replaced or retrofilled to bring the PCB concentration to below 50 ppm. Eight capacitors located in Facility 4155 contain PCB levels above 50 ppm and are proposed for removal by the base.

Radon. The Air Force conducted initial screening surveys to identify the probability of elevated indoor radon concentrations in habitable structures on all Air Force installations. The initial survey at Carswell AFB was conducted in March 1989 by the base Bioenvironmental Engineering Office. The survey consisted of 33 samples taken from military housing units, the child care center, on-base billeting, and the airman's dormitories. Two of the 33 samples taken were above the U.S. Environmental Protection Agency's recommended mitigation level of 4 picocuries per liter. An additional screening was conducted for on-base living quarters in 1991. Twenty-five of the 644 samples taken during the second screening registered above the recommended mitigation level.

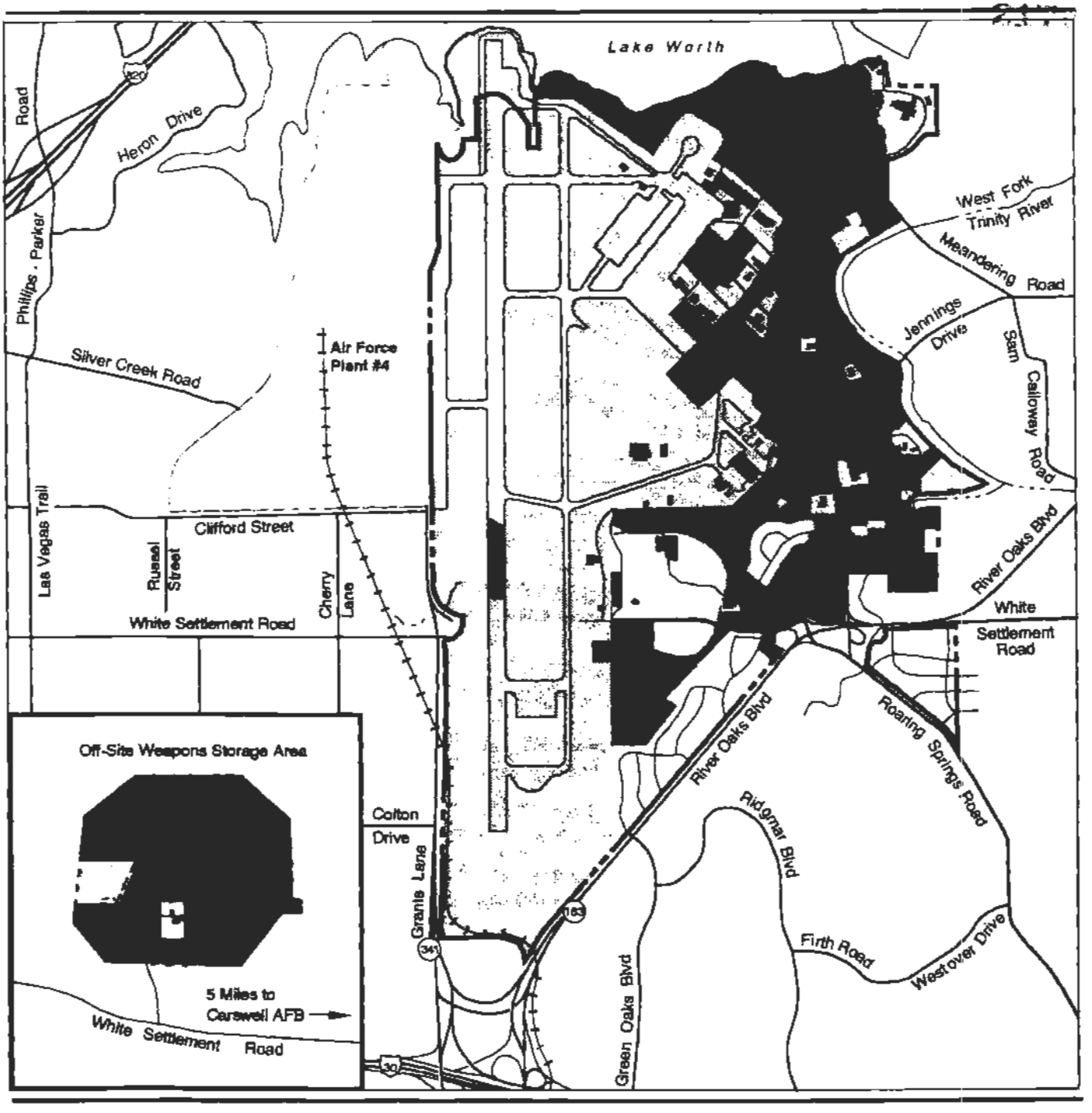
Lead-Based Paint. Facilities that were constructed prior to the implementation of the DOD ban on the use of lead-based paint in 1978 are likely to contain such paint. The majority of military family housing units and 272 other facilities were constructed prior to or during 1978.

OFF-BASE PROPERTY FINDINGS

A total of 230 properties contiguous to the base boundary were evaluated in the off-base land use analysis. Based on the records search and site inspections of the properties conducted for this EBS, there are no areas off-base where it is known that contamination has resulted from activities on Carswell AFB. However, a groundwater contamination plume is known to have migrated onto the base from Air Force Plant #4. The plume is being remediated under the IRP for Air Force Plant #4.

PROPERTY CATEGORIZATION

As described above, property on Carswell AFB was classified into one of the seven categories based on the findings of this EBS (Figure S-1). Category 1 properties on Carswell AFB consist of family housing areas located in the southeastern part of the base, and also the entire off-site Kings Branch residential area. Category 2 properties encompass most of the eastern part of the base and most of the off-site WSA. Paved runways and taxiways at the north and south ends of the airfield area are classified as Category 3. Two separate IRP areas along the eastern base boundary and an IRP site at the off-site WSA are also Category 3 properties. Two small separate areas of Category 4 properties are associated with IRP sites in the south-central part of the base, and a portion of the southern half of the main runway overlying an IRP site is also Category 4. Category 5 properties include the paved runways and taxiways in the central part of the airfield area, which



EXPLANATION

- Uncontaminated Property (Category 1)
- Hazardous substance stored - no release (Category 2)
- Hazardous substance release, below action levels (Category 3)
- Hazardous substance release, all actions have been taken (Category 4)
- Hazardous substance release, not all actions have been taken (Category 5)
- Hazardous substance release, no actions taken (Category 6)
- Areas requiring additional evaluation (Category 7)
- Base Boundary

0 850 1300 2600 Feet

Note: Information current as of November 12, 1993 and is subject to revision

Property Categorization

Figure S-1

overlie the trichloroethylene plume; an area overlying the trichloroethylene plume east of the flightline area in the south-central part of the base; and an IRP site along the eastern base boundary. Several parcels scattered around the central, eastern, and southern portions of the base and the southwest corner of the fenced part of the off-site WSA (all associated with IRP sites) are classified as Category 6. The majority of Category 7 properties are the unpaved areas of the airfield in the western part of the base, and an adjacent, large area with an aircraft apron and associated facilities in the central part of the base. The hospital area in the northeast corner of the base and the firing range on the eastern base boundary are Category 7. Several other small parcels, generally associated with specific facilities in the eastern half of the base, and the EOD range in the western part of the off-site WSA are also Category 7 properties.

THIS PAGE INTENTIONALLY LEFT BLANK

RECEIVED

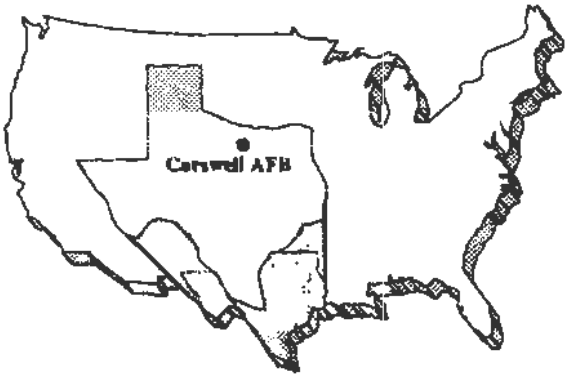


TABLE OF CONTENTS

TABLE OF CONTENTS

Page

1.0 PURPOSE OF THE ENVIRONMENTAL BASELINE SURVEY 1-1
1.1 INTRODUCTION 1-1
1.2 BOUNDARIES OF THE PROPERTY AND SCOPE OF SURVEY AREA 1-3

2.0 SURVEY METHODOLOGY 2-1
2.1 APPROACH AND RATIONALE 2-1
2.1.1 Description of Documents Reviewed 2-3
2.1.2 Inspection of Properties Conducted 2-6
2.1.3 Personnel Interviews 2-7

3.0 FINDINGS FOR BASE PROPERTY 3-1
3.1 HISTORY AND CURRENT USAGE 3-1
3.2 ENVIRONMENTAL SETTING 3-5
3.3 PROPERTY CATEGORIZATION RESOURCES 3-8
3.3.1 Hazardous Substances 3-10
3.3.1.1 Hazardous Materials/Petroleum Products Management 3-10
3.3.1.2 Hazardous Waste/Petroleum Waste Management 3-11
3.3.2 IRP Sites Identified to Date 3-14
3.3.3 Storage Tanks 3-17
3.3.3.1 Aboveground Storage Tanks 3-17
3.3.3.2 Underground Storage Tanks 3-17
3.3.3.3 Pipelines, Hydrant Fueling, and Transfer Systems 3-18
3.3.4 Oil/Water Separators 3-18
3.3.5 Pesticides 3-19
3.3.6 Medical/Biohazardous Waste 3-19
3.3.7 Ordnance 3-20
3.3.8 Wastewater Discharges 3-21
3.3.9 Radioactive and Mixed Wastes 3-21
3.3.10 Solid Waste 3-21
3.4 DISCLOSURE RESOURCES 3-22
3.4.1 Asbestos 3-22
3.4.2 Polychlorinated Biphenyls 3-22
3.4.3 Radon 3-22
3.4.4 Lead-Based Paint 3-23

4.0 FINDINGS FOR OFF-BASE PROPERTIES 4-1
4.1 LAND USES 4-2
4.2 PROPERTY INSPECTIONS 4-2

5.0 CONCLUSIONS 5-1
5.1 PROPERTY MATRIX 5-1
5.2 PROPERTY ZONES 5-2
5.3 RESOURCE MAP 5-3
5.4 DATA GAPS 5-4

6.0 CERTIFICATION AND LIST OF PREPARERS 6-1

TABLE OF CONTENTS
(Continued)

APPENDICES

A References
B Sample Forms
C Hazardous Materials Storage
D Summary of Title Search
E History of Facility Usage
F Hazardous Wastes Generated
G Glossary of Terms, Acronyms, and Abbreviations

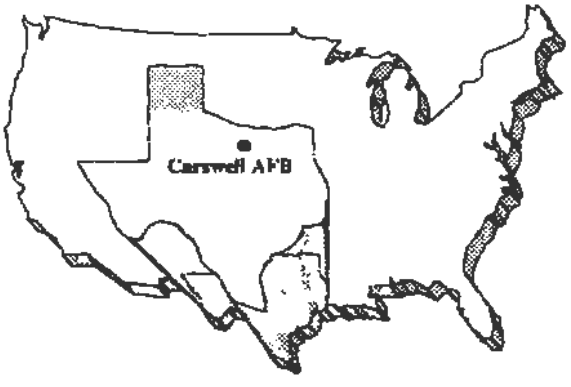
LIST OF TABLES

Table		Page
2-1	Personnel Interviewed	2-8
3-1	Hazardous Waste Accumulation Points	3-24
3-2	Installation Restoration Program Sites	3-27
3-3	Aboveground Storage Tanks	3-29
3-4	Underground Storage Tanks	3-31
3-5	Oil/Water Separators	3-34
3-6	Pesticide Storage	3-36
3-7	Facilities Surveyed for Asbestos	3-38
3-8	History of Transformers	3-44
3-9	Facilities with Radon Levels Equal to or above 4 pCi/l	3-47
4-1	National Priorities List Sites	4-5
4-2	State Leaking UST Sites	4-5
4-3	RCRA Generator Sites	4-5
4-4	Contiguous Property Parcel Descriptions	4-6
5-1	Facility/Property Matrix - Carswell AFB	5-10
5-2	Property/Facility Key	5-28

LIST OF FIGURES

Figure		Page
1-1	Survey Areas	1-5
2-1	Resource Layer Approach	2-2
3-1	On-Base Land Uses (1943)	3-2
3-2	On-Base Land Uses (1955)	3-4
3-3	1993 Land Use	3-6
3-4	Surface Hydrology	3-9
3-5	Installation Restoration Program Sites	3-16
4-1	Adjacent Property Map (oversized)	4-3
5-1	Resource Map (oversized)	5-5
5-2	Proposed Action	5-7
5-3	Property Categorization	5-9

THIS PAGE INTENTIONALLY LEFT BLANK



CHAPTER 1

1.0 PURPOSE OF THE ENVIRONMENTAL BASELINE SURVEY

1.1 INTRODUCTION

Purpose. This Environmental Baseline Survey (EBS) documents the physical condition of Air Force real property at Carswell Air Force Base (AFB), Texas resulting from the storage, use, and disposal of hazardous substances and petroleum products over the base's history. The EBS collects into a single document all available information to establish a baseline for use by the Air Force in making decisions concerning real property transactions.

Although primarily a management tool, the EBS also assists the Air Force in meeting its obligations under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 United States Code Section 9620(h), as amended by the Community Environmental Response Facilitation Act (CERFA), Public Law 102-426. An EBS is required by Department of Defense (DOD) policy before any property can be sold, leased, transferred, or acquired.

The EBS helps the Air Force to:

- Develop sufficient information to assess the health and safety risks on the property surveyed, and determine what actions are necessary to protect human health and the environment prior to a real property transaction.

- Support decisions for Finding of Suitability to Lease/Finding of Suitability to Transfer and aid in determining lease or deed restrictions.

- Document and obtain regulator concurrence on uncontaminated property as required and defined under CERCLA Section 120(h)(4), identification of uncontaminated property.

- Support notice, when required under CERCLA Section 120(h)(1), of the type, quantity, and time frame of any storage, release, or disposal of hazardous substances or petroleum products on the property.

- Identify data gaps concerning environmental contamination.

- Define potential environmental liabilities associated with real property transactions.

- Aid in determining possible effects on property valuation from any contamination/concerns identified.

- Document sites of contamination identified as requiring remediation in compliance with the base Resource Conservation and Recovery Act (RCRA) Part B permit issued and enforced by the state.

Content of Environmental Baseline Survey Report. The information for the EBS was obtained through a records search, visual inspections, and interviews. The records search included a title search, review of aerial photographs, and review of all available Air Force and other agency records including environmental restoration and compliance reports, records, audits, and inspections. Visual inspections were conducted of the base property and facilities. The EBS also includes an assessment of environmental conditions of off-base properties contiguous to or relatively near the base that could pose environmental concern and/or affect the subject property. Physical inspections were also conducted on contiguous properties where access was obtained from the owner or operator. Where access was not permitted, visual inspections of off-base properties were conducted from base property or public roads.

Based on an analysis of the available data, the EBS categorizes property into one of seven categories:

- Category 1 - Areas where no storage, release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)

- Category 2 - Areas where only storage of hazardous substances or petroleum products has occurred (but no release, disposal, or migration from adjacent areas has occurred)

- Category 3 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, but at concentrations that do not require a removal or remedial action

- Category 4 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, and all remedial actions necessary to protect human health and the environment have been taken

- Category 5 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, removal and/or remedial actions are under way, but all required remedial actions have not yet been taken

- Category 6 - Areas where storage, release, disposal, and/or migration of hazardous substances or petroleum products has occurred, but required response actions have not yet been implemented

- Category 7 - Areas that are unevaluated or require additional evaluation.

Property in the first four categories would be eligible for deed transfer. Property in the last three categories would not be considered for transfer until all necessary actions have been taken and the property has been reclassified into one of the first four categories. Leases would be considered on a case-by-case basis for properties within the last three categories.

Updates and Data Gaps. The EBS combines available information on the property's environmental condition into a single document. Where data gaps were found in the available information, the EBS has identified those data gaps, and sampling and analysis field efforts may be necessary to fill them. If possible, the Air Force will take action to fill the data gaps immediately at the time they are identified so that the EBS will be as complete and accurate as possible. Where it is not possible, the Air Force already has several programs underway to identify and characterize environmental contamination and the presence of hazardous substances that may provide the best vehicle for filling data gaps. In all cases, actions to fill data gaps will be accelerated wherever possible to support the disposal schedule. As efforts to characterize or remediate property at closing Air Force installations are completed, the EBS will be updated periodically to reflect the latest information.

Relationship to Other Documents: The comprehensive plan for the environmental restoration and preparation of closing Air Force installations has been laid out by each installation in a Base Realignment and Closure (BRAC) Cleanup Plan (BCP). The plan for filling data gaps identified in the EBS will be incorporated into the BCP and updated periodically as actions are completed.

The Air Force is also preparing an Environmental Impact Statement (EIS) for the conversion and reuse process for Carswell AFB. The Final EIS will be issued in June 1994. Although these documents may contain some of the same information, they serve a different purpose. The Conversion and Reuse EIS for Carswell AFB will analyze the impacts of disposal and reuse on the environment, while the EBS documents the environmental condition of the property.

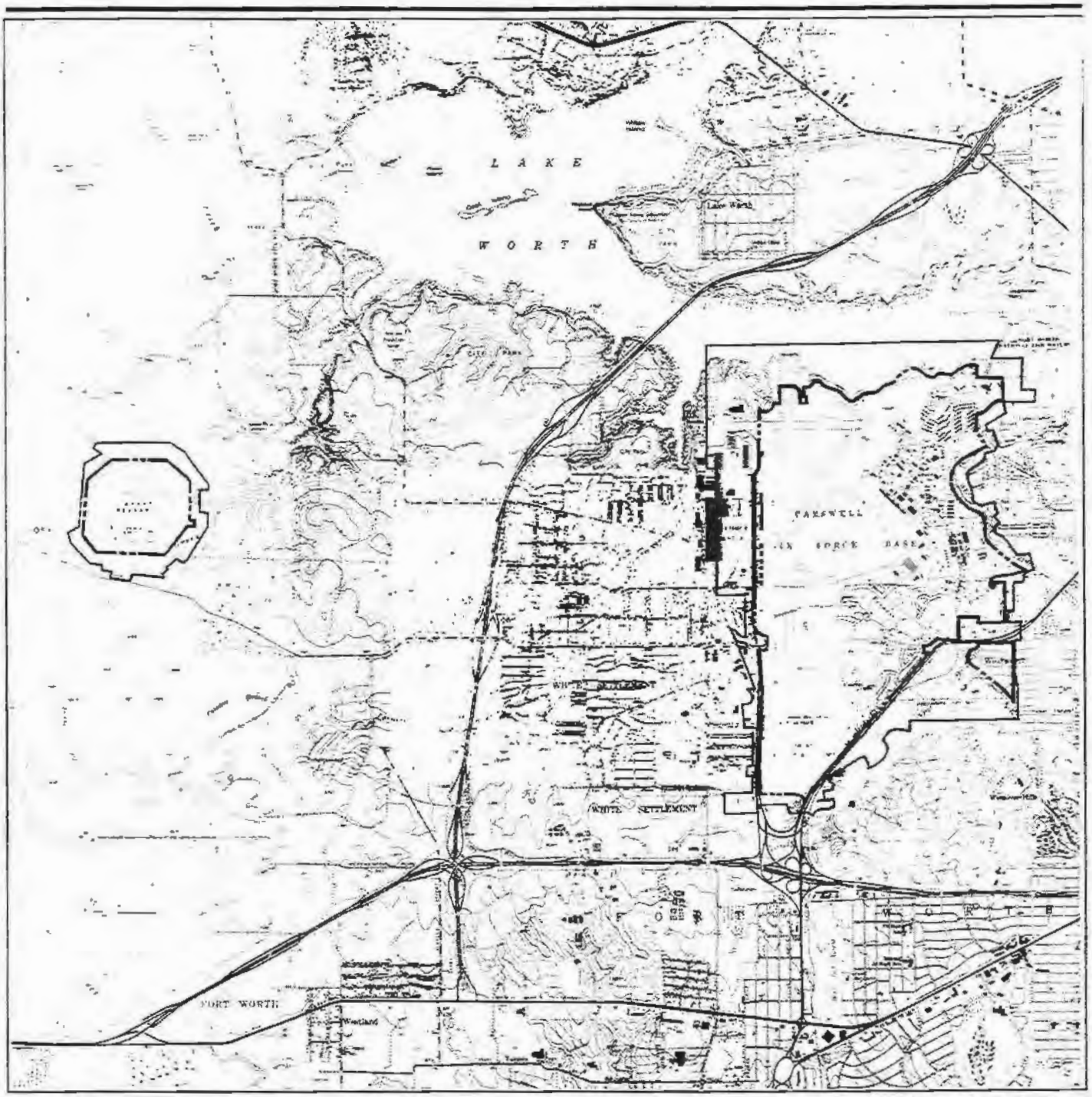
1.2 BOUNDARIES OF THE PROPERTY AND SCOPE OF SURVEY AREA

The EBS at Carswell AFB was based on a review of information available for the visual and/or physical inspection of (1) property on Carswell AFB, (2) property immediately off base (i.e., having a contiguous border with the base boundary), and (3) property within approximately 0.25 mile to 2.5 miles of the base boundary with potential environmental concerns. The

results of the survey for on-base and off-base properties are discussed in Chapters 3 and 4, respectively.

Carswell AFB, which closed on September 30, 1993, comprises a total of 2,555 acres and is located in north-central Texas in Tarrant County, 8 miles west of Fort Worth. The base acreage includes 2,264 acres of contiguous property and two noncontiguous annexes that include the 247-acre off-site Weapons Storage Area (WSA), located 5 miles west of the main base, and a 44-acre residential parcel adjacent to the southeast base boundary. Most of the base property was fee-purchased and was acquired between 1941 and 1943. Several additional parcels were purchased between 1943 and 1987. The scope of the EBS includes all property within the main base, the two noncontiguous annexes, and all contiguous property.

Although the 301st Air Force Reserve Fighter Wing (FW) and several other DOD agencies may retain land following closure of the base, for the purpose of this EBS, all areas of the base have been included in the survey.



EXPLANATION

Base Boundary

Contiguous Parcel Boundary

Survey Areas

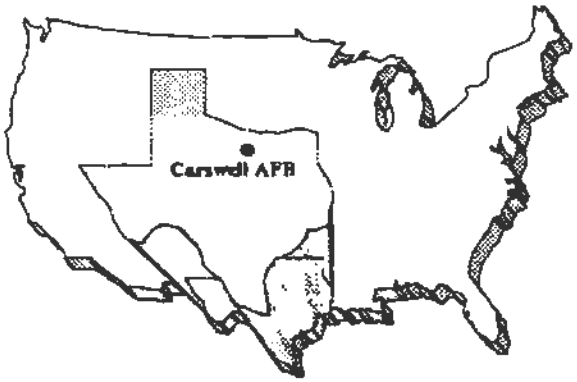
0 .25 .5 1 Mile

Figure 1-1

217023

THIS PAGE INTENTIONALLY LEFT BLANK

217024



CHAPTER 2

2.0 SURVEY METHODOLOGY

The methods used to conduct the EBS of Carswell AFB are described in this chapter.

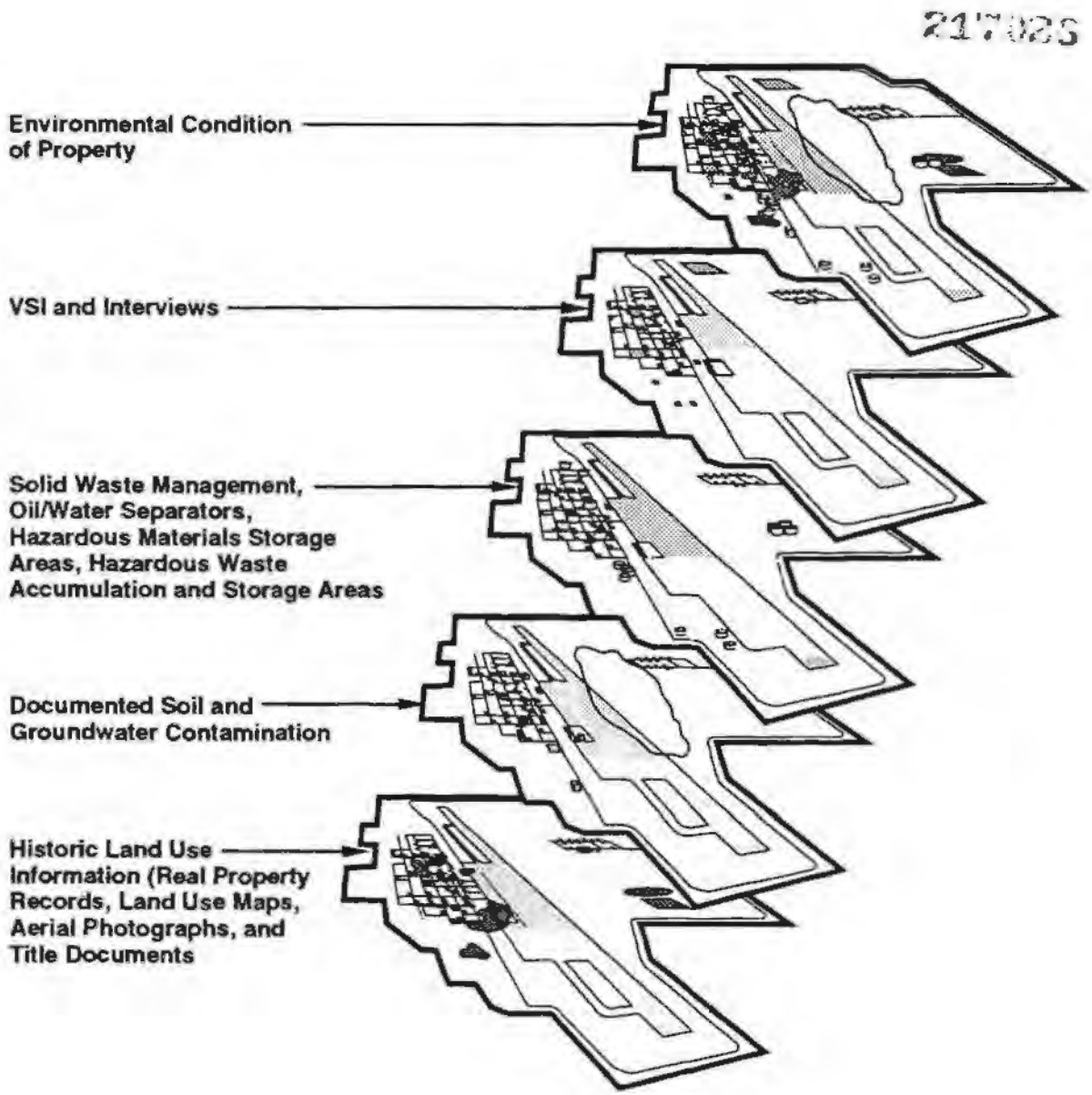
At the time this EBS was conducted, a number of facilities on Carswell AFB were inactive or in the process of being closed. These facilities had been "pickled," a process which involved the removal of mission-related equipment and materials and the cleaning of each facility. Accordingly, some conclusions stated in this EBS are based on inspections of facilities that were not in normal operation.

2.1 APPROACH AND RATIONALE

The EBS followed a methodical process in which the information available was analyzed and conclusions were drawn about the condition of the property. First, real property records, land use maps, and aerial photographs were reviewed to identify historical land uses, a primary indicator of potential contamination. Areas of the base where industrial processes occurred; solid and hazardous wastes were stored, disposed of, or released; and hazardous materials were stored received the closest scrutiny. A review of recorded chain of title documents was also conducted to assess if any prior uses could reasonably have contributed to existing environmental concerns. Next, CERCLA and RCRA studies and field investigations were reviewed to identify areas where the presence (or absence) of contamination has been confirmed. Then records from industrial shops, base supply, the fire department, the bioenvironmental engineer, environmental audits or surveys, and other federal agencies were reviewed to identify any other areas of concern. Types of surveys reviewed included asbestos, lead-based paint, and radon, where they were available (see Appendix A). Finally, past and present employees were interviewed and physical inspections of the property and facilities were conducted to identify any additional evidence of spills, stressed vegetation, i.e., anything that might indicate contamination.

The result is a collection of all available information into "layers" that, when laid over each other, provide a complete picture of the property's condition that enables the researchers to categorize the property into defined environmental condition categories and identify data gaps (Figure 2-1).

The major components feeding into the analysis were a documents review (including aerial photo interpretation), inspections of on-base property, interviews with current and former personnel, and a chain of title review. Each of these components is described below. The approach for conducting the evaluation of off-base properties is presented in Chapter 4.



Resource Layer Approach

Figure 2-1

2.1.1 Description of Documents Reviewed

The records search of available documentation focused primarily on records, reports, and maps maintained by the 7th Civil Engineering Squadron (CES), the 7th Hospital/Bioenvironmental Engineering Services (HOSP/SGPB) office, and the 301st Air Force Reserves Fighter Wing. Most of the files and records pertained to activities that have occurred since 1980.

Various studies, investigations, and inspections that consider environmental conditions at the base, including regulatory compliance issues, have been conducted by the Air Force and other federal and state agencies in the past several years. The results of these studies and investigations provided the initial baseline used in developing this EBS and are referenced throughout this document. The primary types of studies or investigations include the following:

- Installation Restoration Program (IRP) studies
- RCRA Facility Assessments (RFAs)
- Air Force Environmental Compliance Assessment and Management Program (ECAMP) Reports
- Underground storage tank (UST) investigations
- National Environmental Policy Act documentation
- Base Closure Environmental Assistance Team Reports.

As part of the records search, a number of old maps and aerial photographs were reviewed and analyzed to assist in identifying past land uses and potential environmental contamination sources. Maps reviewed covered the period from prior to construction of the base (circa 1940) to the present. The primary map resources reviewed included the Base Comprehensive Plan series (scale of 1 inch = 400 feet), the Utility Block Map series (scale of 1 inch = 50 feet), and design and as-built engineering drawings and maps for specific facilities (as necessary).

The types of documents and records reviewed for each environmental media are described below. A detailed list of references used in preparing this EBS is presented in Appendix A.

Hazardous Materials/Petroleum Products Management. Activities within office areas and dormitories likely required the use of small quantities of hazardous materials, such as ammonia and other cleaning supplies. Hazardous materials usage in specific industrial facilities on the base was determined through a review of Industrial Workplace Case Files maintained

by the Bioenvironmental Engineering Services office. Specific items reviewed in each case file included historic and current Baseline Industrial Hygiene Surveys, Industrial Hygiene Survey Data Sheet - General forms (Air Force Form 2758), Master Workplace Exposure Data Summary forms (Air Force Form 2755), Hazardous Material Data forms (Air Force Form 2761), and relevant correspondence (e.g., Memoranda to the Record) contained in the files related to hazardous materials exposure. Sample forms are provided in Appendix B. Specific hazardous materials exposure incidents (e.g., spills or accidents) were noted and discussed with Bioenvironmental Engineering Services personnel.

A cumulative hazardous materials inventory was developed for each workplace based on a review of Hazardous Material Data forms (Air Force Form 2761) listing all hazardous materials used in a particular workplace. Information on hazardous materials handling, including disposal methods, was also derived from a review of workplace case files. Information contained in these files generally covered the period from the late 1970s to the present. For a discussion of data collected for petroleum products management, see Storage Tanks.

Hazardous Waste/Petroleum Waste Management. Hazardous waste disposal practices were obtained based on a review of Carswell AFB Hazardous Waste Management Plans, hazardous waste manifest information, IRP documents, and other documents contained in the base files. Information on hazardous waste collection and disposal procedures was obtained from interviews with base personnel. For a discussion of data collected for petroleum waste management, see Storage Tanks and Oil/ Water Separators.

IRP Sites Identified to Date. The analysis of IRP sites consisted of a review of various Carswell AFB IRP documents, including the Phase I Records Search and the Phase II (Stage 1 and 2) studies. Base files related to the IRP were also reviewed and interviews were conducted with base personnel responsible for implementing IRP activities. The 1989 RFA and work plans for proposed activities to be performed as part of the RFA were also reviewed.

Storage Tanks. An inventory of existing and historic aboveground storage tanks (ASTs) and USTs and associated piping systems was compiled from a review of the Carswell AFB Underground Storage Tank Management Plan, the Carswell AFB Spill Prevention and Response Plan, various storage tank listings and documentation contained in the base files, storage tank listings provided by the 7th CES and 301st FW, and current and historic TAB G-8, Liquid Fuels Systems maps. Additional information was obtained from a review of the CES map and engineering drawing files and the Real Property Accountable Records.

Oil/Water Separators. An inventory of oil/water separators (OWSs) was compiled from a review of the various listings and documentation contained in the base files. In addition, information was obtained from a review of the installation map and engineering drawing files, the Real Property Accountable Records, and visual inspections conducted as part of this EBS.

Pesticides. Information on pesticide storage and use was obtained from Entomology Shop and Golf Course personnel, the IRP Phase I report, and the Bioenvironmental Engineering Industrial Workplace Case Files for the Entomology Shop and golf course.

Medical/Biohazardous Waste. Information on the generation and disposal of medical/biohazardous waste was obtained from the base hospital, the Bioenvironmental Engineering Services office, and documents in the base files.

Information on photochemical waste, including the use of silver recovery units, was obtained from Bioenvironmental Engineering Services, photographic laboratory and hospital personnel, and other documents in the base files.

Ordnance. Information on sites on base where the disposal or use of ordnance may have resulted in residual soil contamination was obtained through a review of historic and current real property records, installation maps, and photographs.

Wastewater Discharges. A review of the base files and various published documents was conducted to determine wastewater treatment and disposal practices on the base.

Radioactive and Mixed Wastes. Information on radioactive materials and mixed waste was obtained from the IRP Phase I report, the Real Property Accountable Records, and the CES and HOSP/SGPB files.

Solid Waste. Information on current solid waste disposal practices was obtained from the Environmental Management office and the Carswell AFB Conversion and Reuse EIS. Information on past solid waste disposal sites at Carswell AFB was obtained from IRP documentation.

Asbestos. Information on buildings with asbestos-containing material (ACM) at Carswell AFB was obtained from the Asbestos Survey, the Asbestos Management Plan, the Asbestos Log, and the Real Property Accountable Records for individual facilities.

Polychlorinated Biphenyls (PCBs). Information on PCB-containing equipment on the base was obtained from the base personnel at Civil Engineering, from

IRP and 1990 and 1991 ECAMP documents, and from various other documents in the base files.

Radon. Results of radon testing conducted at Carswell AFB as part of the Air Force Radon Assessment and Mitigation Program (RAMP) were obtained from the Bioenvironmental Engineering Services office.

Lead-Based Paint. Facilities constructed prior to and during 1978 were identified through a review of the Real Property Accountable Records (Table 5-1).

2.1.2 Inspection of Properties Conducted

Visual reconnaissance surveys (VRSs) and visual site inspections (VSIs) were performed during the EBS analysis. General VRSs were conducted over large areas of the base to identify areas with potential environmental contamination or concerns. For some areas of the base, the VRSs consisted of only a windshield survey. More focused VSIs, involving exterior and interior (walk-through) inspections, were conducted at most facilities on the base, including all industrial facilities, to identify readily apparent concerns or attributes.

The VSIs of most facilities on the base were conducted to determine or confirm the presence of environmental contamination or concerns, including unusual odors, stained soils, stressed vegetation, leachate seeps, or other indications of potential contamination (see Table 5-1). VSIs were conducted for all industrial facilities and most administrative and community (including commercial) facilities. Each facility was evaluated for unique characteristics and potential environmental concerns. The base Real Property Accountable Records (Air Force Forms 1430-1433) were reviewed to identify specific facility characteristics, such as construction materials, utility hookups, renovations, changes in facility utilization, and distinctive features (e.g., emergency electric power generators or storage tanks). More detailed inspections were conducted at those facilities that had been used for industrial purposes or included specific features such as storage tanks, OWSs, septic tanks, or IRP sites. For residential facilities (e.g., dormitories and military family housing), only a representative sample of the buildings were inspected. For many of the administrative and community facilities, only a general walk-through of each facility was conducted.

A list of facilities on the base summarizing key characteristics and facility-specific environmental information is presented in Table 5-1. A copy of the form used during the VSIs is presented in Appendix B.

In addition, for those facilities that contained industrial workplaces tracked by the Bioenvironmental Engineering Services office, a summary of workplace environmental data related to hazardous material use was

compiled based on a review of the industrial workplace case files. Some facilities contained multiple industrial workplaces. The summary of workplace environmental data includes a cumulative inventory list of the hazardous materials known to have been used in the facility based on available documentation (Appendix C).

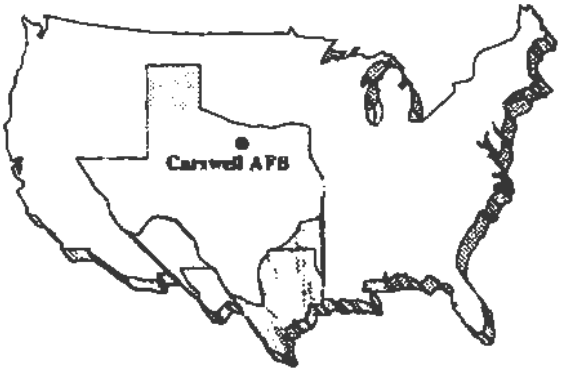
2.1.3 Personnel Interviews

Primary contacts made during the conduct of the EBS were with personnel from the 7th CES, the 301st Air Force Reserves FW, and the 7th HOSP/SGPB office. Principal CES contacts were made with Environmental and Real Estate personnel; contact was also made with CES Drafting, Fire Department, Industrial Engineering, and Operations personnel. Personnel from the 7th Supply Squadron and the Defense Reutilization and Marketing Office (DRMO) were also contacted. During the records search and VSIs, interviews were conducted with base personnel to identify potential environmental concerns related to recent and historic operations at Carswell AFB and to verify information found in the records search. Table 2-1 lists the personnel interviewed at Carswell AFB.

In addition to those personnel listed in Table 2-1, many other technicians, including facility managers, were also interviewed.

Table 2-1. Personnel Interviewed

Organization	Interviewed
7th Bomb Wing	2 Managers
7th Civil Engineering Squadron	9 Technicians, 7 Managers, 3 Administrators
7th Communications Squadron	6 Managers
7th Logistics Group	
7th Medical Squadron	1 Technician, 4 Managers, 1 Administrator
7th Mission Support Squadron	3 Technicians, 2 Managers
7th Morale, Welfare, and Recreation Squadron	2 Administrators
7th Operations Group	
7th Operations Support Squadron	1 Technician, 1 Manager
7th Maintenance Squadron	3 Technicians, 3 Managers, 1 Administrator
7th Security Police Squadron	1 Technician, 8 Managers
7th Supply Squadron	1 Technician, 2 Managers
7th Support Group	
7th Transportation Squadron	2 Technicians, 3 Managers
301st Reserve Fighter Squadron	
301st Civil Engineering Squadron	1 Technician, 1 Administrator
301st Maintenance Squadron	1 Technician, 3 Managers
301st Bioenvironmental Squadron	1 Technician, 1 Administrator
Tenants	
Defense Reutilization and Marketing Office	1 Technician, 1 Administrator
Army Air Force Exchange System	2 Administrators



CHAPTER 3

3.0 FINDINGS FOR BASE PROPERTY

This chapter of the EBS presents the findings of the records search, VSIs, and personnel interviews. Section 3.1 provides a history of the base, while Section 3.2 gives a description of the environmental setting of the base, including utilities. Sections 3.3 and 3.4 describe resource findings and conclusions. Overall property categorization is presented in Chapter 5. Resources within Section 3.4 are disclosure issues only and are not used in property categorization.

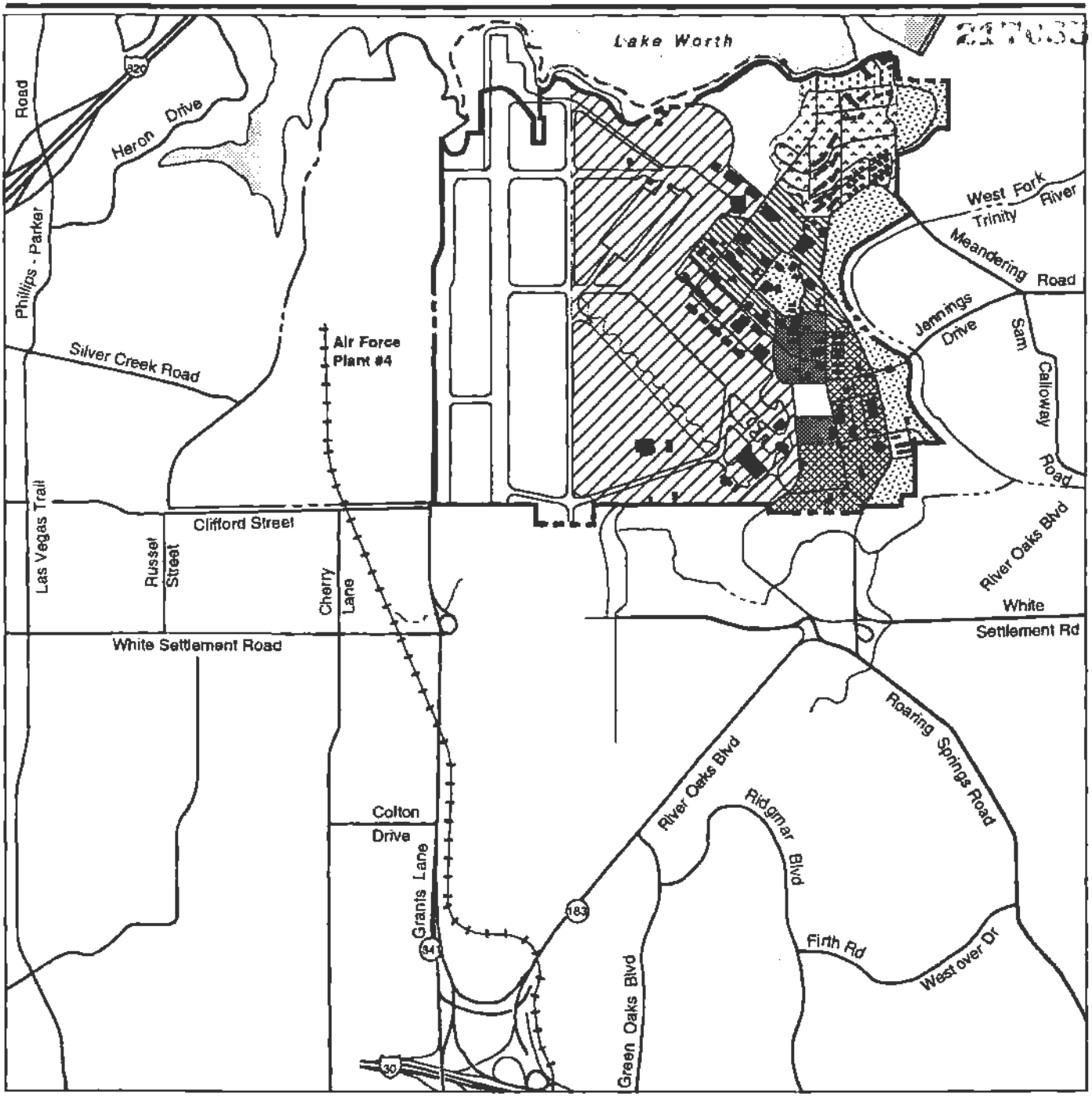
Based on a review of existing documentation and/or the VSI, some sites were identified as potentially requiring remediation. If necessary, remediation of sites not currently undergoing restoration will be accomplished as part of the IRP or other environmental programs.

The data within each resource have been organized into tables, which are provided after Section 3.4.4. The Resource Map is provided as Figure 5-1 (oversized) in Section 5.3. The data listed in the tables and shown on the resource map are based on information obtained from Carswell AFB during the records search and VSI. Because historic data were incomplete, data gaps are shown as unknown or are footnoted at the bottom of tables.

3.1 HISTORY AND CURRENT USAGE

Prior to 1941, the area that is now occupied by Carswell AFB consisted of woods and pasture in an area called White Settlement. In 1940 the U.S. War Department authorized Consolidated Aircraft Corporation to select a suitable site for the construction of an aircraft manufacturing plant and military base. By the fall of 1941, the U.S. War Department began construction on the site selected as the Consolidated Aircraft Corporation aircraft manufacturing and development plant, also known as Air Force Plant #4. The property selected for the aircraft manufacturing facility and military base consisted of 1,450 acres, which was acquired through condemnation by the City of Fort Worth. This acreage includes 967 acres for the military base, and 483 acres for Air Force Plant #4. By 1942 the airfield, called Tarrant Field Airdrome, was assigned to the Army Air Forces Training Command, which was to provide training for B-17 and other pilots to fly the new B-24 Liberators. The adjacent location of the airfield to the new B-24 bomber manufacturing facility contributed to the efficiency of the aircraft development.

Construction at the airfield continued into 1943, extending the runway and taxiways, and erecting hangars and barracks (Figure 3-1). Other facilities constructed during the 1940s included additional hangars, warehouses, maintenance and training shops, and housing. In May 1943, the field was renamed Fort Worth Army Air Field. By 1943, the size of the base had



EXPLANATION

- Airfield
- Aviation Support
- Industrial
- Institutional (Medical)
- Institutional (Education)
- Commercial
- Residential
- Parks/Recreation
- Agriculture*
- Vacant Land
- Carswell AFB Boundary
- Air Force Plant #4 Boundary
- Leased Property

0 650 1300 2600 Feet

* Standard land use designation not applicable to this figure.

On-Base Land Uses (1943)

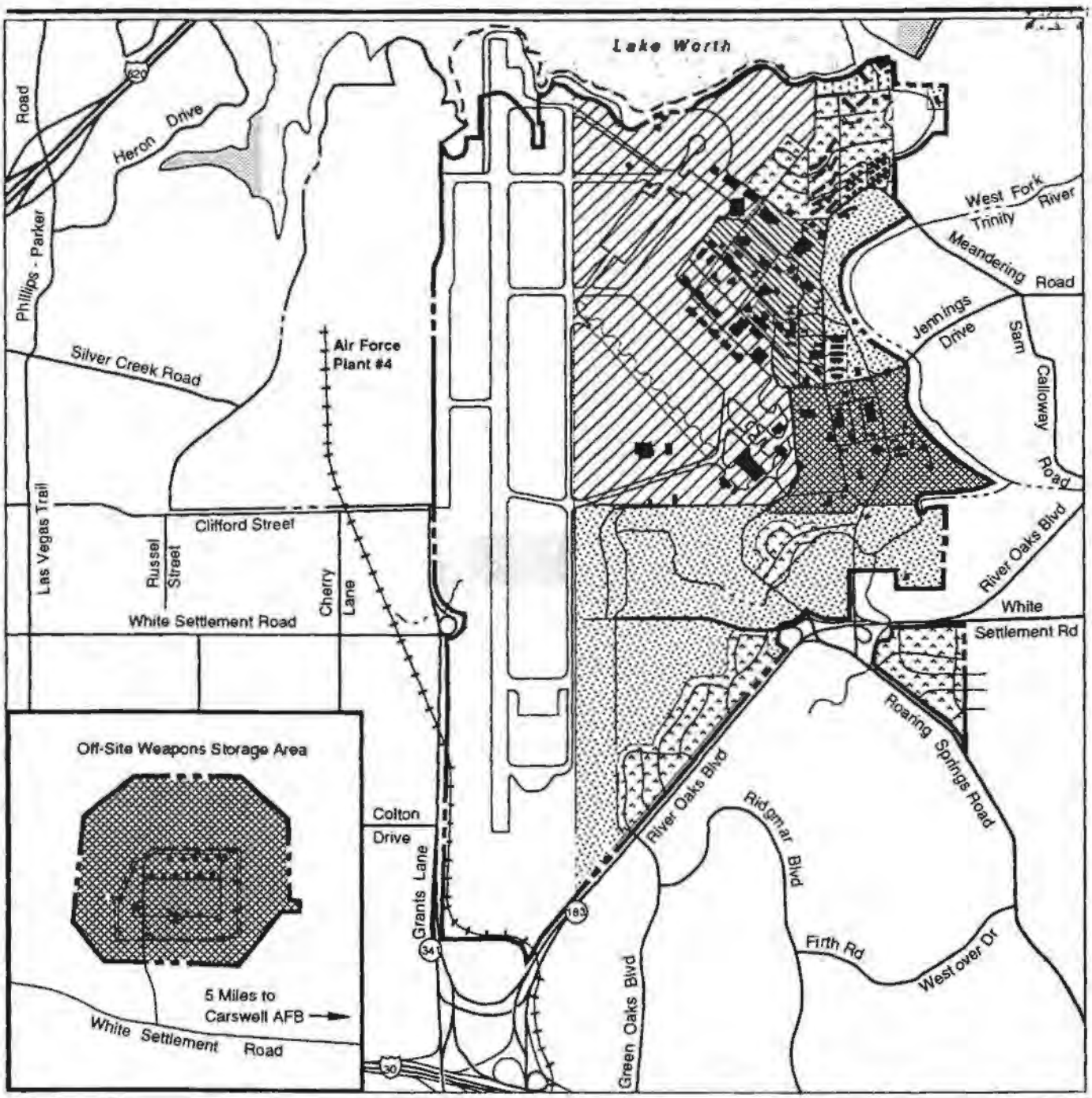
Figure 3-1

expanded to approximately 1,350 acres in fee, and 70 acres north of the base that were leased. In 1945, the Fort Worth Army Air Field began operating a transition school for the B-32 aircraft, which like its predecessor the B-24, was manufactured across the runway at Air Force Plant #4.

In 1946, several changes occurred. The Strategic Air Command (SAC) took control of the base, with the 7th Bombardment Group being activated and the Eighth Air Force Headquarters being reassigned to Fort Worth Army Airfield. The role of the base was modified to include both the training mission and maintenance of a combat ready force. To accommodate the new mission and personnel, new facilities including family housing, recreational facilities, office space, and a maintenance shop were constructed. Aircraft used and maintained during this period included the B-24, B-32, B-29, and B-36B. In 1948, the base was renamed twice in one month: from Fort Worth Army Airfield to Griffiss Air Base on January 13 and then to Carswell AFB on January 30, 1948.

In the 1950s, the 19th Air Division was transferred to the base where it remained until 1988, the longest tenure of any SAC air division. In 1955, the Eighth Air Force Headquarters moved from Carswell AFB to Westover AFB, Massachusetts. In 1957, Carswell AFB began a program to phase out B-36 aircraft and replace them with B-52 Stratofortresses. By 1955, the base had expanded to almost its current size through the fee acquisition of approximately 1,100 acres (Figure 3-2). On February 19, 1958, the base received its first B-52 and was assigned to the 4123rd Strategic Wing. The 3958th Operational Evaluation and Training Squadron and 7th Air Refueling Squadron were also activated. The 3958th was assigned to the 19th Air Division and was one of the units developed to test the B-58, which was manufactured by General Dynamics (formerly known as Consolidated Aircraft Corporation) across the runway. The 7th Air Refueling Squadron was assigned to the 7th Bombardment Wing and the refueling squadron received its first KC-135 by June 1958. By March 1959 the 4123rd Strategic Wing moved to Clinton Sherman AFB, Oklahoma. With the advent of mission and operation changes at Carswell AFB, major capital improvements included storage igloo bunkers, office space, warehouses, barracks, and installation of a fuel hydrant system.

Throughout the 1960s and 1970s, the 7th Bombardment Wing participated in B-52 bombing missions over Vietnam. In 1968, the 340th Bombardment Group was organized and assigned to Carswell AFB, and received the first FB-111A from General Dynamics. The mission of the 340th was to train combat crews to operate the FB-111A. The mission of the 340th Bombardment Group at Carswell AFB lasted only 3 years, when in 1971 the group was reassigned to units at Pease and Plattsburgh Air Force Bases. The base construction during the 1960s and 1970s included storage igloo bunkers, barracks, an engine test cell, base exchange services, and other on-base amenities.



EXPLANATION

- Airfield
- Aviation Support
- Industrial
- Institutional (Medical)
- Institutional (Education)*
- Commercial
- Residential
- Parks/Recreation
- Agriculture*
- Vacant Land
- Carswell AFB Boundary
- Air Force Plant #4 Boundary
- Leased Property

0 650 1300 2600 Feet

* Standard land use designation not applicable to this figure.

On-Base Land Uses (1955)

Figure 3-2

In 1983, the base received a complete new fleet of B-52 "H" models, and by 1984 was fully operational and considered the largest "H" model unit in SAC. In 1985, Carswell AFB received its first Air Launch Cruise Missile (ALCM) and soon thereafter the ALCM-modified B-52s. Carswell AFB has been the home base of the 7th Bombardment Wing since 1948 and operational as a B-52 and KC-135 base since 1956. The Air Force Reserve's 301st Tactical Fighter Wing with F-4s has been present since 1971. The development that occurred during the 1980s included several storage igloos, a hospital, maintenance facilities, offices, a missile assembly shop, and dormitories (Figure 3-3). With the disestablishment of SAC in 1992, the Air Combat Command (ACC) assumed control of the base until September 1993 when Carswell AFB was closed.

The area that comprises Carswell AFB includes 398 parcels obtained from the existing property owners between 1941 and 1987 by fee purchase or Declaration of Taking. In addition, three parcels were excessed by the Air Force between 1967 and 1987.

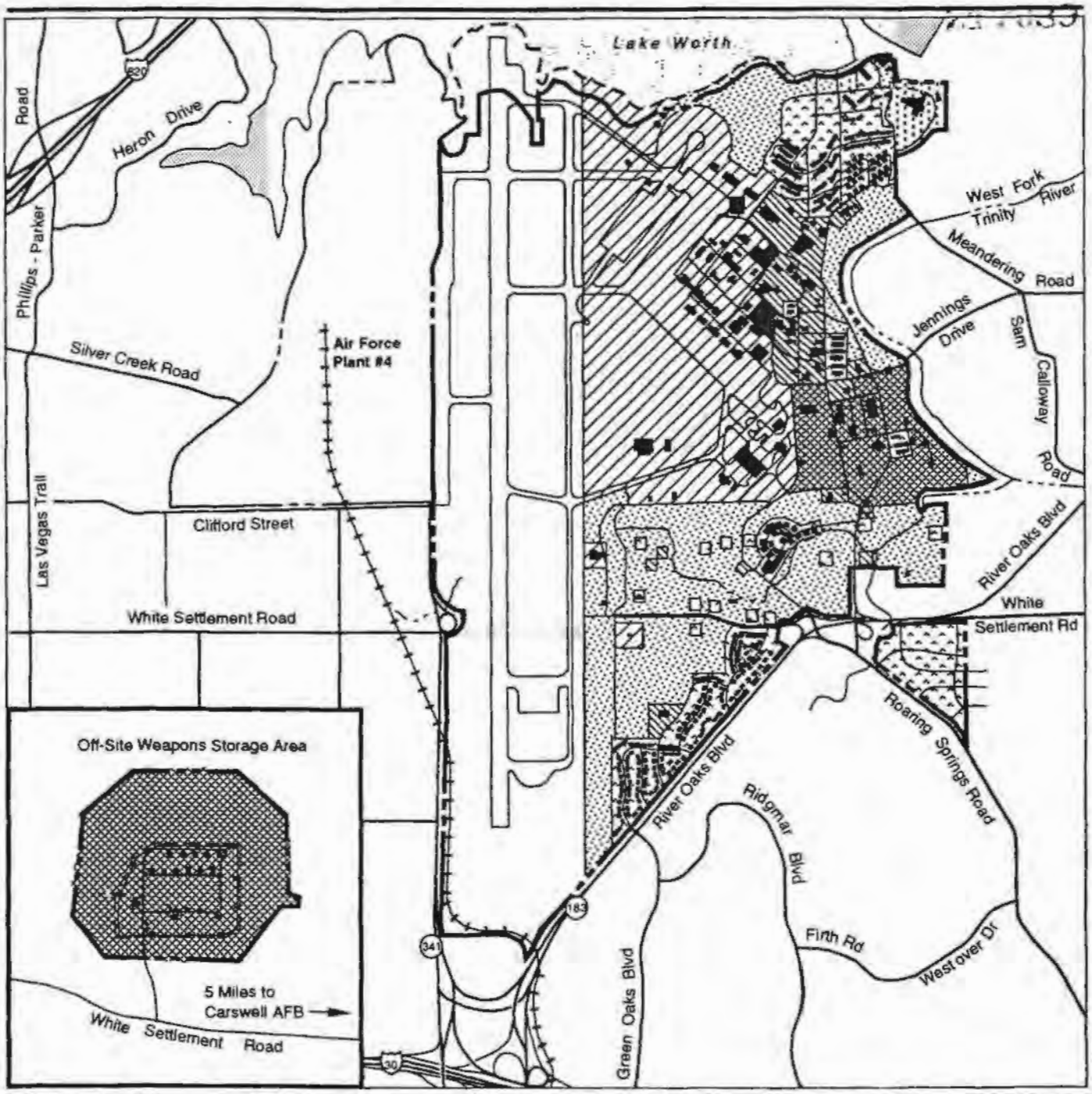
A recorded chain of title search was conducted for on-base parcels to determine prior ownership or uses that could reasonably have contributed to an environmental concern. The title search included ownership of parcels from September 1933 through 1993. A review of the data obtained from the title search did not identify any areas of environmental concern related to past property usage. A description of these parcels is provided in Appendix D.

Historical facility usage at the base was also researched. Facilities that were converted to accommodate different uses, as well as facilities that have been demolished, are listed in Appendix E.

3.2 ENVIRONMENTAL SETTING

Carswell AFB is located in north-central Texas in Tarrant County, 8 miles west of downtown Fort Worth. The base property totals 2,555 acres and consists of the main base and two noncontiguous parcels that include an off-site WSA 5 miles west of the main base and a residential parcel adjacent to the southeast base boundary. The majority of the base area falls within the city of Fort Worth, but some is within the cities of Westworth Village and White Settlement. The main base is bordered by Lake Worth to the north and Air Force Plant #4 to the west, State Highway 183 to the south, and the Trinity River to the east.

Carswell AFB is located within the Grand Prairie section of the Central Lowlands Physiographic Province. The area is characterized by broad terrace surfaces sloping gently eastward, interrupted by westward-facing escarpments. The topography of the base is fairly flat. Elevations range from 550 feet above mean sea level in the east to 690 feet above mean sea level in the southwest.



EXPLANATION

- Airfield
- Aviation Support
- Industrial
- Institutional (Medical)
- Institutional (Education)*
- Commerical
- Residential
- Parks/Recreation
- Agriculture*
- Vacant Land*
- Carswell AFB Boundary
- Air Force Plant #4 Boundary
- Leased Property

0 650 1300 2600 Feet

* Standard land use designation not applicable to this figure.

1993 Land Use

Figure 3-3

The climate in the Fort Worth region is subhumid, with mild winters and hot, humid summers. The average annual precipitation is 31.5 inches, with the majority falling between April and October. The average monthly temperatures range from 86 degrees Fahrenheit (°F) in July to 45°F in January. Temperature changes are rapid and often change 20 to 30 degrees in several hours. Severe thunderstorms with windspeeds of 65 knots and hail storms are common.

The utilities provided to Carswell AFB are briefly described below.

Water Supply. Carswell AFB currently derives its water through two interconnections with the city of Fort Worth's water system. The interconnections include a 12-inch city-owned pipeline that follows the alignment of White Settlement Road and provides water to the Kings Branch and Wherry Housing areas south of the road. The pipeline also connects to the main base system west of the Main Gate and extends to the water booster station in Facility 1082. The second interconnection is a 20-inch city-owned main pipeline that enters the base from the east in the vicinity of Facility 1348, traverses the base westward, and exits near Clifford Street. A 12-inch base-owned line branches off this pipeline and connects to the main base system.

Potable water is pumped by the booster station through the base-owned system, which includes 695,000 gallons of water storage capacity. Two additional facilities with a capacity of 550,000 gallons of storage each are out of service due to cracks and other repair problems. Another 225,000-gallon storage tank was used for fire protection.

Because the off-site WSA does not have a potable water source, bottled water was provided. Two wells provided non-potable water to the off-site WSA for toilet flushing and other non-contact uses.

Wastewater. All wastewater generated on Carswell AFB is discharged to and treated by the city of Fort Worth. The base discharge is monitored by the city in accordance with Industrial Waste Discharge Permit No. I-049. The base does not have an industrial wastewater pretreatment system; however, OWSs are located at various industrial facilities. On-base wastewater flows are directed to the city's treatment plant through three operating main sewer lines.

Wastewater from the Kings Branch housing tract is directed to a 10-inch sewer that enters the system servicing Westworth Village. Wherry housing and base facilities that are generally south of the petroleum, oils, and lubricants (POL) storage facility are serviced by a 36-inch city-owned sewer that follows the Farmers Branch of the Trinity River. A 24-inch sewer parallels the 36-inch line but is currently out of service. The fourth sewer provides service to all base facilities located north of North Warehouse Road. Base personnel have noted that during times of heavy rainfall the sewers on

base have backed up as a result of a city-wide problem of excessive amounts of inflow to the city system. Wastewater flows at the off-site WSA are serviced by a septic system.

Drainage Patterns. The on-base storm drain system consists of curb inlets, airfield drainage inlets, and pipes ranging in size from 15 to 60 inches (Pierce, Goodwin, Alexander, 1986b). Runoff from the northwest portion of the base is directed into Lake Worth immediately north of Facility 3355. Runoff from the southern portion of the base enters Farmers Branch at the corner of Pumphrey and Asco Drives. Storm water runoff from the southeast portion of the base enters the west fork of the Trinity River at the end of Warehouse Street. Two additional storm runoff points for the central and northeast areas of the base are located adjacent to Jennings Drive and Gardner Road, east of the hospital; both discharge to the west fork of the Trinity River. The outfall is permitted under the National Pollutant Discharge Elimination System (NPDES), and monitoring results document compliance with permit discharge limitations (U.S. Air Force, 1993a). Surface hydrology is shown in Figure 3-4.

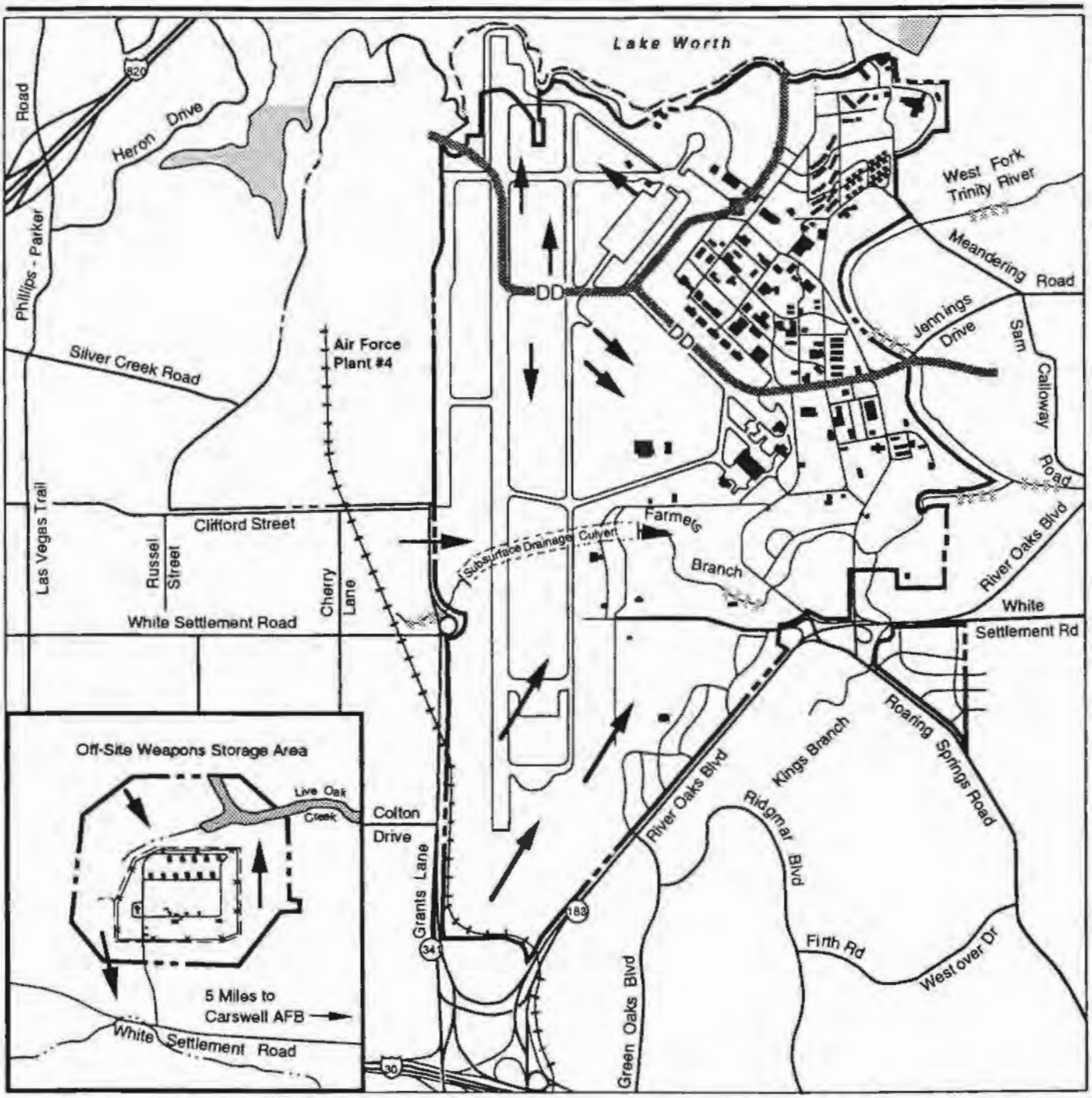
Solid Waste. Solid waste was hauled off base by Waste Management, Inc., and placed in the Lincrest landfill. The base recycled scrap metals (steel, copper, stainless steel) through DRMO. In the past, solid wastes were disposed of at nine different landfills on Carswell AFB. These landfills are being investigated under the IRP (see Table 3-2).

Electricity. Carswell AFB and the off-site WSA are provided with electricity by TU Electric. Electrical power is delivered to Carswell AFB through a 138-kilovolt transmission line that enters the east side of the base near Farmers Branch. The on-base substation is owned by TU Electric and the distribution system is owned by the Air Force. Eight feeder lines supply electricity to the base via overhead and underground services from the substation.

Natural Gas. Service to Carswell AFB is provided by Lone Star Natural Gas Company. Natural gas is supplied via a 16-inch company-owned line entering the west side of the base at Clifford Street. Natural gas enters the base system through the gas regulator station near Facility 1149 and is supplied to the majority of heating systems on base. The off-site WSA does not have natural gas service.

3.3 PROPERTY CATEGORIZATION RESOURCES

The following section describes resources used in property categorization. Items within each resource were given a specific resource category. Findings for each resource were then reviewed to obtain the overall property category (see Table 5-1).



EXPLANATION

- Surface Drainage Direction
- DD Drainage Divide
- Creeks
- Carswell AFB Boundary
- Air Force Plant #4 Boundary
- Leased Property

0 650 1300 2600 Feet

Surface Hydrology

Figure 3-4

Category 2 through 7 properties were identified based upon the methodology presented in Chapter 2. All remaining areas were determined to be Category 1.

Areas that stored hazardous materials and/or generated hazardous waste were considered Category 2 unless a suspected or confirmed release was identified. These include dormitories and offices where it is likely that household or office products containing hazardous substances were stored.

Category 3 designations for the airfield were based upon existing documentation (e.g., personnel interviews, VSIs, written information). No known spills occurred within these areas; however, based on the activities that took place over time, minor releases associated with aircraft operations may have occurred. Contaminant levels, if present, are considered to be below action levels.

Areas where known or suspected contamination has occurred were classified as Category 4 through 7 properties based upon the current program status. In addition, new areas of potential contamination identified as a result of this EBS were classified as Category 7.

3.3.1 Hazardous Substances

3.3.1.1 Hazardous Materials/Petroleum Products Management

Hazardous materials commonly used at Carswell AFB included aviation and motor fuels, numerous types of POL, hydraulic fluids, cleaning solvents and corrosives, pesticides (see Section 3.3.5), paints, and thinners.

Base records were reviewed to identify quantities and types of hazardous materials stored in base facilities. Appendix C provides historical data on hazardous materials (including types and quantities) for facilities that are known to have stored these substances (Table C-1). These data were obtained from Air Force Forms 2761.

Of the 36 facilities for which data on storage of hazardous materials was available, 17 stored more than 1,000 kilograms (kg), or the substance's CERCLA reportable quantity (Table C-2). Based on the usage of a facility or on VSIs, hazardous materials were determined to have been used or stored at another 110 facilities, although data on types and quantities of materials stored or used at these facilities were not available. All facilities where hazardous materials were used or stored and the specific resource categories for these facilities are listed in Table 5-1. As required by CERCLA Section 120(h), notification of past storage of hazardous materials will be provided to the property recipient. Figure 5-1 shows the locations of facilities in which hazardous materials were stored.

Based upon the methodology presented in Chapter 2, no evidence of a release occurring was identified at 132 of the 146 facilities that stored or used hazardous materials, and therefore they are considered Category 2. All remaining facilities that stored hazardous material are considered Category 7 because they are associated with areas identified during the VSI or with tanks whose status is unknown. Any release above action levels, resulting in a possible cleanup action, is discussed within Hazardous Waste/Petroleum Waste Management or IRP Sites Identified to Date (Sections 3.3.1.2 and 3.3.2, respectively). Petroleum products are discussed in Section 3.3.3.

3.3.1.2 Hazardous Waste/Petroleum Waste Management

The following discussion relates to management practices and facilities used pursuant to the requirements of RCRA (enacted in 1978). Waste management practices in use prior to RCRA's requirements are, to the extent that they caused or contributed to environmental contamination, primarily the subject of the Air Force's IRP. Hazardous waste generated at Carswell AFB included waste oils and fuels, wastewater treatment and OWS sludge, batteries, solvent residues, and other chemical wastes. Base records were reviewed to identify quantities and types of hazardous wastes generated or stored in base facilities. There are 75 facilities that generated or stored hazardous wastes. All facilities where hazardous wastes were generated or stored are listed in Table 5-1 and shown in Figure 5-1. An historical overview of accumulation points and types of wastes stored at Carswell AFB is provided in Table 3-1. For those facilities for which information was available, historical data on hazardous waste generated by facility is provided in Appendix F.

Hazardous wastes generated on base were collected at accumulation and satellite accumulation points located throughout the industrial area of the base. Sites designated as accumulation points stored an unlimited amount of hazardous waste for up to 90 days, while those designated as satellite accumulation points stored less than 55 gallons of hazardous waste for an indefinite period of time. Waste was transferred either to an accumulation point or directly to the DRMO hazardous storage facility (Facility 1359) from a satellite accumulation point prior to reaching its 55-gallon limit. All wastes were transferred directly from accumulation points to DRMO prior to reaching their 90-day limit.

DRMO collected and stored all wastes generated on base prior to final disposal off base. This facility operated under the base RCRA Part B permit (Permit No. HW-50289) issued by the Texas National Resources Conservation Commission (TNRCC), formerly the Texas Water Commission, in February 1991, allowing storage of approximately 27,000 pounds of hazardous waste for up to 1 year. Additionally, 20 sites of known hazardous substance releases identified by the 1989 RFA as solid waste management units (SWMUs) and recommended for remediation are also governed by the Part B permit. These sites include 15 IRP sites (discussed

in Section 3.3.2), 4 waste accumulation points at Facilities 1600 (SWMU 16), 1191 (SWMU 36), 1320 (SWMU 61), and 1410 (SWMU 32), and an OWS at Facility 1194 (SWMU 35).

Aerial photographs dating from the late 1950s to the 1990s were reviewed and a number of areas were identified where a VRS should be conducted. Upon completion of the area VRSs, two sites were identified which may require further investigation to determine the presence or absence of contamination. These areas are described below, and their locations are shown in Figure 5-1. Table 5-2 lists their property categorization.

1. (Area 1 in Parcel A-3) Foundation remains of a navigational aid or emergency power generator facility. Area is scattered with broken transite siding and paint chips; these materials may contain asbestos and lead, respectively. Site is located in the southern portion of the base between the Runway 21 overrun and the obstacle course.

2. (Area 2 in Parcel A-8) This site consists of the area located behind and between the bomber parking stubs on both sides of Taxiway 180 in the central flightline area. A fuel odor and areas of stressed vegetation were noted behind the blast shields.

All facilities that generated or stored hazardous wastes were physically inspected in February 1993. Areas where staining and/or stressed vegetation were noted are described below:

- Petroleum stains were noted on the soil surrounding a 55-gallon drum during the VSI on the north side of Facility 218 (Golf Clubhouse). The drum contained approximately 15 gallons of used petroleum.

- Soil staining was noted on the dirt floor of an open-sided equipment storage shed associated with Facility 234. Moderate POL staining was noted on concrete flooring of Facility 235. These facilities are for repair, maintenance, and storage of golf course equipment.

- Numerous areas of POL stains were noted during the VSI of Facilities 262 and 263 (Base Engineering Pavement and Grounds Facility). POL soil stains were located throughout the yard. Stains of unknown origin were noted north of Facility 262. In the center of the yard, a dirt bermed area that was used as a catch basin for an AST contained a mixture of water, oil, and sludge.

- Dead and stressed vegetation were noted around Facility 1015 (Engine Test Cell) and under a JP-4 AST. Stained soil was also noted around this facility and the AST.

- Petroleum stains on asphalt were noted under an emergency generator located on the south side of Facility 1050 (Hangar Maintenance) during the VSI. An oily sheen was present in several of the floor drains of the hangar.

- Discolored soil was noted under a vacuum apparatus for Facility 1101 (Fuels Laboratory).

- Discoloration of the gravel surrounding the liquid fuel unloading pipes was noted during the VSI of Facilities 1163, 1164, and 1174.

- Numerous areas of staining were noted during the VSI of Facilities 1187 and 1190 on areas of concrete and soil. Dead and stressed vegetation were also noted on the grass slope just north of the hazardous storage facility (Facility 1187), where the catch basin outlet valve is located, around the OWS, and along the driveway and facility concrete/asphalt/grass juncture.

- Stained concrete was noted during the VSI of Facility 1202 (washrack) under several 55-gallon drums of ethylene glycol, hydraulic fluid, and lubricating oil.

- Numerous floor drains were noted to be stained during the VSI of Facility 1445. Additional stains were noted in the mechanical room.

- Staining of unknown origin was noted around floor drains in the mechanical room of Facility 1510.

- Numerous areas of staining were noted during the VSI of Facility 1518 (Base Service Station). These petroleum stains were located both inside and outside of the shop area as well as around the floor drain in the mechanical room.

- Staining was noted over most of the washrack area of Facility 1603.

- The VSI noted diesel-stained soil adjacent to the southwest corner of Facility 4145. A small oil spill was located under the generator inside Facility 4145.

- The VSI of Facility 4160 noted staining of floor drains in the mechanical room and northern portion of the maintenance bay.

- The VSI of the Air Museum noted one area approximately 2 feet by 4 feet of petroleum-contaminated soil. Dead and stressed vegetation were noted around this stain. The stain is located directly beneath a museum airplane.

Based on the methodology presented in Chapter 2, no evidence of a release occurring was identified at 54 of the 75 facilities that generated or stored hazardous wastes, and therefore they are considered Category 2. The remaining 21 facilities are considered Category 7 properties based on staining and/or stressed vegetation noted during the VSI.

Specific resource categories for facilities that generated or stored hazardous waste are listed in Table 5-1. Storage of petroleum wastes is discussed in Sections 3.3.3 and 3.3.4.

3.3.2 IRP Sites Identified to Date

This section discusses the IRP at Carswell AFB. The IRP was established to identify, characterize, and remediate CERCLA-related contamination on Air Force installations. However, the IRP process at Carswell AFB also includes RCRA guidelines with the TNRCC acting as lead agency. The program is designed to evaluate past disposal sites, control the migration of contaminants, and control potential hazards to human health and the environment.

A Phase I Records Search for Carswell AFB, completed in 1984, identified 17 potential sites of contamination and recommended 10 sites for further evaluation. These sites included three landfills, two fire department training areas, a waste burial area, a flightline drainage ditch, an entomology dry well, a hydrocarbon contaminated unnamed stream, and the POL tank farm. As recommended, these sites were investigated as part of a Phase II, Stage 1 study conducted in 1986 and a Remedial Investigation (RI) conducted between 1988 and 1991. Three sites originally identified during the initial Record Search (landfills 3 and 6 and the pesticide rinse area) were investigated under the Phase II study, but were not included as part of the RI. Subsequent to the Record Search, a low-level radioactive waste site (SWMU 60) was identified at the off-site WSA and incorporated into the Phase II study and the RI, and the Base Exchange (BX) Service Station was identified and included in the RI. Ongoing investigations identified and incorporated additional sites into the IRP, including a waste oil dump, a waste disposal site at the off-site WSA, and airfield groundwater contamination.

A basewide RFA, conducted in 1989, identified 69 SWMUs. Upon U.S. Environmental Protection Agency (U.S. EPA) and TNRCC review, 20 SWMUs were determined to require additional investigation, including 15 SWMUs associated with previously identified IRP sites. IRP sites previously investigated and recommended for No Further Action (NFA) by the base under the RFA were landfills 3 and 6 and the pesticide rinse area. Since that time NFA documents have been approved by the state for fire department training area 1, the entomology dry well, and the off-site WSA waste disposal site (SWMU 65).

A trichloroethylene (TCE) groundwater contamination plume originating from Air Force Plant #4 migrates to the northeast and southeast onto Carswell AFB. The TCE groundwater contamination may be commingled with groundwater contamination associated with Carswell AFB IRP sites in the southern portion of the base adjacent to the golf course. Plume remediation is managed under a Federal Facilities Agreement for Air Force Plant #4, which is a National Priorities List (NPL) site. Additionally, under a partnering agreement between Air Force Plant #4 and Carswell AFB, groundwater contamination associated with Air Force Plant #4 is the responsibility of the Plant and remediation of surface sites is the responsibility of Carswell AFB. Soil removal for these sites is programmed for landfills 4 and 5 and fire department training area 2, and was conducted at the waste burial area in 1991.

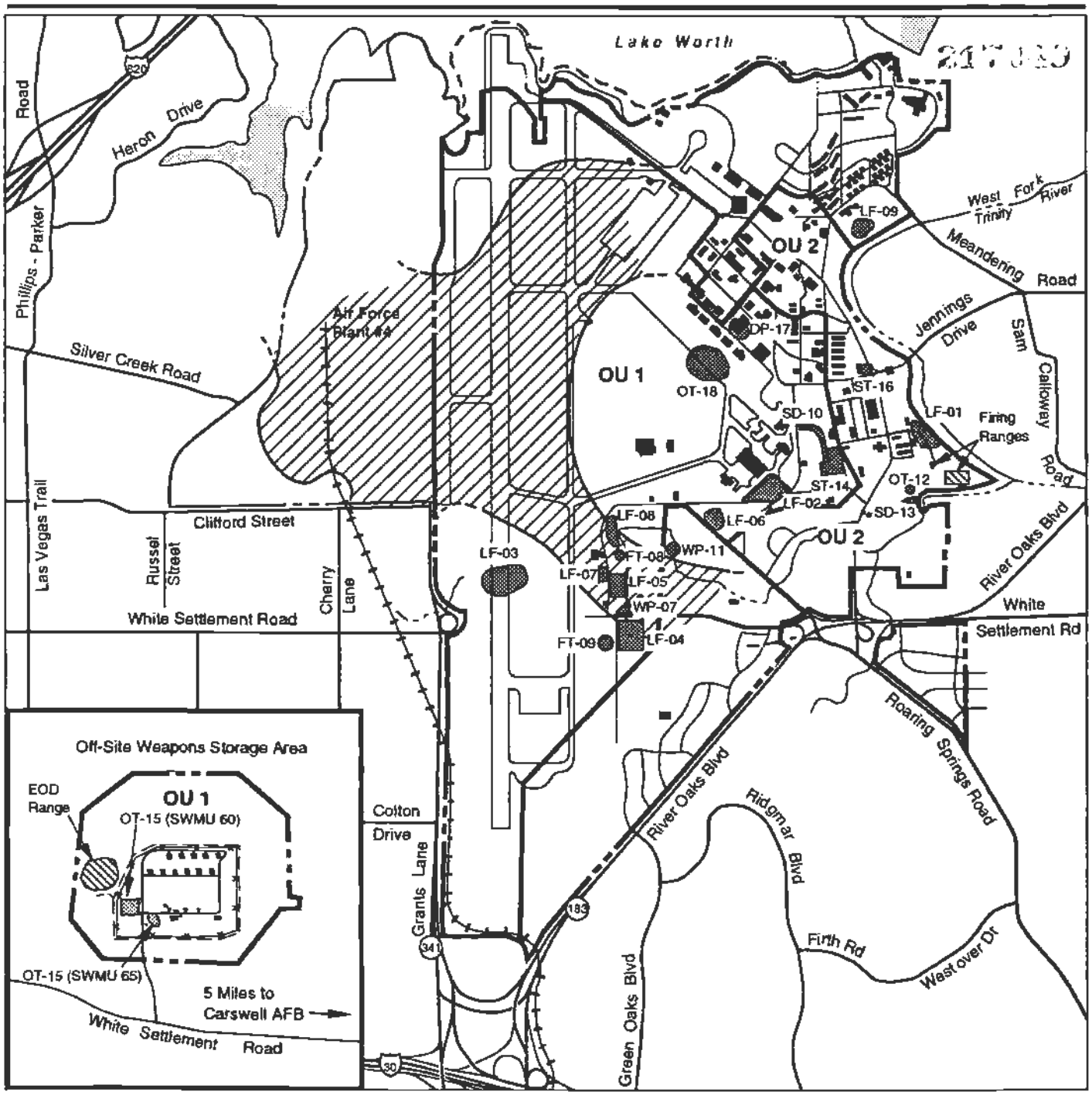
Remedial actions are also scheduled for the flightline drainage ditch, the POL tank farm, and the low-level radioactive waste site (SWMU 60) located at the off-site WSA. Landfill 6, the airfield groundwater site, the waste oil dump, and the BX service station are currently undergoing RIs. A RCRA Facility Investigation is ongoing at the unnamed stream site.

IRP sites at Carswell AFB have been grouped into Operable Units (OUs) based on the location of each site. OU-1 consists of nine active sites located in the central base and airfield areas, OU-2 consists of four active sites located in the eastern portion of the base, and OU-3 is the off-site WSA site. Six sites have been recommended for NFA by the base, and have not been assigned to an OU.

Figures 3-5 and 5-1 show the locations of IRP sites at Carswell AFB, and Table 3-2 provides a brief description and the status of each site.

In addition to the mandates of the IRP, prior to the transfer of any property at Carswell AFB, the Air Force must also comply with the provisions of CERCLA Section 120(h). CERCLA Section 120(h) requires that, before property can be transferred from federal ownership, the United States must provide notice of specific hazardous waste activities on the property and include in the deed a covenant warranting that "all remedial action necessary to protect human health and the environment with respect to any [hazardous] substance remaining on the property has been taken before the date of such transfer." Furthermore, the covenant must also warrant that "any additional remedial action found to be necessary after the date of such transfer shall be conducted by the United States."

To date, 23 sites have been identified for inclusion in the Carswell AFB IRP. Additionally, a TCE groundwater contamination plume has migrated onto Carswell AFB from Air Force Plant #4. Remediation of contamination associated with this TCE plume is the responsibility of Air Force Plant #4.



EXPLANATION

- IRP Site
- Probable TCE Groundwater Contamination Plume - 5 ppb level (Plume boundary not fully characterized)
- EOD and Firing Ranges
- Carswell AFB Boundary
- Air Force Plant #4 Boundary
- Leased Property

0 650 1300 2600 Feet

Note: Information is current as of November 12, 1993 and is subject to revision.

Installation Restoration Program Sites

Figure 3-5

Of the Carswell AFB IRP sites, nine are NFA. Of these, six have been recommended for NFA by the base and are Category 3. Three of these six sites, landfills 7, 8, and 9, were identified and recommended for NFA following the Phase I Records Search. The other three Category 3 sites were approved for NFA after completion of the 1991 RCRA Facility Investigation. The remaining three NFA sites are considered Category 4 pending TNRCC approval for NFA after completion of the 1989 RFA. Four sites have undergone interim removal actions and are considered Category 5. The remaining 10 sites have not yet had the appropriate response actions implemented and are considered Category 6.

3.3.3 Storage Tanks

The following sections describe the findings for ASTs and USTs based on the records search and VSI. An overview of pipelines, hydrant fueling, and transfer systems is also provided. Findings for OWSs are discussed in Section 3.3.4.

3.3.3.1 Aboveground Storage Tanks

There have been 79 ASTs utilized at Carswell AFB. Table 3-3 summarizes their history, and Figure 5-1 shows their locations.

Based on the methodology presented in Chapter 2, no evidence of a release occurring was identified for 37 ASTs, and therefore these are considered Category 2. The remaining 42 ASTs require further evaluation and are considered Category 7. Specific resource categories for these tanks are listed in Tables 3-3 and 5-1. Any release above action levels, resulting in a possible clean-up action, is discussed under Hazardous Waste/Petroleum Products Management or IRP Sites Identified to Date (Sections 3.3.1.2 and 3.3.2, respectively).

3.3.3.2 Underground Storage Tanks

Carswell AFB has an Underground Storage Tank Management Plan that addresses UST regulations and compliance strategies, monitoring alternatives, and operating procedures. There have been 107 USTs utilized at Carswell AFB. Table 3-4 summarizes their history, and Figure 5-1 shows their locations.

Based on the methodology presented in Chapter 2, no evidence of a release occurring was identified for 85 USTs, and therefore these are considered Category 2. The remaining 22 USTs require further evaluation and are considered Category 7 because their status is unknown or they were removed prior to the enactment of the Solid and Hazardous Waste Amendments in 1984. Specific resource categories for these tanks are listed in Tables 3-4 and 5-1. Any release above action levels, resulting in a possible clean-up action, is discussed under Hazardous Waste/Petroleum

Waste Management or IRP Sites Identified to Date (Sections 3.3.1.2 and 3.3.2, respectively).

Permanent closure and removal of USTs is regulated under 31 Texas Administrative Code 334. Upon removal of a UST, soil samples must be taken immediately beneath the removed UST. If hazardous constituents are identified during soil analysis, remediation must be performed in accordance with applicable regulations.

3.3.3.3 Pipelines, Hydrant Fueling, and Transfer Systems

The hydrant fueling system at Carswell AFB was installed in 1953. Three aboveground bulk storage tanks (Facilities 1156, 1157, and 1159), located in the POL storage area, supply the hydrant system and have a combined capacity of 6.6 million gallons. These tanks are supplied by a 12-mile pipeline originating in the city of Aledo. These tanks feed four hydrant fuel system pumphouses, each containing six 25,000-gallon USTs and liquid fuel stands.

Fuel was also issued to aircraft using nine 6,000-gallon mobile refueling trucks. Gasoline diesel fuel and jet fuel for non-aviation purposes were delivered to vehicles, generators, and aerospace ground equipment by mobile truck or through underground and organizational issue and support tanks (Environmental Assessment and Information Systems Division, Argonne National Laboratory, 1992).

In the early 1960s, soil contamination from fuel was discovered in the POL storage area. Leaking underground pipes were located and replaced. No additional leaks are suspected to have occurred since 1965. All underground storage systems are cathodically protected or have tracer leak detection or interstitial monitoring installed (Radian Corporation, 1986).

The POL tank farm is being investigated under the IRP (Site ST-14), and is considered Category 6. Investigation of the fuel lines and storage tanks associated with the hydrant fueling system is incomplete, and represents a data gap. Therefore, the hydrant fueling system is considered to be Category 7.

3.3.4 Oil/Water Separators

OWSs are flow-through systems designed to separate oil, fuel, and grease from water. Other contaminants potentially present in water discharged to an OWS, such as solvents, cannot be removed by this process. Water from an OWS typically discharges to an industrial or sanitary sewer, and is treated at a wastewater treatment plant. There have been 30 OWSs utilized at Carswell AFB. Table 3-5 summarizes their history, and Figure 5-1 shows their locations.

Based on the methodology presented in Chapter 2, no evidence of a release occurring was identified for 17 of the OWSs, and therefore these are considered Category 2. The status of the remaining 13 OWSs is unknown; therefore, they are considered Category 7. Specific resource categories for OWSs are listed in Tables 3-5 and 5-1.

3.3.5 Pesticides

The Pest Management Program at Carswell AFB was the responsibility of the Base Entomologist. Golf course maintenance was the responsibility of the Morale, Welfare, and Recreation Office. Prior to base closure, two contractors used pesticides on base; one provided daily ground maintenance services, while the other provided bi-monthly pest control services for the hospital. Applications of pesticides for these activities were conducted by certified applicators, and were frequently inspected by the Bioenvironmental Engineering and Environmental Health offices. Pesticides used on Carswell AFB were stored in three locations: the Entomology Shop (Facility 1213), the golf course maintenance area (Facilities 234 and 235), and the Pavement and Grounds Facility (Facility 1339). Historical data on pesticides used at Carswell AFB are provided in Table 3-6.

Based on the methodology presented in Chapter 2, Facilities 1213 and 1339 are considered Category 2 properties, since storage of pesticides occurred but no evidence of a release occurring was noted. Two sites (OT-12 and WP-11) relating to pesticide disposal are being investigated under the IRP and are considered Category 3 and 4 properties, respectively. Two sites (OT-12 and WP-11) relating to pesticide disposal are being investigated under the IRP reverse and are considered Category 3 and 4 properties, respectively. Facilities 234/235 are considered Category 7 properties because they require further evaluation to determine the presence and/or extent of any soil contamination.

3.3.6 Medical/Biohazardous Waste

The Robert L. Thompson Regional Hospital was a 140-bed hospital that offered a number of services to both active and retired military personnel and their dependents. These services included general surgery, maternity and radiology departments, and a pharmacy.

A dental clinic, a Civilian Health and Medical Program of the Uniformed Services out-patient clinic, and a full-time veterinary clinic were operated at Carswell AFB. Approximately 14,400 pounds of medical waste were generated annually by the hospital and the other on-base clinics. Prior to 1991, all medical waste was destroyed using an on-base incinerator; the ash was then disposed of as municipal refuse. Beginning in 1991, the medical waste generated at Carswell AFB was picked up twice weekly and disposed of off base at a permitted facility in accordance with state regulations.

Hospital wastes were hauled off base under contract by American Medical Transport.

Medical and dental X-ray operations, as well as photographic operations, produce photochemical wastes and utilize silver recovery units. The silver recovered from these units was sent to DRMO for disposal, while the remaining solution was randomly sampled by Bioenvironmental Engineering prior to discharge to the sanitary sewer.

The hospital and dental and veterinary clinics have been closed; therefore, no medical waste is being generated. Medical waste was processed and disposed of prior to closure in accordance with appropriate federal, state, and local regulations. Based on the methodology presented in Chapter 2, no evidence of a release of medical/biohazardous waste occurring was identified at these facilities; therefore, they are considered Category 2 (although the hospital is considered Category 7 because of associated ASTs requiring further evaluation).

3.3.7 Ordnance

Carswell AFB operated a small explosive ordnance disposal (EOD) proficiency range since the late 1950s. The range was used by base personnel to conduct regular EOD proficiency training exercises using small explosive charges. The EOD range is located on the west end of the off-site WSA. The range consists of a large grass field with an earthen berm for protection of personnel.

Two small arms firing ranges (Facilities 1340 and 1346) are located near the confluence of the Trinity River and Farmers Branch. The outdoor firing range consists of three earthen berms forming an open rectangle; several wood baffles dissect the range. The second facility is an indoor range approximately 3,800 square feet in size.

Three WSAs were utilized by the base. The off-site WSA is located 5 miles west of the main base and consists of 11 concrete storage igloos and numerous munitions maintenance facilities. A second WSA is located on the north end of the base near Lake Worth and consists of 16 storage igloos and support facilities. The ALCM Storage Area is located in the central flightline area. The facility consists of 25 concrete storage igloos, a 68,000-square-foot missile assembly facility (Facility 4210), and additional support facilities.

The EOD range will be cleared of all unexploded ordnance prior to disposal of that parcel. All ordnance accumulated since the range has been closed will be properly packaged and transported off base for use by other Air Force units. Both firing ranges will remain in operation for use by the 301st FW military and law enforcement personnel. Based on the methodology presented in Chapter 2, no evidence of a release occurring was identified at

the indoor firing range, and therefore it is considered Category 2. Based on the activities that have occurred over time, the EOD range and the outdoor firing range are considered Category 7 properties because soil contamination may be present.

All ordnance will be removed from the off-site WSA as well as the WSA located in the central flightline area. The northern WSA will be utilized to support 301st FW operations. Based on the methodology presented in Chapter 2, no evidence of a release occurring was identified at the northern WSA, and it is considered Category 2. The off-site WSA is also considered Category 2, except for an area associated with two Category 6 IRP sites and the EOD Range (Category 7). The ALCM Storage Area is considered Category 7 because of tanks and OWSs with unknown status associated with ALCM maintenance facilities.

3.3.8 Wastewater Discharges

Wastewater discharges are routinely monitored by the city of Fort Worth, and storm water is monitored by DOO personnel in accordance with an NPDES permit. No contamination associated with wastewater discharges was identified at Carswell AFB.

3.3.9 Radioactive and Mixed Wastes

A low-level radioactive waste disposal site is located at the west end of the off-site WSA (IRP site OT-15/SWMU 60). A removal action is programmed for 1994, and ongoing groundwater monitoring will continue to determine if a release of radioactive materials has taken place.

The hospital dispensed oral doses of chemotherapeutic drugs. These materials were supplied, and all remaining residues were properly disposed of, by a single pharmaceutical company.

The low-level radioactive waste disposal site (OT-15/SWMU 60) will be remediated under the IRP. This area is considered Category 6 because all required actions have not yet been taken. No additional contamination associated with radioactive and mixed wastes was identified at Carswell AFB.

3.3.10 Solid Waste

Carswell AFB currently has no active on-base landfills. Solid waste is hauled off-base by a licensed contractor to the Lincrest Landfill. In the past, solid waste was disposed of at nine different locations on base. These sites are being investigated under the IRP (see Section 3.3.2), and are described in Table 3-2.

Landfill 1 has undergone an interim removal action and is considered Category 5. Landfills 2 and 3 are considered Category 4, based on approval for NFA after completion of the 1989 RFA. Landfills 4, 5, and 6 require appropriate response actions and are considered Category 6. Landfills 7, 8, and 9 were identified and recommended for NFA by the TNRCC following the Phase I Records Search and are considered Category 3.

3.4 DISCLOSURE RESOURCES

Disclosure resources include asbestos, PCBs, radon, and lead-based paint. These resources were not used in property categorization. In the event that an issue arises regarding any of these resources, it will be discussed within the appropriate resource in Section 3.3.

3.4.1 Asbestos

A basewide asbestos survey completed in November 1992 identified ACM in 101 facilities (Galson Corporation, 1992). Table 3-7 lists the facilities that have been surveyed and the survey results.

3.4.2 Polychlorinated Biphenyls

All transformers with 50 parts per million (ppm) or more PCBs have been replaced or retrofilled with PCB-free equipment to bring the PCB concentration to below 50 ppm. However, eight capacitors located in Facility 4155 still contain PCB levels above 50 ppm. These capacitors are proposed for removal by the base. A history of base transformers is provided in Table 3-8.

No other contamination associated with PCBs was identified at Carswell AFB.

3.4.3 Radon

The Air Force conducted initial screening surveys to identify the probability of elevated indoor radon concentrations in habitable structures on all Air Force installations. The initial radon survey at Carswell AFB was conducted in March 1989 by the base Bioenvironmental Engineering Office. The survey consisted of 33 samples taken from military housing units, the child care center, on-base billeting, and the airman's dormitories. Two of the 33 samples taken were above the U.S. EPA's recommended mitigation level of 4 picocuries per liter (pCi/l). An additional screening was conducted for on-base living quarters in 1991. Twenty-five of the 644 samples taken during the second screening registered above the recommended mitigation level. Table 3-9 lists facilities with radon levels equal to or above 4 pCi/l.

3.4.4 Lead-Based Paint

The use of lead-based paints declined after 1978. A comprehensive basewide survey to determine the use of lead-based paint at Carswell AFB has not been conducted. Facilities constructed prior to the implementation of the DOD ban on the use of lead-based paint in 1978 are likely to contain such paint. The majority of military family housing units and 272 other facilities were constructed prior to or during 1978.

Table 3-1. Hazardous Waste Accumulation Points
Page 1 of 3

Facility	Waste Stored	Amount Stored[a] (gallons/year)	Documented Years of Storage	Program Status	Specific Property Category
234	Engine oil	Unknown	1992	RCRA	7
1027	Engine oil, hydraulic fluid	Unknown	1992	RCRA	2
1048	Methyl ethyl ketone, rags, PD-680, isopropyl alcohol, engine oil, hydraulic fluid	Unknown	1992	RCRA	2
1050	Hydraulic fluid	Unknown	1992	RCRA	2
1059	Freon fluid	Unknown	1992	RCRA	2
	Hydraulic fluid	3	1990 - 1992		
	PD-680	660	1990 - 1992		
	Lube oil, Citrikleen	Unknown	1992		
	Spill residue, used oil	Unknown	1992		
	Paint stripper	36	1990 - 1992		
	Methyl ethyl ketone	240	1990 - 1992		
	Media bead waste, paint waste, cleaning compound, water soluble oil, JP-4, sand blaster waste	Unknown	1992		
1101	Waste varies based on items returned to supply	Unknown	1992	RCRA	2
1187	Various items from units and shops around base	Unknown	1992	RCRA	7
1189	Potassium ferrocyanide, perchloroethylene, methylene chloride	Unknown	1992	RCRA	2
1190	Waste oil	Unknown	Unknown	RCRA	6
1191	Paint wastes	120	1990 - 1992	RCRA	2
	Engine oil, antifreeze, 7808 synthetic oil, gas/diesel, Safety-Klean, fuel filters	Unknown	1992		
1194	Antifreeze, PD-680, used oil, fuel filters	Unknown	1992	RCRA	2
1250	Waste varies based on items returned to supply	Unknown	1992	RCRA	2
1319	Antifreeze	156	1990-1992	RCRA	2
	Mixed fuels	108	1990 - 1992		

Note: (a) Information on quantities of waste stored was not available for all accumulation points.
RCRA = Resource Conservation and Recovery Act.

Table 3-1. Hazardous Waste Accumulation Points
Page 2 of 3

Facility	Waste Stored	Amount Stored[a] (gallons/year)	Documented Years of Storage	Program Status	Specific Property Category
1319 (cont.)	Engine oil, transmission fluid, lead/acid batteries	Unknown	1992		
1413	JP-4	60	1990 - 1992	RCRA	2
	PD-680	60	1990 - 1992		
	7808 synthetic oil	84	1990 - 1992		
	Carbon remover, finger print remover, Safety-Klean	Unknown	1992		
	Safety-Klean	380	1991 - 1992		
	SE-377C	300	1991 - 1992		
1415	Diesel, motor gasoline, paint waste, PD-680, hydraulic fluid, antifreeze, JP-4, 7808 synthetic oil, engine oil	Unknown	1992	RCRA	2
	Xyglo penetrant	220	1990 - 1992		
	Insp. emulsifier	220	1990 - 1992		
	1-1-1 Trichloroethylene, magnetic inspection comp, x-ray chemicals, sulfur hexafloride	Unknown	1992		
1418	PD-680	Unknown	1992	RCRA	2
1436	Hydraulic fluid	240	1990 - 1992	RCRA	2
	PD-680	240	1990 - 1992		
	Methyl ethyl ketone	0.5	1990 - 1992		
	7576 synthetic oil, cutting fluid, trichloroethane, naphtha, lead-based paint, brake fluid	Unknown	1992		
1602	Oil, epoxy thinner, lacquer thinner, PD-680, methyl ethyl ketone, epoxy stripper	Unknown	1992	RCRA	2
1618	Sodium persulfate	55	1991 - 1992	RCRA	2
	Lacquer thinner	75	1991 - 1992		
	Poly paint	75	1991 - 1992		
1628	Paint waste	120	1990 - 1992	RCRA	2
	Paint stripper	110	1990 - 1992		
	Methyl ethyl ketone	Unknown	1988 - 1989		
	Antifreeze	Unknown	1988 - 1989		
	Carbon remover	Unknown	1988		

Note: (a) Information on quantities of waste stored was not available for all accumulation points.
RCRA = Resource Conservation and Recovery Act.

Table 3-1. Hazardous Waste Accumulation Points
Page 3 of 3

Facility	Waste Stored	Amount Stored[a] (gallons/year)	Documented Years of Storage	Program Status	Specific Property Category
1647	PD-680, JP-4, hydraulic fluid	Unknown	1992	RCRA	2
3000	Infectious waste	Unknown	1992	RCRA	2
3367	Paint wastes, batteries	Unknown	1992	RCRA	2
4213	Alodine	Unknown	1992	RCRA	2
4214	Methyl ethyl ketone, toluene, freon, hydraulic fluid	Unknown	1992	RCRA	2
	Paint wastes	Unknown	1992		
8512	Paint wastes, chromium dust	Unknown	1992	RCRA	2

Note: (a) Information on quantities of waste stored was not available for all accumulation points.
RCRA = Resource Conservation and Recovery Act.

Table 3-2. Installation Restoration Program Sites
Page 1 of 2

IRP Site/ SWMU Number	Operable Unit	Site Description	Known or Suspected Material Disposed of	Dates of Operation	Program Status	Specific Property Category
LF-01 (SWMU 28)	2	Landfill 1	General refuse	1942-1989	Analytical data suggests solvents and metal-bearing wastes. No significant risk. Under consideration for No Further Action.	5
LF-02	NA	Landfill 2	Construction rubble and general refuse	1952-1956	No Further Action per Texas Water Commission/RCRA Facility Assessment March 1989	4
LF-03	NA	Landfill 3	Construction rubble, fill area, and small amount of hazardous waste	1950-1952	No Further Action per Texas Water Commission/RCRA Facility Assessment March 1989	4
LF-04 (SWMU 22)	1	Landfill 4	General refuse and wastes including paint, thinners, strippers, cadmium batteries, waste solvents, burned wastes	1956-1973	Remedial Design deferred December 1991[a]	6
LF-05 (SWMU 23)	1	Landfill 5	Flight line wastes and general refuse	1963-1975	Remedial Design deferred December 1991[a]	6
LF-06 (SWMU 62)	1	Landfill 6	Construction rubble and possible drums of hydraulic fluid	1975-1978	Remedial Investigation	6
LF-07	NA	Landfill 7	Construction rubble and clean fill dirt were reportedly disposed of	1978-1983	No Further Action	3
LF-08	NA	Landfill 8	Non-hazardous fill material, including landscape debris, construction debris, and metal	1960-1969	No Further Action	3
LF-09	NA	Landfill 9	Only clean construction rubble and trees were reportedly disposed of	1978-1983	No Further Action	3
WP-07 (SWMU 24)	1	Waste Burial Area	Buried drums containing cleaning solvents and leaded sludge from flight line	1960s	Remedial Design deferred December 1991; [a]remedial action conducted in 1991	5
FT-08 (SWMU 18)	NA	Fire Training Area 1	Waste oils and fuels were burned	Prior to 1963	No Further Action - 17 December 1991	3

Note: (a) Deferred because of AF Plant #4 TCE plume underlying site; plume pump and treat pilot study in place; interim remedial action programmed for 1995.
RCRA = Resource Conservation and Recovery Act.
NA = Not applicable.

Table 3-2. Installation Restoration Program Sites
Page 2 of 2

IRP Site/ SWMU Number	Operable Unit	Site Description	Known or Suspected Material Disposed of	Dates of Operation	Program Status	Specific Property Category
FT-09 (SWMU 19, 20, and 21)	1	Fire Training Area 2	Waste oils, waste fuels, and waste solvents were burned. Unused JP-4 was observed.	1963-1989	Remedial Action - soil removal in 1994	6
SD-10 (SWMU 53)	1	Flight line drainage ditch	Petroleum, aircraft soap, and oils migrated from flight line	Unknown construction date but used to present	Remedial Action - soil removal in 1994	6
WP-11	NA	Pesticide rinse area	Pesticide spray equipment uncontaminated rinse water	Unknown start-up date. No longer in use	No Further Action per Texas Water Commission/RCRA Facility Assessment - March 1989	4
OT-12 (SWMU 63)	NA	Entomology dry well	Pesticide and herbicide-contaminated rinse water	1965-1981	No Further Action - 17 December 1991	3
SD-13 (SWMU 64 and 67)	2	Unnamed stream	Hydrocarbons	1965-Present	Focused RCRA Facility Investigation	6
ST-14 (SWMU 64)	1	POL tank farm	JP-4	Early 1960s	Remedial Design complete, interim remedial action scheduled for 1994	6
OT-15 (SWMU 60)	3	Weapons Storage Area - Radioactive waste disposal site	Radium	1957-1969	Being monitored. Programmed for Interim Remedial Action in 1994	6
ST-16	2	BX service station	Hydrocarbons	Early 1970s	Remedial Investigation/Feasibility Study[b]	5
OT-18	1	Airfield groundwater	JP-4		Remedial Investigation[b]	6
DP-17	1	Waste oil dump	Oils, solvents, unknown		Remedial Investigation	6
OT-15 (SWMU 65)	NA	Weapons Storage Area disposal site	Waste cleaner, solvents, and thinners, trichloroethylene	Unknown	No Further Action approved 17 December 1991	3
NA	2	East area groundwater	Metals and hydrocarbons, possible solvents		Ongoing groundwater monitoring	5

Note: (b) Groundwater monitoring part of East Area Groundwater site.
NA = Not applicable.
POL = Petroleum, oils, and lubricants.
RCRA = Resource Conservation and Recovery Act.

Table 3-3. Aboveground Storage Tanks
Page 1 of 2

Facility	Contents	Capacity[a] (gallons)	Status	Years of Operation	Program[b] Status	Specific Property Category
Boat House	Unknown	500	Inactive	Unknown	Unknown	7
233	Butane	Unknown	Inactive	1954-Unknown	Unknown	7
234	MOGAS	500	Active	1993-Present	NFPA	2
262	MOGAS	250	Inactive	1992-Unknown	NFPA	2
262	Diesel	250	Inactive	1992-Unknown	NFPA	2
262	Propane	Unknown (3)	Unknown	1954-Unknown	Unknown	7
1000	Diesel	275	Active	1975-Present	NFPA	2
1002	Diesel	250 (4)	Inactive	1984-Unknown	Unknown	7
1015	Carbon dioxide	5,000	Inactive	1968-Unknown	Unknown	7
1015	JP-4	10,000	Inactive	1968-Unknown	Unknown	7
1026	Liquid oxygen	Unknown (3)	Inactive	1964-Unknown	NFPA	2
1026	Liquid nitrogen	Unknown (4)	Inactive	1964-Unknown	NFPA	2
1027	Heating fuel	8,000	Unknown	1986-Unknown	Unknown	7
1050	Diesel	55	Active	1955-Present	Unknown	7
1058	JP-4	Unknown (2)	Inactive	1986-Unknown	Unknown	7
1062	Diesel	25	Active	1986-Present	NFPA	2
1156	JP-4	840,000	Active	1953-Present	NFPA	2
1157	JP-4	840,000	Active	1951-Present	NFPA	2
1159	JP-4	3,360,000	Active	1985-Present	NFPA	2
1161	AFFF	2,000 (2)	Inactive	1987-Unknown	NFPA	2
1187	Unknown	Unknown	Inactive	1991-Unknown	NFPA	2
1194	Waste oil	Unknown	Inactive	1983-Unknown	NFPA	2
1212	Unknown	Unknown	Unknown	1985-Unknown	Unknown	7
1215	Diesel	25	Active	1981-Present	NFPA	2
1256	MOGAS	5,000	Inactive	1955-1988	NFPA	2
1259	MOGAS	11,000	Inactive	1942-1988	NFPA	2
1261	MOGAS	11,000	Inactive	1942-1988	NFPA	2
1263	Diesel	11,000	Inactive	1950-1988	NFPA	2

Notes: (a) Numbers in parentheses refer to the number of tanks, if more than one.
(b) NFPA = Monitored under recommended National Fire Protection Association (NFPA) guidelines; Unknown = No records available.
AFFF = Aqueous film-forming foam.
MOGAS = Motor gasoline.

Table 3-3. Aboveground Storage Tanks
Page 2 of 2

Facility	Contents	Capacity[a] (gallons)	Status	Years of Operation	Program[b] Status	Specific Property Category
1264	MOGAS	12,000	Inactive	1975-1988	NFPA	2
1265	MOGAS	11,000	Inactive	1942-1988	NFPA	2
1320	Various oils	55 (6)	Inactive	1953-Unknown	NFPA	2
1418	Diesel	50	Active	1984-Present	Unknown	7
1423	Diesel	100	Active	1942-Present	Unknown	7
1425	Diesel	100	Unknown	Unknown	Unknown	7
1504	Diesel	25	Active	1953-Present	NFPA	2
1510	Diesel	275	Active	1959-Present	NFPA	2
1658	Diesel	55	Active	1955-Present	Unknown	7
1720	Diesel	300	Active	1953-Present	Unknown	7
1730	Diesel	275	Active	1951-Present	Unknown	7
1750	Diesel	110 (2)	Unknown	Unknown	Unknown	7
1765	Diesel	25	Active	Unknown-Present	Unknown	7
1807	Unknown	Unknown	Unknown	Unknown	Unknown	7
2574	Unknown	Unknown	Unknown	Unknown	Unknown	7
3000	Heating fuel	250 (2)	Unknown	Unknown	Unknown	7
3106	Chlorine	Unknown	Unknown	1952-Unknown	Unknown	7
4101	Diesel	500	Unknown	Unknown	Unknown	7
4114	Diesel	12 (2)	Unknown	Unknown	Unknown	7
4120	Diesel	12	Unknown	Unknown	Unknown	7
4141	Unknown	Unknown	Inactive	1959-Unknown	NFPA	2
4146	JP-4	2,500	Unknown	Unknown	Unknown	7
4150	Diesel	275	Active	1954-Present	Unknown	7
4152	Diesel	275	Active	1954-Present	Unknown	7
4153	Diesel	275	Active	1954-Present	Unknown	7
4154	Diesel	275	Active	1954-Present	NFPA	2
4155	Diesel	275	Active	1955-Present	NFPA	2
4175	Diesel	275	Active	1961-Present	Unknown	7
8503	Propane	100 (2)	Inactive	Unknown	Unknown	7
8504	Unknown	Unknown	Unknown	Unknown	Unknown	7

Note: (a) Numbers in parentheses refer to the number of tanks, if more than one.
(b) NFPA = Monitored under recommended National Fire Protection Association (NFPA) guidelines; Unknown = No records available.
MOGAS = Motor gasoline.

Source: Carswell AFB, n.d., UST/AST Inventory.

Table 3-4. Underground Storage Tanks
Page 1 of 3

Facility	Contents	Capacity (gallons)[a]	Status[b]	Years of Operation	Program[c] Status	Specific Property Category
1015	JP-4	3,000	Active	1967-Present	RCRA/TNRCC	2
1027	Unknown	Unknown	Unknown	Unknown	Unknown	7
1040	Diesel	400	Active	1955-Present	RCRA/TNRCC	2
1049	Unknown	Unknown	Removed	1982-Unknown	Unknown	7
1050	Heating fuel	15,000	Active	1982-Present	Unknown	7
1064	Diesel	10,000 (2)	Active	1988-Present	RCRA/TNRCC	2
1064	MOGAS	10,000 (2)	Active	1988-Present	RCRA/TNRCC	2
1140	Crankcase oil	800 (2)	Removed	Unknown-1989	RCRA/TNRCC	2
1145	Waste oil	1,000	Removed	1985-Unknown	Unknown	7
1158	Unknown	Unknown	Unknown	1956-Present	RCRA/TNRCC	2
1163	Unknown	Unknown	Unknown	Unknown	Unknown	7
1170	JP-4	2,000 (2)	Active	1961-Present	RCRA/TNRCC	2
1191	Waste oil	500	Removed	1983-1993	RCRA/TNRCC	2
1194	Waste oil	2,000	Active	1983-Present	RCRA/TNRCC	2
1212	Unknown	Unknown	Unknown	1985-Unknown	Unknown	7
1411	MOGAS	4,000	Removed	1964-Unknown	RCRA/TNRCC	2
1411	Diesel	2,000	Active	1963-Present	RCRA/TNRCC	2
1411	JP-4	2,000	Active	1963-Present	RCRA/TNRCC	2
1411	MOGAS	2,000	Active	1963-Present	RCRA/TNRCC	2
1420	Waste oil	2,000	Active	1985-Unknown	Unknown	7
1420	Heating fuel	4,000	Unknown	1983-Unknown	Unknown	7
1423	Waste oil	500	Active	1976-Present	Unknown	7
1425	Diesel	1,000	Active	1955-Present	RCRA/TNRCC	2
1427	Diesel	500	Active	Unknown-Present	Unknown	7
1518	MOGAS	10,000 (4)	Removed	1972-1993	RCRA/TNRCC	2
1518	Waste oil	600	Inactive	1970-1993	RCRA/TNRCC	2

Notes: (a) Numbers in parentheses refer to number of tanks, if more than one.
(b) Inactive status refers to temporarily out of service or permanently abandoned in place.
(c) USTs are regulated under both the Resource Conservation and Recovery Act (RCRA) and the Texas Natural Resources Conservation Commission (TNRCC).
MOGAS = Motor gasoline.

Table 3-4. Underground Storage Tanks
Page 2 of 3

Facility	Contents	Capacity (gallons)[a]	Status[b]	Years of Operation	Program[c] Status	Specific Property Category
1627	MOGAS	1,000	Removed	1981-1993	RCRA/TNRCC	2
1627	Diesel	1,000	Removed	1981-1993	RCRA/TNRCC	2
1627	JP-4	2,000	Removed	1981-1993	RCRA/TNRCC	2
1629	Diesel	500	Removed	1980-1993	RCRA/TNRCC	2
1643	Heating fuel	8,500	Active	1982-Present	Unknown	7
1643	Heating fuel	5,000	Removed	1980-Unknown	Unknown	7
1658	Diesel	275	Removed	Unknown-1990	RCRA/TNRCC	2
1749	Diesel	7,830	Removed	1981-Unknown	Unknown	7
1750	Diesel	20,000	Unknown	1957-Unknown	Unknown	7
1750	Diesel	20,000	Inactive	1986-1993	RCRA/TNRCC	2
1750	Diesel	8,000	Active	1986-Present	RCRA/TNRCC	2
3000	Diesel	15,000 (2)	Active	1985-Present	RCRA/TNRCC	2
3001	Heating fuel	20,000 (2)	Active	1959-Present	RCRA/TNRCC	2
3001	Diesel	10,000	Active	1958-Present	RCRA/TNRCC	2
3190	Heating fuel	2,000	Active	1980-Present	RCRA/TNRCC	2
3359	Diesel	2,000	Active	1979-Present	RCRA/TNRCC	2
3360	Diesel	5,000	Active	1978-Present	RCRA/TNRCC	2
4101	Diesel	500	Removed	Unknown	Unknown	7
4102	Diesel	315	Inactive	1980-1993	RCRA/TNRCC	2
4102	Heating fuel	100	Active	1980-Present	RCRA/TNRCC	2
4111	Diesel	500	Active	1979-Present	RCRA/TNRCC	2
4115	Diesel	600	Removed	1968-1991	RCRA/TNRCC	2
4127	Diesel	500	Active	1959-Present	RCRA/TNRCC	2
4135	Diesel	380	Removed	1991-Unknown	Unknown	7
4136	Diesel	300	Active	1991-Present	RCRA/TNRCC	2
4141	Diesel	250	Active	1959-Present	RCRA/TNRCC	2
4143	Diesel	500	Active	1964-Present	RCRA/TNRCC	2
4145	Diesel	500	Active	1981-Present	RCRA/TNRCC	2
4150	Diesel	25,000 (6)	Inactive	1951-1992	RCRA/TNRCC	2
4152	JP-4	25,000 (6)	Inactive	1951-1992	RCRA/TNRCC	2
4153	JP-4	25,000 (6)	Inactive	1953-1992	RCRA/TNRCC	2
4154	JP-4	25,000 (6)	Inactive	1951-1992	RCRA/TNRCC	2
4155	Diesel	1,000	Active	1955-Present	RCRA/TNRCC	2

Notes: (a) Numbers in parentheses refer to number of tanks, if more than one.
(b) Inactive status refers to temporarily out of service or permanently abandoned in place.
(c) USTs are regulated under both the Resource Conservation and Recovery Act (RCRA) and the Texas Natural Resources Conservation Commission (TNRCC).
MOGAS = Motor gasoline.

Table 3-4. Underground Storage Tanks
Page 3 of 3

Facility	Contents	Capacity (gallons)[a]	Status[b]	Years of Operation	Program[c] Status	Specific Property Category
4170	JP-4	25,000 (6)	Removed	1952-1992	RCRA/TNRCC	2
4171	Diesel	5,000	Active	1976-Present	RCRA/TNRCC	2
4205	Waste oil	550	Removed	1984-Unknown	Unknown	7
4210	Waste oil	1,000	Inactive	1985-1992	RCRA/TNRCC	2
4210	Waste oil	8,000 (3)	Inactive	1985-1992	RCRA/TNRCC	2
4210	Heating fuel	6,000	Active	1985-Present	RCRA/TNRCC	2
4215	Heating fuel	2,000	Active	1985-Present	Unknown	7
4216	Diesel	5,000	Active	1983-Present	RCRA/TNRCC	2
8505	Unknown	Unknown	Removed	Unknown	Unknown	7
8514	Unknown	Unknown	Unknown	Unknown	Unknown	7
8514	Diesel	1,200	Active	1957-Present	Unknown	7
8515[c]	Diesel	1,000	Removed	Unknown	Unknown	7

Notes: (a) Numbers in parentheses refer to number of tanks, if more than one.
(b) Inactive status refers to temporarily out of service or permanently abandoned in place.
(c) USTs are regulated under both the Resource Conservation and Recovery Act (RCRA) and the Texas Natural Resources Conservation Commission (TNRCC).

Sources: Carswell AFB, 1993c; 1992h; n.d., UST/AST Inventory.

Table 3-5. Oil/Water Separators
Page 1 of 2

Facility	Capacity (Gallons)[a]	Description	Status	Year of Installation	Program[b] Status	Specific Property Category
38B	Unknown	Industrial Waste Treatment & Disposal	Active	Unknown	NPDES	2
38E	Unknown	Industrial Waste Treatment & Disposal	Active	Unknown	NPDES	2
1015	1,060	Engine Test Cell	Inactive	1968	RCRA part B Permit	2
1027	875	Aircraft Corrosion Control	Inactive	Unknown	Unknown	7
1060	115	Aircraft Maintenance	Inactive	1986	RCRA Part B Permit	2
1064	18,500	Service Station	Inactive	Unknown	RCRA Part B Permit	2
1138	1,000	Unknown - Not on Real Property Record	Unknown	Unknown	Unknown	7
1138	Unknown	Unknown - Not on Real Property Record	Unknown	Unknown	Unknown	7
1145	500	Automotive Hobby Shop	Inactive	Unknown	Unknown	7
1190	5,280	Aircraft Maintenance[c]	Inactive	1955	RCRA Part B Permit	2
1191	550	Vehicle Maintenance	Inactive	1984	RCRA Part B Permit	2
1194	375	Refueling Vehicle Maintenance	Inactive	1983	RCRA Part B Permit	2
1202	Unknown	Vehicle Service Station	Unknown	1949	Unknown	7
1320	400	Base Engineering Maintenance Shop	Inactive	1953	RCRA Part B Permit	2
1414	1,000	Aircraft Maintenance	Inactive	1942	RCRA Part B Permit	2
1420	2,700	Aircraft Maintenance	Inactive	1983	RCRA Part B Permit	2
1423	3,500	Air Freight[d]	Active	1942	RCRA Part B Permit	2
1504	Unknown	Security Police Operations	Inactive	1953	RCRA Part B Permit	2
1518	Unknown	Exchange Service Station	Active	1972	RCRA Part B Permit	2

Notes: (a) Numbers in parentheses refer to number of OWSs, if more than one.
(b) Closure of OWSs to occur under RCRA Part B permit.
(c) Consists of an oil/water separator, an oil skim holding tank, and a water/waste pit.
(d) Serves Facility 1420.
RCRA = Resource Conservation and Recovery Act.
NPDES = National Pollutant Discharge Elimination System.

Table 3-5. Oil/Water Separators
Page 2 of 2

Facility	Capacity (Gallons)[a]	Description	Status	Year of Installation	Program[b] Status	Specific Property Category
1602	18,500	Aerospace Ground Equipment Shop	Active	1942	RCRA Part B Permit	2
1628	5,100	Inspection Shop	Inactive	1990	RCRA Part B Permit	2
1643	12,730(2)	Aircraft Maintenance	Active	Unknown	Unknown	7
1645[c]	8,500	Aircraft Maintenance	Unknown	Unknown	Unknown	7
1648	6,000	Weapons and Release System	Unknown	Unknown	Unknown	7
1656	18,500	Fuel System Maintenance	Active	Unknown	Unknown	7
4146	Unknown	Engine Test Cell	Unknown	Unknown	Unknown	7
4210	4,500	Munitions Maintenance	Unknown	Unknown	Unknown	7
4210	7,920	Munitions Maintenance	Unknown	Unknown	Unknown	7

Notes: (a) Numbers in parentheses refer to number of OWSs, if more than one.
(b) Closure of OWSs to occur under RCRA Part B permit.
(c) Unable to locate.
RCRA = Resource Conservation and Recovery Act.

Source: Carswell AFB, 1989a; 1992d; U.S. Air Force, 1993a.

Table 3-6. Pesticide Storage
Page 1 of 2

Facility	Type	Quantity	Specific Property Category
234/235	Grozyme	2 gallons	7
	MSMA	12 gallons	
	Round-up (concentrate)	13 gallons	
	Sencor	2 pounds	
	Trimec, Classic	20 gallons	
1213	Alcohol, Denatured	10 gallons	2
	B-1 Insect Spray	8 gallons	
	Baygon, PT-250	60 cans	
	BP-300 Pyrethrum	1 gallon	
	Carbarnate 1.5 EC	7 gallons	
	Combat	5 pounds	
	DEET Repellent	288 ounces	
	D Phenothrin 2%	240 cans	
	Dursban, PT 270	6 cans	
	Dursban, PT 270	45 pounds	
	Dursban, 4E	7 gallons	
	Dursban, 10 CR	20 pounds	
	FICAM 2-1/2 G	16 pounds	
	FICAM Dust	30 pounds	
	FICAM W	5 pounds	
	FLYTEK, FLYBAIT	30 pounds	
	Fumasol Bait Stations	48 pounds	
	Fumitoxic	5 pounds	
	FVS Insect Fogger	60 cans	
	Gencor 9%	90 fluid ounces	
	Insect Repellent	400 ounces	
	Killmaster II	12 gallons	
	Logic	75 pounds	
	MAKI	33 pounds	
	Malathion ULV	35 gallons	
	Orthene	8 gallons	
	Orthene TnT	32 pounds	
	Perma Dust, PT-240	87 cans	
	Phostoxin (fumigant)	5 cans	
	PIVAL	5 pounds	
	Plus Pyrethrum, PT-565	33 cans	

Table 3-6. Pesticide Storage
Page 2 of 2

Facility	Type	Quantity	Specific Property Category
1213 (Continued)	Precor, 5 E	29 fluid ounces	
	Pyrenone	25 pounds	
	Rodent Baiters	8 cases	
	Roost No More	20 gallons	
	Roundup (concentrate)	14 gallons	
	Roundup (ready-use)	5 gallons	
	Safrotin EC	2.25 gallons	
	Sevin 80S	70 pounds	
	Skunk Sorb	24 ounces	
	Skunk Sorb (space)	10 gallons	
	Snap Rodent Traps	70 boxes	
	Spray-N-Stay	24 gallons	
	Sticky Roach Traps	1 case	
	Surflan	12 gallons	
	Tempo 20 W	30 pounds	
	Trap, glueboard	72	
	Tribute	18 gallons	
	Trimec, Classic	21 gallons	
	Trimec, Southern	2 gallons	
	Valent; X-77 Spreader	24 gallons	
	Wasp Freeze	21 cans	
1339	Arsenal	22 fluid ounces	2
	Bueno 6	12.5 gallons	
	Diquat	2.25 gallons	
	Embark	0.25 gallons	
	Fusilade 2000	118 fluid ounces	
	Rodeo	3 gallons	
	Round-up (concentrate)	13 gallons	
	Surflan	12 gallons	
	Trimec, Classic	21 gallons	

Note: Information on duration of storage was unavailable.

Table 3-7. Facilities Surveyed for Asbestos
Page 1 of 6

Facility (Use)	Year of Construction	Asbestos-Containing Material (ACM) Present
208 (Pavement and Ground Facility)	1972	Exterior shingles
209 (Pavement and Ground Facility)	1972	Exterior shingles
212 (Golf Equipment)	1973	No ACM identified
213 (Golf Equipment)	1977	No ACM identified
234 (Pavement and Ground Facility)	1988	Ceiling tile, sheetrock
240 (Security Police Kennel)	1956	No ACM identified
241 (Kennel Support)	1956	Floor tile, sheetrock
260 (Family Housing)	1938	Insulation
272 (Riding Stables)	1983	Exterior shingles, sheetrock
292 (Unknown)	Unknown	Interior wall
390 (Child Care Center)	1951	Boiler insulation, hot water tank insulation, floor tile
391 (Airport Surveillance Radar)	1978	Floor tile, sheetrock
1015 (Test Cell)	1968	Floor tile, ceiling tile, furnace material, mechanical equipment
1020 (Traffic Gate)	1951	Floor tile, exterior shingles
1021 (Support Structure)	1986	No ACM identified
1040 (Water Fire Pump)	1955	Insulation
1046 (Maintenance Dock)	1982	Floor tile, sheetrock
1048 (Maintenance Dock)	1958	Flexible duct, boiler flue, sheetrock, ceiling tile, floor tile, exterior shingles
1049 (Maintenance Dock)	1958	Boiler flue, flexible duct, sheetrock
1050 (Maintenance Hangar)	1955	Unspecified pipe, boiler flue, mechanical equipment, steam piping and fitting, unspecified fitting, wall transite, exterior material, furnace piping and fitting, ceiling tile, floor tile, sheetrock (wall and ceiling), duct joint tape, flexible duct
1055 (Avionics)	1956	Mechanical equipment, steam piping and fitting, water pipe and fitting insulation, sheetrock, furnace piping and fitting, chilled water system fitting, floor tile, ceiling tile, wall transite, exterior shingles
1058 (Petroleum Operations)	1986	Floor tile, sheetrock
1060 (General Purpose Aircraft)	1986	Sheetrock, floor tile, ceiling tile
1062 (Petroleum Operations)	1986	Ceiling tile, sheetrock, rolled sheet-type roof
1063 (Petroleum Operations)	1986	Floor tile, ceiling tile, sheetrock
1082 (Water Supply)	1942	Floor tile, sheetrock, ceiling tile
1101 (Petroleum Operations)	1971	Sheetrock, floor tile, ceiling tile, rolled sheet-type roof
1149 (Headquarters Wing)	1987	Sheetfloor, sheetrock

Table 3-7. Facilities Surveyed for Asbestos
Page 2 of 6

Facility (Use)	Year of Construction	Asbestos-Containing Material (ACM) Present
1170 (Petroleum Operations)	1957	Sheetrock, floor tile
1172 (Petroleum Operations)	1986	Sheetrock, ceiling tile, exterior shingles
1189 (Headquarters Group)	1942	Wall transite, sheetrock, floor tile, ceiling tile, exterior shingles
1214 (Maintenance Shop)	1942	Exterior material, sheetrock, ceiling glued tile, ceiling tile, floor tile, exterior shingles
1215 (Administration)	1981	Sheetrock, ceiling tile, floor tile
1217 (Maintenance)	1981	Ceiling tile, floor tile, sheetrock
1219 (Offices)	1981	Sheetrock, floor tile, ceiling tile
1229 (Storage Warehouse)	1942	Piping, sheetrock, wall transite, floor tile
1231 (Storage Warehouse)	1989	Mechanical equipment (boiler), steam piping and fitting, sheetrock, wall transite, water fitting insulation, rolled sheet-type roof, exterior insulation, refrigeration piping and fitting, ceiling insulation, floor tile, ceiling tile
1233 (Warehouse Publications)	1942	Wall transite, sheetrock, floor tile, ceiling tile
1236 (Warehouse Packing)	1972	Ceiling tile, sheet rock, floor tile
1237 (Warehouse Supply)	1942	Wall transite, floor tile, sheetrock, exterior shingles
1238 (Warehouse Retail)	1942	Wall transite, exterior shingles, floor tile
1241 (Laundry Supply)	1945	Wall transite, sheet floor, sheetrock, floor tile, exterior shingles
1251 (Base Supply)	1953	Exterior material, ceiling tile, sheetrock, floor tile, glued wall tile, boiler flue, glued ceiling tile
1267 (Hazard Storage)	1978	Ceiling transite, wall transite
1270 (Hazard Storage)	1955	Exterior shingles, sheetrock
1300 (Main Gate)	1955	Floor tile
1301 (Bus Shelter)	1983	Rolled sheet-type roof
1302 (Main Office)	1955	Water pipe insulation, sheetrock, ceiling tile
1320 (Maintenance Shop)	1953	Wall transite, ceiling transite, ceiling tile, floor tile, sheetrock, water pipe and fitting insulation, rolled sheet-type roof, piping transite
1330 (Contract Office)	1954	Ceiling transite, furnace fitting, pipe insulation, fitting insulation, ceiling tile, sheetrock, floor tile
1332 (Entrance Gate)	1955	Floor tile
1336 (Maintenance Trailer)	1972	Floor tile
1337 (White House Communications)	1984	Sheetrock, ceiling tile, floor tile

Table 3-7. Facilities Surveyed for Asbestos
Page 3 of 6

Facility (Use)	Year of Construction	Asbestos-Containing Material (ACM) Present
1348 (Small Arms Maintenance)	1979	Sheetrock, ceiling tile, floor tile
1360 (Supply Warehouse)	1963	Sheetrock, floor tile, ceiling tile
1370 (Supply Warehouse)	1962	No ACM identified
1372 (Supply Warehouse)	1973	No ACM identified
1401 (Supply Warehouse)	1958	Ceiling tile
1402 (Weapons Systems Shop)	1958	Ceiling tile
1403 (Shop Storage)	1958	No ACM identified
1404 (Supply Warehouse)	1958	Ceiling tile, sheetrock, floor tile
1405 (Maintenance Dock)	1958	No ACM identified
1407 (Aircraft Shop)	1986	Ceiling tile, floor tile
1410 (Aircraft Shop)	1946	Steam piping and fitting, duct, flexible duct, ceiling tile, floor tile, sheetrock, unspecified debris, roof-tar on concrete
1412 (Unknown)	Unknown	Heater corrugated insulation
1414 (Aircraft Shop)	1942	Wall transite, sheetrock, flexible duct, floor tile, ceiling tile, exterior material
1416 (Survey Equipment Shop)	1942	Boiler & pipe insulation, overhead duct wall transite, air duct insulation, exterior shingle
1425 (Fire Station)	1955	Wall transite, ceiling tile, water tank and pipe insulation
1427 (Ground Controlled Approach RAPCON Support Building)	1952	Heater insulation, joints, latrine
1428 (Special Operations)	1942	Exterior shingles
1430 (Squadron Operations)	1946	Furnace fitting, sheetrock, ceiling tile, floor tile, rolled sheet-type roof
1432 (Dormitory)	Unknown	Insulation on pipes & boilers
1445 (Field Training)	1959	Flexible duct, mechanical equipment (boiler), ceiling tile, sheetrock, floor tile
1450 (Data Processing Installation)	1983	Ceiling tile, sheetrock, floor tile
1500 (Library)	1943	Floor and ceiling pipe insulation
1504 (Special Operations)	1953	Hot water and joint pipe insulation
1510 (Wing Headquarters)	1959	Boiler room duct and pipe insulation, floor tile, mechanical equipment
1515 (Security Police Operations)	1942	Pipe insulation
1518 (Exchange Service Station)	1972	Ceiling tiles possibly ACM
1520 (Dormitory)	1983	Mechanical equipment, tank and piping
1521 (Dormitory)	1984	Exhaust flue, tank and duct insulation possible ACM
1522 (Dormitory)	1984	Exhaust flue, tank and duct insulation possible ACM
1525 (Base Personnel Office)	1953	Transite pipes and overhead piping

RAPCON = Radar Approach Control.

Table 3-7. Facilities Surveyed for Asbestos
Page 4 of 6

Facility (Use)	Year of Construction	Asbestos-Containing Material (ACM) Present
1550 (Dining Hall)	1953	Water pipe
1560 (Headquarters)	1951	Water fitting insulation, wall and ceiling tiles
1561 (Traffic Management Facility)	1951	Ceiling material, tank insulation, pipe insulation
1562 (Wing Headquarters)	1951	Boiler room insulation, pipe fitting
1563 (Group Headquarters)	1951	Pipe insulation
1564 (Disaster Preparation)	1951	Mechanical room wall, pipe fitting
1615 (Specified Headquarters)	1943	Boiler room insulation
1617 (Training Aid Shop)	1953	Wall transite, wall and ceiling material, floor tiles
1619 (Training Aid Shop)	1942	Exterior shingles
1628 (Aircraft Support Equipment Shop Storage Facility)	1981	Ceiling tiles possible ACM
1630 (Squadron Operations)	1945	Sheetrock, shingled roof, wall and ceiling material
1642 (Weapon Systems Shop)	1953	Tile floor, ceiling tiles, sheetrock
1648 (Weapons and Release System Shop)	1981	Insulation and sheetrock
1654 (Reserve Forces Training Facility)	1963	Pipe insulation
1720 (Wing Headquarters)	1953	Wall tile, pipe and fittings, pipe insulation
1730 (Communications Facility)	1951	Pipe and fittings
1739 (Squadron Operations)	1981	Ceiling tile
1740 (Squadron Operations)	1990	Exterior material, ceiling tile
1766 (Base Package Store)	1986	Wall and ceiling material, ceiling tile, floor tile
1780 (Specified Headquarters)	1969	Floor tile, wall texture, acoustic tile
1792 (Flight Simulator Training)	1978	Floor tile, sealing tape
1805 (Swimmers' Bath House)	1949	Pipe and tank insulation
1810 (Gymnasium)	1965	Pipe and tank insulation
1820 (Recreation Center)	1953	Wall transite, ceiling tiles, floor tiles, wall insulation, boiler room air handler, pipe fittings and insulation
1825 (Education Center)	1978	Floor tiles
1826 (Education Center)	1978	Floor tiles
1827 (Education Center)	1979	Floor tiles
1828 (Education Center)	1979	Floor tiles
1829 (Education Center)	1981	Floor tiles
1830 (Education Center)	1981	Sheetrock, floor tiles

Table 3-7. Facilities Surveyed for Asbestos
Page 5 of 6

Facility (Use)	Year of Construction	Asbestos-Containing Material (ACM) Present
1835 (Exchange Service Outlet)	1942	Ceiling tiles, floor tiles, pipe and fittings insulation
1837 (Exchange Service Outlet)	1942	Possible ACM in exterior shingles
1838 (Chapel)	1942	Pipe insulation
1840 (Clothing Store)	1978	Floor tile, ceiling tile, sheetrock
1845 (Theater)	1970	Pipe fittings, floor tiles, pipe insulation, tank, asphalt & gravel, sheetrock
2570 (Non-Commissioned Officers' Dining Hall)	1957	Tank and pipe insulation, steam line insulation
2573 (Bath House)	1962	Pipe fittings, tank, asphalt & gravel
3000 (Composite Medical Clinic)	1987	Mechanical equipment, floor insulation, pipe insulation, pipe fittings
3001 (Steam Facility)	1958	Hot and cold water pipes, air handler, hot water tank, pipe insulation
3100 (Animal Clinic)	1956	Sheetrock, floor tiles, asphalt & gravel
3102 (Officers' Dining Hall)	1942	Exterior pipe insulation
3103 (Dining Hall)	1951	Wall transite, roof, sheetrock, floor tiles
3106 (Swimmers' Bath House)	1952	Transite walls
3110 (Visiting Officers' Quarters)	1969	Ceiling, storage tank and insulation
3113 (Temporary Housing)	1984	Possible-boiler room
3138 (Social Activity Facility)	1984	Sheetrock, ceiling tile, floor tile
3139 (Air Force Clinic)	1982	Floor tiles
3140 (Temporary Housing)	1959	Steamline insulation, ceiling
3153 (Pharmacy)	1988	Shingle roof
3260 (Family Housing Appropriated)	1960	Pipe insulation, attic transite flue
3335 (Recreation Facility)	1961	Floor tiles
3336 (MWR Shoreline Inn)	Unknown	Floor tiles
3337 (MWR Storage)	1979	Sheetrock, floor tiles
3340 (Recreational Building)	1959	Sheetrock, floor tile, roof
3341 (Readiness Crew)	1976	Sheetrock, floor & ceiling tiles
3346 (Readiness Crew)	1986	Roof, floor, sheetrock
4102 (Airport Surveillance Radar)	1982	Floor tile, asphalt & gravel
4115 (TACAN Station)	Unknown	Exterior tiles, shingles
4143 (Communications Transmitter)	1964	Duct, fitting insulation, sheetrock, floor tiles, asphalt & gravel
4150 (Hydrant Fuel Facility)	1954	Floor tiles, duct, asphalt & gravel
4152 (Hydrant Fuel)	1954	Floor tiles, asphalt & gravel
4157 (Maintenance Shop)	1984	Ceiling and floor tiles, sheetrock
4160 (Storage)	1977	Floor tiles
4170 (Unknown)	Unknown	Roof material, tiles

MWR = Morale, Welfare, and Recreation.
TACAN = Tactical Air Navigation.

Table 3-7. Facilities Surveyed for Asbestos
Page 6 of 6

Facility (Use)	Year of Construction	Asbestos-Containing Material (ACM) Present
4171 (Electric Power Generator Plant)	1978	Possible ACM on vibration joint
4173 (Security Guard Tower)	1983	Pipe insulation
4175 (Readiness Crew Surveillance)	1961	Pipe insulation
4180 (Reserve Forces Team Building)	1981	Floor & ceiling tiles, sheetrock, asphalt & gravel
4215 (Surveillance Inspection Shop)	1984	Floor & ceiling tiles, sheetrock
4217 (Resource Forces Team Building)	1984	Floor & ceiling tiles, sheetrock, asphalt & gravel
8500 (Safety, Control and Identification)	1956	Sheetrock, piping, fittings, floor tiles, asphalt & gravel
8502 (Water Supply Building)	1956	Pipe insulation
8503 (Inspection Shipping)	1956	Unknown
8505 (Electric Power Station)	1956	Pipe insulation
8506 (Ammunition Storage)	1956	Roof
8514 (Munitions Shop)	1956	Piping, asphalt & gravel
9999 (Wherry Housing)	Unknown	Insulation

Note: This list does not include those buildings assigned as family housing.

Source: Carswell AFB, 1992a; Galson Corporation, 1993.

Table 3-8. History of Transformers
Page 1 of 3

Pole/Pad Location	PCBs (ppm)	Status
1-21	90	Removed - date unknown
1-27	78	Removed - date unknown
1-28	259	Removed - date unknown
1-33	60	Removed - date unknown
2-3	51	Removed - date unknown
2-5	108	Removed - date unknown
2-15	193	Removed - date unknown
2-37	436	Removed - date unknown
2-38	603	Removed - date unknown
2-39	252	Removed - date unknown
2-53	58	Removed - date unknown
2-54	61	Removed - date unknown
2-63	82	Removed - date unknown
2-70	472	Removed - date unknown
3-10	288	Removed - date unknown
3-11	528	Removed - date unknown
3-12	328	Removed - date unknown
3-13	947	Removed - date unknown
3-14	538	Removed - date unknown
3-15	164	Removed - date unknown
3-32	318	Removed - date unknown
3-33	215	Removed - date unknown
3-34	215	Removed - date unknown
3-65	1542	Unknown
3-72	166	Removed - date unknown
3-73	150	Removed - date unknown
3-74	99	Removed - date unknown
3-81	96	Unknown
3-96	784	Unknown
3-97	477	Unknown
3-100	182	Removed - date unknown
3-107	187	Removed - date unknown
3-113	80	Removed - date unknown
3-119	350	Removed - date unknown
3-129	183	Removed - date unknown
3-147	201	Removed - date unknown

PCBs = Polychlorinated biphenyls.
ppm = Parts per million.

Table 3-8. History of Transformers
Page 2 of 3

Pole/Pad Location	PCBs (ppm)	Status
3-148	648	Removed - date unknown
3-149	3211	Unknown
3-150	760	Removed - date unknown
3-160	716	Unknown
3-162	188	Unknown
3-163	290	Unknown
3-164	162	Unknown
3-166	519	Unknown
3-167	574	Unknown
3-168	477	Unknown
4-1A	251	Unknown
4-19	94	Removed - date unknown
4-20	122	Removed - date unknown
4-43	358	Unknown
4-60	66	Unknown
4-65	58	Unknown
4-78	662	Unknown
4-86	88	Unknown
4-107	211	Unknown
5-62	61	Unknown
5-73	133	Unknown
5-76	242	Unknown
6-2	1324	Unknown
7-10	281	Unknown
7-11	281	Unknown
7-12	306	Unknown
7-14		Unknown
7-40	193	Unknown
7-42		Unknown
7-42	3974	Unknown
7-44	158	Removed - date unknown
7-47	56	Unknown
7-49	479	Unknown
8-4	337	Removed - date unknown
8-44	465	Removed - date unknown
Facility 4111	334	Removed - date unknown
Facility 4143	50	Unknown

PCBs = Polychlorinated biphenyls.
ppm = Parts per million.

Table 3-8. History of Transformers
Page 3 of 3

Pole/Pad Location	PCBs (ppm)	Status
8500-6	98	Removed - date unknown
8500-13	70	Removed - date unknown
8500-16	103	Removed - date unknown
8500-38	114	Removed - date unknown
8500-39	121	Removed - date unknown
8500-40	104	Removed - date unknown
North of Runway	53	Unknown
Sub Station	51	Removed - date unknown
Sub Station	140	Removed - date unknown
Sub Station	670	Removed - date unknown
	980	
Sub Station	100	Removed - date unknown
Sub Station	94	Removed - date unknown
Sub Station	50	Removed - date unknown
TU-6	64	Removed - date unknown
TU-30	325	Removed - date unknown
TU-32	112	Unknown
Unknown	112	Unknown
	92	

PCBs = Polychlorinated biphenyls.
ppm = Parts per million.

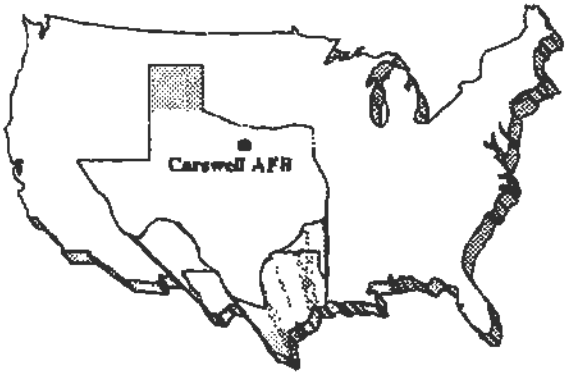
Table 3-9. Facilities with Radon Levels Equal to or above 4 pCi/l

Facility	Address	Radon level (pCi/l)
539	328 Tinker	5.7
484	612 General Arnold	5.5
485	608 General Arnold	5.1
611	224 General Arnold	4.5
602	328 General Arnold	4.4
632	217 Tinker	4.3
666	6613 Styles	4.0
3110	Transient Living Facility	3.8
613	216 General Arnold	3.8
1520	Dormitory	3.7
529	420 General Arnold	3.7
607	308 General Arnold	3.7
1520	Dormitory	3.6
3110	Transient Living Facility	3.6
400	808 General Arnold	3.6
486	604 General Arnold	3.5
623	200 Tinker	3.5
667	6609 Styles	3.5
546	6704 Duncan	3.4
600	336 General Ramey	3.4
604	320 General Arnold	3.4
934	6405 Ascol Drive	3.4
606	312 General Arnold	3.3
614	212 General Arnold	3.3
643	312 Tinker	3.3

Note: Radon concentration is greater than the lower 95% confidence level for 4.0 pCi/l.
pCi/l = picocuries per liter.

Source: U.S. Air Force, 1992c.

THIS PAGE INTENTIONALLY LEFT BLANK



CHAPTER 4

4.0 FINDINGS FOR OFF-BASE PROPERTIES

CERCLA Section 120(h), as amended, requires that a physical inspection be conducted of properties adjacent to the subject real property, to the extent permitted by owners and operators of such property. As mentioned in Section 1.2, this includes those properties contiguous to the boundaries of the base, as well as those properties relatively near the base that could pose significant environmental concern or impact to the base. All reasonably obtainable federal, state, and local government records were reviewed for each contiguous property where there has been a release of any hazardous substance and/or petroleum derivative, and where activities on that property are likely to cause or contribute to a release or threatened release of any hazardous substance or petroleum product or its derivatives on the real property. The following federal and state data bases were reviewed. These data bases were queried based on the minimum search distances recommended by the American Society for Testing and Materials guidelines for conducting Phase I site assessments (American Society for Testing and Materials, 1993).

Two data bases (federal NPL and federal RCRA Treatment, Storage, and Disposal facilities list) were queried beyond the minimum search distance recommended. Distances searched for each data base are provided below.

- Federal NPL - 2.5 miles
- Federal Comprehensive Environmental Response, Compensation, and Liability Information System list - 1.0 mile
- Federal RCRA Treatment, Storage, and Disposal facilities list - 2.5 miles
- Federal RCRA generators list - contiguous properties
- State lists of hazardous waste sites - 1.0 mile
- State landfill and/or solid waste disposal site lists - 0.5 mile
- State leaking UST lists - 0.5 mile
- State registered UST lists - contiguous properties

One NPL site (Table 4-1), five state leaking UST sites (Table 4-2), and one RCRA generator site (Table 4-3) were found within the Carswell AFB search area. These sites are shown in Figure 4-1 (oversized).

4.1 LAND USES

There are 230 contiguous properties around Carswell AFB (see Figure 4-1). Table 4-4 lists the size and land use of each parcel, and the type of survey conducted for each parcel. The total acreage for each parcel is listed; acreage within the study area (contiguous to the base within one-quarter mile of the base boundary) is also provided.

4.2 PROPERTY INSPECTIONS

All contiguous off-base properties were visually inspected. This inspection consisted of a "windshield" survey of the property. When permitted by the owner, contiguous off-base properties were physically inspected; this entailed a visit to the property, an interview with the property owner/operator (when present), and a walk-around of the property. No sampling of any kind was conducted. Unless otherwise noted, no visual signs of contamination or environmental concern were identified. A description of each parcel is provided in Table 4-4 by property identification number, and properties are shown Figure 4-1.

A total of 242 properties contiguous to the base boundary, including properties contiguous to off-site parcels, were evaluated in the off-base land use analysis. Based on the records search and site inspections of these properties conducted for this EBS, there are no areas on Carswell AFB where it is known that contamination has resulted from activities on any of the off-base properties, with the exception of the TCE plume originating at Air Force Plant #4. Although some heavy petroleum staining was observed during inspection of contiguous properties, primarily at automobile repair and maintenance facilities on the west side of the base (see Table 4-4), no evidence of contamination that would affect base property was noted. No off-base properties are known to be contaminated as a result of activities on Carswell AFB property. According to base personnel, a possible fuel leak into the Trinity River, believed to have originated on the base, occurred in the past. This leak was not apparent during the off-base property inspection, and may have been eliminated by on-base IRP remediation activities.

217085

Figure 4-1. Adjacent Property Map (Oversized)

231 7035

THIS PAGE INTENTIONALLY LEFT BLANK

Figure 4-1 is Missing From the Official Government Document

Table 4-1. National Priorities List Sites

MAP ID	Facility	Address	Wastes Generated
1	Air Force Plant #4 (General Dynamics)	Grants Lane Fort Worth, TX 76108	Halogenated and aromatic organic compounds, volatile organic compounds (VOCs), heavy metals including chromium, lead, and arsenic, and alpha and beta radiation

Table 4-2. State Leaking UST Sites

MAP ID	Facility	Address	Status
2	Western Company of N. America	7700 Wyatt Drive White Settlement, TX 76108-2530	Initial directives issued; awaiting initial response
3	Western Company of N. America	7700 Wyatt Drive White Settlement, TX 76108-2531	Final concurrence issued; case closed
4	White Settlement ISD-Tax Office	700 Odie Drive White Settlement, TX 76108-2832	Final concurrence issued; case closed
5	Auto Locators	800 South Cherry Lane White Settlement, TX 76108-2505	Incident reported; initial directives not yet issued
6	Walmart Hypermart USA Convenience	1409 South Cherry Lane White Settlement, TX 76108-3622	Quarterly monitoring report received; review pending

Table 4-3. RCRA Generator Sites

MAP ID	Facility	Address	Waste Type
7	Western Company of N. America	7609 White Settlement Road Fort Worth, TX 76108	Ignitable, corrosive, and reactive solid wastes

Table 4-4. Contiguous Property Parcel Descriptions
Page 1 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[a]		Parcel Description
			Visual Inspection	Physical Inspection	
1	20	20	10/20/93		Public/recreation; private camp.
2	13	13	10/20/93		Vacant; wooded.
3	5	5	10/20/93		Public/recreation; private resort.
4	0.5	0.5	10/20/93		Vacant; vacant.
5	1.6	1.6	10/20/93		Vacant; vacant.
6	0.7	0.7	10/15/93	10/15/93	Public/recreation; flood control.
7	0.6	0.6	10/15/93	10/15/93	Public/recreation; flood control.
8	1.8	1.8	10/15/93	10/15/93	Public/recreation; flood control.
9	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
10	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
11	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
12	0.6	0.6	10/15/93	10/15/93	Public/recreation; flood control.
13	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
14	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
15	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
16	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
17	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
18	6	6	10/15/93	10/15/93	Public/recreation; flood control.
19	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
20	2.9	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
21	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
22	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
23	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
24	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
25	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
26	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
27	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
28	0.1	0.1	10/15/93	10/15/93	Public/recreation; flood control.

Note: (a) Dates given as month/day/year.

Table 4-4. Contiguous Property Parcel Descriptions
Page 2 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[a]		Parcel Description
			Visual Inspection	Physical Inspection	
29	0.2	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
30	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
31	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
32	Unknown	Unknown	10/15/93	10/15/93	Public/recreation; flood control.
33	0.2	0.2	10/15/93	10/15/93	Public/recreation; flood control.
34	7.7	7.7	10/18/93	10/18/93	Residential; mobile home park.
35	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
36	4.2	4.2	10/16/93	10/16/93	Public/recreation; flood control.
37	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
38	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
39	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
40	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
41	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
42	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
43	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
44	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
45	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
46	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
47	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
48	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
49	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
50	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
51	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
52	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
53	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
54	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
55	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
56	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.

Table 4-4. Contiguous Property Parcel Descriptions
Page 3 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[a]		Parcel Description
			Visual Inspection	Physical Inspection	
57	0.2	0.2	10/16/93	10/16/93	Public/recreation; flood control.
58	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
59	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
60	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
61	Unknown	Unknown	10/16/93	10/16/93	Public/recreation; flood control.
62	0.1	0.1	10/16/93	10/16/93	Public/recreation; flood control.
63	0.2	0.2	10/16/93	10/16/93	Public/recreation; flood control.
64	0.7	0.7	10/16/93	10/16/93	Public/recreation; flood control.
65	0.3	0.3	10/16/93	10/16/93	Public/Recreation; flood control.
66	0.3	0.3	10/16/93	10/18/93	Public/recreation; flood control.
67	0.3	0.3	10/16/93	10/16/93	Public/recreation; flood control.
66	0.3	0.3	10/18/93	10/16/93	Public/recreation; flood control.
69	17	17	10/16/93	10/16/93	Public/recreation; flood control.
70	Unknown	Unknown	10/21/93	10/21/93	Public/recreation; flood control.
71	Unknown	Unknown	10/21/93	10/21/93	Public/recreation; flood control.
72	Unknown	Unknown	10/21/93	10/21/93	Public/recreation; flood control.
73	1.5	1.5	10/21/93	10/21/93	Public/recreation; flood control.
74	Unknown	Unknown	10/21/93	10/21/93	Public/recreation; flood control.
75	Unknown	Unknown	10/21/93	10/21/93	Agriculture; single house with pasture.
76	Unknown	Unknown	10/21/93	10/21/93	Public/recreation; flood control.
77	0.1	0.1	10/21/93	10/21/93	Public/recreation; flood control.
78	Unknown	Unknown	10/21/93		Vacant; vacant.
79	2.9	2.9	10/20/93		Residential; single-family residence on wooded parcel.
80	1.5	1.5	10/20/93		Agriculture; horse pasture and woods.
81	1.8	1.6	10/20/93		Agriculture; horse pasture.
82	0.5	0.5	10/20/93		Residential; single-family residence.
83	0.5	0.5	10/20/93		Agriculture; horse pasture.
64	6	6	10/14/93		Agriculture; horse pasture.

Table 4-4. Contiguous Property Parcel Descriptions
Page 4 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[e]		Parcel Description
			Visual Inspection	Physical Inspection	
85	0.5	0.5	10/14/93	10/14/93	Residential; single-family residence, landscaped, with a septic system.
86	0.5	0.5	10/20/93		Residential; single-family residence, landscaped, with a septic system.
87	0.5	0.5	10/20/93		Residential; single-family residence, landscaped, with a septic system.
88	0.5	0.5	10/14/93	10/14/93	Residential; single-family residence, landscaped, with a septic system.
89	0.5	0.5	10/14/93	10/14/93	Residential; single-family residence, landscaped, with a septic system.
90	0.5	0.5	10/14/93	10/14/93	Residential; single-family residence, landscaped, with a septic system.
91	0.5	0.5	10/20/93		Residential; single-family residence, landscaped, with a septic system.
92	0.5	0.5	10/20/93		Residential; single-family residence, landscaped, with a septic system.
93	0.4	0.4	10/19/93		Vacant; vacant.
94	0.2	0.2	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.
95	0.3	0.3	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.
96	0.2	0.2	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.
97	0.2	0.2	10/14/93	10/14/93	Residential; single-family residence, landscaped with potential transite siding.
98	0.2	0.2	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.
99	0.2	0.2	10/14/93	10/14/93	Residential; single-family residence, landscaped, with potential transite siding.
100	0.2	0.2	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.

Table 4-4. Contiguous Property Parcel Descriptions
Page 5 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[a]		Parcel Description
			Visual Inspection	Physical Inspection	
101	0.2	0.2	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.
102	0.2	0.2	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.
103	0.2	0.2	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.
104	0.2	0.2	10/19/93		Residential; single-family residence, landscaped.
105	0.2	0.2	10/14/93	10/14/93	Residential; single-family residence, landscaped, with potential transite siding.
106	0.1	0.1	10/14/93	10/14/93	Residential; single-family residence, landscaped.
107	Unknown	Unknown	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.
108	Unknown	Unknown	10/19/93		Residential; single-family residence, landscaped.
109	0.2	0.2	10/14/93	10/14/93	Residential; single-family residence, landscaped, with potential transite siding.
110	0.2	0.2	10/15/93	10/15/93	Residential; single-family residence, landscaped, with potential transite siding.
111	0.2	0.2	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.
112	0.2	0.2	10/14/93	10/14/93	Residential; single-family residence, landscaped, with potential transite siding.
113	0.2	0.2	10/19/93		Residential; single-family residence, landscaped, with potential transite siding.
114	Unknown	Unknown	10/14/93	10/14/93	Residential; single-family residence, landscaped, with potential transite siding.
115	Unknown	Unknown	10/14/93	10/14/93	Residential; multi-family dwelling, landscaped.
116	98	98	10/20/93		Public/recreation; country club golf course, with a 1500-gallon gasoline AST.
117	2.4	2.4	10/20/93		Vacant; electrical utility right-of-way.
118	1.4	1.4	10/20/93		Vacant; wooded with creek.
119	Unknown	Unknown	10/20/93		Vacant; wooded with creek.

Table 4-4. Contiguous Property Parcel Descriptions
Page 6 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[a]		Parcel Description
			Visual Inspection	Physical Inspection	
120	0.8	0.8	10/20/93		Vacant; wooded with creek.
121	1.0	1.0	10/20/93		Residential; single-family residence, landscaped, with a septic system.
122	0.2	0.2	10/20/93		Residential; landscaped lawn area.
123	0.2	0.2	10/20/93		Residential; single-family residence, landscaped.
124	0.6	0.6	10/20/93		Vacant; vacant.
125	2.9	2.9	10/14/93	10/14/93	Institutional; church.
126	1.2	1.2	10/15/93	10/15/93	Residential; single-family residence, landscaped, with a septic system.
127	3.4	3.4	10/15/93	10/15/93	Residential; single-family residence, landscaped, with a septic system.
128	4.5	4.5	10/20/93		Residential; single-family residence, landscaped and wooded with creek.
129	2.6	2.6	10/18/93	10/18/93	Residential; single-family residence with out-buildings, landscaped, with horse pasture, woods, and creek. Transite siding on a shed. Four 55-gallon drums: 1 empty, 1 one-quarter full (contents unknown), 1 full (contents unknown), and 1 full diesel. Two 5-gallon cans of hydraulic fluid, 1 empty. Five lead-acid batteries.
130	2.6	2.6	10/18/93	10/18/93	Residential; Barn with horse pasture, wooded area with creek.
131	3.8	3.8	10/18/93	10/18/93	Residential; single-family residence with separate guest house with a septic system, landscaped and wooded, with a creek.
132	0.4	0.4	10/15/93	10/15/93	Vacant; vacant.
133	4.0	4.0	10/20/93		Vacant; wooded.
134	44	44	10/20/93		Vacant; wooded.
135	2.8	2.8	10/18/93		Vacant; vacant.
136	Unknown	Unknown	10/15/93		Vacant; vacant.
137	7.1	7.1	10/15/93		Vacant; vacant.

Table 4-4. Contiguous Property Parcel Descriptions
Page 7 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[a]		Parcel Description
			Visual Inspection	Physical Inspection	
138	2.1	2.1	10/20/93		Vacant; powerline right-of-way.
139	Unknown	Unknown	10/20/93		Vacant; vacant.
140	13	13	10/20/93		Vacant; vacant.
141	1.3	1.3	10/21/93		Commercial; shopping center and parking lot.
142	5	5	10/21/93		Commercial; department store and parking lot.
143	1.1	1.1	10/21/93		Commercial; parking lot in shopping center.
144	1.2	1.2	10/21/93		Commercial; restaurant and parking lot.
145	0.9	0.9	10/21/93		Commercial; parking lot in shopping center.
146	0.9	0.9	10/21/93		Commercial; restaurant.
147	0.6	0.6	10/21/93		Commercial; restaurant and parking lot.
148	0.5	0.5	10/14/93	10/14/93	Commercial; restaurant.
149	Unknown	Unknown	10/19/93	10/19/93	Commercial; shopping center and parking lot.
150	Unknown	Unknown	10/15/93	10/15/93	Vacant; vacant.
151	15	15	10/15/93	10/15/93	Industrial; former highway maintenance yard. Heavy oil stain under vehicle ramp. Minor oil stain on floor of former paint shop. Former hazardous material storage area. Debris pile including yard waste, metal, and tires. Stockpiles of sand, gravel, steel beams, and concrete parking lot stoppers. Building foundation with asbestos tiles. 5-gallon can containing oil-water sludge.
152	1.1	1.1	10/15/93	10/15/93	Industrial; former highway maintenance yard. Vacant, with some steel beams and metal culverts stockpiled.
153	2.0	2.0	10/15/93		Industrial; auto salvage yard with cars, boats, and motorcycles.
154	0.4	0.4	10/15/93	10/15/93	Vacant; vacant with some tires, and wood, concrete, and metal debris.
155	1.5	1.5	10/15/93	10/15/93	Vacant; vacant.
156	17	17	10/18/93		Commercial; store with parking lot.
157	0.2	0.2	10/18/93	10/18/93	Vacant; vacant with some trash.
158	0.2	0.2	10/18/93		Residential; single-family residence, landscaped.

Table 4-4. Contiguous Property Parcel Descriptions
Page 8 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[a]		Parcel Description
			Visual Inspection	Physical Inspection	
159	0.2	0.2	10/18/93		Vacant; vacant.
160	0.2	0.2	10/18/93		Institutional; church parking lot.
161	1.2	1.2	10/18/93		Institutional; church.
162	1.2	1.2	10/18/93	10/18/93	Institutional; church.
163	0.2	0.2	10/18/93	10/18/93	Vacant; vacant.
164	0.2	0.2	10/18/93	10/18/93	Residential; single-family residence, landscaped.
165	0.2	0.2	10/18/93	10/18/93	Vacant; vacant.
166	0.1	0.1	10/18/93	10/18/93	Residential; single-family residence, landscaped.
167	0.1	0.1	10/20/93		Residential; single-family residences, landscaped.
168	0.2	0.2	10/20/93	10/20/93	Residential; single-family residence, landscaped, with potential transite siding.
169	0.2	0.2	10/19/93		Vacant; vacant.
170	0.9	0.9	10/19/93		Commercial; skating rink.
171	4.3	4.3	10/20/93	10/20/93	Industrial; metal casting foundry and cultured marble production shop. Several 55-gallon drums, probably empty.
172	5	5	10/20/93		Residential; trailer park, landscaped.
173	0.9	0.9	10/20/93		Vacant; vacant.
174	0.2	0.2	10/20/93		Industrial; cabinetry shop, with one 55-gallon drum, contents unknown.
175	0.1	0.1	10/20/93	10/20/93	Industrial; offices.
176	0.4	0.4	10/20/93	10/20/93	Industrial; cabinetry shop, uses water-based adhesives.
177	1.2	1.2	10/19/93		Industrial; water production area. Water well and water storage UST. Paint and chlorine cylinders stored on site.
178	Unknown	Unknown	10/19/93		Industrial; water wells.
179	2.7	2.7	10/19/93	10/19/93	Industrial; railroad track (unused).
180	0.6	0.6	10/19/93	10/19/93	Vacant; vacant.

Table 4-4. Contiguous Property Parcel Descriptions
Page 9 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[a]		Parcel Description
			Visual Inspection	Physical Inspection	
181	0.9	0.9	10/19/93	10/19/93	Commercial; private social club. Radioactive material was encapsulated in 2 pits and has been removed.
182	1.5	1.5	10/20/93		Industrial; drum storage yard next to a shipping warehouse, approximately 250 55-gallon drums.
183	0.7	0.7	10/20/93		Industrial; shipping warehouse with four 250-gallon ASTs, contents unknown.
184	1.9	1.9	10/20/93		Industrial; shipping warehouse with 500-gallon fuel AST.
185	0.4	0.4	10/20/93		Industrial; paved lot adjacent to shipping warehouse.
186	0.1	0.1	10/19/93		Vacant; vacant with some construction debris.
187	0.03	0.03	10/19/93		Vacant; vacant.
188	1.6	1.6	10/19/93		Vacant; vacant with some trash from an adjacent property.
189	0.1	0.1	10/19/93		Vacant; vacant with creek.
190	0.2	0.2	10/19/93		Vacant; vacant with creek.
191	0.8	0.8	10/20/93		Industrial; body shop and used car lot with three 55-gallon drums (probably empty) and used tires.
192	0.03	0.03	10/20/93		Commercial; driveway to adjacent businesses.
193	0.2	0.2	10/19/93		Industrial; auto body shop.
194	0.1	0.1	10/19/93	10/19/93	Residential; duplex, landscaped.
195	0.1	0.1	10/19/93	10/19/93	Residential; duplex, landscaped.
196	0.1	0.1	10/20/93		Industrial; landscaped.
197	0.1	0.1	10/20/93		Industrial; used car lot and garage.
198	0.1	0.1	10/20/93	10/20/93	Industrial; auto body shop. Several 55-gallon drums, empty paint cans, lead-acid batteries, and used tires. Heavy oil stain near drum containing waste motor oil.
199	0.1	0.1	10/20/93	10/20/93	Industrial; auto body shop.
200	0.2	0.2	10/20/93	10/20/93	Industrial; auto body shop.
201	0.1	0.1	10/20/93		Vacant; vacant.

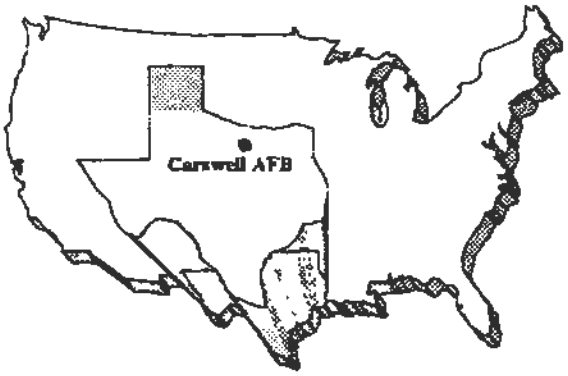
Table 4-4. Contiguous Property Parcel Descriptions
Page 10 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[a]		Parcel Description
			Visual Inspection	Physical Inspection	
202	0.3	0.3	10/20/93	10/20/93	Industrial; auto repair garage. Three 55-gallon drums of used motor oil. Two minor and one heavy oil stains.
203	0.2	0.2	10/20/93	10/20/93	Residential; single-family residence, landscaped, and gravel parking lot.
204	0.1	0.1	10/20/93	10/20/93	Industrial; auto repair garage.
205	0.1	0.1	10/20/93	10/20/93	Industrial; auto repair garage. Used motor oil stored in several 55-gallon drums.
206	0.2	0.2	10/19/93		Commercial; fast food restaurant.
207	0.2	0.2	10/19/93		Industrial; auto repair garage. One 15-gallon and four 55-gallon drums, contents unknown.
208	0.1	0.1	10/19/93		Industrial; auto repair garage.
209	0.1	0.1	10/19/93		Industrial; auto repair garage.
210	6.2	6.2	10/20/93		Commercial; private social club, landscaped.
211	0.1	0.1	10/20/93	10/20/93	Vacant; vacant.
212	13	13			Industrial; Air Force Plant #4.
213	62	62			Industrial; Air Force Plant #4.
214	99	Unknown			Industrial; Air Force Plant #4.
215	47	47			Industrial; Air Force Plant #4.
216	65	Unknown			Industrial; Air Force Plant #4.
217	18	18			Industrial; Air Force Plant #4.
218	1.2	1.2			Industrial; Air Force Plant #4.
219	129	Unknown			Industrial/Lake Worth; Air Force Plant #4.
220	122	Unknown			Airfield/Lake Worth; runway and lakeshore.
221	6.9	Unknown	10/19/93	10/19/93	Airfield; taxiway.
222	2	2	10/19/93	10/19/93	Airfield; vacant.
223	195	Unknown	10/18/93	10/18/93	Public/recreation; lakeshore.
224	213	Unknown	10/18/93	10/18/93	Public/recreation; lakeshore.
225	98	Unknown	10/16/93	10/16/93	Public/recreation; picnic and playground facilities, lakeshore. Dead grass where storm water runs off road.

Table 4-4. Contiguous Property Parcel Descriptions
Page 11 of 11

Parcel Number (see Figure 4-1)	Number of Acres Within Parcel	Approximate Acreage Within Study Area	Survey Date[a]		Parcel Description
			Visual Inspection	Physical Inspection	
226	15	15	10/15/93	10/15/93	Lake Worth/public recreation; picnic facilities and lakeshore.
227	311	Unknown	10/15/93	10/15/93	Lake Worth/public recreation; picnic facilities and lakeshore.
228	53	Unknown	10/15/93	10/15/93	Lake Worth/public recreation; lakeshore.
229	1.1	1.1	10/15/93	10/15/93	Public/recreation; vacant.
230	0.4	0.4	10/15/93	10/15/93	Public/recreation; vacant with paved road.
231	4.9	4.9	10/18/93	10/18/93	Public/recreation; abandoned fish hatchery ponds. Gasoline UST adjacent to this property.
232	48	48	10/21/93	10/21/93	Agriculture; grazed grassland and woods.
233	6	6	10/21/93	10/21/93	Agriculture; wooded with creek.
234	61	61	10/21/93	10/21/93	Agriculture; woods with creek, partially graded. Empty 55-gallon drum and small debris pile.
235	5	5	10/21/93	10/21/93	Agriculture; vacant.
236	2	2	10/21/93	10/21/93	Agriculture; vacant.
237	1.7	1.7	10/21/93	10/21/93	Agriculture; pastures.
238	7.4	7.4	10/21/93	10/21/93	Agriculture; single-family residence, landscaped, with pastures.
239	11	11	10/21/93	10/21/93	Agriculture; woods and seeded pasture.
240	1.6	1.6	10/21/93	10/21/93	Agriculture; grazed grassland and wooded.
241	11	11	10/21/93	10/21/93	Agriculture; grazed grassland and wooded.
242	40	40	10/21/93	10/21/93	Agriculture; grazed grassland and wooded.

2171 /0



CHAPTER 5

5.0 CONCLUSIONS

This chapter provides the summary of findings for the EBS at Carswell AFB.

5.1 PROPERTY MATRIX

Table 5-1 provides a summary of all resources by facility, and Table 5-2 lists all facilities within each property. Figure 5-1 shows property boundaries and facility locations. The headings for Table 5-1 are listed below with an explanation of the information being shown:

- Facility (Use): the facility identification number or location and general use of the facility

- Property ID Number: Property identification numbers were assigned based on the Draft Disposal Plan (Figure 5-2). The letters A through N were randomly assigned. As the base was further divided based on property categories, the parcels were given number values in addition to the letters (e.g., A-1, A-2). These designations are shown on Figure 5-1.

- Year of Construction: the year the facility was constructed

- Square Footage: the area of the facility in square feet

- IRP Site: indicates any IRP sites that may affect the facility

- Hazardous Material
  - H = facility has been used as a hazardous materials storage area

  - P = facility has been used to store pesticides

  - Numbers 2 through 7 indicate property categorization

- Hazardous Waste
  - W = facility has been used as a hazardous waste storage area (daily collection point, satellite accumulation point, accumulation point)

  - M = medical/biohazardous waste has been generated within the facility

  - Numbers 2 through 7 indicate property categorization

- Storage Tanks/OWSs - Type: indicates whether the tank is a UST, AST, or OWS. Number in parentheses indicates tank categorization.

- Storage Tanks/OWSs - Content: indicates what is stored in the tank

- Storage Tanks/OWSs - Capacity (gallons): indicates the storage capacity in gallons

- ACM: indicates whether or not the facility contains asbestos

  Y = asbestos was identified in surveys or asbestos register
  N = no suspected material was identified, or building type excludes use of ACM
  U = unknown if asbestos is present

- Lead-Based Paint: indicates whether the facility was constructed prior to or during 1978; blank = facility was constructed after 1978

- Type of Inspection Completed: indicates which facilities had a visual or physical inspection performed or no inspection conducted

- Overall Property Category: indicates how the facility has been categorized.

5.2 PROPERTY ZONES

Figure 5-3 shows the on-base properties categorized as discussed in Section 1.1. These property zones reflect the findings of the EBS for Carswell AFB, as discussed in Chapter 3, including identification of areas considered uncontaminated based on the requirements of CERCLA Section 120(h).

As discussed in Section 3.3, Category 2 through 7 properties were identified based upon the methodology presented in Chapter 2. All remaining areas were determined to be Category 1.

Areas that stored hazardous materials and/or generated hazardous waste were considered Category 2 unless a suspected or confirmed release was identified. These include dormitories and offices where it is likely that household or office products containing hazardous substances were stored.

Category 3 designations for the airfield were based upon existing documentation (e.g., personnel interviews, VSIs, written information). No known spills occurred within these areas; however, based on the activities

that took place over time, minor releases associated with aircraft operations may have occurred. Contaminant levels, if present, are considered to be below action levels.

Areas where known or suspected contamination has occurred were classified as Category 4 through 7 properties based upon the current program status. In addition, new areas of potential contamination identified as a result of this EBS were classified as Category 7.

Category 1 properties on Carswell AFB consist of family housing areas located in the southeastern part of the base, and also the entire off-site Kings Branch residential area. Category 2 properties encompass most of the eastern part of the base and most of the off-site WSA. Paved runways and taxiways at the north and south ends of the airfield area are classified as Category 3. Two separate IRP areas along the eastern base boundary and an IRP site at the off-site WSA are also Category 3 properties. Two small separate areas of Category 4 properties are associated with IRP sites in the south-central part of the base, and a portion of the southern half of the main runway overlying an IRP site is also Category 4. Category 5 properties include the paved runways and taxiways in the central part of the airfield area, which overlie the trichloroethylene plume; an area overlying the trichloroethylene plume east of the flightline area in the south-central part of the base; and an IRP site along the eastern base boundary. Several parcels scattered around the central, eastern, and southern portions of the base and the southwest corner of the fenced part of the off-site WSA (all associated with IRP sites) are classified as Category 6. The majority of Category 7 properties are the unpaved areas of the airfield in the western part of the base, and an adjacent, large area with an aircraft apron and associated facilities in the central part of the base. The hospital area in the northeast corner of the base and the firing range on the eastern base boundary are Category 7. Several other small parcels, generally associated with specific facilities in the eastern half of the base, and the EOD range in the western part of the off-site WSA are also Category 7 properties.

5.3 RESOURCE MAP

The resource map provided (see Figure 5-1) shows the findings of the EBS for Carswell AFB based on the records search and VSI. Information identified on the map includes IRP sites, locations of storage tanks and OWSs, and locations of hazardous substance storage. The following list describes and explains some of the symbols and shading used on the map. Additional symbols are provided in the map legend.

- H = Hazardous materials used or stored within the facility
- M = Medical/biohazardous waste generated within the facility

- W = Hazardous waste generated or stored within the facility (including accumulation points)

- P = Pesticides stored within the facility

- A = Red = ACM within facility
  Blue = Presence of ACM within facility unknown

- Facility shaded yellow = Facility constructed prior to or during 1978.

5.4 DATA GAPS

As discussed in Section 1.1, the EBS identifies data gaps that need to be resolved. The plan for resolving these data gaps will be incorporated into the BCP. Data gaps identified to date are listed below:

- Investigations of fuel lines and storage tanks associated with the hydrant fueling system are incomplete.

- Areas of soil staining and/or stressed vegetation noted during the VSI for this EBS have not been investigated.

- Lead-based paint surveys have not been conducted.

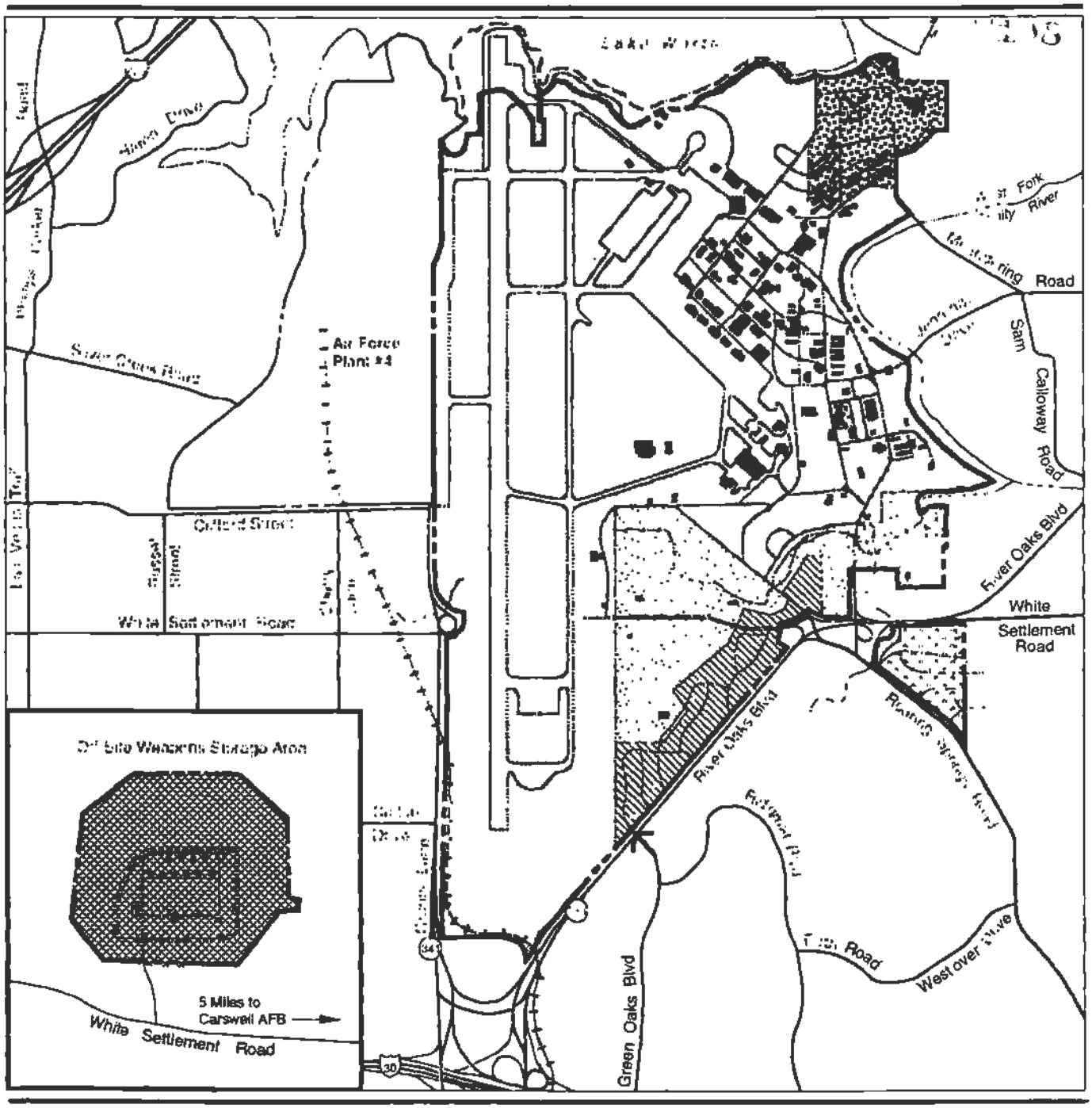
217195

Figure 5-1. Resource Map (oversized)

THIS PAGE INTENTIONALLY LEFT BLANK

2171-7

Figure 5-1 is Missing From the Official Government Document



EXPLANATION

- Airfield *
- Aviation Support *
- Industrial
- Office/Industrial Park *
- Institutional (Medical) *
- Institutional (Education) *
- Commercial
- Residential
- Public Facilities/ Recreation
- Agriculture *
- Vacant Land *
- Military
- Institutional (Prison)
- Carswell AFB Boundary
- Air Force Plant #4 Boundary
- Leased Property
- Improved Access

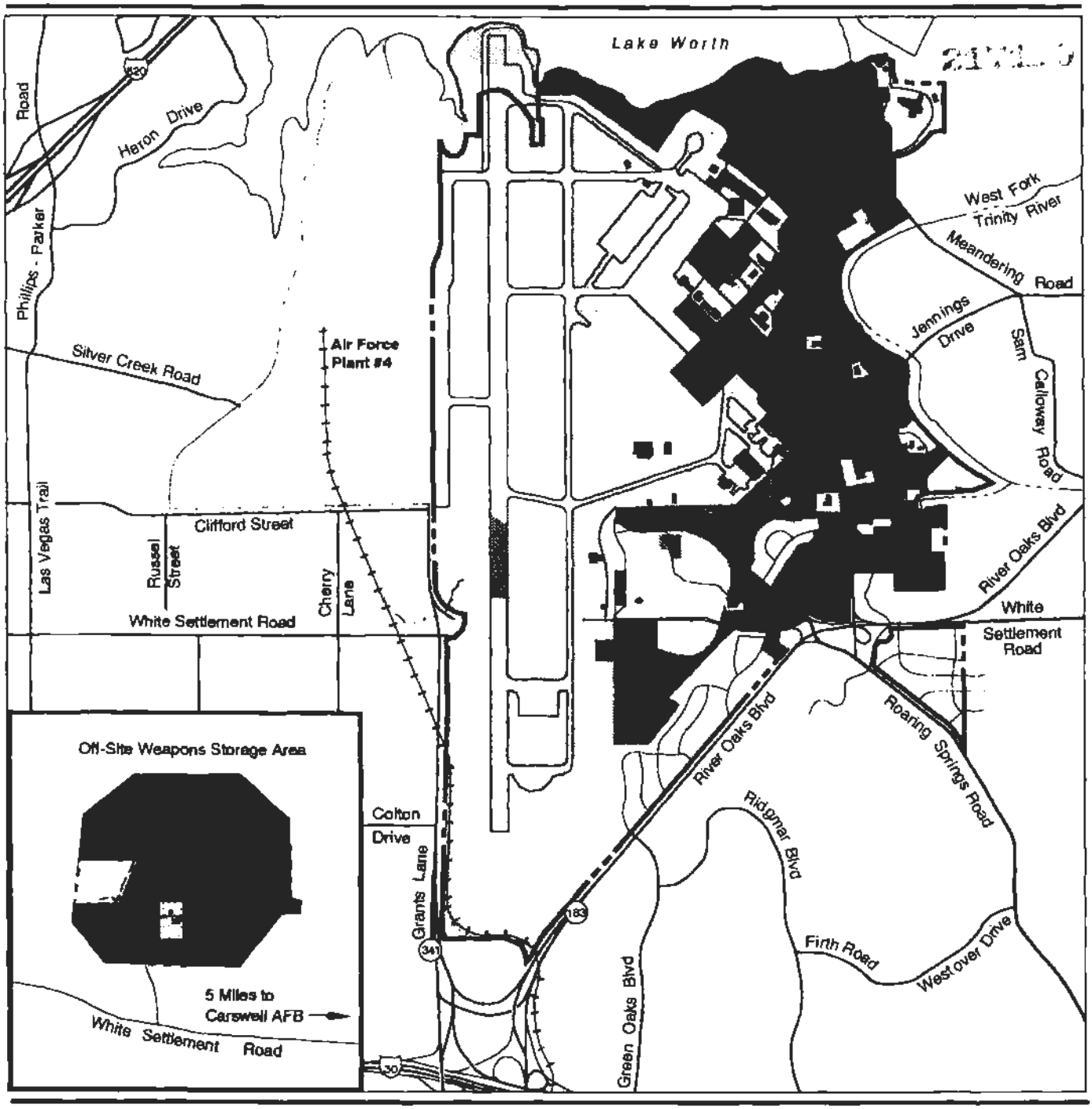
0 650 1300 2600 Feet

* Standard land use designation not applicable to this figure.

Proposed Action

Figure 5-2

THIS PAGE INTENTIONALLY LEFT BLANK



EXPLANATION

- Uncontaminated Property (Category 1)
- Hazardous substance stored - no release (Category 2)
- Hazardous substance release, below action levels (Category 3)
- Hazardous substance release, all actions have been taken (Category 4)
- Hazardous substance release, not all actions have been taken (Category 5)
- Hazardous substance release, no actions taken (Category 6)
- Areas requiring additional evaluation (Category 7)
- Base Boundary

0 650 1300 2600 Feet

Note: Information current as of November 12, 1993 and is subject to revision

Property Categorization

Figure 5-3

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 1 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs			ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
							Type	Content	Capacity (gallons)[a]				
28 (Aircraft Wash Rack)	A-15	1946	31,437							U	X	Physical	2
29 (Aircraft Wash Rack)	A-8	1954	76,572							U	X	Physical	7
38A (Industrial Waste Treatment and Disposal Facility)	A-15	1978	NA							N		Physical	2
38B (Industrial Waste Treatment and Disposal Facility)	A-15	1978	NA				OWS-A(2)	Waste Oil	Unknown	N		Physical	2
38C (Industrial Waste Treatment and Disposal Facility)	A-15	1978	NA							N		Physical	2
38D (Industrial Waste Treatment and Disposal Facility)	A-15	1978	NA							N		Physical	2
38E (Industrial Waste Treatment and Disposal Facility)	H-2	1978	NA	SD-13			OWS-A(2)	Waste Oil	Unknown	N		Physical	6
38F (Industrial Waste Treatment and Disposal Facility)	A-15	1978	NA							N		Physical	2
39 (Storm Drain Disposal)	A-22	1942	NA	ST-16						U	X		7
208 (Pavement and Grounds Facility)	H-1	1972	96							Y	X	Physical	2
209 (Pavement and Grounds Facility)	H-1	1972	53							Y	X	Physical	2
212 (Golf Clubhouse and Equipment Storage)	H-6	1973	1,000	Plume	H-2					N	X	Physical	5
213 (Golf Clubhouse and Equipment Storage)	H-6	1977	1,000	Plume	H-2					N	X	Physical	5
218 (Golf Clubhouse and Equipment Storage)	H-4	1954	7,958			W-7				U	X	Physical	7
225 (Family Housing)	H-1	1920	3,273							U	X	Physical	5
226 (Storage Shed)	H-6	1988	1,440	Plume	H-2					U		Physical	5
231 (Pavement and Grounds Facility)	H-6	1985	190	Plume						U		Physical	5
233 (Pavement and Grounds)	H-8	1954	831	Plume	H-7		UST-A(2)	Propane	Unknown	U	X		7
234 (Pavement and Grounds Facility)	H-8	1988	2,880	Plume	H-7, P-7	W-7	AST-A(2)	MOGAS		Y		Physical	7
235 (Pavement and Grounds Facility)	H-8	1972	720	WP-11	H-7	W-7				U	X		7
240 (Security Police Kennel)	H-1	1956	896							N	X		2
241 (Security Police Kennel)	H-1	1956	569							Y	X		2
259 (Air Force Office of Special Investigation)	H-1	1935	1,716							U	X		2
260 (Family Housing)	E-1	1938	4,275							Y	X		1

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 2 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs Type	Storage Tanks/OWSs Content	Storage Tanks/OWSs Capacity (gallons)**	ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
262 (Pavement and Grounds Facility)	A-16	1954	890		H-2	W-7	AST-I(2) AST-I(2) AST-U(7)	MOGAS Diesel Propane	250 250 Unknown(3)	U	X	Physical	7
263 (Pavement and Grounds Facility)	A-16	1954	785							U	X		7
272 (Riding Stables)	H-1	1954	1,286							Y			2
280 (Family Housing)	D-1	1920	4,718							U	X		1
390 (Child Care Center)	G-1	1951	28,620							Y	X		2
391 (Airport Surveillance Radar)	G-1	1978	3,830			W-2				U	X	Physical	2
618 (Family Management Office)	F-1	1951	1,855							U	X		2
619 (Maintenance Shop)	F-1	1951	2,420		H-2					U	X	Physical	2
1000 (Communication Receiver)	A-8	1975	375		H-2		AST-A (2)	Diesel	275	U	X	Physical	7
1002 (Water Pump Station)	A-8	1984	1,360		H-2		AST-A (1) AST-I (7)	Water Diesel	150,000 250(4)	U		Physical	7
1015 (Test Cell)	A-8	1988	3,901		H-2	W-2	AST-I (7) AST-I (7) UST-A (2) OWS-I (2)	CO_2 JP-4 JP-4 Waste oil	5,000 10,000 3,000 1,060	Y	X	Physical	7
1020 (Traffic Check House)	A-15	1951	53							Y	X		2
1021 (Support Structure)	A-15	1986	NA							Y			2
1022 (Technical Lab)	A-14	1988	2,000		H-2					U		Physical	4
1025 (Parking Compound)	A-15	1990	60,912							U		Physical	2
1026 (Liquid Oxygen Storage)	A-15	1964	1,925		H-2		AST-A (2) AST-A (2)	LO_2 LN_2	Unknown(3) Unknown(4)	U	X	Physical	2
1027 (Aircraft Corrosion Control)	A-8	1986	55,579		H-2	W-2	OWS-I (7) AST-U (7) UST-U (7)	Waste oil Heating fuel Unknown	875 8,000 Unknown	U		Physical	7
1032 (Sewage Pump Station)	Unknown*	1986	108							U			
1034 (Storage Shed)	A-14	1988	100	LF-02						U		Physical	4
1035 (Storage Shed)	A-14	1988	100	LF-02						U		Physical	4
1039 (Water Tank Storage)	A-14	1955	NA	LF-02			AST-A (1)	Water	500,000	U	X	Physical	4

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 3 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs Type	Storage Tanks/OWSs Content	Storage Tanks/OWSs Capacity (gallons)[a]	ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
1040 (Water Fire Pump)	A-14	1955	1,452	LF-02	H-2		UST-A (2)	Diesel	400	Y	X	Physical	4
1041 (Traffic Check House)	A-14	1986	34	LF-02						U		Physical	4
1045 (Base Supply Open Storage)	A-20	1985	3,177		H-2	W-2				U		Physical	6
1046 (Maintenance Dock Fuel System)	A-15	1982	600							Y		Physical	2
1048 (Maintenance Dock Fuel System)	A-15	1958	24,215		H-2	W-2				Y	X	Physical	2
1049 (Maintenance Dock Fuel System)	A-8	1958	20,540		H-2		UST-R (7)	Unknown	Unknown	Y	X	Physical	7
1050 (Maintenance Hangar)	A-8	1955	188,978		H-2	W-2	AST-A (7) UST-A (7)	Diesel Fuel oil	55 15,000	Y	X	Physical	7
1055 (Avionics Shop)	A-14	1956	30,021	LF-02	H-2	W-2				Y	X	Physical	4
1057 (Petroleum Operations)	A-15	1979	320							U		Physical	2
1058 (Petroleum Operations)	A-15	1986	179		H-2		AST-I (7)	JP-4	Unknown(2)	Y		Physical	2
1059 (Hazardous Storage)	A-15	1991	1,200			W-2				U		Physical	2
1060 (Aircraft General Purpose Shop)	A-15	1986	23,074		H-2	W-2	OWS-I(2)	Waste oil	115	Y		Physical	2
1062 (Petroleum Operations)	A-15	1986	1,333		H-2		AST-A(2)	Diesel	25	Y		Physical	2
1063 (Petroleum Operations)	A-15	1986	592							Y		Physical	2
1064 (Vehicle Fueling Station)	A-15	1988	320		H-2	W-2	UST-A(2) UST-A(2) OWS-I(2)	MOGAS Diesel Waste oil	10,000(2) 10,000(2) 18,500	U		Physical	2
1066 (Solvent Storage)	A-15	1956	NA		H-2					U	X	Physical	2
1078 (Water Tank)	A-15	1942	NA							U	X		2
1080 (Water Tank)	A-15	1953	NA							U	X		2
1082 (Building Water Supply)	A-15	1942	1,156		H-2					Y	X	Physical	2
1101 (Petroleum Operations)	A-34	1971	1,600		H-7	W-2				Y	X	Physical	7
1138 (Unknown)	Unknown*	Unknown	Unknown			W-7	OWS-U(7) OWS-U(7)	Waste oil Waste oil	1,000 Unknown	U			
1140 (Auto Hobby Shop)	Unknown*	Unknown	Unknown		H-7	W-7	UST-R(2)	Waste oil	800(2)	U			
1145 (Automotive Hobby Shop)	A-13	1990	16,025		H-2	W-2	OWS-I(7) UST-R(7)	Waste oil Waste oil	500 1,000	U		Physical	7
1149 (Headquarters Wing)	A-15	1987	3,557							Y			2
1156 (Jet Fuel Storage)	A-20	1953	15,000	ST-14	H-2		AST-A(2)	JP-4	840,000	U	X	Physical	6
1157 (Jet Fuel Storage)	A-20	1951	2,000	ST-14	H-2		AST-A(2)	JP-4	840,000	U	X		6

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 4 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs Type	Storage Tanks/OWSs Content	Storage Tanks/OWSs Capacity (gallons)[a]	ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
1158 (Liquid Fuel Pump Station)	A-20	1956	537	ST-14	H-2		UST-U(2)	Unknown	Unknown	U	X	Physical	6
1159 (Jet Fuel Storage)	A-20	1985	NA	ST-14	H-2		AST-A(2)	JP-4	3,360,000	U		Physical	6
1161 (Storage Shed)	A-15	1987	400		H-2		AST-I(2)	AFFF	2,000(2)	U		Physical	2
1163 (Liquid Fuel Pump Standard)	A-19	1967	NA		H-7		UST-U(7)	Unknown	Unknown	U	X		7
1164 (Liquid Fuel Pump Standard)	A-19	1967	NA		H-7					U	X		7
1165 (Liquid Fuel Pump Standard)	A-15	1967	NA							U	X	Physical	2
1166 (Liquid Fuel Pump Station)	A-19	1967	NA							U	X	Physical	7
1167 (Liquid Fuel Pump Station)	A-15	1967	NA							U	X	Physical	2
1168 (Liquid Fuel Pump Station)	A-19	1967	312							U	X	Physical	7
1169 (Liquid Fuel Pump Station)	A-15	1967	312							U	X	Physical	2
1170 (Petroleum Operations)	A-19	1957	346		H-2		UST-A(2)	JP-4	2,000(2)	Y	X	Physical	7
1172 (Petroleum Operations)	A-15	1986	552		H-2					Y			2
1174 (Liquid Fuel Standard)	A-19	1991	600							U		Physical	7
1187 (Hazardous Storage)	A-20	1991	600	SD-10	H-2	W-7	UST-U(7) AST-I(2)	Unknown Unknown	Unknown Unknown	U			6
1189 (Headquarters Group)	A-15	1942	2,750		H-2	W-2				Y	X	Physical	2
1190 (Industrial Waste Treatment and Disposal)	A-20	1955	NA	SD-10		W-7	OWS-I(2)	Waste oil	5,280	U	X	Physical	6
1191 (Vehicle Maintenance Shop)	A-15	1984	37,740		H-2	W-2	UST-R(2) OWS-I(2)	Waste Oil Waste Oil	500 550	U		Physical	2
1192 (Vehicle Operations Administration)	A-15	1986	700							U		Physical	2
1194 (Refueling Vehicle Shop)	A-15	1983	3,808		H-2	W-2	UST-A(2) OWS-I(2) AST-I(2)	Waste oil Waste oil Waste oil	2,000 375 Unknown	U		Physical	2
1202 (Vehicle Service Rack)	A-19	1949	3,534			W-7	OWS-U(7)	Waste oil	Unknown	U	X	Physical	7
1203 (Civil Engineering Open Storage)	A-15	1969	8,333							U	X	Physical	2
1212 (Storage Facility)	A-19	1985	592		H-2		UST-U(7) AST-U(7)	Unknown Unknown	Unknown Unknown	U		Physical	7
1213 (Storage Shed)	A-15	1981	19,360		H-2, P-2					U		Physical	2
1214 (Maintenance Shop)	A-15	1942	9,000		H-2					Y	X	Physical	2
1215 (Base Engineering Administration)	A-15	1981	18,944		H-2	W-2	AST-A(2)	Diesel	25	Y		Physical	2

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 5 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs			ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
							Type	Content	Capacity (gallons)[a]				
1217 (Base Engineering Maintenance Shop)	A-15	1981	12,482		H-2	W-2				Y		Physical	2
1219 (Base Engineering Storage Facility)	A-15	1981	8,913							Y		Physical	2
1229 (Housing Supply and Storage)	A-15	1942	20,033							Y	X	Physical	2
1231 (Storage Facility)	C-1	1989	41,878		H-2					Y		Physical	2
1233 (Warehouse)	A-15	1942	9,000							Y	X	Physical	2
1236 (Traffic Management Facility)	A-15	1972	19,200		H-2					Y	X	Physical	2
1237 (Warehouse)	A-15	1942	9,000							Y	X	Physical	2
1238 (Retail Exchange Warehouse)	A-15	1942	9,000							Y	X	Physical	2
1241 (Housing Supply Storage)	A-15	1945	1,668							Y	X	Physical	2
1242 (Open Storage)	A-15	1984	1,725							N		Physical	2
1250 (Hazardous Storage)	A-15	1991	150			W-2				U		Physical	2
1251 (Warehouse)	A-15	1953	76,556		H-2	W-2				Y	X	Physical	2
1256 (MOGAS Storage)	A-15	1955	NA		H-2		AST-I(2)	MOGAS	5,000	U	X	Physical	2
1259 (MOGAS Storage)	A-15	1942	NA		H-2		AST-I(2)	MOGAS	11,000	U	X	Physical	2
1261 (MOGAS Storage)	A-15	1942	NA		H-2		AST-I(2)	MOGAS	11,000	U	X	Physical	2
1263 (Diesel Storage)	A-15	1950	NA		H-2		AST-I(2)	Diesel	11,000	U	X	Physical	2
1264 (MOGAS Storage)	A-15	1975	NA		H-2		AST-I(2)	MOGAS	12,000	U	X	Physical	2
1265 (MOGAS Storage)	A-15	1942	NA		H-2		AST-I(2)	MOGAS	11,000	U	X	Physical	2
1267 (Hazardous Storage)	A-15	1978	1,800							Y		Physical	2
1268 (Major Command Headquarters)	A-15	1951	1,500							U	X	Physical	2
1269 (Hazardous Storage)	A-15	1982	900			W-2				U		Physical	2
1270 (Hazardous Storage)	A-15	1955	1,132							Y	X	Physical	2
1275 (Branch Exchange)	A-15	1986	16,320							U		Physical	2
1300 (Traffic Check House)	A-15	1955	274							Y	X	Physical	2
1301 (Bus Shelter)	A-15	1983	86							Y			2
1302 (Security Police Control)	A-15	1955	1,289							Y	X	Physical	2
1312 (Electric Switch Station)	A-15	1942	22,102							U	X	Physical	2
1315 (Unknown)	Unknown[a]	Unknown	Unknown							U			
1319 (Hazardous Storage)	A-15	1991	150			W-2				U		Physical	2

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 6 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs			ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
							Type	Content	Capacity (gallons)[a]				
1320 (Base Engineering Maintenance Shop)	A-15	1953	3,838		H-2	W-2	OWS-I(2) AST-I(2)	Waste oil Various oil	400 55(6)	Y	X	Physical	2
1324 (Dormitory)	A-15	1984	25,460							U		Physical	2
1326 (Dormitory)	A-15	1986	25,460							U		Physical	2
1330 (Wing Headquarters)	A-15	1954	6,311							Y	X	Physical	2
1332 (Traffic Check House)	A-15	1955	39							Y	X	Physical	2
1336 (Paving Group Office)	A-15	1972	Unknown							Y	X	Physical	2
1337 (Specified Headquarters)	A-15	1984	7,280							Y		Physical	2
1339 (Storage Shed)	A-15	1987	1,000		P-2					U		Physical	2
1340 (Small Arms Range)	A-18	1963	NA			W-2				U	X	Physical	7
1341 (Machine Gun Range)	A-18	1985	NA							U		Physical	7
1346 (Indoor Small Arms Range)	A-15	1956	3,825		H-2					U		Physical	2
1347 (Hazardous Storage)	A-21	1989	3,640	LF-01						U		Physical	5
1348 (Maintenance Facility)	A-15	1979	1,450		H-2	W-2				Y		Physical	2
1359 (Warehouse)	A-15	1990	6,256							U		Physical	2
1360 (Warehouse)	A-21	1963	4,800	LF-01						Y	X	Physical	5
1361 (Open Storage)	Unknown[a]	1969	87,500							U	X		
1370 (Warehouse)	A-15	1962	4,000							N	X	Physical	2
1371 (Open Storage)	A-21	1969	8,333	LF-01						U	X	Physical	5
1372 (Warehouse)	A-15	1973	4,000							N	X	Physical	2
1401 (Warehouse)	A-15	1958	20,077							Y	X	Physical	2
1402 (Warehouse)	A-15	1958	23,752		H-2					Y	X	Physical	2
1403 (Aircraft Support Equipment Shop Storage Facility)	A-15	1958	20,077		H-2					N	X	Physical	2
1404 (Wholesale Supply and Equipment)	A-15	1958	23,752							Y	X		2
1405 (Maintenance Dock)	A-15	1958	20,077		H-2	W-2				N	X	Physical	2
1406 (Traffic Check House)	A-15	1986	34							U		Physical	2
1407 (General Purpose Aircraft Shop)	A-15	1986	625							Y		Physical	2
1410 (Jet Engine Maintenance Shop)	A-15	1946	60,869		H-2	W-2				Y	X	Physical	2

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 7 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs Type	Storage Tanks/OWSs Content	Storage Tanks/OWSs Capacity (gallons)[a]	ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
1411 (Vehicle Fuel Station)	A-15	1963	50		H-2		UST-A(2) UST-A(2) UST-A(2) UST-R(2)	MOGAS JP-4 Diesel MOGAS	2,000 2,000 2,000 4,000	N	X	Physical	2
1413 (Hazardous Storage)	A-15	1991	150			W-2				U		Physical	2
1414 (Aircraft Support Equipment Shop Storage Facility)	A-24	1942	39,026	DP-17	H-2	W-2	OWS-I(2)	Waste oil	1,000	Y	X	Physical	6
1415 (Hazardous Storage)	A-15	1991	450			W-2				U		Physical	2
1416 (Survey Equipment Storage)	A-15	1942	7,923		H-2					Y	X	Physical	2
1417 (Traffic Check House)	A-8	1987	24							U			7
1418 (Weapons and Release System Shop)	A-8	1984	11,399		H-2	W-2	AST-A(7)	Diesel	50	U		Physical	7
1420 (Aircraft Support Equipment Shop Storage Facility)	A-8	1983	13,207		H-2	W-2	UST-A(7) OWS-I(2) UST-U(7)	Waste oil Waste oil Fuel oil	2,000 2,700 4,000	U		Physical	7
1423 (Air Freight Terminal)	A-8	1942	13,817		H-2	W-2	OWS-A(2) AST-A(7) UST-A(7)	Waste oil Diesel Waste oil	3,500 100 500	U	X	Physical	7
1425 (Fire Station)	A-8	1955	29,577		H-2	W-2	UST-A (2) AST-U(7)	Diesel Diesel	1,000 100	Y	X	Physical	7
1427 (Ground Controlled Approach RAPCON Support Facility)	A-8	1952	3,431		H-2		UST-A(7)	Diesel	500	Y	X	Physical	7
1428 (Special Operations)	A-8	1942	3,002							Y	X	Physical	7
1430 (Squadron Operations)	A-15	1946	26,318							Y	X	Physical	2
1435 (Aircraft Support Equipment Shop Storage Facility)	A-15	1990	2,000			W-2				U		Physical	2
1436 (Hazardous Storage)	A-8	1991	150			W-2				U		Physical	7
1438 (Storage Facility)	A-8	1959	64							U	X	Physical	7
1445 (Field Training Facility)	A-25	1959	43,663		H-7					Y	X	Physical	7
1450 (Data Processing Installation)	A-15	1983	8,141							Y		Physical	2
1500 (Library)	A-15	1943	7,528							Y	X	Physical	2
1504 (Special Operations)	A-15	1953	14,136		H-2	W-2	AST-A(2) OWS-I(2)	Diesel Waste oil	25 Unknown	Y	X	Physical	2

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 8 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs			ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
							Type	Content	Capacity (gallons)[a]				
1505 (Air Force Office of Special Investigations)	A-15	1984	3,116							U		Physical	2
1506 (Dining Hall)	A-15	1992	24,000							U	X	Physical	2
1509 (Post Office)	A-15	1942	4,740							U	X	Physical	2
1510 (Wing Headquarters)	A-23	1959	25,284		H-7		AST-A(2)	Diesel	275	Y	X	Physical	7
1515 (Security Police Operations)	A-15	1942	6,100							Y	X	Physical	2
1518 (Exchange Service Station)	A-22	1972	3,775		H-7	W-7	UST-I(2) OWS-A(2) UST-R(2)	Waste oil Waste oil MOGAS	600 Unknown 10,000(4)	U	X	Physical	7
1520 (Dormitory)	A-15	1983	26,145							Y		Physical	2
1521 (Dormitory)	A-15	1984	25,888							U		Physical	2
1522 (Dormitory)	A-15	1984	25,888							U		Physical	2
1523 (Dormitory)	A-15	1953	25,138							U	X	Physical	2
1524 (Dormitory)	A-15	1989	25,138							U		Physical	2
1525 (Base Personnel Office)	A-15	1953	29,286							Y	X	Physical	2
1550 (Dining Hall)	A-15	1953	14,508			W-2				Y	X	Physical	2
1560 (Headquarters)	A-15	1951	13,320							Y	X	Physical	2
1561 (Traffic Management Facility)	A-15	1951	15,261							Y	X	Physical	2
1562 (Wing Headquarters)	A-15	1951	13,337							Y	X	Physical	2
1563 (Group Headquarters)	A-15	1951	12,955							Y	X	Physical	2
1564 (Disaster Preparation)	A-15	1951	12,853							Y	X	Physical	2
1565 (Dormitory)	A-15	1986	25,259							U		Physical	2
1566 (Dormitory)	A-15	1986	25,297							U		Physical	2
1602 (Jet Engine Maintenance Shop)	A-11	1942	11,062		H-2	W-2	OWS-A(2)	Waste oil	18,500	U	X	Physical	2
1603 (Shop)	A-8	1990	480							U		Physical	7
1604 (Airport Training Facility)	A-11	1942	3,912							U	X	Physical	2
1615 (Specified Headquarters)	A-11	1943	11,930		H-2	W-2				Y	X	Physical	2
1617 (Training Aid Shop)	A-11	1953	2,400		H-2	W-2				Y	X	Physical	2
1618 (Hazardous Storage)	A-11	1991	150			W-2				U		Physical	2
1619 (Training Aid Shop)	A-11	1942	9,958		H-2					Y	X	Physical	2
1626 (Security Police)	A-11	1986	209							U		Physical	2

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 9 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs			ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
							Type	Content	Capacity (gallons)**				
1627 (Vehicle Fuel Station)	A-8	1990	160		H-2	W-2	UST-R(2) UST-R(2) UST-R(2)	MOGAS Diesel JP-4	1,000 1,000 2,000	U		Physical	7
1628 (Aircraft Support Equipment Shop Storage Facility)	A-8	1981	6,240		H-2	W-2	OWS-I(2)	Waste oil	5,100	U		Physical	7
1629 (Security Police Central Control)	A-11	1981	3,633		H-2		UST-R(2)	Diesel	500	U		Physical	2
1630 (Squadron Operations)	A-8	1945	5,923							Y	X	Physical	7
1631 (Hazardous Storage)	Unknown*	1988	144			W-7				U			
1639 (Traffic Check House)	A-8	1986	34							U			7
1642 (Weapons and Release System Shop)	A-8	1953	1,200		H-2					Y	X	Physical	7
1643 (Maintenance Dock)	A-8	1960	58,140		H-2	W-2	UST-R(7) UST-A(7) OWS-A(7)	Fuel oil Fuel oil Waste oil	5,000 8,500 12,730(2)	U		Physical	7
1644 (Water Pump Station)	A-8	1980	720							U		Physical	7
1645 (Aircraft Maintenance) (removed)	Unknown*	Unknown	Unknown			W-7	OWS-U(7)	Waste oil	8,500	U			
1647 (Base Engineering Maintenance Shop)	Unknown*	Unknown	Unknown			W-7				U			
1648 (Weapons and Release System Shop)	A-8	1981	21,660		H-2	W-2	OWS-U(7)	Waste oil	6,000	Y		Physical	7
1649 (Avionics Shop)	A-8	1991	11,200		H-2					U		Physical	7
1650 (Avionics Shop)	A-10	1963	28,413		H-2	W-2				U	X	Physical	2
1651 (Reserve Forces Training Facility)	A-15	1988	13,900							U			2
1653 (Warehouse)	A-15	1990	2,000							U		Physical	2
1654 (Reserve Forces Training Facility)	A-10	1963	29,587							Y	X	Physical	2
1655 (General Purpose Aircraft Shop)	A-10	1991	21,133		H-2					U		Physical	2
1656 (Fuel System Maintenance Dock)	A-8	1991	11,000		H-2	W-2	OWS-A(7)	Waste oil	18,500	U		Physical	7
1657 (Water Pump Station)	A-8	1991	256							U		Physical	2
1658 (Electric Generator Plant)	A-8	1955	NA		H-2		AST-A(7) UST-R(2)	Diesel Diesel	55 275	U	X	Physical	7
1659 (Radar Meteorological Set C-Band)	A-8	1978	NA							U	X	Physical	7
1660 (Group Headquarters)	A-15	1981	3,880							U		Physical	2
1710 (Audio-Visual Facility)	A-11	1958	7,413		H-2					U	X	Physical	2
1720 (Wing Headquarters)	A-8	1953	11,784		H-2		AST-A(7)	Diesel	300	Y	X	Physical	7

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 10 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs Type	Storage Tanks/OWSs Content	Storage Tanks/OWSs Capacity (gallons)[a]	ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
1730 (Communication Facility)	A-8	1951	7,288		H-2		AST-A(7)	Diesel	275	Y	X	Physical	7
1739 (Squadron Operations)	A-11	1981	1,200							Y		Physical	2
1740 (Squadron Operations)	A-11	1990	5,292		H-2					Y		Physical	2
1749 (Electric Power Station)	A-8	1981	1,229		H-2		UST-R(7)	Diesel	7,830	U		Physical	7
1750 (Communication Relay Station)	A-8	1957	17,210		H-2		UST-U(7)	Diesel	20,000	U	X	Physical	7
							UST-A(2)	Diesel	8,000				
							UST-I(2)	Diesel	20,000				
							AST-U(7)	Diesel	110(2)				
1751 (Communication Relay Station)	A-8	1963	392							U	X	Physical	7
1752 (Flight Simulator Training)	A-11	1983	19,339							U		Physical	2
1765 (Commissary Store)	A-8	1985	118,542		H-2		AST-A(7)	Diesel	25	U		Physical	7
1766 (Base Package Store)	A-15	1986	5,830							U		Physical	2
1780 (Specified Headquarters)	A-11	1969	30,740							Y	X	Physical	2
1790 (Squadron Operations)	A-11	1970	11,003							U	X	Physical	2
1792 (Flight Simulator Training)	A-11	1978	4,095							Y	X	Physical	2
1805 (Swimming Bath House)	A-25	1949	3,550							Y	X	Physical	7
1806 (Swimming Pool)	A-25	1949	7,446							U	X	Physical	7
1807 (Swimming Pool Water Treatment)	A-25	1949	625		H-2		AST-U(7)	Unknown	Unknown	U	X	Physical	7
1808 (Swimming Pool)	A-25	1960	672							U	X	Physical	7
1809 (Water Tank Storage)	A-15	1942	NA							U	X	Physical	2
1810 (Gymnasium)	A-15	1965	25,702							Y	X	Physical	2
1815 (Bowling Alley)	A-15	1987	26,820		H-2	W-2				U		Physical	2
1820 (Recreation Center)	A-15	1953	19,311							Y	X	Physical	2
1825 (Education Center)	A-15	1978	1,200							Y	X	Physical	2
1826 (Education Center)	A-15	1978	1,200							Y	X	Physical	2
1827 (Education Center)	A-15	1979	1,200							Y		Physical	2
1828 (Education Center)	A-15	1979	1,200							Y		Physical	2
1829 (Education Center)	A-15	1981	1,200							Y		Physical	2
1830 (Education Center)	A-15	1981	1,200							Y		Physical	2
1835 (Exchange Service Outlet)	A-15	1942	4,446							Y	X	Physical	2
1837 (Exchange Service Outlet)	A-15	1942	2,650							U	X	Physical	2

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 11 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs			ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
							Type	Content	Capacity (gallons)[a]				
1838 (Chapel)	A-15	1942	8,790							U	X	Physical	2
1840 (Clothing Store)	A-15	1978	2,756							Y	X	Physical	2
1845 (Theater)	A-15	1970	9,967							Y	X	Physical	2
1880 (Exchange Sales Store)	A-15	1972	100,074		H-2					U	X	Physical	2
2570 (Non-Commissioned Officers' Dining Hall)	A-15	1957	16,292			W-2				Y	X	Physical	2
2571 (Non-Commissioned Officers' Swimming Pool)	A-15	1962	1,547							U	X	Physical	2
2572 (Non-Commissioned Officers' Swimming Pool)	A-15	1962	4,043							U	X	Physical	2
2573 (Swimmers' Bath House)	A-15	1962	1,547							Y	X	Physical	2
2574 (Swimming Pool Water Treatment)	A-27	1962	82		H-2		AST-U(7)	Unknown	Unknown	U	X	Physical	7
3000 (Composite Medical Clinic)	B-1	1987	345,186		H-2, M-2	W-2	UST-A(2) AST-U(7)	Diesel Fuel oil	15,000(2) 250(2)	Y		Physical	7
3001 (Steam Facility)	B-1	1958	6,432		H-2		UST-A(2) UST-A(2)	Fuel oil Diesel	20,000(2) 10,000	Y	X	Physical	7
3003 (Support Facility)	B-1	1985	NA							U		Physical	7
3004 (Traffic Check House)	B-2	1988	196							U			2
3100 (Animal Clinic)	B-2	1956	1,046		H-2, M-2					Y	X	Physical	2
3102 (Officers' Dining Hall)	B-1	1942	25,918							Y	X	Physical	7
3103 (Officers' Dining Hall)	B-1	1951	1,500		H-2					Y	X	Physical	7
3104 (Water Storage Tank)	B-2	1959	NA							U	X	Physical	2
3105 (Solid Waste Repository)	B-1	1951	229							U	X	Physical	
3106 (Swimmers' Bath House)	B-1	1952	1,532		H-2		AST-U(7)	Chlorine	Unknown	Y	X	Physical	7
3107 (Officers' Swimming Pool)	B-1	1952	3,354							U	X	Physical	7
3108 (Officers' Swimming Pool)	B-1	1952	860							U	X	Physical	7
3109 (Air Force Clinic)	B-2	1984	12,586							U		Physical	2
3110 (Visiting Officers' Quarters)	B-2	1969	16,079							Y	X		2
3111 (Non-Air Force Administration Office)	Unknown[a]	1989	840							U			2
3112 (Temporary Housing)	B-2	1984	2,550							U			2
3113 (Temporary Housing)	B-2	1984	2,933							U			2

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 12 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs			ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
							Type	Content	Capacity (gallons)[a]				
3114 (Temporary Housing)	B-2	1984	2,550							U			2
3115 (Temporary Housing)	B-2	1969	15,534							U	X		2
3138 (Social Activity Facility)	B-2	1984	3,138							Y		Physical	2
3139 (Air Force Clinic)	B-2	1982	1,440							Y		Physical	2
3140 (Temporary Housing)	B-2	1959	17,094							Y	X		2
3153 (Pharmacy)	B-2	1988	1,100							Y		Physical	2
3175 (Law Center)	A-15	1986	6,204							U			2
3190 (Youth Center)	A-15	1981	11,340		H-2		UST-A(2)	Fuel oil	2,000	U		Physical	2
3201 (Storage Facility)	A-15	1948	2,450							U	X	Physical	2
3204 (Storage Facility)	A-15	1948	2,450							U	X		2
3206 (Family Housing Operating Quarters)	A-15	1948	4,900							U	X		2
3209 (Storage Facility)	A-15	1948	2,450							U	X		2
3210 (Storage Facility)	A-15	1948	2,450							U	X		2
3211 (Storage Facility)	A-15	1948	2,450							U	X		2
3212 (Storage Facility)	A-15	1948	2,450							U	X		2
3213 (Storage Facility)	A-15	1948	2,450							U	X		2
3260 (Family Housing Appropriated)	B-2	1950	11,202							Y	X		2
3272 (Post Office)	B-2	1990	228							U			2
3324 (Recreation Facility)	A-15	1987	1,440							U			2
3326 (Recreation Facility)	A-15	1987	1,440							U			2
3328 (MWR Storage)	A-15	1987	1,440							U		Physical	2
3335 (Recreation Facility)	A-15	1961	NA							Y	X		2
3337 (MWR Storage)	A-15	1979	1,500							Y			2
3340 (Recreation Facility)	A-15	1959	1,083		H-2					Y	X	Physical	2
3341 (Readiness Crew)	A-15	1976	1,800							Y	X		2
3346 (Readiness Crew)	A-15	1986	1,820							Y			2
3351 (Storage)	A-15	1963	5,999							U	X	Physical	2
3352 (Storage)	A-15	1963	5,999							U	X	Physical	2
3355 (Conventional Munitions Shop)	A-15	1951	4,633							U	X		2
3358 (Vehicle Service Rack)	A-15	1960	455							U	X	Physical	2

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 13 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs Type	Storage Tanks/OWSs Content	Storage Tanks/OWSs Capacity (gallons)[d]	ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
3359 (Reserve Forces Team Facility)	A-15	1976	1,264		H-2		UST-A(2)	Diesel	2,000	U	X	Physical	2
3360 (Electric Power Generator Plant)	A-15	1978	NA		H-2		UST-A(2)	Diesel	5,000	U	X	Physical	2
3367 (Hazardous Storage)	A-15	1991	86			W-2				U		Physical	2
3369 (Shop)	A-15	1978	4,133		H-2	W-2				U	X	Physical	2
3370 (Storage Magazine)	A-15	1953	960							U	X	Physical	2
3371 (Storage Igloo)	A-15	1951	924							U	X		2
3372 (Storage Igloo)	A-15	1951	924							U	X		2
3373 (Storage Igloo)	A-15	1951	924							U	X		2
3374 (Storage Igloo)	A-15	1951	924							U	X		2
3375 (Storage Igloo)	A-15	1951	924							U	X		2
3376 (Storage Igloo)	A-15	1951	924							U	X	Physical	2
3377 (Storage Igloo)	A-15	1951	924							U	X		2
3378 (Storage Igloo)	A-15	1951	924							U	X		2
3379 (Storage Igloo)	A-15	1951	924							U	X		2
3380 (Storage Igloo)	A-15	1951	924							U	X		2
3381 (Storage Igloo)	A-15	1951	924							U	X		2
3382 (Storage Igloo)	A-15	1951	924							U	X	Physical	2
3383 (Storage Igloo)	A-15	1978	1,950							U	X	Physical	2
3384 (Storage Igloo)	A-15	1978	1,950							U	X	Physical	2
3385 (Storage Igloo)	A-15	1978	1,950							U	X	Physical	2
3386 (Storage Igloo)	A-15	1978	1,950							U	X	Physical	2
4100 (Airport Surveillance Radar)	H-3	1982	28	LF-04						U		Physical	6
4101 (Airport Surveillance Radar)	H-3	1982	52	LF-04	H-2		UST-R(7) AST-U(7)	Diesel Diesel	500 500	U		Physical	6
4102 (Airport Surveillance Radar)	H-3	1982	1,365	LF-04	H-2		UST-I(2) UST-A(2)	Diesel Fuel oil	315 100	Y		Physical	6
4106 (Instrument Landing System Glide Slope)	A-32	1981	84							U			7
4107 (Instrument Landing System Glide Slope)	A-1	1981	96							U		Physical	3
4108 (Instrument Landing System Localizer)	A-3	1981	628							U			7

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 14 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs Type	Storage Tanks/OWSs Content	Storage Tanks/OWSs Capacity (gallons)[a]	ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
4109 (Instrument Landing System Localizer)	A-3	1979	112							U			7
4111 (Electric Power Generator Plant)	A-3	1979	NA		H-2		UST-A(2)	Diesel	500	U		Physical	7
4114 (Aircraft System Support)	A-3	1964	NA		H-2		AST-U(7)	Diesel	12(2)	U	X	Physical	7
4115 (removed)	Unknown*	Unknown	Unknown		H-7		UST-R(2)	Diesel	600	Y			
4120 (Aircraft System Support)	A-29	1964	NA		H-2		AST-U(7)	Diesel	12	U	X	Physical	7
4126 (Fireman Training Facility)	A-3	1971	NA							U	X		7
4127 (Electric Power Generator Plant)	A-3	1959	NA		H-2		UST-A(2)	Diesel	500	U	X	Physical	7
4129 (Instrument Landing System Glide Slope)	A-7	1981	10							U			7
4130 (Instrument Landing System Glide Slope)	A-7	1981	111							U		Physical	7
4131 (Instrument Landing System Glide Slope)	A-7	1981	150							U		Physical	7
4135 (Electric Power Generator Plant)	A-5	1991	NA	Plume	H-2		UST-R(7)	Diesel	380	U		Physical	7
4136 (Fixed Tactical Air Navigation Station)	A-5	1991	215	Plume	H-2		UST-A(2)	Diesel	300	U		Physical	7
4141 (Electric Power Generator Plant)	A-8	1959	NA	Plume	H-2		UST-A(2) AST-I(2)	Diesel Unknown	250 Unknown	U	X	Physical	7
4142 (Sanitary Latrine)	Unknown*	1990	200							U			
4143 (Communication Transmitter)	A-8	1964	1,520		H-2		UST-A(2)	Diesel	500	Y	X	Physical	7
4145 (Electric Power Generator Plant)	A-8	1981	NA	Plume	H-7		UST-A(2)	Diesel	500	U		Physical	7
4146 (Engine Test Cell)	A-3	1984	10,517	Plume	H-2	W-2	AST-U(7) OWS-U(7)	JP-4 Waste oil	2,500 Unknown	U		Physical	7
4147 (Traffic Check House)	Unknown*	1986	34							U			
4150 (Hydrant Fuel Facility)	A-9	1954	1,508		H-2		AST-A(7) UST-I(2)	Diesel Diesel	275 25,000(6)	Y	X	Physical	6
4151 (Water Supply Facility)	A-9	1959	1,200							U	X	Physical	6
4152 (Hydrant Fuel Facility)	A-9	1954	1,507	OT-18	H-2		AST-A(7) UST-I(2)	Diesel JP-4	275 25,000(6)	Y	X	Physical	6
4153 (Hydrant Fuel Facility)	A-8	1954	1,507		H-2		AST-A(7) UST-I(2)	Diesel JP-4	275 25,000(6)	U	X	Physical	7

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 15 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs Type	Content	Capacity (gallons)[a]	ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
4154 (Hydrant Fuel Facility)	A-8	1954	1,508		H-2		AST-A(2) UST-I(2)	Diesel JP-4	275 25,000(6)	U	X	Physical	7
4155 (Utility Vault)	A-8	1955	4,943		H-2		AST-A(2) UST-A(2)	Diesel Diesel	275 1,000	U	X	Physical	7
4156 (Weapon System Facility)	A-9	1988	2,400	OT-18	H-2	W-2				U		Physical	6
4157 (Maintenance Shop)	A-8	1984	1,200			W-2				Y		Physical	7
4160 (Storage)	A-8	1977	4,580		H-7					Y	X	Physical	7
4161 (Vehicle Service Rack)	A-8	1984	60							U		Physical	7
4170 (Unknown)	A-8	Unknown	Removed		H-2		UST-R(2)	JP-4	25,000(6)	Y		Physical	7
4171 (Electric Power Generator Plant)	A-8	1978	NA		H-2		UST-A(2)	Diesel	5,000	U	X	Physical	7
4172 (Traffic Check House)	A-8	1986	34							U			7
4173 (Security Guard Tower)	A-8	1983	NA							Y			7
4175 (Readiness Crew)	A-8	1961	57,843		H-2		AST-A(7)	Diesel	275	Y	X	Physical	7
4177 (Officers' Swimming Pool)	A-8	1966	800							U	X		7
4178 (Security Police)	A-8	1976	178							U	X		7
4179 (Traffic Check House)	Unknown[a]	1986	34							U			
4180 (Reserve Forces Team Facility)	A-8	1981	1,349	Plume						Y		Physical	7
4181 (Traffic Check House)	A-8	1986	34	Plume						U			7
4190 (Instrument Landing System Localizer)	A-29	1981	204							U			7
4191 (Instrument Landing System Localizer)	A-29	1981	108							U			7
4200 (Security Police)	A-8	1984	168							U			7
4205 (Storage)	A-8	1984	15,787			W-2	UST-R(7)	Waste oil	550	U		Physical	7
4208 (Hazardous Storage)	A-8	1984	96		H-2					U		Physical	7
4210 (Assembly Shop)	A-8	1983	68,296		H-2	W-2	OWS-U(7) OWS-U(7) UST-I(2) UST-I(2) UST-A(2)	Waste oil Waste oil Waste oil Waste oil Fuel oil	7,920 4,500 1,000 8,000 6,000	U		Physical	7
4213 (Hazardous Storage)	A-8	1991	86			W-2				U		Physical	7
4214 (Hazardous Storage)	A-8	1991	86			W-2				U		Physical	7
4215 (Surveillance Inspection Shop)	A-8	1984	7,775		H-2	W-2	UST-A(7)	Fuel oil	2,000	Y		Physical	7

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 16 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs			ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
							Type	Content	Capacity (gallons)[a]				
4216 (Electric Power Generator Plant)	A-8	1984	NA		H-2		UST-A(2)	Diesel	5,000	U		Physical	7
4217 (Reserve Forces Team Facility)	A-8	1984	1,896							Y		Physical	7
4220 (Storage Igloo)	A-8	1984	4,800							U			7
4221 (Electric Power Station)	A-8	1985	258							U			7
4222 (Storage Igloo)	A-8	1984	4,800							U			7
4223 (Storage Igloo)	A-8	1984	4,800							U			7
4224 (Electric Power Station)	A-8	1985	258							U			7
4225 (Storage Igloo)	A-8	1984	4,800							U			7
4226 (Storage Igloo)	A-8	1984	4,800							U			7
4227 (Electric Power Station)	A-8	1985	258							U			7
4228 (Storage)	A-8	1984	4,800							U			7
4229 (Storage)	A-8	1984	4,800							U			7
4230 (Electric Power Station)	A-8	1985	258							U			7
4231 (Storage Igloo)	A-8	1984	4,800							U			7
4232 (Electric Power Station)	A-8	1986	258							U			7
4233 (Storage Igloo)	A-8	1984	4,800							U			7
4234 (Storage Igloo)	A-8	1984	4,800							U			7
4235 (Electric Power Station)	A-8	1986	258							U			7
4236 (Storage Igloo)	A-8	1986	4,800							N			7
4237 (Storage Igloo)	A-8	1986	4,800							N			7
4238 (Electric Power Station)	A-8	1986	258							N			7
4239 (Storage Igloo)	A-8	1986	4,800							N			7
4240 (Storage Igloo)	A-8	1986	4,800		H-2					N		Physical	7
4241 (Electric Power Station)	A-8	1986	258							N		Physical	7
4242 (Storage Igloo)	A-8	1986	4,800		H-2					N		Physical	7
4243 (Storage Igloo)	A-8	1986	4,800							N			7
4244 (Electric Power Station)	A-8	1986	258							N			7
4245 (Storage Igloo)	A-8	1986	4,800							N			7
4246 (Storage Igloo)	A-8	1986	4,800							N			7
4247 (Electric Power Station)	A-8	1986	258							N			7

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 17 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs			ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
							Type	Content	Capacity (gallons)[a]				
4248 (Storage Igloo)	A-8	1986	4,800							N			7
4249 (Storage Igloo)	A-8	1986	4,800							N			7
4250 (Electric Power Station)	A-8	1986	258							N			7
4251 (Storage Igloo)	A-8	1986	4,800							N			7
4252 (Storage Igloo)	A-8	1986	4,800							N			7
4253 (Electric Power Station)	A-8	1986	258							N			7
4254 (Storage Igloo)	A-8	1986	4,800							N			7
4255 (Storage Igloo)	A-8	1986	4,800							N			7
4256 (Electric Power Station)	A-8	1986	258							N		Physical	7
4257 (Storage Igloo)	A-8	1986	4,800							N			7
8500 (Safety, Control and Identification)	N-2	1956	932							Y	X	Physical	6
8501 (Water Tank Storage)	N-4	1956	NA							U	X	Physical	3
8502 (Water Supply Facility)	N-2	1956	78							Y	X	Physical	6
8503 (Surveillance Inspection Shipping)	N-2	1956	6,959		H-2	W-2	AST-N(7)	Propane	100(2)	U	X	Physical	6
8504 (Water Supply Facility)	N-4	1956	78		H-2		AST-U(7)	Unknown	Unknown	U	X	Physical	3
8505 (Electric Power Station)	N-4	1956	1,488		H-2		UST-R(7)	Unknown	Unknown	Y	X	Physical	3
8506 (Small Arms Ammunition Storage)	N-4	1956	5,000							Y	X	Physical	3
8507 (Spares Storage)	N-4	1956	2,500							U	X	Physical	3
8508 (Pyrotechnic Storage)	N-3	1956	351							U	X	Physical	2
8509 (Segmented Magazine Storage)	N-3	1956	540							U	X	Physical	2
8510 (Ancillary Explosives Facility)	Unknown*	1989	NA							U			
8511 (Detonator Storage)	N-3	1956	126							U	X	Physical	2
8512 (Hazardous Storage)	N-2	1991	86			W-2				U		Physical	6
8514 (Conventional Munitions Shop)	N-3	1956	2,600		H-2		UST-A(7) UST-U(7)	Diesel Unknown	1,200 Unknown	U	X	Physical	2
8515 (Vehicle Fuel Station)	N-3	1956	4		H-2		UST-R(7)	Diesel	1,000	U			2
8520 (Explosive Ordnance Disposal Range)	N-1	1971	NA							U	X	Physical	7
8531 (Munitions Storage Igloo)	N-3	1956	1,576							U	X	Physical	2
8533 (Munitions Storage Igloo)	N-3	1956	1,266							U	X	Physical	2
8535 (Munitions Storage Igloo)	N-3	1956	2,147							U	X	Physical	2
8537 (Munitions Storage Igloo)	N-3	1956	2,147							U	X	Physical	2

Table 5-1. Facility/Property Matrix - Carswell AFB
Page 18 of 18

Facility (Use)	Property ID Number	Year of Construction	Square Footage	IRP Site	Hazardous Materials	Hazardous Waste	Storage Tanks/OWSs			ACM	Lead-Based Paint	Type of Inspection Completed	Overall Property Category
							Type	Content	Capacity (gallons)[a]				
8539 (Munitions Storage Igloo)	N-3	1956	2,147							U	X	Physical	2
8541 (Munitions Storage Igloo)	N-3	1956	2,147							U	X	Physical	2
8552 (Munitions Storage Igloo)	N-3	1956	1,060							U	X	Physical	2
8554 (Munitions Storage Igloo)	N-3	1956	2,146							U	X	Physical	2
8556 (Munitions Storage Igloo)	N-3	1956	2,146							U	X	Physical	2
8558 (Munitions Storage Igloo)	N-3	1956	2,146							U	X	Physical	2
8560 (Munitions Storage Igloo)	N-3	1956	2,146							U	X	Physical	2
Area 1	A-3	NA	NA									Physical	7
Area 2	A-8	NA	NA									Physical	7
Air Museum	A-3	NA	NA									Physical	7
Boat House (removed)	Unknown*	Unknown	Unknown		H-7		AST-R(7)	Unknown	500	U			

Note: (a) Numbers in parentheses indicate number of tanks if more than one.
* Unable to locate.
A = Active
ACM = Asbestos-containing material
AFFF = Aqueous film-forming foam.
AST = Aboveground storage tank
AVGAS = Aviation gasoline.
DRMO = Defense Reutilization and Marketing Office.
H = Facility usage included storage of hazardous materials.
I = Inactive.
M = Medical/biohazardous wastes were generated within the facility.
MOGAS = Motor gasoline.
N = No suspected ACM identified, or facility type excludes the use of ACM
NA = Not applicable.
OWS = Oil/water separator.
P = Facility usage included storage of pesticides.
R = Removed.
U = Unknown status.
UST = Underground storage tank.
W = Hazardous wastes were generated or stored within the facility.
X = Facility was constructed prior to or during 1978.
Y = Yes

Table 5-2. Property/Facility Key
Page 1 of 11

Property ID Number	Facility (Use)
A-1,3	4107 (Instrument Landing System Glide Slope)
A-3,7	4108 (Instrument Landing System Localizer)
	4109 (Instrument Landing System Localizer)
	4111 (Electric Power Generator Plant)
	4114 (Aircraft System Support)
	4126 (Fireman Training Facility)
	4127 (Electric Power Generator Plant)
	4146 (Engine Test Cell)
	Air Museum
	Area 1
A-5,7	4135 (Electric Power Generator Plant)
	4136 (Fixed Tactical Air Navigation Station)
A-7,7	4129 (Instrument Landing System Glide Slope)
	4130 (Instrument Landing System Glide Slope)
	4131 (Instrument Landing System Glide Slope)
A-8,7	1000 (Communication Receiver)
	1002 (Water Pump Station)
	1015 (Test Cell)
	1027 (Aircraft Corrosion Control)
	1049 (Maintenance Dock Fuel System)
	1050 (Maintenance Hangar)
	1417 (Traffic Check House)
	1418 (Weapons and Release System Shop)
	1420 (Aircraft Support Equipment Shop Storage Facility)
	1423 (Air Freight Terminal)
	1425 (Fire Station)
	1427 (Ground Controlled Approach RAPCON Support Facility)
	1428 (Special Operations)
	1436 (Hazardous Storage)
	1438 (Storage Facility)
	1603 (Shop)
	1627 (Vehicle Fuel Station)
	1628 (Aircraft Support Equipment Shop Storage Facility)
	1630 (Squadron Operations)
	1639 (Traffic Check House)
	1642 (Weapons and Release System Shop)
	1643 (Maintenance Dock)
	1644 (Water Pump Station)
	1648 (Weapons and Release System Shop)
	1649 (Avionics Shop)
	1656 (Fuel System Maintenance Dock)
	1657 (Water Pump Station)
	1658 (Electric Generator Plant)
	1659 (Radar Meteorological Set C-Band)

Table 5-2. Property/Facility Key
Page 2 of 11

Property ID Number	Facility (Use)
A-8,7 (Continued)	1720 (Wing Headquarters)
	1730 (Communication Facility)
	1749 (Electric Power Station)
	1750 (Communication Relay Station)
	1751 (Communication Relay Station)
	1765 (Commissary Store)
	29 (Aircraft Wash Rack)
	4141 (Electric Power Generator Plant)
	4143 (Communication Transmitter)
	4145 (Electric Power Generator Plant)
	4153 (Hydrant Fuel Facility)
	4154 (Hydrant Fuel Facility)
	4155 (Utility Vault)
	4157 (Maintenance Shop)
	4160 (Storage)
	4161 (Vehicle Service Rack)
	4170 (Unknown)
	4171 (Electric Power Generator Plant)
	4172 (Traffic Check House)
	4173 (Security Guard Tower)
	4175 (Readiness Crew)
	4177 (Officers' Swimming Pool)
	4178 (Security Police)
	4180 (Reserve Forces Team Facility)
	4181 (Traffic Check House)
	4200 (Security Police)
	4205 (Storage)
	4208 (Hazardous Storage)
	4210 (Assembly Shop)
	4213 (Hazardous Storage)
	4214 (Hazardous Storage)
	4215 (Surveillance Inspection Shop)
	4216 (Electric Power Generator Plant)
	4217 (Reserve Forces Team Facility)
	4220 (Storage Igloo)
	4221 (Electric Power Station)
	4222 (Storage Igloo)
	4223 (Storage Igloo)
	4224 (Electric Power Station)
	4225 (Storage Igloo)
	4226 (Storage Igloo)
	4227 (Electric Power Station)
	4228 (Storage)
	4229 (Storage)

Table 5-2. Property/Facility Key
Page 3 of 11

Property ID Number	Facility (Use)
A-8,7 (Continued)	4230 (Electric Power Station)
	4231 (Storage Igloo)
	4232 (Electric Power Station)
	4233 (Storage Igloo)
	4234 (Storage Igloo)
	4235 (Electric Power Station)
	4236 (Storage Igloo)
	4237 (Storage Igloo)
	4238 (Electric Power Station)
	4239 (Storage Igloo)
	4240 (Storage Igloo)
	4241 (Electric Power Station)
	4242 (Storage Igloo)
	4243 (Storage Igloo)
	4244 (Electric Power Station)
	4245 (Storage Igloo)
	4246 (Storage Igloo)
	4247 (Electric Power Station)
	4248 (Storage Igloo)
	4249 (Storage Igloo)
	4250 (Electric Power Station)
	4251 (Storage Igloo)
	4252 (Storage Igloo)
	4253 (Electric Power Station)
	4254 (Storage Igloo)
	4255 (Storage Igloo)
	4256 (Electric Power Station)
	4257 (Storage Igloo)
	Area 2
A-9,6	4150 (Hydrant Fuel Facility)
	4151 (Water Supply Facility)
	4152 (Hydrant Fuel Facility)
	4156 (Weapon System Facility)
A-10,2	1650 (Avionics Shop)
	1654 (Reserve Forces Training Facility)
	1655 (General Purpose Aircraft Shop)
A-11,2	1602 (Jet Engine Maintenance Shop)
	1604 (Airport Training Facility)
	1615 (Specified Headquarters)
	1617 (Training Aid Shop)
	1618 (Hazardous Storage)
	1619 (Training Aid Shop)
	1626 (Security Police)
	1629 (Security Police Central Control)

Table 5-2. Property/Facility Key
Page 4 of 11

Property ID Number	Facility (Use)
A-11,2 (Continued)	1710 (Audio-Visual Facility)
	1739 (Squadron Operations)
	1740 (Squadron Operations)
	1752 (Flight Simulator Training)
	1780 (Specified Headquarters)
	1790 (Squadron Operations)
	1792 (Flight Simulator Training)
A-13,7	1145 (Automotive Hobby Shop)
A-14,4	1022 (Technical Lab)
	1034 (Storage Shed)
	1035 (Storage Shed)
	1039 (Water Tank Storage)
	1040 (Water Fire Pump)
	1041 (Traffic Check House)
	1055 (Avionics Shop)
A-15,2	1020 (Traffic Check House)
	1021 (Support Structure)
	1025 (Parking Compound)
	1026 (Liquid Oxygen Storage)
	1046 (Maintenance Dock Fuel System)
	1048 (Maintenance Dock Fuel System)
	1057 (Petroleum Operations)
	1058 (Petroleum Operations)
	1059 (Hazardous Storage)
	1060 (Aircraft General Purpose Shop)
	1062 (Petroleum Operations)
	1063 (Petroleum Operations)
	1064 (Vehicle Fueling Station)
	1066 (Solvent Storage)
	1078 (Water Tank)
	1080 (Water Tank)
	1082 (Water Supply Facility)
	1149 (Headquarters Wing)
	1161 (Storage Shed)
	1165 (Liquid Fuel Pump Standard)
	1167 (Liquid Fuel Pump Station)
	1169 (Liquid Fuel Pump Station)
	1172 (Petroleum Operations)
	1189 (Headquarters Group)
	1191 (Vehicle Maintenance Shop)
	1192 (Vehicle Operations Administration)
	1194 (Refueling Vehicle Shop)
	1203 (Civil Engineering Open Storage)
	1213 (Storage Shed)

Table 5-2. Property/Facility Key
Page 5 of 11

Property ID Number	Facility (Use)
A-15,2 (Continued)	1214 (Maintenance Shop)
	1215 (Base Engineering Administration)
	1217 (Base Engineering Maintenance Shop)
	1219 (Base Engineering Storage Facility)
	1229 (Housing Supply and Storage)
	1233 (Warehouse)
	1236 (Traffic Management Facility)
	1237 (Warehouse)
	1238 (Retail Exchange Warehouse)
	1241 (Housing Supply Storage)
	1242 (Open Storage)
	1250 (Hazardous Storage)
	1251 (Warehouse)
	1256 (MOGAS Storage)
	1259 (MOGAS Storage)
	1261 (MOGAS Storage)
	1263 (Diesel Storage)
	1264 (MOGAS Storage)
	1265 (MOGAS Storage)
	1267 (Hazardous Storage)
	1268 (Major Command Headquarters)
	1269 (Hazardous Storage)
	1270 (Hazardous Storage)
	1275 (Branch Exchange)
	1300 (Traffic Check House)
	1301 (Bus Shelter)
	1302 (Security Police Control)
	1312 (Electric Switch Station)
	1319 (Hazardous Storage)
	1320 (Base Engineering Maintenance Shop)
	1324 (Dormitory)
	1326 (Dormitory)
	1330 (Wing Headquarters)
	1332 (Traffic Check House)
	1336 (Paving Group Office)
	1337 (Specified Headquarters)
	1339 (Storage Shed)
	1346 (Indoor Small Arms Range)
	1348 (Maintenance)
	1359 (Warehouse)
	1370 (Warehouse)
	1372 (Warehouse)
	1401 (Warehouse)
	1402 (Warehouse)

Table 5-2. Property/Facility Key
Page 6 of 11

Property ID Number	Facility (Use)
A-15,2 (Continued)	1403 (Aircraft Support Equipment Shop Storage Facility)
	1404 (Wholesale Supply and Equipment)
	1405 (Maintenance Dock)
	1406 (Traffic Check House)
	1407 (General Purpose Aircraft Shop)
	1410 (Jet Engine Maintenance Shop)
	1411 (Vehicle Fuel Station)
	1413 (Hazardous Storage)
	1415 (Hazardous Storage)
	1416 (Survey Equipment Storage)
	1430 (Squadron Operations)
	1435 (Aircraft Support Equipment Shop Storage Facility)
	1450 (Data Processing Installation)
	1500 (Library)
	1504 (Special Operations)
	1505 (Air Force Office of Special Investigations)
	1506 (Dining Hall)
	1509 (Post Office)
	1515 (Security Police Operations)
	1520 (Dormitory)
	1521 (Dormitory)
	1522 (Dormitory)
	1523 (Dormitory)
	1524 (Dormitory)
	1525 (Base Personnel Office)
	1550 (Dining Hall)
	1560 (Headquarters)
	1561 (Traffic Management Facility)
	1562 (Wing Headquarters)
	1563 (Group Headquarters)
	1564 (Disaster Preparation)
	1565 (Dormitory)
	1566 (Dormitory)
	1651 (Reserve Forces Training Facility)
	1653 (Warehouse)
	1660 (Group Headquarters)
	1766 (Base Package Store)
	1809 (Water Tank Storage)
	1810 (Gymnasium)
	1815 (Bowling Alley)
	1820 (Recreation Center)
	1825 (Education Center)
	1826 (Education Center)
	1827 (Education Center)

Table 5-2. Property/Facility Key
Page 7 of 11

Property ID Number	Facility (Use)
A-15,2 (Continued)	1828 (Education Center)
	1829 (Education Center)
	1830 (Education Center)
	1835 (Exchange Service Outlet)
	1837 (Exchange Service Outlet)
	1838 (Chapel)
	1840 (Clothing Store)
	1845 (Theater)
	1880 (Exchange Sales Store)
	2570 (Non-Commissioned Officers' Dining Hall)
	2571 (Non-Commissioned Officers' Swimming Pool)
	2572 (Non-Commissioned Officers' Swimming Pool)
	2573 (Swimmers' Bath House)
	28 (Aircraft Wash Rack)
	3175 (Lew Center)
	3190 (Youth Center)
	3201 (Storage Facility)
	3204 (Storage Facility)
	3206 (Family Housing Operating Quarters)
	3209 (Storage Facility)
	3210 (Storage Facility)
	3211 (Storage Facility)
	3212 (Storage Facility)
	3213 (Storage Facility)
	3324 (Recreation Facility)
	3326 (Recreation Facility)
	3328 (MWR Storage)
	3335 (Recreation Facility)
	3337 (MWR Storage)
	3340 (Recreation Facility)
	3341 (Readiness Crew)
	3346 (Readiness Crew)
	3351 (Storage)
	3352 (Storage)
	3355 (Conventional Munitions Shop)
	3358 (Vehicle Service Rack)
	3359 (Reserve Forces Team Facility)
	3360 (Electric Power Generator Plant)
	3367 (Hazardous Storage)
	3369 (Shop)
	3370 (Storage Magazine)
	3371 (Storage Igloo)
	3372 (Storage Igloo)
	3373 (Storage Igloo)

Table 5-2. Property/Facility Key
Page 8 of 11

Property ID Number	Facility (Use)
A-15,2 (Continued)	3374 (Storage Igloo)
	3375 (Storage Igloo)
	3376 (Storage Igloo)
	3377 (Storage Igloo)
	3378 (Storage Igloo)
	3379 (Storage Igloo)
	3380 (Storage Igloo)
	3381 (Storage Igloo)
	3382 (Storage Igloo)
	3383 (Storage Igloo)
	3384 (Storage Igloo)
	3385 (Storage Igloo)
	3386 (Storage Igloo)
	38A (Industrial Waste Treatment and Disposal Facility)
	38B (Industrial Waste Treatment and Disposal Facility)
	38C (Industrial Waste Treatment and Disposal Facility)
	38D (Industrial Waste Treatment and Disposal Facility)
	38F (Industrial Waste Treatment and Disposal Facility)
A-16,7	262 (Pavement and Grounds Facility)
	263 (Pavement and Grounds Facility)
A-18,7	1340 (Small Arms Range)
	1341 (Machine Gun Range)
A-19,7	1163 (Liquid Fuel Pump Standard)
	1164 (Liquid Fuel Pump Standard)
	1166 (Liquid Fuel Pump Station)
	1168 (Liquid Fuel Pump Station)
	1170 (Petroleum Operations)
	1174 (Liquid Fuel Standard)
	1202 (Vehicle Service Rack)
	1212 (Storage Facility)
A-20,6	1187 (Hazardous Storage)
	1045 (Base Supply Open Storage)
	1156 (Jet Fuel Storage)
	1157 (Jet Fuel Storage)
	1158 (Liquid Fuel Pump Station)
	1159 (Jet Fuel Storage)
	1190 (Industrial Waste Treatment and Disposal)
A-21,5	1347 (Hazardous Storage)
	1360 (Warehouse)
	1371 (Open Storage)
A-22,7	39 (Storm Drain Disposal)
	1518 (Exchange Service Station)
A-23,7	1510 (Wing Headquarters)
A-24,6	1414 (Aircraft Support Equipment Shop Storage Facility)

Table 5-2. Property/Facility Key
Page 9 of 11

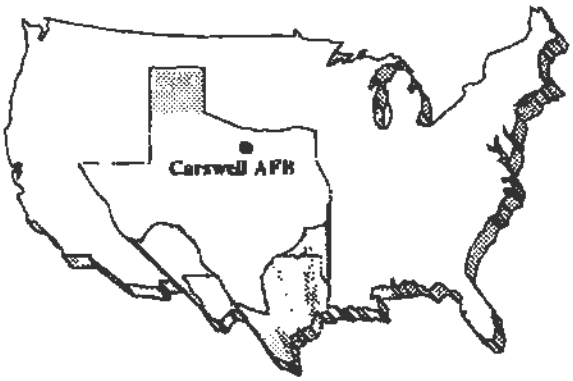
Property ID Number	Facility (Use)
A-25,7	1445 (Field Training Facility)
	1805 (Swimmers' Bath House)
	1806 (Swimming Pool)
	1807 (Swimming Pool Water Treatment)
	1808 (Swimming Pool)
A-27,7	2574 (Swimming Pool Water Treatment)
A-29,7	4120 (Aircraft System Support)
	4190 (Instrument Landing System Localizer)
	4191 (Instrument Landing System Localizer)
A-32,7	4106 (Instrument Landing System Glide Slope)
A-34,7	1101 (Petroleum Operations)
B-1,7	3000 (Composite Medical Clinic)
	3001 (Steam Facility)
	3003 (Support Facility)
	3102 (Officers' Dining Hall)
	3103 (Officers' Dining Hall)
	3105 (Solid Waste Repository)
	3106 (Swimmers' Bath House)
	3107 (Officers' Swimming Pool)
	3108 (Officers' Swimming Pool)
B-2,2	3004 (Traffic Check House)
	3100 (Animal Clinic)
	3104 (Water Storage Tank)
	3109 (Air Force Clinic)
	3110 (Visiting Officers' Quarters)
	3112 (Temporary Housing)
	3113 (Temporary Housing)
	3114 (Temporary Housing)
	3115 (Temporary Housing)
	3138 (Social Activity Facility)
	3139 (Air Force Clinic)
	3140 (Temporary Housing)
	3153 (Pharmacy)
	3260 (Family Housing Appropriated)
	3272 (Post Office)
C-1,2	1231 (Storage Facility)
D-1,1	280 (Family Housing)
E-1,1	260 (Family Housing)
F-1,2	618 (Family Management Office)
	619 (Maintenance Shop)
G-1,2	390 (Child Care Center)
	391 (Airport Surveillance Radar)
H-1,2	208 (Pavement and Grounds Facility)
	209 (Pavement and Grounds Facility)

Table 5-2. Property/Facility Key
Page 10 of 11

Property ID Number	Facility (Use)
H-1,2 (Continued)	225 (Family Housing)
	240 (Security Police Kennel)
	241 (Security Police Kennel)
	259 (Air Force Office of Special Investigations)
	272 (Riding Stables)
H-2,6	38E (Industrial Waste Treatment and Disposal Facility)
H-3,6	4100 (Airport Surveillance Radar)
	4101 (Airport Surveillance Radar)
	4102 (Airport Surveillance Radar)
H-4,7	218 (Golf Clubhouse and Equipment Storage)
H-6,5	212 (Golf Clubhouse and Equipment Storage)
	213 (Golf Clubhouse and Equipment Storage)
	226 (Storage Shed)
	231 (Pavement and Grounds Facility)
H-8,7	233 (Pavement and Grounds)
	234 (Pavement and Grounds Facility)
	235 (Pavement and Grounds Facility)
N-1,7	8520 (Explosive Ordnance Disposal Range)
N-2,6	8500 (Safety, Control and Identification)
	8502 (Water Supply Facility)
	8503 (Surveillance Inspection Shipping)
	8512 (Hazardous Storage)
N-3,2	8508 (Pyrotechnic Storage)
	8509 (Segmented Magazine Storage)
	8511 (Detonator Storage)
	8514 (Conventional Munitions Shop)
	8515 (Vehicle Fuel Station)
	8531 (Munitions Storage Igloo)
	8533 (Munitions Storage Igloo)
	8535 (Munitions Storage Igloo)
	8537 (Munitions Storage Igloo)
	8539 (Munitions Storage Igloo)
	8541 (Munitions Storage Igloo)
	8552 (Munitions Storage Igloo)
	8554 (Munitions Storage Igloo)
	8556 (Munitions Storage Igloo)
	8558 (Munitions Storage Igloo)
	8560 (Munitions Storage Igloo)
N-4,3	8501 (Water Tank Storage)
	8504 (Water Supply Facility)
	8505 (Electric Power Station)
	8506 (Small Arms Ammunition Storage)
	8507 (Spares Storage)
Unknown	1032 (Sewage Pump Station)

Table 5-2. Property/Facility Key
Page 11 of 11

Property ID Number	Facility (Use)
Unknown (Continued)	1138 (Unknown)
	1140 (Auto Hobby Shop)
	1315 (Unknown)
	1361 (Open Storage)
	1631 (Hazardous Storage)
	1645 (Aircraft Maintenance) (removed)
	1647 (Base Engineering Maintenance Shop)
	3111 (Non-Air Force Administration Office)
	4115 (removed)
	4142 (Sanitary Latrine)
	4147 (Traffic Check House)
	4179 (Traffic Check House)
	8510 (Ancillary Explosives Facility)
	Boat House (removed)



CHAPTER 6

CERTIFICATION OF THE
CARSWELL AIR FORCE BASE, TEXAS
ENVIRONMENTAL BASELINE SURVEY

The Environmental Baseline Survey of Carswell Air Force Base utilized only those techniques, procedures, and processes described in this report. In our professional judgment and opinion, the facts and conditions depicted are accurate and are subject to limitations inherent in the investigative techniques used and any expressed limitations in this survey.

REGISTERED PROFESSIONAL ENGINEER
SANDRA L. CUTTINO
No. 38494
EXP 3/31/97
CIVIL
STATE OF CALIFORNIA

Sandra L. Cuttino 10 Nov 93
Sandra L. Cuttino, P.E. Date
Task Order Manager
Air Force Base Closure - BRAC II

I certify that the property conditions stated in this report are based on a thorough review of available records, visual inspections and sampling and analysis as noted and are true and correct, to the best of my knowledge and belief.

Olen Long 16 Nov 93
Olen Long, Site Manager Date
AFBDA/OL-H

I have reviewed the preparer's methodology and report, and concur with the methodology and findings to the best of my knowledge and belief.

Dan Mooney 15 Nov 93
Mr. Dan Mooney, HQ AFCEE, Project Manager Date

The conditions noted in this report are true to the best of my knowledge and belief.

Charles Ray Hatch 14 Dec 93
Ray Hatch, HQ AFBDA, Program Manager Date

S. Felix Amerasinghe 14 Dec 93
Felix Amerasinghe, HQ AFBDA, Environmental Reviewer Date

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF PREPARERS

W. David Ahlborn, Project Environmental Professional, The Earth Technology Corporation
B.A., 1980, Geography, California State University, San Bernardino
Years of Experience: 10

Daniel T. Brechbuhl, Staff Economist, The Earth Technology Corporation
B.A., 1992, Economics, University of Colorado, Boulder
Years of Experience: 1

Calvin Cox, Senior Staff Geologist, The Earth Technology Corporation
B.S., Geology, 1986, San Diego State University, San Diego
Years of Experience: 3

Sandra Lee Cuttino, P.E., Environmental Manager, The Earth Technology Corporation
B.S., 1979, Civil Engineering, University of California, Davis
Years of Experience: 14

David W. Essex, Staff Environmental Specialist, The Earth Technology Corporation
B.S., 1991, Environmental Science, University of California, Riverside
Years of Experience: 2

David Golles, Senior Staff Environmental Specialist, The Earth Technology Corporation
B.A., 1988, Environmental Studies, California State University, San Bernardino
Years of Experience: 4

Peter L. Grill, Senior Staff Environmental Specialist, The Earth Technology Corporation
Environmental Studies, California State University, San Bernardino
Years of Experience: 5

Scott A. Hartford, Captain, U.S. Air Force, AFCEE/ESEP
B.S.C.E., 1986, Civil Engineering, University of New Hampshire
M.B.A., 1990, Management, Golden Gate University
M.S., 1991, Environmental Engineering, University of Colorado, Boulder
Years of Experience: 6

David G. Jury, Senior Staff Environmental Specialist, The Earth Technology Corporation
B.A., 1988, Geography, California State University, Long Beach
Years of Experience: 5

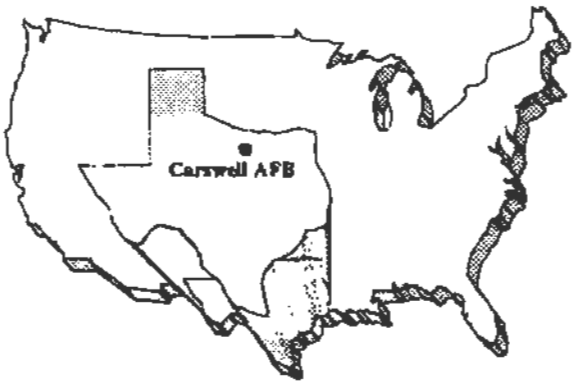
Maria Langmaack, Project Environmental Specialist, The Earth Technology Corporation
B.A., Geography, 1987, California State University, San Bernardino
Years of Experience: 6

Thomas J. McGill, Deputy Office Director, The Earth Technology Corporation
A.B., 1971, Biology, Harvard College
M.A., 1974, Ecology, University of California, Santa Barbara
Ph.D., 1978, Genetics, University of California, Santa Barbara
Years of Experience: 15

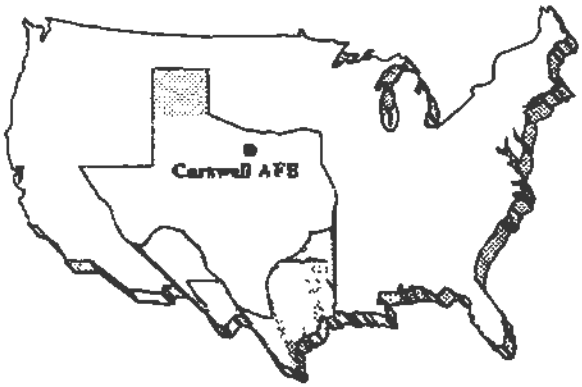
Carl Rykaczewski, Project Environmental Specialist, The Earth Technology Corporation
B.S., 1981, Environmental Resource Management, Pennsylvania State University, University Park
Years of Experience: 5

Nancy Schling, Staff Environmental Specialist, The Earth Technology Corporation
B.A., 1988, Geography, California State University, Long Beach
Years of Experience: 4

Mark Walters, Senior Staff Environmental Specialist, The Earth Technology Corporation
B.S., 1992, Environmental Science, University of California, Riverside
Years of Experience: 4



APPENDICES



APPENDIX A

217127

APPENDIX A

REFERENCES

REFERENCES

American Society for Testing and Materials, 1993. Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.

Ballard, B., 1992. Personal communication with Bob Ballard, Waste Management Inc.

Bloodworth, F.G., 1992. Personal Communication with F.G. Bloodworth, Chief, Water Uses Section for the Texas Water Development Board.

Boerner, B.K., W. Clark, and Q. McGown, 1990. Environmental Impact Study, Lake Worth Leases 7, 9, 10, 14.

Bounds, P., 1992. Personal communication with Paul Bounds, Director of Public Works for the city of White Settlement, Texas.

Camp Dresser & McKee Inc., 1990. Water Supply Master Plan for the City of Fort Worth.

Carswell AFB, n.d., UST/AST Inventory.

Carswell AFB, n.d., Preliminary Assessment/Site Investigation of Radium Contamination.

Carswell AFB 1989a. RCRA Facility Assessment, March.

Carswell AFB 1989b. Waste Minimization Study for Carswell AFB Final Report.

Carswell AFB, 1990a. Hazardous Waste Management Plan, February.

Carswell AFB, 1990b. Underground Storage Tank Program for the Dallas Fort Worth Metrolitan Area Carswell AFB.

Carswell AFB, 1991a. Hazardous Waste Audit Team Inspection Report, August.

Carswell AFB, 1991b. Hazardous Waste Management Plan, April.

Carswell AFB, 1991c. Pest Management Shop Building 1213, Carswell AFB Shop Stock Inventory List.

Carswell AFB, 1991d. Recoverable and Waste Petroleum Plan, April.

Carswell AFB, 1991e. RFI Work Plans, May.

Carswell AFB, 1991f. Spill Prevention and Response Plan, January.

Carswell AFB, 1991g. USAF Real Property Inventory Detail List, Carswell AFB.

Carswell AFB, 1992a. Asbestos Log, April.

Carswell AFB, 1992b. Emergency Electric Generator Inventory.

Carswell AFB, 1992c. Hazardous Waste Analysis Plan, April.

Carswell AFB, 1992d. Hazardous Waste Management Plan, November.

Carswell AFB, 1992e. Spill Prevention and Response Plan, April.

Carswell AFB, 1992f. Underground Storage Tank Management Plan, May.

Carswell AFB, 1992g. Waste Streams Generated Listing, March.

Carswell AFB, 1993a. Storage Tanks by Facility, February.

Carswell AFB, 1993b. USAF Real Property Inventory Change Report, Carswell AFB.

Carswell AFB, 1993c. Regulated Underground Storage Tanks at Carswell AFB, September.

Carswell AFB, 1993d. Pesticide Spill Contingency Plan, Appendix B.

CH_2M Hill, 1984. Installation Restoration Program Records Search for Carswell Air Force Base, Texas, prepared for the Strategic Air Command, February.

City of Fort Worth, see Fort Worth, City of.

City of Westworth Village, see Westworth Village, City of.

City of White Settlement, see White Settlement, City of.

Cunningham, J., 1992. Personal communication with Jack Cunningham, Manager, Customer Relations for Lone Star Gas Company, Forth Worth, Texas.

DeLatorre, C., 1992. Personal communication with Carlos DeLatorre, Community & Customer Service Manager for TU Electric, Fort Worth, Texas.

Dinyarian, N., 1992. Personal communication with Nowzar Dinyarian, City of Fort Worth Water Department, Engineering Division, Texas.

Environmental Assessment and Information Systems Division, Argonne National Laboratory, 1992. Environmental Compliance Assessment and Management Program (ECAMP), Final Report, October.

Fort Worth, City of, 1988. Village Creek Wastewater Treatment Plant, October.

Fort Worth, City of, 1992. Water and Wastewater Capital Improvements Plan Semi-Annual Progress Report, December 1991.

Fort Worth Water Department, n.d. Water Main Map.

Fort Worth Water Department, 1990. 1989-1990 Statistical Report Fort Worth Water Department.

Fort Worth Water Department, 1991-92. Water Analysis Report.

Galson Corporation, 1993. Carswell AFB Asbestos Survey, Volumes IIa and IIb, January.

Hargis & Associates, Inc., 1985. Phase II Investigation of Subsurface Conditions at U.S. Air Force Plant No. 4, Fort Worth, Texas, Volumes 1-6, September 25.

Hargis & Associates, Inc., 1989. Summary of Interim Remedial Investigations, January 1987 to April 1989, U.S. Air Force Plant No. 4, Fort Worth, Texas.

James Toal Company, 1992. Draft Carswell Reuse Plan, March 16.

Lake Worth, City of, n.d. Lake Worth Development Plan and Management Program, prepared by Carter & Burgess, Inc., Fort Worth, Texas.

Lake Worth, City of, 1981. Land Uses (map), prepared by Carter & Burgess, Inc., Fort Worth, Texas.

Maxim Engineers, Inc., 1990. Subsurface Contamination Assessment, April.

Midwest Research Institute, 1992. RAMP Detailed Assessment, January.

North Central Texas Council of Governments, 1991. Assuring Treatment and Disposal Capacity 1991-1992 Interim Regional Solid Waste Management Plan.

North Central Texas Council of Governments, 1992a. 1992 Annual Water Quality Management Plan for North Central Texas, Protecting Lake Water Quality, Texas Water Commission.

North Central Texas Council of Governments, 1992b. Continuous Automated Monitoring System for Trinity River Water Quality, Spring 1992 Edition, prepared in cooperation with City of Dallas, City of Fort Worth, Trinity River Authority, North Texas Municipal Water District, Texas Water Commission, U.S. Environmental Protection Agency, and U.S. Geological Survey.

Pierce, Goodwin, Alexander, 1986a. Comprehensive Plan, Carswell Air Force Base, Executive Summary, May.

Pierce, Goodwin, Alexander, 1986b. Strategic Air Command, Comprehensive Plan, Storm Drainage System Map, Carswell Air Force Base, Fort Worth, Texas, Tab No. G-3.

Radian Corporation, 1986. Installation Restoration Program Phase II - Confirmation/Quantification, Stage I, Volume 1, Final Report for Carswell AFB, Texas, October.

Radian Corporation, 1988. Weapons Storage Area Installation Restoration Program, October.

Radian Corporation, 1989. RCRA Facility Assessment PR/VSI (Preliminary Review Visual Site Inspection) Report Carswell AFB, Fort Worth, Texas.

Radian Corporation, 1990. Installation Restoration Program Remedial Investigation/Feasibility Study Decision Papers, Base Service Station.

Radian Corporation, 1991. Installation Restoration Program Remedial Investigation/Feasibility Study Decision Papers.

Robert D. Niehaus, Inc., 1988. Final Environmental Assessment of the Proposed Land Lease for Military Family Housing at Carswell Air Force Base, Texas, prepared for U.S. Air Force, Strategic Air Command.

Russell, L., 1992. Personal communication with Lester Russell, Utility Manager for the city of Sansom Park, Texas.

Scanlan, J., 1992. Personal communication with James Scanlan, Assistant Director for the city of Fort Worth Water Department, Texas.

Science and Engineering Associates, Inc., 1990. Environmental Compliance Assessment and Management Program (ECAMP) Draft Final Environmental Evaluation Report, April.

Science and Engineering Associates, Inc., 1991. Environmental Compliance Assessment and Management Program (ECAMP) Draft Final Environmental Evaluation Report.

Staggs, K., 1992. Personal communication with Ken Staggs, Utility Plant Operator for the city of River Oaks, Texas.

Tracer Research Corporation, 1992. Tracer Underground Storage Tank Leak Test, June.

U.S. Air Force, n.d. History of Carswell Air Force Base, Carswell AFB History Office.

U.S. Air Force, 1986. Comprehensive Plan, Real Estate Overlay, Tab D-5, May.

U.S. Air Force, 1989. Land Management Plan for Carswell Air Force Base, Texas, for Plan Period March 1989 to February 1994.

U.S. Air Force, 1990. Total Base Acreage, Carswell AFB, February 22.

U.S. Air Force, 1991. Real Property Inventory Detail List, Carswell AFB, October 16.

U.S. Air Force, 1992a. Asbestos Operating Plan, 7th Wing, Carswell Air Force Base, April 1.

U.S. Air Force, 1992b. Carswell AFB RAMP Detailed Assessment Study.

U.S. Air Force, 1993a. Disposal and Reuse of Carswell AFB, Texas, Environmental Impact Statement, Draft, February.

U.S. Air Force, 1993b. Management Action Plan (MAP), Carswell AFB, Fort Worth, Texas.

U.S. Environmental Protection Agency, 1992. A Citizen's Guide to Radon.

Westworth Village, City of, 1958. Survey map, revised June.

Westworth Village, City of, 1989. Zoning Ordinance 19-H, September 19.

White Settlement, City of, 1968. Comprehensive Plan Report Number Two, White Settlement, Texas, prepared by Carter & Burgess, Inc., Fort Worth, Texas, February.

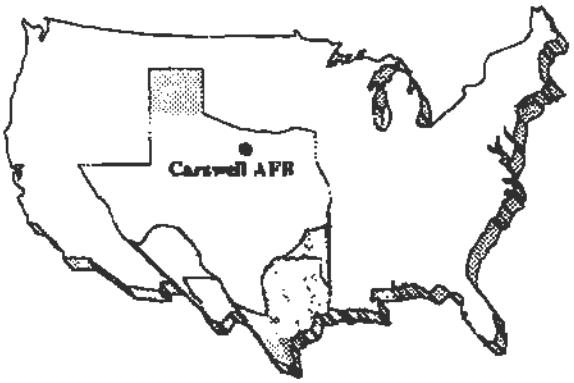
White Settlement, City of, 1982. Ordinance 19-H.

White Settlement, City of, 1983. Parcel map, prepared by Rady & Associates, Inc., Fort Worth, Texas, March.

White Settlement, City of, 1985. Land Use Review.

217133

THIS PAGE INTENTIONALLY LEFT BLANK



APPENDIX B

217155

APPENDIX B

SAMPLE FORMS

MASTER WORKPLACE EXPOSURE DATA SUMMARY	DATE (YYMMDD) 8 8 0 3 0 8	WORKPLACE IDENTIFIER 0 0 3 [redacted] 1 6 5 A
(Use this space for mechanical imprint)		BASE: C ARSWELL
		ORGANIZATION: 7 FMS
		WORKPLACE: ELECTRIC SHOP
		BLDG NO/LOCATION: 1050
		ROOM/AREA: Column 1/3rd floor

HISTORIC DATA

WORKPLACE NARRATIVE

Personnel perform maintenance on electrical parts on aircraft. Exposure to hazardous noise exists while on the flightline and operating a hand drill in the shop. Small amounts of black lacquer is used in spot painting operations. Spray paints contain VM&P naptha, Toluene, xylene, and methylene chloride. Methyl ethyl ketone is used to wipe down parts. Insulating varnish contains xylene, is used to insulate wiring.

EXPOSURE DATA

SOURCE	MEASURED CONCENTRATION OR INTENSITY	ABOVE LIMITS? (Y or N)	CONTROLS
NOISE (dosimetry)	90 dBA RT	Y	HCP plugs or muffs
Hand drill	91 dBA RT	Y	" " "
CHEMICALS			
NO EXPOSURE			

ADMINISTRATIVE DATA

SUPERVISOR (Name, Grade)	DUTY PHONE	OFFICE SYMBOL	AFSC's
MSgt Johnson	5759	MAFAE	423X0

NO PERSONNEL	SHIFTS/DAY	DATA VALID FOR	SURVEY FREQUENCY
☐ MIL ☒ CIV	2	all SHIFT(S)	☒ ANNUAL ☐ QUARTERLY ☐ SEMI-ANNUAL ☐ OTHER _____

SANITARY FACILITIES

LOCATION: ☐ IN WORKPLACE ☒ OTHER 2nd floor

	URINALS	COMMODES	SINKS	SHOWERS	LOCKERS	OTHER
MALE	2	2	1	0	12	--
FEMALE		2	1	0	--	--

AF FORM 2755
JAN 82

INDUSTRIAL HYGIENE SURVEY DATA SHEET – GENERAL (Use this space for mechanical imprint)	DATE (YYMMDD) 8 6 0 8 1 5	WORKPLACE IDENTIFIER 0 0 3 0 [redacted] F A W E [redacted] 1 7 5 A
	BASE: CARSWELL	ORGANIZATION: 7 FMS
HISTORICAL DATA	WORKPLACE: WELDING	
	BLDG NO/LOCATION: 1060	ROOM/AREA: 123

POTENTIAL HAZARD
(Description, Operating Parameters)

Oxy-acetylene, arc, and Tig welding is accomplished on Class I and II metals. Galvanized metal is not welded on in this shop. Prior to welding the zinc galvanize is removed.

EVALUATION
(Standards/Criteria, Sample/Test equipment and results, Discrepancies)

Air sampling was accomplished during routine welding operations of Class I metals during this survey period. Class II metals will need to be sampled as soon as we can coordinate with the shop.

HISTORICAL CASE FILE

CONTROLS
(Existing or recommended; Protective equipment; Engineering, or Administrative)

Welding face shields, gloves, Freely suspended hoods (3) and one portable ventilation unit.

SURVEYED BY (Name, Grade, AFSC)	REVIEWED BY (Name, Grade, AFSC)
LaForgia, Joetta SSgt 90750	Roger E. Bouvier, Capt, 91253

AF FORM 2758 JAN 82
B-2

* NEW FORM DATED 13 APR 85 BASELINE
FILED IN SHOP FOLDER

Bldg 1710

(use this space for mechanical imprint)

INITIAL COMPREHENSIVE SURVEY DATA

HAZARDOUS MATERIALS DATA

DATE (Y) (D): 9 11 19 17

WORKPLACE IDENTIFIER: 0 0 3 0 B A G R 1 3 5 A

BASE: Carswell

DEL DEST CODE: 449 OB

ORGANIZATION: Det 1 1365 AAVS

WORKPLACE: Graphics

BLDG NO/LOCATION: 1710

ROOM/AREA: —

MATERIAL NOMENCLATURE (Manufacturer & Major Ingredients)	NATIONAL STOCK NUMBER (or NIOSH Number)	SPECIFICATION (MIL or FED)	MSDS ON FILE? (Y or N)	QUANTITY USED (per day,wk,mo,yr)	DISPOSAL METHOD (recycle,in process,etc.)	QUANTITY OF WASTE GENERATED	IEX CODE (B,9, none)	POTENTIAL HAZARD (Y or N) Inh	Abs	Ing	Con
1. Scotch 3M				1 pt / 3 mos	In Process	None	8				
Spraymount Adhesive	8040-00-171-1535	—	Y								
a) Isobutane 37%	TZ4300000							N	N	N	N
b) 1,1,1, Trichloroethane 55%	KJ2975000							N	N	N	N
c) Diethylene Ether % unk	JG8225000							N	N	N	N
Dixie Petro Chemical 2. Ammonia Gas	6830-00-616-9184	—	Y	190 lbs / 6 mos	In Process	None	9				
Anhydrous Ammonia a) Gas 100%								N	N	N	N
Steven Ind. 3. Bristine Solvent + Thinner	LP	—	Y	1 gal / 6 mos	In Process	None	9				
a) n-Hexane 100%	MN9275 0000							N	N	N	N
Kodak Co. 139 6844 4. Kodak SD Deactivator	6750-00-1100-1074	—	Y	2½ gal / 2 mos	Sanitary Sewer	Very minute	8				
a) Acetic Acid % unk	AF1225000							N	N	N	N
b) Aqueous Solution, Non-Hazardous unk	1001434 AU							N	N	N	N
Kodak 186 5567 5. SD Activator	6750-01-045-0326	—	Y	2½ gal / 2 mos	Sanitary Sewer	Very minute	8				
a) Potassium Hydroxide 8%	TT2100000							N	N	N	N

AF Form 2761, JAN 89 PREVIOUS EDITION WILL BE USED CURRENT AND CORRECT AS OF 24 Aug 92 (mo/yr)

237150

CARSWELL AFB
ENVIRONMENTAL BASELINE SURVEY
Visual Site Inspection (VSI)
(To be Completed by EBS Team Personnel)

Date _____

Inspector _____

Facility Escort _____

Facility: #_____ Name _____

This Facility and associated property with regards to disposal represents:

☐ no constraints ☐ known or suspected constraints ☐ unknown constraints

Bio/Physical Setting: _____

Current Use: _____

Past Use: ☐ Same as above _____

Does facility generate or store Hazardous Material/Waste: ☐ Yes ☐ No

Accumulation Point: ☐ Yes ☐ No

Types: _____

Disposal practices: _____

"Housekeeping" in and around building is ☐ Good ☐ Poor: _____

Effluent waste created/Destination: _____

Conditions not mentioned that present concerns: _____

Interviews: _____

BUILDING INSPECTION CHECKLIST

Are there any signs of the following on the property _Y_ Yes _N_ No _U_ Unknown

A)	_____	UST	K)	_____	Discolored Soil
B)	_____	AST	L)	_____	Noxious Odors
C)	_____	Oil Water Separator	M)	_____	Sensitive Receptors
D)	_____	Septic Tank	N)	_____	Stressed Vegetation
E)	_____	Waste Piles	O)	_____	Fill Areas/Buried Objects
F)	_____	Lead Paint/Pipes	P)	_____	Drums/Drum Strorage
G)	_____	PCBs	O)	_____	Surface Water
H)	_____	Stained Sinks/Floor Drains	R)	_____	Suspected ACM
I)	_____	Evidence of Spills	S)	_____	Flaking Paint
J)	_____	Evidence of Improper Disposal	T)	_____	Other (Explain Below)

Check List Description:

_____

_____

_____

_____

_____

_____

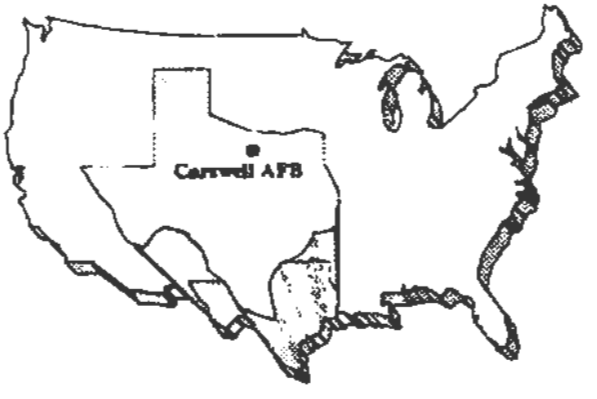
_____

Photo Log:

Roll	Frame	Subject

Facility Diagram

THIS PAGE INTENTIONALLY LEFT BLANK



APPENDIX C

APPENDIX C

HAZARDOUS MATERIALS STORAGE

APPENDIX C

HAZARDOUS MATERIALS STORAGE

Table C-1. An inventory of hazardous materials stored in industrial workplaces based on information maintained by the Bioenvironmental Engineering Services office is presented in Table C-1. Specifically, this inventory reflects information tabulated on Air Force Form 2761, Hazardous Materials Data. The quantity and quality of data on the Hazardous Materials Data forms varies considerably over the period of available records. For some workplaces, records were available back to 1983; for others, records were only available since the late-1980s. The most complete records are available for the last 5 years (i.e., 1987 to 1992). Since 1990, most of the data have been recorded on a computer-generated version of Air Force Form 2761.

The "Quantity Stored" entry is as it was listed on the original forms. If a quantity was not specified on the form, "unknown" has been listed in the Quantity Stored column. It should also be noted that only the amount of product usage per unit time was recorded on the Hazardous Materials Data forms; product storage per unit time was not recorded on the forms. A major assumption made for this appendix is that usage data was the only available data for storage.

The units of measure vary for different classes of products listed on the Hazardous Material Data forms. The "Quantity Stored" for many products is given in conventional quantitative units of ounces, pounds, tons, pints, quarts, gallons, liters, and grams. Other products, however, are listed in terms of non-quantified units such as cans, boxes, rolls, tubes, kits, packs, drums, and cylinders. For these products, the conversion factors listed below were used.

1 bag	= 25 lb	1 ball	= 1 lb	1 bar	= 1 lb
1 barrel	= 350 lb	1 box	= 100 lb	1 can	= 50 lb
1 canister	= 50 lb	1 caplet	= 1 lb	1 cartridge	= 1 lb
1 case	= 50 lb	1 cycle	= 1 lb	1 cylinder	= 100 lb
1 disk	= 1 lb	1 dozen	= 1 lb	1 drop	= 1 lb
1 drum	= 417 lb	1 each	= 1 lb	1 jar	= 1 lb
1 keg	= 100 lb	1 kit	= 1 lb	1 mon	= 1 lb
1 pack	= 1 lb	1 package	= 1 lb	1 pad	= 1 lb
1 pail	= 50 lb	1 pellet	= 1 lb	1 pillow	= 1 lb
1 roll	= 1 lb	1 spool	= 1 lb	1 stick	= 1 lb
1 tablet	= 1 lb	1 tub	= 1 lb	1 tube	= 1 lb

For products listed using volumetric measures, such as pints, quarts, gallons, and liters, knowledge of the density or specific gravity of each product would be required to calculate the respective total weights of product usage per unit time. Given the fact that such data are not recorded on Hazardous Materials Data forms, the weight of an equivalent volume of water (1 U.S. gallon weighs 8.3453 pounds or 3.7854 kilograms) was used to calculate an approximate total product weight. All weights recorded in the English system of ounces and pounds were converted to their metric equivalent.

Only the actual products used in each workplace are listed in Table C-1. In most cases, the product used (e.g., black spray paint) is a mixture of unique chemical constituents. For example, black spray paint consists of several chemical compounds, such as toluene, acetone, butyl acetate, butyl cellosolve, and isobutane. In addition, black spray paint manufactured by two different companies may contain different percentages of the same compounds (i.e., one may contain 5

percent toluene and the other 19 percent) or an entirely different composition of chemical compounds.

Table C-2. The list of products in Table C-1 used in quantities which are subject to reporting requirements specified under 40 CFR Part 373 is provided in Table C-2. Under Section 120(h)(1) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), whenever any agency, department, or instrumentality of the United States enters into any contract for the sale or other transfer of real property which is owned by the United States, and on which any hazardous substance was stored for 1 year or more, known to have been released, or disposed of, the contract must include notice of the type and quantity of such hazardous substance, and the time at which such storage, release, or disposal took place, to the extent such information is available based on a complete search of agency files. Requirements for such notice are outlined in 40 CFR Part 373.

The notice required by 40 CFR Part 373 for the storage of hazardous substances applies only when hazardous substances have been stored in quantities greater than or equal to 1,000 kilograms (or 2,205 pounds) or the CERCLA-reportable quantity for the substance as listed in 40 CFR Part 302.4, whichever is greater. Hazardous substances that are also listed under 40 CFR 261.30 as acutely hazardous wastes, and that are stored for 1 year or more are subject to the notice requirement when stored in quantities greater than or equal to 1 kilogram (2.205 pounds).

Constituents of products and their percentages are listed in Table C-2 when they were provided on Air Force Form 2761. Synonyms and Chemical Abstracts Services Registry Numbers (CASRN) for these constituents are also provided when listed in the Keller's Chemical Reg-A-Dex Chemical Cross Reference.

Table C-1. Hazardous Materials Storage, Facility 1022

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Giant Fish			
Adhesive, RTV	3 ounces/3 months	0.08/3 months	1991
Denatured Alcohol	1 quart/2 months	0.91/2 months	1991
Detergent and Disinfectant	1 quart/year	0.91/year	1991
Electrical Contact Cleaner	6 ounces/year	0.17/year	1991
Flux 100	1 pint/6 years	0.45/6 years	1991
Glass Cleaner	1 quart/year	0.91/year	1991
Lacquer, Flat Black	1 pint/2 months	0.45/2 months	1991
Latex 623	5 gallons/8 months	18/8 months	1991
Leak Detection Oxygen System	2 ounces/month	0.06/month	1991
Lube Oil	2 quarts/3 months	1.82/3 months	1991
Lube Oil	1 quart/3 months	0.91/3 months	1991
Poly, Gray	2 pints/month	0.9/month	1991
Radiac Wash	2 gallons/year	7/year	1991
Sealant, RTV 108	3 ounces/3 months	0.08/3 months	1991
Solder, WW-300	1 pound/year	0.45/year	1991
Superbonder 499	4 ounces/year	0.11/year	1991
Technical Nitrogen	230 feet/3 months	---	1991
Wax Polish	392 grams/6 months	0.39/6 months	1991

Table C-1. Hazardous Materials Storage, Facility 1026

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Bulk Storage/L_{ox}			
General Purpose Deoderant	32 ounces/6 months	0.9/6 months	1990
Glass Cleaner	1 box/year	45/year	1990
Liquid Plastic Polish	1 pint/year	0.45/year	1990
Scouring Powder	42 ounces/year	1.18/year	1990
Spray On Wipe Off	44 ounces/year	1.24/year	1990
Starting Fluid	Unknown	---	1990
Technical L_{NOX}	Bleed tank once a week	---	1990
Technical L_{OX}	Bleed tank once a week	---	1990

Table C-1. Hazardous Materials Storage, Facility 1027

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Inspection Branch			
140 Solvent	700 gallons/year	2,541/year	1992
Electrical Contact Cleaner	8 ounces/month	0.23/month	1992
General Purpose Oil	32 ounces/month	0.9/month	1992
Grease, Aircraft	10 pounds/month	4.5/month	1992
Grease, Aircraft	3.5 pounds/month	1.58/month	1992
Grease, Aircraft	2 ounces/4 months	0.06/4 months	1992
Hydraulic Fluid	Varies	---	1992
Lacquer,Clear	2 quarts/year	1.82/year	1992
Lube Oil	48 ounces/month	1.35/month	1992
Penetrating Fluid	12 ounces/month	0.34/month	1992
Soap, Aircraft	110 gallons on hand	399 on hand	1992
Soap, Aircraft	500 gallons/year	1,815/year	1992

Table C-1. Hazardous Materials Storage, Facility 1048

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Fuel Systems Repair			
Adhesive	1 ounce bottle/day	0.03/day	1990
Adhesive	1 quart/3 months	0.91/3 months	1990
Adhesive	1 quart/6 months	0.91/6 months	1990
Adhesive	3 ounces/2 weeks	0.08/2 weeks	1990
Adhesive Compound	1 tube/day	0.45/day	1990
Adhesive, Patch Kit	2 kits/month	0.9/month	1990
Ammonium Hydroxide	6 ounces/2 weeks	0.17/2 weeks	1990
Cement Chomigun	1 kit/year	0.45/year	1991
Citrikleen	55 gallons/year	200/year	1991
Cleaning Solvent	1 gallon/week	4/week	1990
Corrosion Preventative Compound	5 gallons/year	18/year	1991
Detergent, General	1 gallon/week	3/week	1990
Dishwashing Compound	1 gallon/month	4/month	1991
Disinfectant	0.5 gallon/week	2/week	1990
Dye Leak	1 gallon/5 months	3.63/5 months	1990
Dye, Zyglo	6 ounces/6 months	0.17/6 months	1990
Floor Varnish	1 gallon/3 months	3.63/3 months	1990
Floor Wax	0.5 gallon/week	1.82/week	1990
General Purpose Deodorant	14 ounces/month	0.39/month	1991
Glass Cleaner	36 ounces/month	1.01/month	1991
Hydraulic Fluid	1 pint/month	0.45/month	1990
Isopropyl Alcohol	1 gallon/2 weeks	4/2 weeks	1990
Leak Detection	12 ounces/week	0.34/week	1990
Leak Detection Fluid	48 ounces/month	1.35/month	1991
Leak Test	2 tubes/day	0.9/day	1990
Lubricating Compound	16 ounces/month	0.45/month	1991
Methyl Ethyl Ketone	1 gallon/week	3.63/week	1990
Metal Polish	1 pint/year	0.45/year	1990
Oil, Lubricating	1 quart/year	0.91/year	1991
Oyltite Stick	1 stick/week	0.45/week	1990
PD-680	1 gallon/day	3.63/day	1990
Phenlen	4 ounces/2 weeks	0.11/2 weeks	1990
Primer 148	1 bottle/week	---	1990
Reagent Water	5 gallons/6 months	18/6 months	1991

Table C-1. Hazardous Materials Storage, Facility 1048 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Scouring Power 1	36 ounces/month	1.01/month	1991
Sealing Compound	2 tubes/week	0.9/week	1990
Sealing Compound	1 tube/day	0.45/day	1990-1991
Sealing Compound	12 kits/month	5.4/month	1990
Sealing Compound	1 gallon/8 months	4/8 months	1990
Sealing Compound	1 kit/day	0.45/day	1990
Sealing Compound	3 kits/month	1.35/month	1991
Toilet Soap	0.5 gallon/week	1.82/week	1990
Zinc Chromate Putty	1 pint/year	0.45/year	1990

Table C-1. Hazardous Materials Storage, Facility 1050

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Structural Repair			
Anti-Corrosive Compound	8 ounces/month	0.23/month	1992
Anti-Seize Compound	6 ounces/month	0.17/month	1992
Assembly Fluid	4 ounces/month	0.11/month	1992
Carbon Removing Compound	55 gallons/month	200/month	1992
Carbon Removing Compound	1 gallon/month	4/month	1992
General Purpose Cleaner	1 gallon/month	4/month	1992
Grease, Auto and Artillery	1 pound/month	0.45/month	1992
Grease, General Purpose	0.5 pound/month	0.23/month	1992
Grease, Molybdenum Disulfide	0.5 pound/month	0.23/month	1992
Hydraulic Fluid	1 quart/month	0.91/month	1992
Lacquer, Black	1 pint/month	0.45/month	1992
Lacquer, Blue	1 pint/month	0.45/month	1992
Lacquer, Flat Black	Unknown	---	1992
Lacquer, Gray	1 pint/month	0.45/month	1992
Lacquer, Green	1 pint/month	0.45/month	1992
Lacquer, Orange	1 pint/month	0.45/month	1992
Lacquer, Red	1 pint/month	0.45/month	1992
Lacquer, White	1 pint/month	0.45/month	1992
Lacquer, Yellow	1 pint/month	0.45/month	1992
Lube Oil, General Purpose	1 quart/month	0.91/month	1992
Lube Oil, Molybdenum Disulfide	0.5 pound/month	0.23/month	1992
Lubricant, Solid Film	1 quart/month	0.91/month	1992
Molybdenum Disulfide	10 ounces/3 months	0.28/3 months	1992
Penetrating Fluid	12 ounces/month	0.34/month	1992
Penetrating Oil	16 ounces/month	0.45/month	1992
Pneudraulics			
Adhesive	1 pint/8 months	0.45/8 months	1990
All Purpose XL-8	1 quart/5 months	0.91/5 months	1990
Anti Seize Compound	1 pint/year	0.45/year	1990
Ball and Roller Bearing	1 pound/year	0.45/year	1990

Table C-1. Hazardous Materials Storage, Facility 1050 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Citrikleen	150 gallons/year	545/year	1990
Corrosion Preventative Compound	5 gallons/year	18/year	1990
Corrosion Preventative Compound	12 ounces/year	0.33/year	1990
Corrosion Preventative Compound	As needed	---	1991
Dry Cleaning Solvent	10 gallons/month	36/month	1990
Grease, Aircraft	1 tube/month	0.45/month	1990
Grease, Aircraft	1 quart/6 months	0.91/6 months	1990
Grease, Plug Valve	8 ounces/5 months	0.23/5 months	1990
Hydraulic Fluid	16 ounces/week	0.45/week	1990
Hydraulic Fluid	15 gallons/month	54/month	1990
Lubricating Oil	4 ounces/year	0.11/year	1990
Lubricating Oil	0.5 quart/month	0.45/month	1990
Penetrating Fluid	2 pints/month	0.9/month	1990
Petrolatum, Technical	1 quart/month	0.9/month	1990
Poly, Yellow	As needed	---	1990
Primer, Green Epoxy	1 can/month	23/month	1990
Zinc Chromate, Green	1 can/6 months	23/6 months	1990
Egress			
Adhesive	2 quarts/year	1.82/year	1990
Adhesive	6 quarts/year	5.46/year	1988
All Purpose Cement	6 quarts/year	5.46/year	1988, 1990
Corrosion Preventative Compound	1 can/month	23/month	1988
Corrosion Preventative Compound	1 can/6 months	23/6 months	1990
Cyclohexanone, Technical	1 can/2 years	23/2 years	1990
Enamel, Black	1 can/month	23/month	1986
Enamel, Gray	1 can/month	23/month	1986
Enamel, Strata Blue	1 can/month	23/month	1986
Enamel, White	1 can/month	23/month	1986
Enamel, Yellow	1 can/month	23/month	1986
Insulation Material	Unknown	---	1988, 1990
Lubricating Compound	1 can/3 months	23/3 months	1988, 1990
Penetrating Fluid	1 can/month	23/month	1988

Table C-1. Hazardous Materials Storage, Facility 1050 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Penetrating Fluid	1 can/2 months	23/2 months	1990
Sealing Compound	6 quarts/year	5.46/year	1988, 1990
Technical, Prussian	1 pint/2 years	0.45/2 years	1990
Technical, Prussian Blue	1 pint/6 months	0.45/6 months	1988
Torque Seal	1 ounce/month	0.03/month	1990
Torque Seal	25 ounces/week	0.70/week	1988
CTK/Bench Stock			
Adhesive	4 ounces/month	0.11/month	1990
Adhesive	1 quart/year	0.91/year	1990
Adhesive	2 ounces/month	0.06/month	1990
Adhesive	10 ounces/month	0.28/month	1990
Axle Grease	1 can/2 months	23/2 months	1990
Corrosion Preventative	16 ounces/month	0.45/month	1990
Corrosion Preventative Compound	5 pints/month	2.25/month	1990
Corrosion Preventative Compound	1 pint/month	0.45/month	1990
Dampening Fluid	12 ounces/month	0.34/month	1990
Electrical Contact Cleaner	Unknown	---	1990
Enamel, Black	1 pint/month	0.45/month	1990
Enamel, Olive Drab	2 pints/month	0.9/month	1990
Firewell Sealant	1 pint/3 months	0.45/3 months	1990
Grease	12 ounces/year	0.34/year	1990
Grease	6.5 pounds/month	2.93/month	1990
Grease	5 ounces/year	0.14/year	1990
Hydraulic Fluid	28 quarts/month	25.5/month	1990
Insulating Varnish	1 ounce/year	0.03/year	1990
Lacquer, Blue	1 pint/month	0.45/month	1990
Lacquer, Clear	1 pint/month	0.45/month	1990
Lacquer, Clear	0.5 pint/month	0.23/month	1990
Lacquer, Orange	1 pint/month	0.45/month	1990
Lacquer, Red	1 pint/month	0.45/month	1990
Liquid Nitrogen	1 cylinder/3 months	45/3 months	1990
Lube Oil	0.5 gallon/year	2/year	1990
Paint, Gloss White	1 pint/month	0.45/month	1990
Penetrating Fluid	2 ounces/month	0.06/month	1990

Table C-1. Hazardous Materials Storage, Facility 1050 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Penetrating Fluid	1 pint/month	0.45/month	1990
Primer, Green	2 pints/month	0.9/month	1990
Starting Fluid	4.15 ounces/month	0.12/month	1990
Trichlorotrifluoroethane	14 ounces/month	0.39/month	1990
Windshield Cleaner	1 pint/month	0.45/month	1990
Bomber Branch			
Adhesive	3 tubes/month	1.35/month	1991
Adhesive Epoxy	4 ounces/month	0.11/month	1992
Cleaning and Lube Compound	180 cans/year	4,050/year	1991
Corrosion Preventative Compound	2 ounces/month	0.06/month	1992
Desiccant	2 cans/month	45/month	1992
Electrical Contact Cleaner	1 pint/week	0.45/week	1991
Grease, Molybdenum	20 pounds/month	9/month	1991
Greaser	2 bottles/month	---	1992
Hydraulic Fluid	450 quarts/month	409.5/month	1991
Lacquer, Black	1 can/month	23/month	1991
Lacquer, Gray	1 can/month	23/month	1991
Lacquer,Clear	1 can/month	23/month	1991
Leak Tec	3 bottles/month	---	1992
Lube Oil	600 quarts/month	546/month	1991
Penetrating Fluid	1 can/month	23/month	1991
Sealant	3 ounces/month	0.08/month	1991
Sealant	2 kits/month	0.9/month	1992
Sealant	4 liters/month	---	1991
Sealant	24 ounces/month	0.68/month	1992
Sealing Compound	2 tubes/month	0.9/month	1991
Sealing Compound	25 kits/year	11.25/year	1992
Sealing Compound	24 ounces/month	0.68/month	1992
Silicone Compound	2 tubes/month	0.9/month	1991
Silicone Sealant	4 tubes/month	1.8/month	1992
Solvent and Antifreeze	100 pints/year	45/year	1992
Starter Cartridge	Unknown	---	1991

Table C-1. Hazardous Materials Storage, Facility 1050 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Environmental Electric			
Acid, Sulfuric Electrolyte	4 gallons/month	15/month	1991
Adhesive	0.5 ounce/2 months	0.01/2 months	1991
Adhesive Conductive Silver	1 ounce/6 months	0.03/6 months	1991
Cleaning Compound	24 ounces/month	0.68/month	1991
Corrosion Preventative	3 pints/month	1.35/month	1991
Corrosion Preventative	24 ounces/month	0.68/month	1991
Corrosion Preventative Compound	2 gallons/year	7/year	1991
Grease, Adhesive	2 ounces/year	0.06/year	1991
Grease, Aeroshell	6.5 pounds/2 years	3/2 years	1991
Grease, Aircraft	16 ounces/year	0.45/year	1991
Grease, Molybdenum	1 pound/3 years	0.45/3 years	1991
Grease, Ordnance	2 ounces/year	0.06/year	1991
Insulating Varnish	2 ounces/year	0.06/year	1991
Insulating Varnish	1 quart/year	0.91/year	1991
Lead Tin Solder	1 roll/year	0.45/year	1991
Leak Detection Compound	20 ounces/month	0.56/month	1991
Lube Oil	1 ounce/month	0.03/month	1991
Lubriplate 107	14 ounces/year	0.39/year	1991
Neoprene Contact Cement	0.5 pint/year	0.23/year	1991
Penetrating Fluid	24 ounces/month	0.68/month	1991
RTV Adhesive	3 ounces/year	0.08/year	1991
Sealing Compound	1 ounce/year	0.02/year	1991
Sodium Bicarbonate	5 pounds/month	2/month	1991
Soldering Flux	1 pint/year	0.45/year	1991
Trichlorotrifluoroethane	2.5 gallons/year	9/year	1991
Vinegar Acid	10 gallons/month	36/month	1991

Table C-1. Hazardous Materials Storage, Facility 1055

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Weapons Release			
Automotive and Artillery	6.5 pounds/year	3/year	1990
Cleaning Compound	26 ounces/month	0.73/month	1990
Corrosion Preventative	1 pint/2 months	0.45/2 months	1990
Dry Cleaning Solvent	Unknown	---	1990
Enamel, Black	2 pints/6 months	0.9/6 months	1990
Enamel, Flat Black	2 pints/6 months	0.9/6 months	1990
Enamel, Gray	2 pints/6 months	0.9/6 months	1990
Enamel, Olive Drab	2 pints/6 months	0.9/6 months	1990
Enamel, White	2 pints/6 months	0.9/6 months	1990
Enamel, Yellow	0.5 pint/month	0.23/month	1990
Gloss Purple	1 quart/2 years	0.91/2 years	1990
Grease, Aircraft	1 quart/6 months	0.91/6 months	1990
Grease, Ball and Roller Bearing	1 can/month	23/month	1990
Hydraulic Fluid	1 quart/2 months	0.91/2 months	1990
Lacquer, Gray	1 pint/month	0.45/month	1990
Lacquer, Olive Drab	2 pints/month	0.9/month	1990
Lacquer, Red	1.5 pints/month	0.68/month	1990
Leak Detection	48 ounces/year	1.35/year	1990
Lubri-Bond 220	70 ounces/year	1.97/year	1990
Lubricant, Solid Film	2 pints/month	0.9/month	1990
Molybdenum Disulfide	10 ounces/6 months	0.28/6 months	1990
Oil, Lubricating	8 ounces/3 months	0.23/3 months	1990
Oil, Lubricating	16 ounces/2 months	0.45/2 months	1990
Oil, Lubricating	4 ounces/3 months	0.11/3 months	1990
Oil, Varnish	1 quart/year	0.91/year	1990
Primer, Gray Spray	2 pints/month	0.9/month	1990
Rifle Base Cleaning Compound	8 ounces/month	0.23/month	1990
Sealing Compound	10 pints/year	4.5/year	1990
Avionics Phase			
Aaper Alcohol and Methane	4 ounces/month	0.11/month	1990
Cleaning Compound	1 quart/month	0.91/month	1990

Table C-1. Hazardous Materials Storage, Facility 1055 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Grease, Aircraft	1 ounce/6 months	0.03/6 months	1990
Grease, Molybdenum	1.75 pounds/6 months	0.79/6 months	1990
Lube Oil	16 ounces/6 months	0.45/6 months	1990
Lube Oil	4 ounces/6 months	0.11/6 months	1990
Molybdenum Disulfide	1 pound/year	0.45/year	1990
Sealant Compound	3 tubes/month	1/month	1990
Solvent	2 ounces/3 months	0.06/3 months	1990
COMM/NAV			
Aerosol, Gray	Maintained, not used	---	1992
Cleaning Compound	1 pint/2 months	0.45/2 months	1986
Corrosion Preventative	8 ounces/month	0.23/month	1986
Corrosion Preventative	1 pint/month	0.45/month	1986
Corrosion Preventative	1 pint/2 months	0.45/2 months	1986
Electron Tube	2-3 tubes/month	0.9-1/month	1992
Enamel, Gray	1 pint/month	0.45/month	1986
Flux, Alpha Metal	1 ounce/month	0.03/month	1992
Flux, Solder	1 ounce/month	0.03/month	1986
GLP Insulating Varnish	2 ounces/month	0.06/month	1992
Lacquer, Green	1 pint/3 months	0.45/3 months	1986
Lacquer, Black	2 pints/month	0.9/month	1986
Lacquer, Gray	1 pint/month	0.45/month	1986
Lacquer, Olive Drab	1 pint/month	0.45/month	1986
Lacquer, White	1 pint/6 months	0.45/6 months	1986
Lacquer, Yellow	2 pints/year	0.9/year	1987
Lacquer, Yellow	1 pint/6 months	0.45/6 months	1986
Lube Comp, Dimethylsilicone	1 pint/6 months	0.45/6 months	1992
Lube Dimethyl Silicone	12 ounces/month	0.34/month	1986
Lube Oil	1 ounce/year	0.03/year	1986, 1992
Metal Polish Type 1	1 pint/month	0.45/month	1986
Methanol, Technical	8 ounces/month	0.23/month	1986
Methyl Alcohol	8 ounces/month	0.23/month	1992
Oil, Diala A	Contained at shipment	---	1992
Paint, Flat Black	1 pint/month	0.45/month	1991
Paint, Flat Black	3 pints/year	1.35/year	1992

Table C-1. Hazardous Materials Storage, Facility 1055 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Penetrating Fluid	6 ounces/month	0.17/month	1986
Penetrating Fluid	10 ounces/month	0.28/month	1986
Primer, Gray	1 pint/month	0.45/month	1986
Red Insulating Varnish	2 ounces/month	0.06/month	1986
Simethyl Silicone	1 pint/month	0.45/month	1986
Fire Control			
Dust Control	1 can/week	23/week	1990
Electrical Contact Cleaner	16 ounces/month	0.45/month	1987
Electrical Lubricating Compound	1 can/6 months	23/6 months	1990
Enamel, Black	2 cans/6 months	45/6 months	1990
Epoxy Resin	100 ounces/year	2.81/year	1990
Fluorocarbon Lubricant	1 pint/month	0.45/month	1990
General Purpose Detergent	14 ounces/2 months	0.39/2 months	1990
Glass Cleaner	14 ounces/2 months	0.39/2 months	1990
Grease	8 ounces/year	0.23/year	1990
Lacquer, Black	1 pint/month	0.45/month	1987
Lacquer, Red	1 pint/month	0.45/month	1986-1987
Lacquer, Yellow	1 pint/month	0.45/month	1986
Leak Tech	4 ounces/month	0.11/month	1990
Lube Oil Semi Fluid	8 ounces/2 weeks	0.23/2 weeks	1986
Lube Oil Spray	1 pint/week	0.45/week	1986
Lubricant, Solid Film	1 quart/month	0.91/month	1986
Lubricant, Solid Film	2 pints/week	0.9/week	1986-1987
Percholethylene	Unknown	---	1985
Stoddard Solvent	25 gallons/month	91/month	1985
Stoddard Solvent	25 gallons/month	91/month	1986
Stoddard Solvent	25 gallons/month	91/month	1987
Super Glue	10 ounces/6 months	0.28/6 months	1990
Trichloroethane	10 drums/year	1,877/year	1985
Trichloroethane	16 ounces/2 months	0.45/2 months	1990

Table C-1. Hazardous Materials Storage, Facility 1055 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
EWS			
1,1,2, Trichlorotrifluoroethane	12 ounces/month	0.34/month	1986-1987
1,1,2,Trichlorotrifluoromethane	1 can/month	23/month	1985
Acetone	1 pint/month	0.45/month	1991
Acetone, Technical	1 pint/month	0.45/month	1990
Circuit Cooler	3 cans/month	68/month	1991
Dampening Fluid	5 gallons/month	18/month	1987
Dampening Fluid	15 gallons/month	54/month	1991
Dry Cleaning Solvent	1 gallon/month	3.63/month	1991
Enamel, Black	1 quart/6 months	0.91/6 months	1987
Enamel, Black	60 ounces/month	1.69/month	1987
Enamel, Gloss Black	1 pint/6 months	0.45/6 months	1987
Enamel, White	1 gallon/year	3.63/year	1987
Freon	50 gallons/month	182/month	1987
Freon 113	25 gallons/month	91/month	1986
Freon 113	1 gallon/month	3.63/month	1991
Grease, Aircraft	2 pounds/year	0.9/year	1991
Grease, Molybdenumdisulfide	1.75 pounds/6 months	0.79/6 months	1990
Humi Seal	17 pints/year	7.65/year	1987
Humi Seal Insulating Varnish	12 ounces/month	0.34/month	1991
Isopropyl Alcohol	0.5 gallon/month	2/month	1991
Lacquer, Blue	6 pints/year	2.7/year	1987
Lacquer, Blue	2 pints/year	0.9/year	1991
Lacquer, Gray	6 pints/year	2.7/year	1987
Lacquer, Gray	1 pint/year	0.45/year	1991
Lacquer, Olive Drab	0.5 pint/month	0.23/month	1987
Lube Compound	6 ounces/month	0.03/month	1987
Lube Oil	4 ounces/year	0.11/year	1991
Lubricating Compound	24 cans/month	540/month	1991
Primer Coating	1 gallon/year	3.63/year	1987
Silicone Damping Fluid	25 pints/month	11/month	1986
Solder	2 pounds/year	0.9/year	1991

Table C-1. Hazardous Materials Storage, Facility 1055 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Solder	2 spools/year	0.9/year	1991
Soldering Flux	8 pints/6 months	4/6 months	1987
Soldering Flux	4 bottles/year	---	1991
Super Bonder 499	5 bottles/year	---	1991
Trichlorotrifluoroethane	30 cans/month	675/month	1991
BOMB/NAV			
Adhesive Spray	10 ounces/3 months	0.28/3 months	1986
Alpha Flux	Unknown	---	1990
Alpha Flux 100	1 pint/year	0.45/year	1991
Adhesive	1 kit/year	0.45/year	1990
Cleaning Compound	2 pints/month	0.9/month	1991
Denatured Alcohol	10 ounces/3 months	0.28/3 months	1986
Dichlorodifluoromethane	6 ounces/month	0.17/month	1986
Dust Control	1 pint/month	0.45/month	1991
Electrical Cleaning Compound	2 pints/month	0.9/month	1985-1986
Enamel, Black	2 pints/month	0.9/month	1986
Gray Lacquer	Unknown	---	1990
Grease, Aircraft	1.75 pounds/year	0.79/year	1986
Grease, Aircraft	1.75 pounds/3 years	0.79/3 years	1991
Helium	1 cylinder/2 months	45/2 months	1990
Helium	2 cylinders/year	90/year	1991
Emulsified Oil Dust Control	1 pint/month	0.45/month	1986
Insulating Compound	12 ounces/year	0.34/year	1990
Insulating Varnish	1 can/year	23/year	1991
Isopropyl Alcohol	3 gallons/6 months	11/6 months	1991
Lacquer, Black	1 pint/2 weeks	0.45/2 weeks	1985-1986
Lacquer, Flat Black	2 pints/month	0.9/month	1991
Lacquer, Olive Drab	1 pint/month	0.45/month	1991
Lacquer, Orange	1 pint/3 months	0.45/3 months	1986
Lacquer, Red	1 pint/3 months	0.45/3 months	1985-1986
Lacquer, White	1 pint/month	0.45/month	1986
Lacquer, Yellow	1 pint/2 months	0.45/2 months	1986
Lacquer, Yellow	16 ounces/month	0.45/month	1985-1986
Lacquer, Olive Drab	16 ounces/month	0.45/month	1985-1986

Table C-1. Hazardous Materials Storage, Facility 1055 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Lube Oil, General Purpose	2 cans/year	45/year	1991
Lube Oil, General Purpose	1 can/year	23/year	1991
Nitrogen	1 cylinder/year	45/year	1991
Nitrogen	15 pounds/6 months	7/6 months	1986
Paint, Gray Semi Gloss	1 quart/month	0.91/month	1991
Resin PAK	1 kit/6 months	0.45/6 months	1986
Sealing Compound, Red	1 bottle/year	---	1991
Silicone Seven Lube	5 pints/year	2/year	1991
Solder	Unknown	---	1990-1991
Solid Film Lube	1 can/year	23/year	1991
Strip Coat	1 gallon/year	3.63/year	1991
Technical Toluene	5 gallons/year	18/year	1991
Torque Seal	2 ounces/6 months	0.06/6 months	1990-1991
Avionics Guidance Control			
Acetone	1 pint/6 months	0.45/6 months	1990
Corrosion Preventative Compound	1 pint/month	0.45/month	1990
Dimethyl Silicone	8 ounces/month	0.23/month	1991
Electric Contact Cleaner	40 ounces/month	1.13/month	1990
Electric Insulating Compound	1 pint/month	0.45/month	1990
Grease, Aircraft	1 pound/year	0.45/year	1991
Lube Compound	32 ounces/month	0.9/month	1990
Lube Oil	32 ounces/month	0.9/month	1990
Lube Oil	1 quart/year	0.91/year	1990
Lube Oil	1 pound/year	0.45/year	1990-1991
Metal Polish	1 pint/6 months	0.45/6 months	1990
Paint, Flat Black Spray	1 pint/3 months	0.45/3 months	1990
Paint, Flat Black	42 ounces/month	1.18/month	1991
Paint, Gray Spray	354 ounces/year	9.96/year	1991
Paint, Olive Drab	8 ounces/week	0.23/week	1991
Paint, Yellow	2 pints/year	0.9/year	1990
Paint, Yellow Spray	105 ounces/year	2.95/year	1991
Plastic Polish	2 ounces/month	0.06/month	1990
Silicone	3 ounces/year	0.08/year	1991

Table C-1. Hazardous Materials Storage, Facility 1055 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Slyd Lub Compound Bulk	8 ounces/month	0.23/month	1991
Solder Flux	5 ounces/month	0.14/month	1991
Solid Film Lube	2 pints/month	0.9/month	1990
Varnish, GC Electronics	2 ounces/year	0.06/year	1991
WD-40	16 ounces/year	0.45/year	1991
Auto Pilot			
1,1,1 Trichlorotrifluoroethane	16 ounces/month	0.45/month	1985
Adhesive, Cyanoacrylate	1 bottle/month	---	1985
Adhesive Sealant	1 tube/month	0.45/month	1985
Adhesive/Sealant	3 ounces/4 months	0.08/4 months	1985
Alcohol, Denatured	6.5 ounces/3 months	0.18/3 months	1985
Anti Seize Compound	1 quart/6 months	0.91/6 months	1985
Enamel, Semi Gloss	1 quart/3 months	0.91/3 months	1985
Grease, Aircraft	1 pound/year	0.45/year	1985
Lacquer, Black	1 pint/3 months	0.45/3 months	1985
Lacquer, Olive Drab	1 pint/3 months	0.45/3 months	1985
Lube Oil	1 quart/year	0.91/year	1985
Lubricating Compound	2 cans/month	45/month	1985
Paint, Gray Spray	1 can/month	23/month	1985
Petrolatum, Technical	1 pint/2 years	0.45/2 years	1985
Sealing Compound	3 tubes/month	1/month	1985
Sealing Compound	2 tubes/month	0.9/month	1985
Solder	As needed	---	1985
Soldering Flux	16 ounces/year	0.45/year	1988
Soldering Flux	16 ounces/3 months	0.45/3 months	1985
Torque Seal	2 tubes/month	0.9/month	1985

Table C-1. Hazardous Materials Storage, Facility 1060

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Metals Technology			
Acetone	1 pint/week	0.45/week	1989
Acid, Hydraulic	Very minute	---	1990
Acid, Nitric	Very minute	---	1990
Anti Heat	12 ounces/month	0.34/month	1990
Boelube 90	1 pint/year	0.45/year	1990
Break Free	1 pint/week	0.45/week	1989
Cleaner Lube and Preservative	5 pints/month	2/month	1990
Cutting Fluid	5 gallons/year	18/year	1990
Cutting Oil	2 gallons/month	7/month	1989
Cutting Fluid	5 pints/month	2/month	1990
D-Spate	4 pints/week	0.18/week	1989
Dye, Blue Layout	2 pints/year	0.9/year	1990
Dye, Blue Layout	2 pints/year	0.9/year	1989
Gear Lube	5 gallons/year	18/year	1990
Grease, Aeroshell	14 ounces/month	0.39/month	1990
Hydraulic Fluid	5 gallons/year	18/year	1990
Hydraulic Oil	5 gallons/year	18/year	1990
Lube Oil	4 ounces/month	0.11/month	1990
Lube Oil	20 ounces/month	0.56/month	1990
Rust Solve	2 pints/week	0.9/week	1989
Surface Stripper	1 pint/6 months	0.45/6 months	1989
Machine Shop			
Cutting Oil	2 gallons/month	7/month	1987
Dye, Blue Layout	2 pints/year	0.9/year	1987

Table C-1. Hazardous Materials Storage, Facility 1062

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Fuels Distribution			
Aircraft Cleaner	55 gallons/2 months	155/2 months	1990
Aluminum	1 pint/month	0.45/month	1990
Anti Fogg Compound	1 pint/month	0.45/month	1990
Diesel Starting Fuel	108 ounces/year	3.04/year	1990
Diesel Starting Fuel	12 cans/year	270/year	1990
General Purpose Detergent	2 gallons/year	7/year	1990
Glass Cleaner	8 ounces/6 months	0.23/6 months	1990
Isopropyl Alcohol	5 gallons/month	18/month	1990
Misty Penetrating Lube	4 cans/6 months	90/6 months	1990
Paint, Aluminum Spray	1 pint/month	0.45/month	1990
Paint, Exterior White	5 gallons/year	18/year	1990
Paint, Flat Black	1 pint/month	0.45/month	1990
Paint, Red	1 pint/month	0.45/month	1990
Paste Wax	2 cans/6 months	45/6 months	1990
Penetrating Oil	1 pint/year	0.45/year	1990
Penzoil	4-5 quarts/week	15-18/week	1990
Plastic Polish	1 pint/6 months	0.45/6 months	1990
Scouring Powder	14 ounces/6 months	0.39/6 months	1990
Screen Klean	18 ounces/6 months	0.51/6 months	1990

Table C-1. Hazardous Materials Storage, Facility 1082

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Sanitation and Water Waste			
Calcium Hypochlorite Granules	50 pounds/month	23/month	1986
Chlorine, Technical	200 pounds/week	90/week	1986
Cutting Fluid	1 gallon/year	3.63/year	1986
Enamel, Yellow	24 ounces/month	0.68/month	1986
Lacquer, Black	55 ounces/month	1.55/month	1986
Primer, PVC	1 quart/month	0.91/month	1986
Propane	7 ounces/3 months	0.20/3 months	1986
PVC Cement	5 ounces/year	0.14/year	1986
Soda Ash	500 pounds/week	225/week	1986
Solder	1 pound/year	0.45/year	1986
Solder Flux	12 ounces/year	0.34/year	1986

Table C-1. Hazardous Materials Storage, Facility 1101

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Fuel Lab			
Acid, Sulfuric	Emergency	---	1989
Alcohol	1 gallon/month	3.63/month	1989
Ether	5 gallons/month	18/month	1989
JP-4	20 gallons/week	73/week	1989
No Chromix	Emergency	---	1989
Potassium Dichromate	Emergency	---	1989

Table C-1. Hazardous Materials Storage, Facility 1145

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Auto Hobby Shop			
Carburetor and Metal Parts Cleaner	25 gallons/can	91/can	1990
Denatured Alcohol	1 gallon/6 months	3.63/6 months	1990
Enamel, Pure White	1 gallon/year	3.63/year	1990
Enamel, Rust, Not High Gloss	1 gallon/year	3.63/year	1990
Freon 12	6 14-ounce cans/ 6 months	2.36/6 months	1990
Gear Oil	3 32-ounce bottles/ 6 months	2.7/6 months	1990
General Purpose Spray On Detergent	3 gallons/week	11/week	1990
Grease, Auto	3 14-ounce tubes/week	1.18/week	1990
Pine Oil Detergent	12 quarts/month	10.9/month	1990
Safety Kleen Solvent	30 gallons/year	109/year	1990
Scouring Powder	12 21-ounce cans/ month	7.09/month	1990
Secon Refrigerant Oil Change	6 4-ounce cans/ 6 months	0.68/6 months	1990
Stain, Pecan	1 gallon/year	3.63/year	1990
Ultra Deep Base	1 gallon/year	3.63/year	1990
Welding Rods	1 spool/year	0.45/year	1990
Arts and Crafts			
Bleach Fixer and Replenisher	1 kit/month	0.45/month	1990
Ceramic Sealer	12 ounces/4 months	0.34/4 months	1990
Ceramic Slip Tale	Unknown	---	1986
Dektol Developer	1 gallon/month	3.63/month	1990
Developer Parts A-D	1 kit/month	0.45/month	1990
Eastman Kodak	1 gallon/year	3.63/year	1986
Fixer	11 pounds/month	5/month	1990
Gloss Glaze	Unknown	---	1986
Hypo Cleaning Agent	4.5 ounces/month	0.13/month	1990
Indicator Stop Bath	0.5 gallon/month	2/month	1990
Lubricant	6 ounces/month	0.17/month	1990

Table C-1. Hazardous Materials Storage, Facility 1145 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Mictodol-X-Developer	2 ounces in gallon of water/month	0.06/month	1990
Solder	1.5 pounds/month	0.68/month	1990
Stabilizer E-6	1 ounce in gallon of water/month	0.03/month	1990
Versatol Developer	1 gallon/month	3.63/month	1990

Table C-1. Hazardous Materials Storage, Facility 1172

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Bulk Storage/L_{ox}			
General Purpose Deodorant	32 ounces/6 months	0.9/6 months	1990
Glass Cleaner	1 box/year	45/year	1990
Liquid Plastic Polish	1 pint/year	0.45/year	1990
Scouring Powder	42 ounces/year	1.18/year	1990
Spray On Wipe Off	44 ounces/year	1.24/year	1990
Starting Fluid	Unknown	---	1990
Technical L_{NOX}	Bleed tank once a week	---	1990
Technical L_{ox}	Bleed tank once a week	---	1990

Table C-1. Hazardous Materials Storage, Facility 1189

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Reproduction			
Dry Ink Docutech	42 pounds/month	19/month	1992
Fuser Agent	2 liters/month	1.8/month	1992

Table C-1. Hazardous Materials Storage, Facility 1191

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Allied Trades			
3919 S Prepsolvent	1 gallon/month	3.63/month	1987
Acid, Hydrochloric	3 ounces/year	0.08/year	1990
Aerosol, Flat White	2 pints/month	0.9/month	1987
Aerosol, Red	1 pint/month	0.45/month	1987
Black Walkway Compound	1 gallon/5 months	3.63/5 months	1987
Enamel, Black	126 ounces/month	3.54/month	1990
Enamel, Blue	1 gallon/week	3.63/week	1987
Enamel, White	1 gallon/3 months	3.63/3 months	1987
Fisheye Eliminator	10 ounces/week	0.28/week	1987
Hardener 793S	1 pint/week	0.45/week	1987
Imron Poly Blue	1 gallon/week	3.63/week	1987
Lacquer, Black	1 pint/week	0.45/week	1987
Lacquer, Dark Green	52 ounces/month	1.46/month	1987
Lacquer, Platinum Gray	1 gallon/month	3.63/month	1987
Lacquer, Strata Blue	2 pints/week	0.9/week	1987
Paint Additive	1 pint/week	0.45/week	1987
Paint Additive	Unknown	---	1987
Paint, White Street Marking	1 gallon/5 months	3.63/5 months	1987
Plasti Kote, Yellow	1 pint/month	0.45/month	1987
Poly, Forest Green	10 gallons/month	36/month	1990
Poly, Green Catalyst	10 gallons/month	36/month	1990
Polyurethane	10 quarts/week	9/week	1987
Polyurethane Enamel Paint Activator	10 quarts/month	9/month	1990
Pressurized Spray Lit	1 pint/month	0.45/month	1987
Primer, Brown Enamel	26 ounces/month	0.73/month	1990
Red Acrylic Putty	3 tubes/month	1/month	1987
Reducer	1 gallon/week	3.63/week	1987
Thinner, Dope and Lacquer	2 gallons/week	7/week	1987
Thinner Type 2	1 gallon/2 months	3.63/2 months	1987
Weather Strip Adhesive	2 tubes/month	0.9/month	1987
Vehicle Maintenance			
105/140 Solvent	5 gallons/month	18/month	1991

Table C-1. Hazardous Materials Storage, Facility 1191 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Alcohol, Denatured	1 gallon/month	3.63/month	1991
Antifreeze	55 gallons/month	200/month	1991
Brake Fluid	2 gallons/month	7/month	1991
Cleaner Lube Pres	5 pints/month	2/month	1991
Cleaning and Lubricating Compound	32 ounces/month	0.9/month	1991
Cleaning Compound	84 cans/year	1,890/year	1991
Cutting Fluid	5 gallons/year	18/year	1991
Freon 12	50 pounds/varies in summer	23/varies in summer	1991
Gasket Compound	2 pints/month	0.9/month	1991
Grease	3 quarts/month	273/month	1991
Grease	280 ounces/month	7.88/month	1991
Grease	6.5 pounds/month	3/month	1991
Hydraulic Fluid	5 gallons/month	18/month	1991
Hydraulic Fluid	110 gallons/year	399/year	1991
Lacquer, White	1 gallon/6 months	3.63/6 months	1991
Leak Preventative Compound	2 pints/month	0.9/month	1991
Lube Compound	32 ounces/month	0.9/month	1991
Lube Oil	1 can/month	23/month	1991
Lube Oil, Grade 10	110 gallons/year	399/year	1991
Lube Oil, Grade 30	110 gallons/month	399/month	1991
Lube Oil, 80-90 Weight	110 gallons/year	399/year	1991
Mineral Oil	1 quart/month	3.63/month	1991
Penetrating Fluid	60 ounces/month	1.69/month	1991
Penetrating Oil	3 pints/month	1.35/month	1991
Radiator Cleaner	92 cans/year	2,070/year	1991
Sealing Compound	100 cubic centimeters/ year	---	1991
Starting Fluid	12 ounces/year	0.34/year	1991
WD-40	195 ounces/month	5.48/month	1991
Windshield Cleaner	10 pints/month	5/month	1991

Table C-1. Hazardous Materials Storage, Facility 1194

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Refueling Maintenance			
Adhesive	2 ounces/month	0.06/month	1986
Aircraft Cleaning Compound	6 gallons/month	22/month	1986
Alcohol, Denatured	1 gallon/year	3.63/year	1986
Antifreeze	1 gallon/month	3.63/month	1986
Isopropyl Alcohol	1 gallon/year	3.63/year	1986
Brake Fluid	1 gallon/6 months	3.63/6 months	1986
Brake Parts Cleaner	76 ounces/month	2.14/month	1986
Cleaner, Lube and Preservative	3 pints/month	1.35/month	1986
Copper Coat Gasket Compound	12 ounces/month	0.34/month	1986
Grease	Varies	---	1986
Grease, Auto and Artillery	Varies	---	1986
Grease, Ball Bearing	12 ounces/month	0.34/month	1986
Grease, Ball-Roller	Varies	---	1986
Hydraulic Fluid	Varies	---	1986
Lube Oil	3 quarts/month	3/month	1986
Lubricating Compound	32 ounces/month	0.9/month	1986
Mineral Oil	5 gallons/year	18/year	1986
PD-680	5 gallons/month	18/month	1986
Penetrating Fluid	24 ounces/month	0.68/month	1986
Penetrating Oil	1 pint/month	0.45/month	1986
Pipe Sealant	17 ounces/month	0.48/month	1986
Primer, Fuel Engine	2 cans/year	45/year	1986
Silicone Adhesive	9 ounces/year	0.25/year	1986
SK-105 Solvent	20 gallons/3 months	73/3 months	1986
Trichlorotrifluoroethane	1,728 ounces/month	49/month	1986
WD-40	72 ounces/month	2.02/month	1986
Windshield Cleaner	32 ounces/month	0.9/month	1986

Table C-1. Hazardous Materials Storage, Facility 1213

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Entomology			
Arnidinohydrazone	6 cases/month	300/month	1990
Baygon	6 gallons/year	22/year	1990
D-Phenothrin	1,440 ounces/year	40.5/year	1990
Denatured Alcohol	4 gallons/year	15/year	1990
Dursban	1/2 drum/year	94/year	1990
Dursban	0.5 gallon/month	2/month	1990
Ficam Dust	12 pails/year	270/year	1990
Ficam W Insecticide	4 drums/year	751/year	1990
Fly Killer	10 pounds/year	7/year	1990
Gencor Emulsifier	40 ounces/year	1.13/year	1990
Gold Crest Termiticide	6 gallons/year	22/year	1990
Killmaster	36 gallons/year	131/year	1990
Logic Fine Ant Bait	100 pounds/6 months	45/6 months	1990
Maki Pellets	6 pails/year	135/year	1990
Malathion Ulv	1 drum/year	188/year	1990
Orthene Fine Ant Killer	50 pounds/year	23/year	1990
Orthene Tree/Ornam Spray	96 ounces/year	2.7/year	1990
Ortho W-77 Sticker	6 gallons/year	22/year	1990
Phostoxin Pellets	6 cans/year	135/year	1990
Pivalyn Concentrate	6 cans/year	135/year	1990
Precor 5E	10 ounces/year	0.28/year	1990
PT-240 Perma Dust	16/48 cans/year	---	1990
PT-250 Baygon	252 pounds/year	113/year	1990
PT-270 Dursban	336 pounds/year	151/year	1990
PT-565 Pynethrum Plus	2,760 ounces/6 months	78/6 months	1990
Pynenone Toss	12 cans/6 months	270/6 months	1990
Roost No More	5-gallon pail, may be used when contract expires	18	1990
Round-Up Herbicide	Unknown	---	1990
Safratin Emulsifiable	10 quarts/year	9/year	1990
Sevin 805	6 bags/year	68/year	1990
Skunk Sorb Concentrate	72 ounces/year	0.34/year	1990
Surflan A.S.	May be used when contract expires	---	1990
Total Release Fvs Fogger	72 ounces/year	2.03/year	1990

Table C-1. Hazardous Materials Storage, Facility 1213 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Trimec Broadleaf Herbicide	May be used when contract expires	---	1990
ULD-300 Insecticide	2 gallons/year	7/year	1990
Wasp Freeze 2	1,680 ounces/year	47/year	1990

Table C-1. Hazardous Materials Storage, Facility 1214

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
HVAC Shop			
CC-300T Hydantoin	35 gallons/year	127/year	1993
CC-330 Biocide	100 gallons/year	363/year	1993
CC-370 Microbiocide	15 gallons/year	54/year	1993
CC-487 Detergent	15 gallons/year	54/year	1993
CCS-10 Oxidizer	60 gallons/year	218/year	1993
Fast-Vac Pump Oil	10 gallons/year	36/year	1993
Freon 22	1,000 pounds/year	450/year	1993
Phree Guard	60 gallons/year	218/year	1993
Propane	40 pints/year	18/year	1993
Refrigerant 12	Emergency	---	1993
Refrigerant 2	Emergency	---	1993
Soldering Paste	24 ounces/year	0.68/year	1993
Pavement/Heavy Equipment			
Additive, Gasoline	33 ounces/month	0.93/month	1990
Alcohol, Denatured	4 gallons/month	15/month	1990
Asphalt, Emulsion	Varies	---	1990
Asphalt, Hot Mix	Varies	---	1990
Battery Terminal Protector	4 pounds/year	2/year	1990
Brown	24 cans/month	540/month	1990
Fuel Saver	5 gallons/3 months	18/3 months	1990
Grease	7 pounds/month	3/month	1990
Hydraulic Fluid	2 gallons/month	7/month	1990
Open Gear Wire and Rope Lube	52 ounces/month	1.46/month	1990
Paint, Red	20 cans/month	450/month	1990
Ready Mix Concrete	Varies	---	1990
Shell Donax TD Fluid	5 gallons/3 months	18/3 months	1990
Silikal 7R-AF Powder	2 kits/month	0.9/month	1990
Silikal Cold Weather Additive	2 kits/month	0.9/month	1990
Silikal Powder Hardener	2 kits/month	0.9/month	1990
Silikal R7AF Liquid Component	2 kits/month	0.9/month	1990

Table C-1. Hazardous Materials Storage, Facility 1214 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Starting Fluid	16 ounces/month	0.45/month	1990
Unique Patching Cement	Varies	---	1990
Windshield Cleaner	12 pints/month	5.4/month	1990

Table C-1. Hazardous Materials Storage, Facility 1215

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Asbestos Removal			
Adhesive, Spray	16 ounces/month	0.45/month	1989
Encapsulating Material	5 gallons/3 months	18/3 months	1989
Penetrating Material	5 gallons/3 months	18/3 months	1989

Table C-1. Hazardous Materials Storage, Facility 1217

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Exterior Electric			
Gasoline	1 gallon/year	3.63/year	1990
Gloss Black Great Day	1 pint/month	0.45/month	1990
PVC Cement	2 pints/year	0.9/year	1990
Rust Stop	1 pint/year	0.45/year	1990
Scotch Kote Electric Coating	1 pint/month	0.45/month	1990
Starting Fluid	8 ounces/year	0.23/year	1990
WD-40	3 pints/month	1.35/month	1990
Vertical Construction			
Adhesive, Ceiling Tile Wall Board	2 gallons/year	7/year	1992
Adhesive, CT20 Ceiling Tile	32 ounces/year	0.9/year	1992
Adhesive, S821	4 gallons/year	15/year	1992
Adhesive, Wall Board	2 gallons/year	7/year	1992
Armaflex Finish	4 gallons/year	15/year	1992
Brazing Alloy, Silver	1 pound/year	0.45/year	1992
Enamel, Natural Base	4 gallons/year	15/year	1992
Enamel, Semi-Gloss	4 gallons/year	15/year	1992
Enamel, White	1 pint/month	0.45/month	1992
Gear and Lube	24 pints/year	11/year	1992
Grease, Multi Purpose	6 pounds/year	2.7/year	1992
Grout Sealer	2 gallons/year	7/year	1992
Hydraulic Fluid	10 gallons/year	36/year	1992
Kleen Strip Remover	1 gallon/year	3.63/year	1992
Lacquer Thinner	4 gallons/year	15/year	1992
Latex, White	4 gallons/year	15/year	1992
Lockweld Contact Cement	12 gallons/year	44/year	1992
Lockweld 205	5 gallons/year	18/year	1992
Medallion Finish Stain	4 gallons/year	15/year	1992
Oil, Cutting	5 gallons/year	18/year	1992
Oil, Cutting Thread	1 gallon/year	3.63/year	1992
Oil, Grease	5 gallons/year	18/year	1992
Rapid Tap	24 pints/year	10.8/year	1992

Table C-1. Hazardous Materials Storage, Facility 1217 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Rectorseal Airlock	8 ounces/year	0.23/year	1992
Sealing Compound	8 ounces/year	0.23/year	1992
Silver Solder	1 pound/month	0.45/month	1992
Spackling Paste	1 gallon/year	3.63/year	1992
Spray Lube	6 pints/year	2.7/year	1992
Stain, Dark Oak	4 gallons/year	15/year	1992
Technical Methyl Ethyl Ketone	1 gallon/year	3.63/year	1992
Thread Sealing Compound	16 ounces/year	0.45/year	1992
WD-40	12 ounces/year	0.34/year	1992
Welding Rod 6011	1 pound/month	0.45/month	1992
Welding Rod 7018	1 pound/month	0.45/month	1992
West Zone			
Adhesive, Acoustic Ceiling Tile	1 pound/year	0.45/year	1990
Adhesive, Armstrong	1 quart/6 months	0.91/6 months	1990
Adhesive, Base	1 pint/year	0.45/year	1990
Adhesive, Liquid Nails Contact	10 ounces/6 months	0.28/6 months	1990
Adhesive, Purpose	5 gallons/year	18/year	1991
Adhesive, Stair Thread	1 pint/year	0.45/year	1990
Air Kontrol Filter Spray	16 ounces/year	0.45/year	1991
All Pro Ready Mix Compound	5 gallons/year	18/year	1991
Auto Brake Fluid	1 quart/6 months	0.91/6 months	1990
Caulk	7 ounces/year	0.20/year	1991
Evap. Coil Cleaner	1 gallon/coil	3.63/coil	1990
Contact Cement	1 quart/year	0.91/year	1990
CPVC Quick Day Cleaner	1 quart/6 months	0.91/6 months	1990
Duct Sealant	1 tube/6 months	0.45/6 months	1990
Enamel, Great Day Spray	2 pints/6 months	0.9/6 months	1990
Enamels, Lettering	1 pint/6 months	0.45/6 months	1990
Gray Acrylic Mortar Patch	1 pint/year	0.45/year	1990
Indoor Coil Cleaner	1 gallon/6 months	3.63/6 months	1990
Lube Oil	1 quart/6 months	0.91/6 months	1990

Table C-1. Hazardous Materials Storage, Facility 1217 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Lubricant 1200 2	1 can/year	23/year	1991
Machine Cleaner	8 ounces/6 months	0.23/6 months	1990
Nar Coil Cleaner	1 gallon/coil	3.63/coil	1990
Oil, Dayton Thread Cutting	Unknown	---	1990
Oil, Rando	1 quart/6 months	0.91/6 months	1990
Oil, Refrigeration	3 gallons/month	11/month	1990
Oil, Vacuum Pump	1 quart/month	0.91/month	1990
Paint, White	6 gallons/year	22/year	1990
Paint, Yellow Spray	1 pint/6 months	0.45/6 months	1990
Permatex Gasket Sealant	1 pint/6 months	0.45/6 months	1990
Pine Oil Concentrate	1 gallon/3 months	3.63/3 months	1990
Pipe Thread Compound	10 ounces/year	0.28/year	1990
Primer, Purple	1 pint/6 months	0.45/6 months	1990
PVC Cement	1 quart/6 months	0.91/6 months	1990
Refrigerant	100 gallons/year	363/year	1990
Refrigerant #11	50 gallons/year	182/year	1990
Roof Pro	1 gallon/year	3.63/year	1991
Soldering Flux	4 ounces/year	0.11/year	1990
Solvent/Cement	1 quart/6 months	0.91/6 months	1990
Spray On Insulating	1 pint/3 months	0.45/3 months	1990
Tar	50 gallons/year	182/year	1990
WD-40	32 ounces/year	0.9/year	1991
Windshield Cleaner	1 gallon/6 months	3.63/6 months	1990
Wood Stain	1 gallon/year	3.63/year	1990
Entomology			
Arnidinohydrazone	6 cases/month	135/month	1990
Baygon	6 gallons/year	22/year	1990
D-Phenothrin	1,440 ounces/year	40.5/year	1990
Denatured Alcohol	4 gallons/year	15/year	1990
Dursban	1/2 drum/year	94/year	1990
Dursban	0.5 gallon/month	2/month	1990
Ficam Dust	12 pails/year	270/year	1990
Ficam W Insecticide	4 drums/year	751/year	1990
Fly Killer	10 pounds/year	5/year	1990

Table C-1. Hazardous Materials Storage, Facility 1217 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Gencor Emulsifier	40 ounces/year	1.13/year	1990
Gold Crest Termiticide	6 gallons/year	22/year	1990
Killmaster	36 gallons/year	131/year	1990
Logic Fine Ant Bait	100 pounds/6 months	45/6 months	1990
Maki Pellets	6 pails/year	135/year	1990
Malathion Ulv	1 drum/year	188/year	1990
Orthene Fine Ant Killer	50 pounds/year	23/year	1990
Orthene Tree/Ornam Spray	96 ounces/year	2.7/year	1990
Ortho W-77 Sticker	6 gallons/year	22/year	1990
Phostoxin Pellets	6 cans/year	135/year	1990
Pivalyn Concentrate	6 cans/year	135/year	1990
Precor 5E	10 ounces/year	0.28/year	1990
PT-240 Perma Dust	768 ounces/year	21.6/year	1990
PT-250 Baygon	252 pounds/year	115/year	1990
PT-270 Dursban	336 pounds/year	151/year	1990
PT-565 Pynethrum Plus	2,760 ounces/6 months	78/6 months	1990
Pynenone Toss	12 cans/6 months	270/6 months	1990
Roost No More	5-gallon pail, may be used when contract expires	18	1990
Round-Up Herbicide	Unknown	---	1990
Safratin Emulsifiable	10 quarts/year	9/year	1990
Sevin 805	6 bags/year	68/year	1990
Skunk Sorb Concentrate	12 ounces/year	0.34/year	1990
Surflan A.S.	May be used when contract expires	---	1990
Total Release Fvs Fogger	72 ounces/year	2.03/year	1990
Trimec Broadleaf Herbicide	May be used when contract expires	---	1990
ULD-300 Insecticide	2 gallons/year	7/year	1990
Wasp Freeze 2	1,680 ounces/year	473/year	1990

Table C-1. Hazardous Materials Storage, Facility 1236

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Packing and Crating			
Break Free Clp	1 pint/3 months	0.45/3 months	1992
Enamel, Black	24 pints/month	11/month	1992
General Purpose Detergent	12 pints/month	5.4/month	1992
Hand Cleaner Paste	2 pounds/month	0.9/month	1992
Hydraulic Fluid	1 gallon/year	3.63/year	1992
Lube Oil	24 quarts/year	22/year	1992
Windshield Solvent	1 pint/6 months	0.45/6 months	1992

Table C-1. Hazardous Materials Storage, Facility 1320

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Power Pro.			
Antifreeze	25 gallons/month	91/month	1992
Compound, Water Displacing	1 pint/2 years	0.45/2 years	1992
CPC	1 pint/2 years	0.45/2 years	1992
Gear and Wire Rope Lube	13 ounces/3 months	0.37/3 months	1992
Hydraulic Fluid	2 quarts/month	1.8/month	1992
Oil, Gear	1 quart/year	0.91/year	1992
Oil, Penetrating	1 pint/6 months	0.45/6 months	1992
Paint, Aluminum Spray	1 pint/month	0.45/month	1992
Paint, Blue Spray	1 pint/2 months	0.45/2 months	1992
Paint, Red Spray	1 pint/2 months	0.45/2 months	1992
Paint, White Spray	1 pint/month	0.45/month	1992
Paint, Yellow Spray	1 pint/month	0.45/month	1992
Starting Fluid, Spray On	1.5 pints/month	0.66/month	1992
Starting Fluid, Pyroil	1.5 pints/month	0.66/month	1992
Sulfuric Acid	10 gallons/month	36/month	1992
Trichloroethane	1 pint/2 years	0.45/2 years	1992

Table C-1. Hazardous Materials Storage, Facility 1346

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Combat Arms Range			
Cleaner/Lube	24 ounces/month	0.68/month	1989
Cleaner, Lubricant and Preservative	5 pints/month	2.25/month	1989
Detergent, General Purpose	1 bottle/2 months	---	1989
Lube Oil	1 pint/month	0.45/month	1989

Table C-1. Hazardous Materials Storage, Facility 1402

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Weapons Release			
Automotive and Artillery	6.5 pounds/year	3/year	1990
Cleaning Compound	26 ounces/month	0.73/month	1990
Corrosion Preventative	1 pint/2 months	0.45/2 months	1990
Dry Cleaning Solvent	Unknown	---	1990
Enamel, Black	2 pints/6 months	0.9/6 months	1990
Enamel, Flat Black	2 pints/6 months	0.9/6 months	1990
Enamel, Gray	2 pints/6 months	0.9/6 months	1990
Enamel, Olive Drab	2 pints/6 months	0.9/6 months	1990
Enamel, White	2 pints/6 months	0.9/6 months	1990
Enamel, Yellow	0.5 pint/month	0.23/month	1990
Gloss Purple	1 quart/2 years	0.91/2 years	1990
Grease, Aircraft	1 quart/6 months	0.91/6 months	1990
Grease, Ball and Roller Bearing	1 can/month	23/month	1990
Hydraulic Fluid	1 quart/2 months	0.91/2 months	1990
Lacquer, Gray	1 pint/month	0.45/month	1990
Lacquer, Olive Drab	2 pints/month	0.9/month	1990
Lacquer, Red	1.5 pints/month	0.68/month	1990
Leak Detection	48 ounces/year	1.35/year	1990
Lubri-Bond 220	70 ounces/year	1.97/year	1990
Lubricant, Solid Film	2 pints/month	0.9/month	1990
Molybdenum Disulfide	10 ounces/6 months	0.28/6 months	1990
Oil, Lubricating	8 ounces/3 months	0.23/3 months	1990
Oil, Lubricating	16 ounces/2 months	0.45/2 months	1990
Oil, Lubricating	4 ounces/3 months	0.11/3 months	1990
Oil, Varnish	1 quart/year	0.91/year	1990
Primer, Gray Spray	2 pints/month	0.9/month	1990
Rifle Base Cleaning Compound	8 ounces/month	0.23/month	1990
Sealing Compound	10 pints/year	4.5/year	1990

Table C-1. Hazardous Materials Storage, Facility 1403

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Munitions/AGE			
Adhesive Contact	1 quart/6 months	0.91/6 months	1992
Adhesive Cyanoacrylate	1 ounce/month	0.03/month	1992
Aliphatic Naphtha	4 gallons/day	15/day	1992
Bondo Dent Filler	As needed	---	1992
Brake Fluid, Auto	2 gallons/month	7/month	1992
Compound, Anti-Seize	1 pint/6 months	0.45/6 months	1992
Compound, Sealing	1 kit/month	0.45/month	1992
Compound, Sealing	8 ounces/2 months	0.23/2 months	1992
Corrosion Preventative Compound	5 pounds/year	2/year	1992
Corrosion Preventative Compound	1 pint/month	0.45/month	1992
Cutting Fluid	2 ounces/week	0.06/week	1992
Denatured Alcohol	1 gallon/month	3.63/month	1992
Desiccant, Activated	1 can/year	23/year	1992
Detergent, General Purpose	32 ounces/month	0.9/month	1992
Dry Cleaning Solvent	30 gallons/month	109/month	1992
Enamel, Black	1 pint/week	0.45/week	1992
Enamel, Blue	1 pint/month	0.45/month	1992
Enamel, Olive Drab	10 pints/month	4.5/month	1992
Enamel, Red	3 pints/week	1.35/week	1992
Enamel, Silver	6 pints/week	2.7/week	1992
Enamel, White	1 pint/week	0.45/week	1992
Finish Floor Non Buffing	8 gallons/month	29/month	1992
Grease, Aircraft	5 pounds/6 months	2/6 months	1992
Grease, Aircraft and Inst	1 gallon/month	3.63/month	1992
Grease, Auto and Artillery	1 gallon/month	3.63/month	1992
Grease, General Purpose	1 gallon/month	3.63/month	1992
Hydraulic Fluid	2 gallons/month	7/month	1992
Hydraulic Fluid Petro	4 gallons/month	15/month	1992
Isopropyl Alcohol	1 gallon/2 months	3.63/2 months	1992
Lacquer, Green	1 pint/month	0.45/month	1992
Lacquer, Silver	1 pint/month	0.45/month	1992
Lube Oil	1 gallon/6 months	3.63/6 months	1992
Lube Oil	4 ounces/2 months	0.11/2 months	1992

Table C-1. Hazardous Materials Storage, Facility 1403 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Lube Oil	1 quart/month	0.91/month	1992
Lubricant Fluorocarbon	1 pint/month	0.45/month	1992
Methylene Chloride	Unknown	---	1992
Oil, Lube Gear	1 gallon/6 months	3.63/6 months	1992
Oil, Penetrating	2 ounces/week	0.06/week	1992
Paint Remover	72 ounces/month	2.03/month	1992
Primer, Gray	10 pints/week	4.5/week	1992
Sealant 2 Pt	1 pint/year	0.45/year	1992
Sealant Anaerobic 250 cc	1 pint/month	0.45/month	1992
Sealant Anaerobic 50 cc	3 ounces/month	0.08/month	1992
Sealing Compound	16 ounces/month	0.45/month	1992
Silicone Brake Fluid	1 gallon/2 months	3.63/2 months	1992
Silicone Compound	8 ounces/2 months	0.23/2 months	1992
Silicone Compound	1 pound/year	0.45/year	1992
Silicone Sealant	16 ounces/day	0.45/day	1992
Solid Film Lubricant	12 ounces/week	0.34/week	1992
Sweeping Compound 3	Unknown	---	1992
Thinner, Aircraft	1 gallon/month	3.63/month	1992
Trichlorotrifluoroethane	1 pint/week	0.45/week	1992
Varnish Oil	1 quart/month	0.91/month	1992
Walkway Non-Slip Type 2	1 gallon/month	3.63/month	1992

Table C-1. Hazardous Materials Storage, Facility 1410

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Accessory Repair			
Anti-Corrosion Compound	8 ounces/month	0.23/month	1992
Anti-Seize Compound	6 ounces/month	0.17/month	1992
Assembly Fluid	4 ounces/month	0.11/month	1992
Calibrating Fluid	1 gallon/month	3.63/month	1986
Calibration Fluid 2	Unknown	---	1983
Carbon Remover	55 gallons/6 months	200/6 months	1990
Carbon Remover	5 gallons/month	18/month	1990
Carbon Remover	30 gallons/month	109/month	1983,1986
Carbon Removing Compound	1 gallon/month	3.63/month	1992
Carbon Removing Compound	55 gallons/year	200/year	1992
Decarbonizer MXP	55 gallons/6 months	200/6 months	1990
Degreasing Solvent	55 gallons/4 months	200/4 months	1990
Finger Print Remover	10 gallons/year	36/year	1990
Finger Print Remover	1 gallon/month	3.63/month	1983
Fluid, Calibrating	1 gallon/month	3.63/month	1990
General Purpose Cleaner	1 gallon/month	3.63/month	1992
Grease, Auto and Artillery	1 pound/month	0.45/month	1992
Grease, General Purpose	0.5 pound/month	0.23/month	1992
Grease, Molybdenum Disulfide	0.5 pound/month	0.23/month	1992
Hydraulic Fluid	1 quart/month	0.91/month	1992
Lacquer, Black	1 pint/month	0.45/month	1992
Lacquer, Blue	1 pint/month	0.45/month	1992
Lacquer, Gray	1 pint/month	0.45/month	1992
Lacquer, Green	1 pint/month	0.45/month	1992
Lacquer, Olive Drab	2 pints/month	0.9/month	1990
Lacquer, Orange	1 pint/month	0.45/month	1992
Lacquer, Red	6 pints/month	2.7/month	1990
Lacquer, Red	1 pint/month	0.45/month	1992
Lacquer, White	1 pint/month	0.45/month	1992
Lacquer, Yellow	1 pint/month	0.45/month	1992
Lube Oil, General Purpose	1 quart/month	0.91/month	1992

Table C-1. Hazardous Materials Storage, Facility 1410 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Lube Oil, Molybdenum Disulfide	0.5 pound/month	0.23/month	1992
Lubricant, Solid Film	1 quart/month	0.91/month	1992
Molybdenum Disulfide	10 ounces/3 months	0.28/3 months	1992
Oil, Engine	500 gallons/3 months	1,815/3 months	1990
Oil, Engine Synthetic	Unknown	---	1983
Oil, Lubricating	55 gallons/2 years	200/2 years	1986,1990
Oil, Penetrating	16 ounces/month	0.45/month	1992
PD-680	30 gallons/month	109/month	1983,1986
PD-680	55 gallons/2 months	200/2 months	1986,1990
Penetrating Fluid	12 ounces/month	0.34/month	1992
Primer, Green	10 quarts/2 months	9.1/2 months	1990
Primer, Green Zinc Chromate	4 pints/month	1.8/month	1990
Soap, Toilet Grit 1	1 pound/month	0.45/month	1986
Wheel and Tire			
Adhesive	1 quart/2 years	0.91/2 years	1990,1992
Anti-Seize Compound	1 pound/month	0.45/month	1990,1992
Biogenic SE	60 gallons/year	218/year	1992
Dry Cleaning Solvent	5 gallons/month	18/month	1990
General Purpose Cleaner	1 gallon/month	3.63/month	1992
Grease, Aircraft	3 cans/month	68/month	1990
Grease, Aircraft	25 pounds/month	11/month	1992
Hand Cleaner Water Less	1 pound/month	0.45/month	1992
Hand Grit Soap	2 pounds/month	0.9/month	1992
Hydraulic Fluid	0.5 quart/month	0.45/month	1990
Hydraulic Fluid	1 quart/3 months	0.91/3 months	1992
Lacquer, Black	2 cans/month	45/month	1990
Lacquer, Orange	2 cans/month	45/month	1990
Lacquer, Red	2 pints/month	45/month	1992
Lacquer, Red	2 cans/month	45/month	1990
Lacquer, White	1 pint/month	0.45/month	1992
Lacquer, White	2 pints/month	0.9/month	1990
Leak Tech	16 ounces/month	0.45/month	1992

Table C-1. Hazardous Materials Storage, Facility 1410 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Oil, Lubricating	3 cans/day	68/day	1990
Oil, Lubricating	8 ounces/year	0.23/year	1990,1992
Oil, Lubricating	12 ounces/month	0.34/month	1992
Oil, Lubricating Pump	8 ounces/year	0.23/year	1992
PD-680 2	5 gallons/6 months	18/6 months	1992
Silicone Compound	40 ounces/month	1.13/month	1992
Silicone Compound	3 tubes/month	1/month	1990
Solvent Degreaser	5 gallons/month	18/month	1990
Talc Lubricant	1/2 can/month	11/month	1990
Talc Lubricant	0.5 pound/month	0.23/month	1992
Torque Seal	3 ounces/month	0.08/month	1992
Washing Solvent	5 gallons/month	18/month	1990
Aero Repair Shop			
Dry Cleaning Solvent	5 gallons/6 months	18/6 months	1991
General Purpose Cleaner	5 gallons/month	18/month	1991
General Purpose Detergent	5 gallons/6 months	18/6 months	1992
Grease, Aircraft	3 cans/month	68/month	1991
Hydraulic Fluid	1 gallon/month	3.63/month	1991
Lacquer, Black	1 ounce/month	0.03/month	1991
Lacquer, Blue	1 pint/month	0.45/month	1991
Lacquer, Brown	2 cans/month	45/month	1991
Lacquer, Olive Drab	2 cans/month	45/month	1991
Lacquer, Red	2 cans/month	45/month	1991
Lubricant, Inner Lube Talc	1 case/year	23/year	1991
Oil, Lube	4 ounces/week	0.11/week	1991
Paint, Yellow Traffic	5 gallons/year	18/year	1991
Preventative Compound	5 gallons/year	18/year	1991
Jet Engine Maintenance			
Adhesive Epoxy Resin	1 ounce/month	0.03/month	1988
Anti-Seize Compound	1 pint/3 months	0.45/3 months	1988
Assembly Fluid	4 ounces/year	0.11/year	1988
Cleaner, Lubricant and Preservative	1 pint/3 months	0.45/3 months	1988

Table C-1. Hazardous Materials Storage, Facility 1410 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Cleaning and Lubricating Compound	6 ounces/year	0.17/year	1988
Corrosion Preventative	1 gallon/6 months	3.63/6 months	1988
Corrosion Preventative	1 pint/month	0.45/month	1988
Dye, Blue Layout	1 pint/6 months	0.45/6 months	1988
Enamel, Black	1 pint/2 months	0.45/2 months	1988
Gasket Sealing Compound	4 ounces/month	0.11/month	1988
Grease	5 pounds/6 months	2/6 months	1988
Grease, Aircraft	1 pint/6 months	0.45/6 months	1988
Grease, Aircraft	5 pounds/6 months	2/6 months	1988
Grease, General Purpose	1 pint/6 months	0.45/6 months	1988
Grease, General Purpose	5 pounds/6 months	2/6 months	1988
Growco Silver	1 pint/6 months	0.45/6 months	1988
Hard Film Solvent	1 pint/6 months	0.45/6 months	1988
Humidity Indicator	3 ounces/month	0.08/month	1988
Hydraulic Fluid	1 quart/3 months	0.91/3 months	1988
Hydraulic Fluid	16 ounces/month	0.45/month	1988
Lacquer, Flat Black	1 pint/2 months	0.45/2 months	1988
Lacquer, Olive Drab	4 pints/month	1.8/month	1988
Lacquer, Orange	1 pint/month	0.45/month	1988
Lacquer, Red	1 pint/month	0.45/month	1988
Lacquer, White	3 cans/month	68/month	1988
Lubricant 1	1 quart/year	0.91/year	1988
Molybdenum Disulfide	1 pint/6 months	0.45/6 months	1988
Molybdenum Disulfide	1 pound/6 months	0.45/6 months	1988
Molybdenum Disulfide	1 can/3 months	23/3 months	1988
Molybdenum Disulfide	1.75 pounds/month	0.79/month	1988
Molybdenum Disulfide, Technical	1 pint/6 months	0.45/6 months	1988
Oil, Engine	3 quarts/month	2.73/month	1988
Oil, Engine/Lubricant	1 quart/week	0.91/week	1988
Oil, Lubricant ACFT	2 quarts/month	1.82/month	1988
Oil, Lubricating	1 pint/year	0.45/year	1988
Oil, Lubricating	1 pint/month	0.45/month	1988
Oil, Penetrating	1 pint/month	0.45/month	1988
Oil, Penetrating 1	1 pint/6 months	0.45/6 months	1988
Penetrating Fluid	1 pint/month	0.45/month	1988

Table C-1. Hazardous Materials Storage, Facility 1410 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Petrolatum, Technical	1 pint/month	0.45/month	1988
Pigment, Prussian Blue	1 tube/6 months	0.45/6 months	1988
Plasti Kote	1 pint/6 months	0.45/6 months	1988
Primer, Green	4 pints/month	1.8/month	1988
Zinc Chromate Green	1 quart/3 months	0.91/3 months	1988
Battery Shop			
Acid, Sulfuric	4 gallons/month	15/month	1990
Adhesive RTV	3 ounces/year	0.08/year	1990
Cleaning Compound	24 ounces/month	0.68/month	1990
Corrosion Preventative	24 ounces/month	0.68/month	1990
Penetrating Fluid	24 ounces/month	0.68/month	1990
Silicone Compound	1 ounces/month	0.03/month	1990
Environmental Electric			
Acid, Sulfuric Electrolyte	4 gallons/month	15/month	1991
Adhesive	0.5 ounce/2 months	0.01/2 months	1991
Adhesive, Conductive Silver	1 ounce/6 months	0.03/6 months	1991
Cleaning Compound	24 ounces/month	0.68/month	1991
Corrosion Preventative	3 pints/month	1.35/month	1991
Corrosion Preventative	24 ounces/month	0.68/month	1991
Corrosion Preventative Compound	2 gallons/year	7/year	1991
Grease, Adhesive	2 ounces/year	0.06/year	1991
Grease, Aeroshell	6.5 pounds/2 years	3/2 years	1991
Grease, Aircraft	16 ounces/year	0.45/year	1991
Grease, Molybdenum	1 pound/3 years	0.45/3 years	1991
Grease, Ordnance	2 ounces/year	0.06/year	1991
Insulating Varnish	2 ounces/year	0.06/year	1991
Insulating Varnish	1 quart/year	0.91/year	1991
Lead Tin Solder	1 roll/year	0.45/year	1991
Leak Detection Compound	20 ounces/month	0.56/month	1991
Lube Oil	1 ounce/month	0.03/month	1991
Lubriplate 107	14 ounces/year	0.39/year	1991

Table C-1. Hazardous Materials Storage, Facility 1410 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Neoprene Contact Cement	0.5 pint/year	0.23/year	1991
Penetrating Fluid	24 ounces/month	0.68/month	1991
RTV Adhesive	3 ounces/year	0.02/year	1991
Sealing Compound	1 ounce/year	0.03/year	1991
Sodium Bicarbonate	5 pounds/month	2/month	1991
Soldering Flux	1 pint/year	0.45/year	1991
Trichlorotrifluoroethane	2.5 gallons/year	9/year	1991
Vinegar Acid	10 gallons/month	36/month	1991

Table C-1. Hazardous Materials Storage, Facility 1414

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
NDI			
1,1,1 Trichloroethane	1 gallon/2 months	3.63/2 months	1990
50 PPM STD	5 ounces/year	0.14/year	1990
Compound, Inspection	25 gallons/year	91/year	1990
Developer	5 gallons/year	18/year	1990
Developer	9 pounds/year	4/year	1990
GSA Air Deodorant	14 ounces/month	0.34/month	1990
Kodak Stop Bath	5 gallons/year	18/year	1990
Non Hazardous Calibration Standard	5 ounces/year	0.14/year	1990
Oil, Magnetic Inspection	2 quarts/month	1.82/month	1990
Optical Lens Cleaner	1 quart/month	0.9/month	1990
Pacific West Corporation	1 can/6 months	23/6 months	1990
Penetrant Developer	12 ounces/3 months	0.34/3 months	1990
Penetrant, Portable	12 ounces/year	0.34/year	1990
Penetrant Precheck	5 pints/month	2.25/month	1990
Penetrant Remover	24 ounces/week	0.68/week	1990
Pre Check Cleaner	24 ounces/week	0.68/week	1990
Rapid Fixer	5 gallons/year	18/year	1990
Remover	55-110 gallons/year	200-399/year	1990
Sodium Hexafluoride	1 gallon/3 months	3.63/3 months	1990
Trichloroethane	1 gallon/2 months	3.63/2 months	1990
Zyglo Penetrant	55-110 gallons/year	200-399/year	1990
AGE			
1,1,1 Silicone Compound	10.6 ounces/month	0.30/month	1991
Adhesive	1 quart/3 months	0.91/3 months	1989
Adhesive	4 ounces/month	0.11/month	1991
Adhesive	1 tube/month	0.45/month	1991
Adhesive, Gray RTV	51.5 ounces/month	1.45/month	1991
Adhesive, Multi Purpose	1 quart month	0.91/month	1991
Adhesive, RTV	6 ounces/month	0.17/month	1990
Adhesive, Rubber Gasket	5 ounces/6 months	0.14/6 months	1989
Antifreeze	110 gallons/month	399/month	1989
Antifreeze	110 gallons/6 weeks	399/6 weeks	1991

Table C-1. Hazardous Materials Storage, Facility 1414 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Antifreeze	1 gallon/month	3.63/month	1991
Assembly Fluid	4 ounces/6 months	0.11/6 months	1989
Assembly Fluid 1	4 ounces/6 months	0.11/6 months	1991
Auto and Artillery	12 ounces/month	0.34/month	1991
Brake Fluid	1 gallon/year	3.63/year	1991
Break Free	6 pints/month	2.7/month	1991
Carbitol Solvent	10 cases/month	225/month	1991
Citrikleen	1 gallon/day	3.63/day	1987, 1989
Citrikleen	55 gallons/month	200/month	1991
Clean Burn Fuel	12 ounces/month (Winter) 4 ounces/month (Summer)	0.34/month 0.11/month	1991
Cleaner and Lubricant	24 pints/month	10.8/month	1991
Corrosion Preventative	1 quart/year	0.91/year	1991
CSD Methyl Ethyl Ketone	1 gallon/month	3.63/month	1990
Dextron 2	24 quarts/month	22/month	1991
Diesel Starting Fluid	22 ounces/month	0.62/month	1987
Diethylene Glycol Monobutylether	1 gallon/6-8 months	3.63/6-8 months	1989
Ektasolve Solvent	10 cases/month	225/month	1991
Electric Contact Cleaning	16 ounces/month	0.45/month	1990
Enamel, Aluminum	12 pints/month	5.4/month	1991
Enamel, Aluminum	1 pint/month	0.45/month	1990
Enamel, Black	1 pint/month	0.45/month	1987
Enamel, Blue	1 pint/2 months	0.45/2 months	1991
Enamel, Clear	1 can/month	23/month	1987
Enamel, Clear Gloss	1 quart/year	0.91/year	1991
Enamel, Flat Yellow	1 gallon/year	3.63/year	1991
Enamel, Gloss Black	12 pints/month	5.4/month	1991
Enamel, Gloss Black	13 ounces/month	0.37/month	1990
Enamel, Gloss White	13 ounces/month	0.37/month	1990
Enamel, Gloss White	12 pints/month	5.4/month	1991
Enamel, Red	12 pints/month	5.4/month	1991
Enamel, Red	13 ounces/month	0.37/month	1990
Enamel, Red	2 pints/month	0.9/month	1987
Enamel, Red	1 gallon/3 months	3.63/3 months	1991
Enamel, Silver	1 pint/month	0.45/month	1991
Enamel, White	1 pint/month	0.45/month	1986-1987

Table C-1. Hazardous Materials Storage, Facility 1414 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Enamel, Yellow	2 pints/month	0.9/month	1986-1987
Enamel, Yellow	6 pints/month	3/month	1991
Enamel, Yellow Semi Gloss	1 gallon/year	3.63/year	1991
Engine Cold Starting Aid	2 cylinders/month	90/month	1989
Ether	1 case/month	23/month	1991
Form-A-Gasket	12 ounces/month	0.34/month	1991
Freon 12	50 pounds/6 months	23/6 months	1989
Freon 12	750 pounds/summer	338/summer	1991
Gear, Lube Oil	0.5 quart/month	0.45/month	1989
Grease	8 ounces/year	0.23/year	1991
Grease, Aircraft	10 ounces/month	0.28/month	1991
Grease, Automotive and Artillery	6 pounds/6 months	3/6 months	1990
Grease, Ball and Roller Bearing	24 ounces/month	0.68/month	1991
Hydraulic Fluid	1 quart/month	3.63/month	1991
Hydraulic Fluid	24 quarts/month	22/month	1991
Jet Lube	1 quart/year	0.91/year	1991
Joint Compound	1 quart/year	0.91/year	1991
Lacquer, Acid Resistant	12 quarts/month	11/month	1991
Lacquer, Black	1 pint/month	0.45/month	1986-1987
Lacquer, Black	1 quart/month	0.91/month	1986,1989
Lacquer, Clear	1 gallon/year	3.63/year	1991
Lacquer, Green	2 pints/month	0.9/month	1986
Lacquer, Olive Drab	39 ounces/month	1.10/month	1986
Lacquer, Olive Drab	24 cans/month	540/month	1987
Lacquer, Red	3 pints/month	1.35/month	1986
Leak Lock	1 tube/month	0.45/month	1991
Leak Tech	40 ounces/month	1.13/month	1991
Lube, Aerosol Silicone	16 ounces/month	0.45/month	1990
Lube, All purpose	12 ounces/3 months	0.34/3 months	1989
Lube, General Purpose	3 pints/month	1/month	1991
Lube Oil	1 quart/month	0.91/month	1989
Lube Oil, 10-40 Weight	55 gallons/3 months	200/3 months	1991
Lube Oil, Gear	2 quarts/month	2/month	1991
Lube, Perma Silk Solid Flm	8 pints/month	4/month	1991
Lube, Royco	24 quarts/month	22/month	1991

Table C-1. Hazardous Materials Storage, Facility 1414 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Lube, Solid Film	4 cans/month	90/month	1989
Lubri Bond 220	8 ounces/month	0.23/month	1991
Lubricant, Royal	24 quarts/month	22/month	1991
Magnesium Chromate	1 pint/year	0.45/year	1989
Methanol Technical	1 quart/3 months	0.91/3 months	1989
Methanol Technical	1 gallon/6 months	3.63/6 months	1991
Methanol Technical	1 gallon/month	3.63/month	1991
Methyl Ethyl Ketone	Unknown	---	1986
Methyl Ethyl Ketone	3 gallons/month	11/month	1991
Oil, Crankcase 10-30 Weight	3 quarts/6 months	3/6 months	1991
Oil Free Poly Coating	1 gallon/year	3.63/year	1991
Oil, Hatco	24 quarts/month	22/month	1991
Oil, Huvac Pump Flush	1 quart/6 months	0.91/6 months	1991
Oil, Lube	10-20 quarts/month	10-18/month	1990
Oil, Lube	10 ounces/month	0.28/month	1990
Oil, Lube	20 ounces/month	0.56/month	1990
Oil, Lube	3 quarts/3 months	3/3 months	1991
Oil, Lube 2	2 quarts/month	2/month	1990
Oil, Lube General Purpose	13 ounces/month	0.37/month	1990
Oil Resistant Adhesive	3 ounces/month	0.08/month	1991
Oil, Special Purpose	1 quart/6 months	0.91/6 months	1991
Oil, Vacuum Pump	1 quart/month	0.91/month	1991
Paint, Aluminum/Silver	1 pint/month	0.45/month	1989
Paint, Brown	4 gallons/3 months	15/3 months	1991
Paint, Clear Gloss	2 pints/month	0.9/month	
Paint, Gray Gloss	1 gallon/3 months	3.63/3 months	1991
Paint, Heat Resisting	1 gallon/2 months	3.63/2 months	1989
Paint, Poly	2 cases/month	45/month	1987
Paint, Pure White	5 gallons/3 months	18/3 months	1991
Paint Remover	18 pints/month	8/month	1991
Paint, Silver Spray	13 ounces/month	0.37/month	1989
Paint, White Latex	5 gallons/2 years	18/2 years	1991
Paint, White Latex	1 gallon/year	3.63/year	1991
PD-680	5 gallons/week	18/week	1987
Petrolatum, Technical	1 quart/2 months	0.91/2 months	1989
Pigmented Component	10 ounces/month	0.28/month	1990

Table C-1. Hazardous Materials Storage, Facility 1414 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Poly, Black	4 pints/month	2/month	1989
Poly, Blue	1 pint/month	0.45/month	1989
Poly Coating	1 pint/month	0.45/month	1986
Poly Coating	1 quart/3 months	0.91/3 months	1989
Poly, Dark Gray	12 pints/month	5/month	1989
Poly, Dark Green	2 quart kits/month	2/month	1991
Poly, Gray	2 pints/month	0.9/month	1989
Poly, Green	2 quart kits/month	2/month	1991
Poly, Light Green	1 quart kit/3 months	0.91/3 months	1991
Poly Paint, Green	1 kit/year	0.45/year	1987
Poly, Red	6 pints/month	3/month	1989
Poly, White	1 pint/month	0.45/month	1989
Poly, Yellow	2 pints/month	0.9/month	1989
Primer, Engine Fuel	10 cases/month	225/month	1991
Primer, Epoxy	2 pints/month	0.9/month	1989
Primer, Green	Unknown	---	1989
Pro Seal	1 kit/month	0.45/month	1991
Propane Fuel	1-2 cylinders/year	45-90/year	1989
Propane Fuel	14 ounces/year	0.39/year	1986-1987
Protopet Yellow	1 gallon/year	3.63/year	1991
Pyroil Starting Fluid	8.3 ounces/2 months	0.23/2 months	1989
Refrigeration, Lube and Oil	3 pints/month	1/month	1991
Rust Resistant Olive Drab	1 gallon/month	3.63/month	1991
Sealant	1 gallon/day	3.63/day	1987
Sealant	3 ounces/month	0.08/month	1991
Sealing Compounds	3 ounces/month	0.08/month	1990
Semi Gloss	1 gallon/year	3.63/year	1991
Silicone Compound	10 ounces/month	0.28/month	1990
Silicone, PSI 601	28 ounces/month	0.79/month	1991
Starting Fluid	22 ounces/month	0.62/month	1986
Starting Fluid	58 ounces/week	1.63/week	1986-1987
Starting Fluid	10 cases/month	225/month	1991
Super Filer Coat	6 pints/month	3/month	1991
Superbonder	20 ounces/month	0.56/month	1991
Surf-Kote	1 quart/month	0.91/month	1991
Surface Stripper	3 cans/month	68/month	1989

Table C-1. Hazardous Materials Storage, Facility 1414 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Thinner	1 gallon/18 months	3.63/18 months	1987
Thinner	1 gallon/3 months	3.63/3 months	1986
Walkway Compound Sealing, Gray	1 gallon/year	3.63/year	1991
Weld Kit	1 kit/as needed	0.45/as needed	1991
Life Support			
Adhesive	2 pints/week	0.9/week	1985
Adhesive	3 quarts/month	3/month	1990
Adhesive, Cyanoacrylate	1 ounce/month	0.03/month	1990
Adhesive, Rubber	1 quart/month	0.91/month	1990
Adhesive, Rubber	3 quarts/month	3/month	1990
Isopropyl Alcohol	2 gallons/month	7/month	1990
Baby Powder	1 bottle/month	---	1988-1990
Catalyst Comp 3	1 ounce/6 months	0.03/6 months	1985
Dichloroemethane	1 quart/year	0.91/year	1985
Dichloroemethane	1 pint/month	0.45/month	1990
Enamel	1 pint/month	0.45/month	1985
Enamel, Gray	1 pint/month	0.45/month	1990
Enamel, Gray	4 pints/month	2/month	1990
Enamel, Gray Spray	2 pints/month	0.9/month	1988
Ink, Black Marking	1 pint/year	0.45/year	1990
Ink, Marking Stencil	1 pint/month	0.45/month	1990
Ink, White Marking	1 pint/month	0.45/month	1990
Ink, White Marking	2 pints/year	0.9/year	1990
Inner Tube With Lubricant	2 pints/month	0.9/month	1988
Isopropyl Alcohol	15 ounces/month	0.42/month	1985
Isopropyl Alcohol	2 gallons/month	7/month	1985-1990
Lacquer, Black	2 pints/month	0.9/month	1985-1990
Lacquer, Black	2 pints/month	0.9/month	1990
Lacquer, Enamel	1 pint/month	0.45/month	1988
Lacquer, Olive Drab	1 pint/month	0.45/month	1990
Lacquer, Red	1 pint/month	0.45/month	1988-1990
Lacquer, Yellow	2 pints/month	0.9/month	1988-1990
Liquid Cement	1 quart/year	0.91/year	1985

Table C-1. Hazardous Materials Storage, Facility 1414 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
PD-680	Unknown	---	1988
PD-680	1 gallon/year	3.63/year	1990
Poly, Compound 1	15 ounces/month	0.42/month	1985
Release Agent	1 quart/6 months	0.91/6 months	1985
Rubber Silicone	1 tube/month	0.45/month	1990
Rubber Silicone	8 ounces/month	0.23/month	1990
Rubber Silicone	1 pint/month	0.45/month	1988
Spray Glue	1 pint/month	0.45/month	1990
Trichloroprene Adhesive	1 quart/week	0.91/week	1985

Table C-1. Hazardous Materials Storage, Facility 1416

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Survival Equipment			
1, 1, 1 Trichloroethane	1 gallon/3 years	3.63/3 years	1990, 1992
1, 1, 1 Trichloroethane	1 can/year	23/year	1985
1, 1, 1 Trichloroethane	1 gallon/6 months	3.63/6 months	1990
Adhesive	4 quarts/year	4/year	1990
Adhesive	24 cans/year	540/year	1985
Adhesive	1 pint/4 months	0.45/4 months	1992
Adhesive	6 pints/year	3/year	1984
Adhesive	42 cans/year	945/year	1984
Adhesive	24 quarts/year	22/year	1984
Adhesive, Natural Rubber	2 kits/year	0.9/year	1990, 1992
Adhesive, Polychroprene	1 bottle/18 months	---	1990
Adhesive, RTV	1 pint/18 months	0.45/18 months	1992
Blue Sealing Compound	1 gallon/18 months	3.63/18 months	1990
Blue Sealing Compound	1 pint/18 months	0.45/18 months	1992
Blue Sealing Compound	250 cubic centimeters/year	---	1990
Contact Cement	1 quart/3 months	0.91/3 months	1990, 1992
Enamel, Black Spray	10 pints/year	5/year	1985
Enamel, Strata Blue	24 pints/year	11/year	1984
Grease, Automotive	10 pounds/10 years	5/10 years	1992
Grease, Automotive	1 pound/year	0.45/year	1992
Ink, Black Marking	1 quart/year	0.91/year	1992
Ink, Black Stencil	1 kit/year	0.45/year	1990
Ink, Black Stencil	1 pint/2 months	0.45/2 months	1990, 1992
Ink, Black Stencil	1 quart/8 years	0.91/8 years	1990
Ink, Black Stencil	1 pint/3 months	0.45/3 months	1992
Ink, Black Stencil	1 pint/8 months	0.45/8 months	1990
Ink, Strata Blue Marking	1 pint/4 1/2 years	0.45/4 1/2 years	1990
Ink, Strata Blue Marking	1 quart/year	0.91/year	1990
Ink, White Stencil	1 pint/8 months	0.45/8 months	1990
Ink, White Stencil	1 pint/2 months	0.45/2 months	1990, 1992
Ink, White Stencil	1 pint/month	0.45/month	1992
Isopropyl Alcohol	1 gallon/year	3.63/year	1990, 1992
Lubricant, Talc	Unknown	---	1984
Molybdenum Disulfide	1 pound/5 years	0.45/5 years	1992

Table C-1. Hazardous Materials Storage, Facility 1416 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Oil, Lubricating	1 gallon/2 years	3.63/2 years	1990, 1992
Polymeric Systems RTV	1 tube/18 months	0.45/18 months	1990
Solvent	1 can/year	23/year	1985
Technical Beeswax	3 pounds/year	1/year	1992
Technical Paraffin Wax	3 pounds/year	1/year	1992
Technical Talc	1 pound/year	0.45/year	1990, 1992
Technical Toluene	5 gallons/2 years	18/2 years	1990, 1992
Technical Toluene	1 pint/month	0.45/month	1992
Technical Toluene	1 can/year	23/year	1984

Table C-1. Hazardous Materials Storage, Facility 1418

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Weapons Release			
Sealing Compound	10 ounces/month	0.28/month	
Yellow Enamel	1 pint/year	0.45/year	
Grease	1.75 pounds/year	0.79/year	1992
Lube Oil	3 ounces/month	0.08/month	1992
Arrangement Equipment			
Cleaning Compound Solvent	16 ounces/2 weeks	0.45/2 weeks	1990
Corrosion Preventative	16 ounces/month	0.45/month	1990
Grease, Ball and Bearing	1.75 pounds/6 months	0.79/6 months	1990
Lacquer, Clear	1 pint/month	0.45/month	1990
Lacquer, Flat Black	4 pints/month	2/month	1990
Lacquer, Gloss Black	4 pints/month	2/month	1990
Lacquer, Gray	1 pint/month	0.45/month	1990
Lacquer, Green	10 cans/month	225/month	1990
Lacquer, Green	1 case/month	23/month	1990
Lacquer, Red	1 pint/month	0.45/month	1990
Lacquer, White (Flat)	1 pint/month	0.45/month	1990
Lacquer, Yellow	1 pint/month	0.45/month	1990
Oil, Lubricating	4 ounces/2 weeks	0.11/2 weeks	1990
Weapons Loading			
Dry Cleaning Solvent	Unknown	---	1992
Grease, Ball and Roller Bearing	1.75 pounds/month	0.79/month	1992
Grease, Lube	14 ounces/month	0.39/month	1992
Lacquer, Black	1 pint/month	0.45/month	1992
Lacquer, Light Gray	1 pint/month	0.45/month	1992
Lacquer, Red	1 pint/month	0.45/month	1992
Lacquer, Yellow	1 pint/month	0.45/month	1992
Primer, Gray	1 pint/month	0.45/month	1992

Table C-1. Hazardous Materials Storage, Facility 1418 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Weapons Release			
Automotive and Artillery	6.5 pounds/year	3/year	1990
Cleaning Compound	26 ounces/month	0.73/month	1990
Corrosion Preventative	1 pint/2 months	0.45/2 months	1990
Dry Cleaning Solvent	Unknown	---	1990
Enamel, Black	2 pints/6 months	0.9/6 months	1990
Enamel, Flat Black	2 pints/6 months	0.9/6 months	1990
Enamel, Gray	2 pints/6 months	0.9/6 months	1990
Enamel, Olive Drab	2 pints/6 months	0.9/6 months	1990
Enamel, White	2 pints/6 months	0.9/6 months	1990
Enamel, Yellow	0.5 pint/month	0.23/month	1990
Gloss, Purple	1 quart/2 years	0.91/2 years	1990
Grease, Aircraft	1 quart/6 months	0.91/6 months	1990
Grease, Ball and Roller Bearing	1 can/month	23/month	1990
Hydraulic Fluid	1 quart/2 months	0.91/2 months	1990
Lacquer, Gray	1 pint/month	0.45/month	1990
Lacquer, Olive Drab	2 pints/month	0.9/month	1990
Lacquer, Red	1.5 pints/month	0.68/month	1990
Leak Detection	48 ounces/year	1.35/year	1990
Lubri-Bond 220	70 ounces/year	1.97/year	1990
Lubricant, Solid Film	2 pints/month	0.9/month	1990
Molybdenum Disulfide	10 ounces/6 months	0.28/6 months	1990
Oil, Lubricating	8 ounces/3 months	0.23/3 months	1990
Oil, Lubricating	16 ounces/2 months	0.45/2 months	1990
Oil, Lubricating	4 ounces/3 months	0.11/3 months	1990
Oil, Varnish	1 quart/year	0.91/year	1990
Primer, Gray Spray	2 pints/month	0.9/month	1990
Rifle Base Cleaning Compound	8 ounces/month	0.23/month	1990
Sealing Compound	10 pints/year	5/year	1990

Table C-1. Hazardous Materials Storage, Facility 1420

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Munitions/AGE			
Adhesive Contact	1 quart/6 months	0.91/6 months	1992
Adhesive Cyanoacrylate	1 ounce/month	0.03/month	1992
Aliphatic Naphtha	4 gallons/day	15/day	1992
Bondo Dent Filler	As needed	---	1992
Brake Fluid, Auto	2 gallons/month	7/month	1992
Compound, Anti-Seize	1 pint/6 months	0.45/6 months	1992
Compound, Sealing	1 kit/month	0.45/month	1992
Compound, Sealing	8 ounces/2 months	0.23/2 months	1992
Corrosion Preventative Compound	5 pounds/year	2/year	1992
Corrosion Preventative Compound	1 pint/month	0.45/month	1992
Cutting Fluid	2 ounces/week	0.06/week	1992
Denatured Alcohol	1 gallon/month	3.63/month	1992
Desiccant, Activated	1 can/year	23/year	1992
Detergent, General Purpose	32 ounces/month	0.9/month	1992
Dry Cleaning Solvent	30 gallons/month	0.84/month	1992
Enamel, Black	1 pint/week	0.45/week	1992
Enamel, Blue	1 pint/month	0.45/month	1992
Enamel, Olive Drab	10 pints/month	5/month	1992
Enamel, Red	3 pints/week	1/week	1992
Enamel, Silver	6 pints/week	3/week	1992
Enamel, White	1 pint/week	0.45/week	1992
Floor Finish, Non Buffing	8 gallons/month	29/month	1992
Grease, Aircraft	5 pounds/6 months	2/6 months	1992
Grease, Aircraft and Instrumentation	1 gallon/month	3.63/month	1992
Grease, Auto and Artillery	1 gallon/month	3.63/month	1992
Grease, General Purpose	1 gallon/month	3.63/month	1992
Hydraulic Fluid	2 gallons/month	7/month	1992
Hydraulic Fluid Petro	4 gallons/month	15/month	1992
Isopropyl Alcohol	1 gallon/2 months	3.63/2 months	1992
Lacquer, Green	1 pint/month	0.45/month	1992
Lacquer, Silver	1 pint/month	0.45/month	1992
Lube Oil	1 gallon/6 months	3.63/6 months	1992

Table C-1. Hazardous Materials Storage, Facility 1420 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Lube Oil	4 ounces/2 months	0.11/2 months	1992
Lube Oil	1 quart/month	0.91/month	1992
Lubricant, Fluorocarbon	1 pint/month	0.45/month	1992
Methylene Chloride	Unknown	---	1992
Oil, Lube Gear	1 gallon/6 months	3.6/6 months	1992
Oil, Penetrating	2 ounces/week	0.06/week	1992
Paint Remover	72 ounces/month	2.03/month	1992
Primer, Gray	10 pints/week	5/week	1992
Sealant 2 Pt	1 pint/year	0.45/year	1992
Sealant Anaerobic 250 cc	1 pint/month	0.45/month	1992
Sealant Anaerobic 50 cc	3 ounces/month	0.08/month	1992
Sealing Compound	16 ounces/month	0.45/month	1992
Silicone Brake Fluid	1 gallon/2 months	3.63/2 months	1992
Silicone Compound	8 ounces/2 months	0.23/2 months	1992
Silicone Compound	1 pound/year	0.45/year	1992
Silicone Sealant	16 ounces/day	0.45/day	1992
Solid Film Lubricant	12 ounces/week	0.34/week	1992
Sweeping Compound 3	Unknown	---	1992
Thinner, Aircraft	1 gallon/month	3.63/month	1992
Trichlorotrifluoroethane	1 pint/week	0.45/week	1992
Varnish Oil	1 quart/month	0.91/month	1992
Walkway Non-Slip Type 2	1 gallon/month	3.63/month	1992

Table C-1. Hazardous Materials Storage, Facility 1425

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Fire Department			
Cleaning Soap	2 gallons/week	7/week	1988
Detergent	2 ounces/week	0.06/week	1988
Enamel, Silver	12 ounces/month	0.34/month	1988
Lacquer, Green	4 pints/month	2/month	1988
Oil, Union	8 gallons/month	29/month	1988
Paint, Spray	24 ounces/month	0.68/month	1988
Fire Ext. Maintenance			
AFFF	2-3 gallons/week	7-11/week	1990
Halon 1211	1,500 pounds/year	675/year	1990
Ink, White Marking	1 pint/6 months	0.45/6 months	1990
Lacquer, Red	1 pint/3 months	0.45/3 months	1990
Lacquer Thinner	5 gallons/2 years	18/2 years	1990
Lacquer, White	1 pint/6 months	0.45/6 months	1990
Monoammonium Phosphate	500 pounds/year	225/year	1990
Poly, Yellow	1 gallon kit/year	3.63/year	1990
Potassium Bicarbonate	400 pounds/year	180/year	1990
Fire Truck Maintenance			
Adhesive	6 ounces/3 months	0.17/3 months	1990
Battenfeld Amersion	1 gallon/month	3.63/month	1990
Brake Cleaner	16 ounces/month	0.45/month	1990
Chem Ray Coating	2 gallons/year	7/year	1990
Compound, Silicone Lube	16 ounces/month	0.45/month	1990
Corrosion Preventative	3 ounces/month	0.08/month	1990
Engine Brite	32 ounces/month	0.9/month	1990
Fuel Saver	5 ounces/month	0.14/month	1990
Gasket Compound	1 ounce/month	0.03/month	1990
Hydraulic Fluid	2 quarts/month	2/month	1990
Isopropyl Alcohol	3 ounces/month	0.08/month	1990
Oil, Continental	2 gallons/month	7/month	1990
Oil, Penetrating	3 ounces/month	0.08/month	1990

Table C-1. Hazardous Materials Storage, Facility 1425 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Old World Trading	1 gallon/month	3.63/month	1990
Safety Kleen	5 gallons/month	18/month	1990
Shell	28 ounces/month	0.79/month	1990

Table C-1. Hazardous Materials Storage, Facility 1427

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Ground Communication			
1, 1, 1 Trichloroethane	26 ounces/month	0.73/month	1992
Adhesive	1 ounce/month	0.03/month	1992
Corrosion Preventative Compound	1 pint/month	0.45/month	1992
Electrical Contact Cleaner	6 ounces/month	0.17/month	1992
Enamel, Clear	1 pint/month	0.45/month	1992
Enamel, Yellow	1 pint/3 months	0.45/3 months	1992
Filler Coat	12 ounces/year	0.34/year	1992
Grease, Silicone	8 ounces/year	0.23/year	1992
Isopropyl Alcohol	1 pint/month	0.45/month	1992
Lacquer, Gray	1 pint/6 months	0.45/6 months	1992
Lacquer, Green	72 ounces/year	2.02/year	1992
Lubricating Compound	1 pint/month	0.45/month	1992
Nitrogen	1 cylinder/month	45/month	1992
Oil, Electrical Insulating	Unknown	---	1992
Oil, Lubricating	1 ounce/month	0.03/month	1992
Solder, Lead Tin	5 pounds/year	2/year	1992
Solder, Tin Alloy	1 pound/year	0.45/year	1992
Soldering Flux	1 quart/year	0.45/year	1992
Soldering Flux	2 ounces/month	0.06/month	1992

Table C-1. Hazardous Materials Storage, Facility 1445

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
PMEL			
Bow Solder Co	1 pound/year	0.45/year	1987
Cesium	Unknown	---	1987
Chemtronics	18 ounces/week	0.51/week	1987
Freezing Compound	12 ounces/week	0.34/week	1987
Haper Alcohol and Chemical	1 gallon/year	3.63/year	1987
Mercury	5 pounds/year	2/year	1987
Plutonium	Unknown	---	1987
Trichlorotrifluoroethane	10 gallons/2 years	36/2 years	1987
FID			
Alpha 100 Flux	2 ounces/year	0.06/year	1991
Lead Tin Solder	1 roll/2 years	0.45/2 years	1991
PD-680	1 gallon/year	3.63/year	1991

Table C-1. Hazardous Materials Storage, Facility 1602

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
AGE			
Acid, Sulfuric	100 gallons/year	363/year	1992
Adhesive	2 quarts/year	2/year	1992
Adhesive Insul, RTV 108	6 ounces/year	0.17/year	1992
Adhesive Sealant, RTV 108	As needed	---	1992
Adhesive Spray 74	576 ounces/year	16/year	1992
Adhesive TB1363D	800 cubic centimeters/year	23/year	1992
Antifreeze, Ethylene Glycol	240 gallons/year	8,712/year	1992
Baking Soda	50 pounds/year	23/year	1992
Battery Corrosion Preventative	18 quarts/year	16/year	1992
Battery Protector Spray	312 ounces/year	9/year	1992
Brake Fluid 455	12 gallons/year	44/year	1992
Brake Fluid HDCP-420	12 gallons/year	44/year	1992
Citrikleen	110 gallons	399	1992
Compound, Antiseize	8 ounces/year	0.23/year	1992
Compound, Cleaning Acft	220 gallons/year	799/year	1992
Compound, Cleaning and Lubricating	384 ounces/year	11/year	1992
Compound, Corrosion Preventative	As needed	---	1992
Compound, Sealing	16 cartridges/year	7/year	1992
Compound, Sealing	16 tubes/year	7/year	1992
Compound, Walkway	2 gallons/year	7/year	1992
CV#83 Adh, Joint and Thread	880 cubic centimeters/year	---	1992
Diesel Fuel	12,000 gallons/year	4,356/year	1992
Enamel, Black	48 pints/year	22/year	1992
Enamel, Black Lusterless	10 pints/year	5/year	1992
Enamel, Blue	As needed	---	1992
Enamel, Clear	10 pints/year	5/year	1992
Enamel, Flat Black	As needed	---	1992
Enamel, Gloss Black	18 pints/year	8/year	1992
Enamel, Gloss White	48 pints/year	22/year	1992
Enamel, Gray	10 pints/year	5/year	1992
Enamel, Green	As needed	---	1992

Table C-1. Hazardous Materials Storage, Facility 1602 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Enamel Green	48 pints/year	22/year	1992
Enamel, Olive Drab	As needed	---	1992
Enamel, Red	48 pints/year	22/year	1992
Enamel, Yellow	20 pints/year	9/year	1992
EPK (EPS)608, PT A	1 kit/year	0.45/year	1992
Epoxy Hardener	1 pint/year	0.45/year	1992
Epoxy Sealer 486-A	1 quart/year	0.91/year	1992
Falcon Dust Off (Freon 12)	50 pounds/year	23/year	1992
Form-A-Gasket Sealant	16 tubes/year	7/year	1992
Gear Oil, 75 Weight	20 quarts/year	18/year	1992
Grease, Aircraft	12 pounds/year	5/year	1992
Grease, Aircraft (Royco 220)	120 pounds/year	54/year	1992
Grease, Aircraft (Royco 22)	120 pounds/year	54/year	1992
Grease, Auto and Artillery	2 cans/year	45/year	1992
Grease, Auto and Artillery	20 cans/year	450/year	1992
Grease, Ball and Bearing	48 cartons/year	---	1992
Grease, Batam S-830-RR	126 ounces/year	3.54/year	1992
Grease SA-824-3262	70 ounces/year	1.97/year	1992
Grease, Silicone G624	2 tubes/year	0.9/year	1992
Grease, Versible G351	32 ounces/year	0.9/year	1992
Hydraulic Fluid	660 quarts/year	601/year	1992
Hydraulic Fluid	140 quarts/year	127/year	1992
Hydraulic Fluid, Royco 782	660 gallons/year	2,396/year	1992
Isopropyl Alcohol	4 gallons/year	15/year	1992
JP-4 Fuel	100,000 gallons/year	36,300/year	1992
Lacquer, Black Acid Resistant	10 pints/year	5/year	1992
Lacquer, Blue	5 pints/year	2/year	1992
Lacquer, Clear	As needed	---	1992
Lacquer, Green	As needed	---	1992
Lacquer, Green	24 pints/year	11/year	1992
Lacquer, Ivory	As needed	---	1992
Lacquer, Olive Drab	As needed	---	1992
Lacquer, Orange	As needed	---	1992
Lacquer, Red	20 pints/year	9/year	1992
Lacquer, Red	Unknown	---	1992

Table C-1. Hazardous Materials Storage, Facility 1602 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Lacquer, White	20 pints/year	9/year	1992
Lacquer, Yellow	As needed	---	1992
Leak Tec 16 OX Type 1	48 ounces/year	1.35/year	1992
Lube Oil	12 quarts/year	11/year	1992
Lube Oil, Gear	10 quarts/year	10/year	1992
Lube Oil, General Purpose	5 cans/year	113/year	1992
Lube Oil, Inst Acft	2 cans/year	45/year	1992
Lube Oil, Royco 808	6 drums/year	1,126/year	1992
Lubricant, Slyde 2	576 ounces/year	16/year	1992
Lubricant, Solid Film	12 ounces/year	0.34/year	1992
Methyl Ethyl Ketone	1 gallon/year	3.63/year	1992
Mikro Kleen	220 gallons/year	799/year	1992
Oil, 15-40 Weight	960 quarts/year	874/year	1992
Oil, 15-40 Weight	4 drums/year	751/year	1992
Oil, Penetrating	4 cans/year	90/year	1992
Paint, Heat Resistant Aluminum	As needed	---	1992
Paint, Heat Resistant Aluminum	5 gallons/year	18/year	1992
Plastic Polish Liquid	2 pints/year	0.9/year	1992
Primer, Brown	24 pints/year	11/year	1992
Primer, Fuel Engine	384 ounces/year	11/year	1992
Primer, Yellow	20 pints/year	9/year	1992
RTV 108 Adhesive Sealant	As needed	---	1992
RTV 118 Adhesive	5 tubes/year	2/year	1992
RTV 162 Adhesive	As needed	---	1992
Safety Kleen 105	110 gallons/year	399/year	1992
Scotch Spray Mount Adh	As needed	---	1992
Scotchal Brand Edge Sealer	128 ounces/year	4/year	1992
Silicone Sealant, PSI-601	16 kits/year	7/year	1992
Soap, Borax With Lanolin	24 boxes/year	1,080/year	1992
Solvent, Carbitrol	3 gallons/year	11/year	1992
Starting Fluid	384 ounces/year	11/year	1992
Stay Clean Paste Flux	12 cans/year	270/year	1992
Stripper	2 gallons/year	7/year	1992
Super Bond	24 ounces/year	0.68/year	1992
Technical Petrolatum	8.75 pounds/year	4/year	1992

Table C-1. Hazardous Materials Storage, Facility 1602 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Technical Toluene	1 gallon/year	3.63/year	1992
Unleaded Gas	3,000 gallons/year	10,890/year	1992
Zinc Chromate, Yellow	20 pints/year	9/year	1992

Table C-1. Hazardous Materials Storage, Facility 1615

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Photography			
Acid, Sulfuric	12 ounces/month	0.34/month	1991
Acid, Sulfuric	12 ounces/year	0.34/year	1989
Bath Reversal and Replenisher	15 gallons/month	54/month	1983
Bleach Replenisher	10 gallons/month	36/month	1986
Bleach Replenisher	50 gallons/month	182/month	1983
Bleach Replenisher	5 gallons/month	18/month	1991
Bleach Starter	Unknown	---	1991
Bleach Starter	5 gallons/month	18/month	1991
Conditioner and Replenisher	15 gallons/month	54/month	1983, 1986
Color Developer Replenisher B	5 gallons/month	18/month	1991
Color Developer Replenisher A	5 gallons/month	18/month	1991
Conditioner and Replenisher	5 gallons/month	18/month	1991
Developer E-6AR	25 gallons/month	91/month	1983, 1986
Developer Replenisher E-6	5 gallons/month	18/month	1991
First Developer	5 gallons/month	18/month	1991
First Developer Replenisher	5 gallons/month	18/month	1991
First Developer Starter	5 gallons/month	18/month	1991
First Developer Starter	Unknown	---	1991
Fix Bath	15 gallons/month	54/month	1983
Fixer and Replenisher	5 gallons/month	18/month	1991
Kodak Color Developer	10 gallons/month	36/month	1986
Kodak Indicator	15 gallons/month	54/month	1986
Kodak Stabilizer and Replenisher	10 gallons/month	36/month	1986
Oil, Residual	As needed	---	1991
Photo Stabilizer	10 gallons/month	36/month	1983
Replenisher Developer	20 gallons/month	73/month	1983
Replenisher Developer	25 gallons/month	91/month	1983
Replenisher Developer	25 gallons/month	91/month	1986
Reversal Bath and Replenisher	5 gallons/month	18/month	1991
Reversal Replenisher	5 gallons/month	18/month	1991
Sodium Hydroxide	2 quarts/year	2/year	1989

Table C-1. Hazardous Materials Storage, Facility 1615 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Sodium Hydroxide	2 quarts/month	2/month	1991
Stabilizer and Replenisher	Unknown	---	1991
Stabilizer Replenisher	5 gallons/month	18/month	1991

Table C-1. Hazardous Materials Storage, Facility 1617

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Electronics			
Adhesive Cyanoacrylate	4 ounces/year	0.11/year	1992
Detergent	3 bottles/month	---	1992
Glass Cleaner	3 bottles/month	---	1992
Solder, Resin Core	0.3 pound/year	0.14/year	1992
Solder, Rosin Core	0.3 pound/year	0.14/year	1992
Paint Shop			
Additive, Sealing	40 gallons/year	145/year	1990
Aerosol Burp	6 pints/year	3/year	1990, 1991
Bet'r Cast Gray 630	1 kit/year	0.45/year	1990, 1991
Bet'r Cast Gray 645	1 kit/year	0.45/year	1990, 1991
Black, Flat	1 pint/2 months	0.45/2 months	1991
Cast, Gray Bet'r	1 gallon/year	3.63/year	1990
Clear	0.5 quart/year	0.45/year	1991
Clear VC-21	1 kit/year	0.45/year	1990
Developer	4 quarts/month	4/month	1990
Developer	12 quarts/year	11/year	1990, 1991
Enamel, Black	1 pint/2 months	0.45/2 months	1990, 1991
Enamel, Brown	1 gallon/year	3.63/year	1990, 1991
Enamel, Flat Green	1 gallon/year	3.63/year	1991
Enamel, Gloss Brown	2 gallons/year	7/year	1991
Enamel, Gloss Gray	2 gallons/year	7/year	1991
Enamel, Gloss Black	8 gallons/year	29/year	1991
Enamel, Gloss Red	2 gallons/year	7/year	1991
Enamel, Gloss White	2 gallons/year	7/year	1991
Enamel, Gray	1 gallon/year	3.63/year	1991
Enamel, Green	1 gallon/year	3.63/year	1991
Enamel, Phenolic Inside	Unknown	---	1990
Enamel, Phenolic Outside	Unknown	---	1990
Enamel, Red	2 gallons/year	7/year	1990
Enamel, Red	3 pints/year	1/year	1990, 1991
Enamel, Red	6 pints/year	3/year	1991
Enamel, Strata Blue	1 pint/month	0.45/month	1990

Table C-1. Hazardous Materials Storage, Facility 1617 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Enamel, White	Unknown	---	1990
Enamel, Yellow	1 gallon/year	3.63/year	1990, 1991
Fish Eye Eliminator	1 pint/year	0.45/year	1990, 1991
Fixer, Zip	12 quarts/year	11/year	1990, 1991
Fixer, Zip	3 quarts/month	3/month	1990
Flat Black	1 pint/2 months	0.45/2 months	1990
Lacquer, Black	2 gallons/month	7/month	1990
Lacquer, Black	1 pint/month	0.45/month	1990
Lacquer, Blue	3 pints/year	1/year	1990, 1991
Lacquer, Blue	1 pint/month	0.45/month	1990
Lacquer, Camouflage Black	2 gallons/year	7/year	1991
Lacquer, Camouflage Dark Gull Gray	1 gallons/year	3.63/year	1991
Lacquer, Clear	1 pint/month	0.45/month	1990
Lacquer, Clear	3 pints/year	1/year	1990, 1991
Lacquer, Clear	1 gallon/year	3.63/year	1991
Lacquer, Flat Black	6 pints/year	3/year	1990, 1991
Lacquer, Gray	3 pints/year	1/year	1991
Lacquer, Gray	4 pints/year	2/year	1990
Lacquer, Gray	1 pint/month	0.45/month	1990
Lacquer, Orange	3 pints/year	1/year	1990, 1991
Lacquer, Red	1 pint/month	0.45/month	1990
Lacquer, Sealing Sanding	2 gallons/month	7/month	1990
Lacquer, Silver	3 pints/year	1/year	1990, 1991
Lacquer, White	1 gallon/year	3.63/year	1990
Lacquer, White	1 pint/2 months	0.45/2 months	1990, 1991
Lacquer, White	1 pint/month	0.45/month	1990
Lacquer, Yellow	3 pints/year	1/year	1990, 1991
Methyl Ethyl Ketone	5 gallons/year	18/year	1991
Paint Remover	2 gallons/year	7/year	1990, 1991
Parting Kote	1 can/year	23/year	1991
Parting Kote	4 pints/year	2/year	1991
Partizleote	1 pint/year	0.45/year	1990
Partizleote	4 pints/year	2/year	1990
Poly, Black	2 gallons/month	7/month	1990
Poly, Blue	1 quart/month	0.91/month	1990
Poly, Gray	2 gallons/month	7/month	1990

Table C-1. Hazardous Materials Storage, Facility 1617 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Poly, Red	1 quart/month	0.91/month	1990
Poly, White	1 pint/month	0.45/month	1990
Primer Coating	2 gallons/month	7/month	1990
Primer, Gray	3 pints/year	1/year	1990
Primer, Gray	1 pint/3 months	0.45/3 months	1990
Primer, Gray	6 pints/year	3/year	1991
Primer, Water Reducible	Unknown	---	1990
Putty, Red	12 ounces/year	0.34/year	1990
Red Stuff Putty	12 ounces/year	0.34/year	1991
Sealing Additive	40 gallons/year	145/year	1991
Sealing Additive	4 bottles/2 months	---	1990
Super Bonder	1 ounce/year	0.03/year	1990, 1991
Technical	5 gallons/year	18/year	1990
Thinner	10 gallons/year	36/year	1990, 1991
Thinner	20 gallons/year	73/year	1991
Thinner, Dope and Lacquer	10 gallons/year	36/year	1990
Thinner, Dope and Lacquer	10 gallons/month	36/month	1990
Thinner, Dope and Lacquer	20 gallons/year	73/year	1991
Thinner, Stic Adhesive	20 gallons/year	73/year	1990
Varnish, Clear	1 gallon/year	3.63/year	1990, 1991
Water Reducible White	Unknown	---	1990
Water Reducible Black	Unknown	---	1990
Wood Stain	1 gallon/year	3.63/year	1991
Welding Shop			
Acetylene	500 pounds/year	225/year	1991
Argon	500 pounds/year	225/year	1991
Argon co2	500 pounds/year	225/year	1991
D-Spat	16 ounces/year	0.45/year	1991
Rod, Flux Coated Brazing .125	Unknown	---	1991
Welding Rod .062	500 pounds/year	225/year	1991
Welding Rod (Gerro Metal Prod Co)	10 pounds/year	5/year	1991
Welding Rod (J.W.Harris Co Inc)	10 pounds/year	5/year	1991

Table C-1. Hazardous Materials Storage, Facility 1617 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Welding Rod (Protectiv Metal Ahloys Inc)	10 pounds/year	5/year	1991
Welding Rod 1060/1200	10 pounds/year	5/year	1991
Welding Rod 4043	10 pounds/year	5/year	1991
Welding Rod 4130	10 pounds/year	5/year	1991
Welding Rod 6013	10 pounds/year	5/year	1991
Welding Rod 7018	10 pounds/year	5/year	1991
Welding Rod R60	10 pounds/year	5/year	1991

Table C-1. Hazardous Materials Storage, Facility 1619

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Carpentry			
Dap Wood Dough	4 ounces/year	0.11/year	1992
Elmers Wood Glue	0.5 gallon/year	2/year	1992
Oil, Lubricating	2 quarts/year	1.82/year	1992
Solvent, Famowood	1 pint/year	0.45/year	1992
Machine Shop			
1, 1, 1 Trichloroethane	2 cans/year	45/year	1991
1, 1, 1 Trichloroethane	16 ounces/2 months	0.45/2 months	1988
Adhesive	1 ounce/year	0.45/year	1991
Adhesive, Loctite	8 ounces/5 years	0.23/5 years	1988
Adhesive Part A and B	1 kit/year	0.45/year	1991
Bio-Clean 18 Machine Cleaner	Unknown	---	1991
Bond-Do	1 kit/6 months	0.45/6 months	1988
Bondo, Dent Filler	2 kits/year	0.9/year	1991
Cleaner, Lube Pres	1 pint/3 months	0.45/3 months	1991
Cleaning Compound Solvent	26 ounces/year	0.73/year	1991
Compound, Threading	1 bottle/6 months	---	1991
Cream, Handoleaner	1 can/2 months	23/2 months	1991
Detergent, General Purpose	1 bottle/3 months	---	1991
Dye, Blue Layout	4 ounces/year	0.11/year	1991
Dye, Blue Layout	12 ounces/2 months	0.34/2 months	1987-1988
Epoweld Pt A and B	2 boxes/year	90/year	1991
Fiber Glass	31 pounds/year	14/year	1990
Filler, Autobody	2 kits/year	0.9/year	1991
Long Life 20/20	Unknown	---	1991
Magic Tap	1 pint/month	0.45/month	1987
Magic Tap Lube	16 ounces/6 months	0.45/6 months	1988
Metal Polish	1/2 can/year	11/year	1991
Metal Working Fluid	1 bottle/6 months	---	1991
Methyl Ethyl Ketone	1 pint/year	0.45/year	1991
Oil, Cutting	1 pint/3 months	0.45/3 months	1987
Oil, Lubricating Aircraft	1 quart/year	0.91/year	1991

Table C-1. Hazardous Materials Storage, Facility 1619 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
Oil, Lubricating Engine	6 quarts/year	5/year	1991
Oil, Lubricating	4 quarts/year	4/year	1991
Oil, Penetrating	1 ounce/month	0.03/month	1991
Rapid Tap	16 ounces/year	0.45/year	1988
Royco	1 pint/month	0.45/month	1990
Safe Tap	Unknown	---	1991
Sealing Compound	1/2 kit/year	0.23/year	1991
Simple Green	Unknown	---	1991
Tap Magic Aluminum	1 bottle/3 months	---	1991
Graphics			
Activator	0.5 gallon/month	2/month	1987, 1990
Activator	7 gallons/month	25/month	1987
Activator, Color	2 gallons/year	7/year	1990
Activator, Long Life	1.5 gallons/month	5/month	1989-1990
Adhesive, 280	2 kits/year	0.9/year	1990
Adhesive, Scotch Mount	16 ounces/6 months	0.45/6 months	1987, 1990
Adhesive, Uncommon Conglomerates	1 pint/year	0.45/year	1990
Ammonia	4 gallons/month	15/month	1987
Armour Plate	1 quart/year	0.91/year	1990
Cleaner, Anti-Fog Glass	13 ounces/3 months	0.37/3 months	1990
Cleaner, Anti-Fog Glass	2 pints/year	0.9/year	1990
Cleaner, Glass	1 gallon/year	3.63/year	1990
Detergent, General Purpose	1 pint/year	0.45/year	1990
Detergent, General Purpose	1 pint/2 months	0.45/2 months	1990
Detergent, Glass	1 gallon/year	3.63/year	1990
Developer, Dynamark 8500	1 quart/6 months	0.91/6 months	1989
Developer, Loquedot 2-part	1 gallon/year	3.63/year	1990
Dust-Off	1 can/year	23/year	1990
Dust-Off	1 pint/year	0.45/year	1990
Dynamic 8500 Developer	2 quarts/year	4/year	1990
Fixative Krylon 1306	0.5 pint/year	0.23/year	1989-1990
Fixer	1 gallon/2 months	3.63/2 months	1987, 1990
Image Transfer	4 quarts/year	4/year	1990

Table C-1. Hazardous Materials Storage, Facility 1619 (Continued)

Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Duration of Storage
INT, Letraset	1 quart/3 months	0.91/3 months	1990
Lacquer, Clear	1/2 can/year	11/year	1989-1990
Photo Chem	1 gallon/3 months	3.63/3 months	1989
Thinner, Bestine Solvent	1 quart/year	0.91/year	1987, 1990

Table C-2. Hazardous Material Storage in Quantities Exceeding 40 CFR 373 Thresholds

Facility Number	Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Year(s)	Constituents	%	Synonym(s)	CASRN
1027	140 solvent	700 gallons/year	2,541/year	1992	Hydrotreated distillate, light	NL	NL	NL
1027	Soap, aircraft	500 gallons/year	1,815/year	1992	Petroleum distillate	NL	Crude oil, petroleum Oil Petroleum crude oil Petroleum oil	8002-05-9
					Hexylene glycol	NL	NL	NL
1048	PD-680	1 gallon/day	363/day	1990	Hydrotreated, light distillate petroleum, 140 solvent	100	NL	NL
1050	Carbon removing compound	55 gallons/month	200/month	1992	NL	NL	NL	NL
1050	Cleaning and lube compound	180 cans/year	4,050/year	1991	1,1,2-Trichloro 1,2,2-trifluorethane	97	Chlorinated fluorocarbon (freon 113) [Ethane, 1,1,2 - trichloro - 1,2,2 - trifluoro] Freon 113 Refrigerant 113 1,1,2 Trichloro - 1,2,2 - trifluroethane (FC113) 1,1,2 Trichlorotrifluoroethane	76-13-1
1050	Lube oil	600 quarts/month	546/month	1991	Oil, lubricating	NL	NL	NL
					Triorthocresyl phosphate	0.5	NL	78-30-8
1050	Hydraulic fluid	450 quarts/month	409.5/month	1991	Hydrotreated light	80	NL	NL
					Triorthocresyl phospahte	1	NL	78-30-8
1055	Dust control	1 can/week	23/week	1990	Chlorinated paraffinic	NL	NL	NL
					Emulsifier, linear alcohol	NL	NL	NL
					Phosphate easter	NL	NL	NL
					Propellent	NL	NL	NL

CFR = Code of Federal Regulations.
NL = Not listed.

Table C-2. Hazardous Material Storage in Quantities Exceeding 40 CFR 373 Thresholds

Facility Number	Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Year(s)	Constituents	%	Synonym(s)	CASRN
1055	Stoddard solvent	25 gallons/month	91/month	1985	NL	NL	NL	8052-41-3
1055	Trichloroethane	10 drums/year	1,877/year	1985	Trichlorotrifluoroethane	97	Chlorinated fluorocarbon (freon 113) [Ethane, 1,1,2-trichloro - 1,2,2 - trifluoro-] Freon 113 Refrigerant 113 1,1,2-Trichloro 1,2,2-trifluoroethane 1,1,2-trichloro-1,2,2-trifluroethane (FC 113) 1,1,2-Trichlorotrifluoroethane	76-13-1
					Carbon dioxide	3	Dry ice	124-38-9
1055	Stoddard solvent	25 gallons/month	91/month	1986	Stoddard solvent	100	NL	8052-41-3
1055	Freon	50 gallons/month	182/month	1987	Trichlorotrifluorethane	100	Chlorinated fluorocarbon (freon 113) [Ethane, 1,1,2-trichloro - 1,2,2 - trifluoro-] Freon 113 Refrigerant 113 1,1,2-trichloro 1,2,2-trifluoroethane 1,1,2-trichloro-1,2,2-Trifluroethane (FC 113) 1,1,2-Trichlorotrifluoroethane	76-13-1
1055	Freon 113	25 gallons/month	91/month	1986	Trichlorotrifluoroethane	100	Chlorinated fluorocarbon (freon 113) [Ethane, 1,1,2-trichloro - 1,2,2 - trifluoro-] Freon 113 Refrigerant 113 1,1,2-trichloro 1,2,2-trifluoroethane 1,1,2-Trichloro-1,2,2-trifluroethane (FC 113) 1,1,2-Trichlorotrifluoroethane	76-13-1

CFR = Code of Federal Regulations.
NL = Not listed.

Table C-2. Hazardous Material Storage in Quantities Exceeding 40 CFR 373 Thresholds
Page 3 of 9

Facility Number	Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Year(s)	Constituents	%	Synonym(s)	CASRN
1055	Lubricating compound	24 cans/month	540/month	1991	Dichlorodifluoromethane	NL	Dichlorodifluoromethane (CFC-12) Dichlorodifluoromethane, R12 Methane, dichlorodifluoro, R12	75-71-8
					(1,1,1)-Trichloroethane	NL	Chlorothene Etane, 1,1,1-Trichloro- Methyl chloroform 1,1,1-Trichloroethane Trichloromethylmethane	71-55-6
					Methyl chloroform	60-65	Chlorothene Etane, 1,1,1-Trichloro- 1,1,1-Trichloroethane Trichloromethylmethane	71-55-6
					Silicone 350	1.96	NL	NL
1055	Trichlorotrifluoroethane	30 cans/month	675/month	1991	1,1,2-Trichloro-1,2,2-trifluorethane	95	Chlorinated fluorocarbon (freon 113) [Ethane, 1,1,2-trichloro - 1,2,2 - trifluoro-] Freon 113 Refrigerant 113 1,1,2-Trichloro-1,2,2-trifluroethane (FC 113) 1,1,2-Trichlorotrifluoroethane	76-13-1
1082	Chlorine, technical	200 pounds/week	90/week	1986	Chlorine	NL	Dichlorine	7782-50-5
1082	Soda ash	500 pounds/week	225/week	1986	NL	NL	NL	NL
1101	JP-4	20 gallons/week	73/week	1989	NL	NL	NL	NL
1191	Antifreeze	55 gallons/month	200/month	1991	Ethylene glycol	91	Glycol alcohol	107-21-1
					Water	5	NL	NL
					Inhibitors	4	NL	
1191	Cleaning compound	84 cans/year	1,890/year	1991	Ketone	27	Ketone, 3 pyridyl 3-(N-mthyl-N-nitrosoamino) propyl 4-(N-Nitrosomethylamino) -1-(3-pyridyl) -1 butanone	64091-91-4
					Aromatic hydrocarbon	27	NL	NL

CFR = Code of Federal Regulations.
NL = Not listed.

Table C-2. Hazardous Material Storage in Quantities Exceeding 40 CFR 373 Thresholds

Facility Number	Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Year(s)	Constituents	%	Synonym(s)	CASRN
					Chlorinated hydrocarbon	14	NL	NL
					Cyclic amide	7.55	NL	NL
1191	Grease	3 quarts/month	272/month	1991	Methyl phenyl silicone	50	NL	NL
					Monochlorotrifluoro-ethylene polymer	46	NL	NL
					Diatomaceous clay	2	Diatomaceous earth Silica, amorphous	61790-53-2
					Sodium petroleum sulfate	3	NL	NL
					Methyl dioctyl diphenylamine	1	NL	NL
1191	Radiator cleaner	92 cans/year	2,070/year	1991	Oxalic acid	NL	NL	144-62-7
1213	Arnidinohydrazone	6 cases/month	300/month	1990	NL	NL	NL	NL
1214	Brown	24 cans/month	540/month	1990	Toluene	10	Benzene, methyl- Methylbenzene Phenylmethane	106-88-3
					Xylene	5	Benzene, dimethyl Demethylbenzene	1330-20-7
					Benzine	10	Naphtha Naphtha petroleum Naphtha, coal tar Petroleum naphtha	8030-30-6
					Titanium dioxide	5	NL	13463-67-7
					Acetone	10	Acetone oil(s) Dimethylformaldehyde Methyl ketone 2 Propanone	67-64-1
1214	Paint, red	20 cans/month	450/month	1991	Butyl cellosolve	NL	NL	NL
					Isopropanol	NL	2-Hydroxypropane Isopropyl alcohol 2-Propyl alcohol	67-63-0
					Mineral spirits	NL	NL	NL
					Toluol	NL	NL	NL
					VM&P naptha	NL	NL	NL

CFR = Code of Federal Regulations.
NL = Not listed.

Table C-2. Hazardous Material Storage in Quantities Exceeding 40 CFR 373 Thresholds
Page 5 of 9

Facility Number	Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Year(s)	Constituents	%	Synonym(s)	CASRN
					Acetone	NL	Acetone oil(s) Dimethyl formaldehyde Methyl ketone 2 Propanone	67-64-1
1217	Arnidinohydrazone	6 cases/month	135/month	1990	NL	NL	NL	NL
1320	Antifreeze	25 gallons/month	91/month	1992	Ethylene glycol	90	Glycol alcohol	107-21-1
					Diethylene glycol	5	NL	
1403	Aliphatic Naptha	4 gallons/day	15/day	1992	NL	NL	NL	NL
1403	Dry cleaning solvent	30 gallons/month	109/month	1992	NL	NL	NL	NL
1410	Carbon Remover	30 gallons/month	109/month	1983,1986	Monoethanolamine	22	Ethamolamine or ethanolamine- solution	141-43-5
					Glycolether	18	NL	NL
1410	Oil, engine	500 gallons/3 months	1,815/3 months	1990	Oils	NL	NL	NL
					Tricresylphosphate	5	NL	1330-78-5
1410	PD-680	30 gallons/month	109/month	1993,1986	Petroleum hydrocarbons	NL	NL	NL
1410	PD-680	55 gallons/2 months	200/2 months	1986,1990	Petroleum naptha	100	Benzine Naptha Naptha petroleum Naptha, coal tar	8030-30-6
1410	Oil, lubricating	3 cans/day	68/day	1990	Lubricating oil	100	NL	NL
1414	Antifreeze	110 gallons/month	399/month	1989	Ethylene glycol	93	Glycol alcohol	107-21-1
					Sodium borate	NL	Borates, tetra Sodium salts, anhydrous	133-43-4
					Trisodium phosphate	NL	NL	NL
					Sodium harcepto benzothiazote	NL	NL	NL
					Glycol	NL	NL	NL
1414	Antifreeze	110 gallons/6 weeks	399/6 weeks	1991	Ethylene glycol	93	Glycol alcohol	107-21-1
					Additives	NL	NL	NL
1414	Carbitol solvent	10 cases/month	225/month	1991	Diethylene-glycol-monoethyl ether	100	NL	112-34-5
1414	Citrikleen	55 gallons/month	200/month	1991	2-Aminoethanol	NL	NL	NL

CFR = Code of Federal Regulations.
NL = Not listed.

Table C-2. Hazardous Material Storage in Quantities Exceeding 40 CFR 373 Thresholds
Page 6 of 9

Facility Number	Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Year(s)	Constituents	%	Synonym(s)	CASRN
					Diethylene glycol monobutyl ether	NL	NL	112-34-5
1414	Ektasolve solvent	10 cases/month	225/month	1991	Diethylene glycol monoethyl ether	100	NL	111-90-0
1414	Engine cold starting aid	2 cylinders/month	90/month	1989	Ether	100	Ethyl ether Diethyl ether Ethane, 1,1-oxybis	60-29-7
1414	Freon 12	750 pounds/ summer	338/summer		Dichlorodifluoromethane	100	Dichlorodifluoromethane (CFC-12) Dichlorodifluoromethane (R-12) Methane, dichlorodifluoro-R12	75-71-8
1414	Lacquer, olive drab	24 cans/month	540/month	1987	RM&P naphtha	6.5	NL	NL
					Toluene	19.6	Benzene, methyl Methylbenzene Phenylmethane	108-88-3
					Xylene	2.84	Benzene, dimethyl Dimethylbenze	1330-20-7
					Methylene chloride	24.6	Dichloromethane methane, dichloro- Methylene chloride Methylene dichloride Narkotil	75-09-2
					Propane	18	Propane	74-98-6
1414	Lube, solid film	4 cans/month	90/month	1989	Toluene	NL	Benzene, methyl Methyl benzene Phenyl methane	108-88-3
					Butyl cellosolve	NL	NL	NL
					Molybdenum disulfide	NL	NL	NL
					Epoxy resin	NL	NL	NL
1414	Primer, engine fuel	10 cases/month	225/month	1991	Ethyl ether	33	Diethyl ether Ethane, 1,1-oxybis	60-29-7
					Heptane	61	Heptanes	142-82-5
					Carbon dioxide	6	Dry ice	124-38-9
					Nitrous oxide	3	NL	10024-97-2

CFR = Code of Federal Regulations.
NL = Not listed.

Table C-2. Hazardous Material Storage in Quantities Exceeding 40 CFR 373 Thresholds
Page 7 of 9

Facility Number	Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Year(s)	Constituents	%	Synonym(s)	CASRN
1414	Starting fluid	10 cases/month	228/month	1991	Diethyl ether	60	Ethyl ether	60-29-7
1418	Lacquer, green	10 cans/month	225/month	1990	Xylene	14.73	Benzene, dimethyl Dimethyl benzene	1330-20-7
					Methylene chloride	18.53	Dichloromethane Methane, dichloro Methylene chloride Methylene dichloride Narkotil	75-09-2
					Acetone	18.15	Acetone oil(s) Dimethyl formaldehyde Methyl ketone 2-Propanone	67-64-1
					Toluene	7.63	Benzene, methyl Methylbenzene Phenylmethane	108-88-3
1420	Aliphatic Naphtha	4 gallons/day	15/day	1992	Cyclohexane	NL	Benzene, hexahydro Hexahydrobenzene Hexamethylene	110-82-7
					Methylcyclohexane	NL	Methyl cyclohexane	108-87-2
					Toluene	NL	Benzene, methyl- Methylbenzene Phenylmethane Toluene	108-88-3
					N-heptane	NL	NL	NL
					C-6-C-8 paraffins	NL	NL	NL
					Cycloparaffins	NL	NL	NL
1602	Antifreeze, Ethylene glycol	240 gallons/year	8,712/year	1992	Ethylene glycol	90-95	Glycol alcohol Ethylen glycol	107-21-1
					Diethylene glycol	0-5	NL	NL
1602	Diesel fuel	12,000 gallons/year	4,356/year	1992	Petroleum mid-distillate	NL	NL	NL
					Distillates, straight run middle	NL	NL	NL
					Hydrodesulfurized/middle distillate	NL	NL	NL

CFR = Code of Federal Regulations.
NL = Not listed.

Table C-2. Hazardous Material Storage in Quantities Exceeding 40 CFR 373 Thresholds

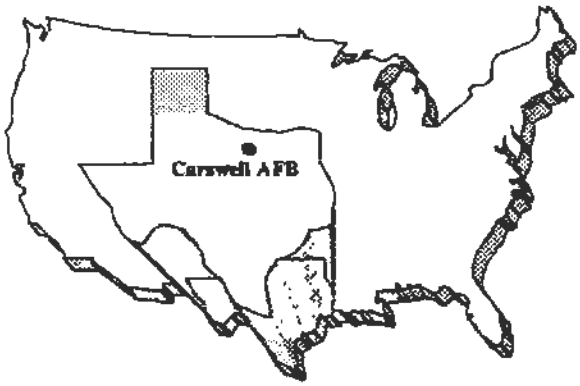
Facility Number	Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Year(s)	Constituents	%	Synonym(s)	CASRN
					Kerosene	NL	Coal oil	8008-20-6
					Kerosene, hydrode-sulfurized	NL	NL	NL
					Light hydrocarbon bend	NL	NL	NL
					Naphthalene	3	Moth balls Moth flakes	91-20-3
1602	Hydraulic fluid Royco 782	660 gallons/year	2,396/year	1992	Synthetic hydrocarbon base stock	NL	NL	NL
					Esters/dibasic acid	33	NL	NL
					Triorthecresyl phosphate	1.0	NL	78-30-8
					Inhibitor, oxidation	02.0	NL	NL
					Additive	NL	NL	NL
1602	JP-4 fuel	100,00 gallons/year	36,300/year	1992	Toluene	22	Benzene, methyl- Methylbenzene Phenylmethane	108-87-2
					Xylene	10	Benzene, dimethyl Dimethyl benzene	1330-20-7
					Ethyl benzene	2	NL	NL
					Benzene	4	Benzol Coal naphtha Cyclohexatriene Phenyl hydride	71-43-2
					Cyclohexane	5	Benzene, hexahydro-cyclohexane Hexahydrobenzene Hexamethylene	110-82-7
					Methyl tert-butyl ether	7	Ether, tert-butyl methyl Methyl tert butyl ether Methyl tert butyl-ether Propane, 2 methoxy-2-methyl-	1634-04-4
1602	Lube oil, Royco 808	6 drums/year	1,126/year	1992	Synthetic esters and other components	100	NL	NL
1602	Soap, borax with lanolin	24 boxes/year	1,080/year	1992	NL	NL	NL	NL

CFR = Code of Federal Regulations.
NL = Not listed.

Table C-2. Hazardous Material Storage in Quantities Exceeding 40 CFR 373 Thresholds

Facility Number	Product	Quantity Stored (Units Provided)	Quantity Stored (kg)	Year(s)	Constituents	%	Synonym(s)	CASRN
1802	Unleaded gas	3,000 gallons/year	10,890/year	1992	Gasoline	100	Motor spirit Natural gasoline Petrol	8006-61-8
					Benzene	1.2-1.4	Benzol Coal naphtha Cyclohexatriene Phenyl hydride	71-43-2
					Toluene	4.3-6.5	Benzene, methyl- Methyl benzene Phenyl methane	108-87-2
					Xylenes	5.1-7.7	Benzene, dimethyl Dimethyl benzene	1330-20-7
					Methyl tert-butyl ether	10	Ether, tert-butyl methyl Methyl tert butyl-ether Propane, 2 methoxy-2-methyl-	1634-04-4
					Cyclohexene	0.5-2.4	Benzene, hexahydro- Hexadydro benzene Hexamethylene	110-82-7
					Ethy benzene	1.2-1.4	NL	NL
1615	Bleach replenisher	50 gallons/month	182/month	1983	Ethylene diamine	NL	NL	NL
					Tetra acetic acid	NL	NL	NL
1615	Developer E-6AR	25 gallons/month	91/month	1983,1986	4-(N-Ethyl-N-2methane-sulfenylaminoethyl) 2-methyl-phenylene diamine sesqui-sulfate monohydrate	NL	NL	NL
					Water	80-85	NL	NL
1615	Replenisher developer	25 gallons/month	91/month	1986	Acetic acid	65-70	Acetic acid, glacial	64-19-7
					Water	30-35	NL	NL
1615	Replenisher developer	25 gallons/month	91/month	1983	NL	NL	NL	NL

CFR = Code of Federal Regulations.
NL = Not listed.



APPENDIX D

APPENDIX D

SUMMARY OF TITLE SEARCH

Table D-1. Summary of Title Search[a]
Page 1 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
A-1 - C. Connelly Survey	09-25-42	Fee
2 - Lots 26 and 27, Block 1, Edgewater	04-16-43	Fee
A-2 - C. Connelly Survey	09-25-42	Fee
A-3 - C. Connelly Survey	09-25-42	Fee
B-3 - J.B. Farmer Survey	06-15-25	Fee
	09-24-42	Fee
5 - Lots 17, 18, 19, 20, 21, 22, 23, 24, 24, Block 1, Edgewater	04-16-43	Fee
6 - Lot 16, Block 1, Edgewater	04-16-43	Fee
7 - Lots 9, 10, 11, 12, 13, 14, 15, Block 1, Edgewater	04-16-43	Fee
8 - All of Block 7, Edgewater	06-15-25	Fee
	04-16-43	Fee
9 - All of Lot 8, Block 1, Edgewater	06-15-25	Fee
	04-16-43	Fee
10 - Lots 6 and 7, Block 1, Edgewater	06-15-25	Fee
	04-16-43	Fee
11 - Lot 5, Block 1, Edgewater	06-15-25	Fee
	04-16-43	Fee
12 - Lots 1, 2, 3, 4, Block 1, Edgewater	06-15-25	Fee
	04-16-43	Fee
13 - J.B. Farmer	04-15-43	Fee
14 - Part of Lots 14, 15, Riverlake	08-10-37	Fee
	03-17-43	Fee
15 - Lot 13, Part of Lots 14, 15, Riverlake	06-19-28	Fee
	03-17-43	Fee
C-15 - Lots 1, 3, 14-17, Block 5, Edgewater	06-15-25	Fee
	09-24-42	Fee
C-16 - Lot 4, Block 5, Edgewater	06-26-42	Fee
C-17 - Lot 2, Block 5, Edgewater	09-24-42	Fee
C-18 - Lot 15, Block 5, Edgewater	09-24-42	Fee
	09-25-42	Fee
C-19 - Lots 3-4, to 12, Block 6, Edgewater	09-24-42	Fee
C-20 - Lots 1-2, Block 6, Edgewater	06-15-25	Fee
	06-26-42	Fee
C-21 - Lots 5-6, Block 3, Edgewater	08-25-42	Fee
	09-25-42	Fee
C-22 - Lot 7, Block 3, Edgewater	09-25-42	Fee
	09-25-42	Fee
C-23 - Lots 2-3, Block 3, Edgewater	09-25-42	Fee
C-24 - Lot 1, Block 3, Edgewater	12-03-41	Fee
	06-26-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 2 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
C-25 - Lot 13, Block 3, Edgewater	09-25-42	Fee
	09-25-42	Fee
C-26 - Lot 8, Block 3, Edgewater	06-26-42	Fee
C-27 - Lots 9, 10, 11, 12, Block 3, Edgewater	06-26-42	Fee
C-28 - S. 50' Lots 7-8, Block 4, Edgewater	09-25-42	Fee
	09-25-42	Fee
C-29 - N. 50' and S. 100' Lots 7-8, Block 4, Edgewater	09-28-42	Fee
	09-29-42	Fee
C-30 - Lots 1 to 6 and N. 150', Lot 7, Block 4, Edgewater	09-24-42	Fee
C-32 - Lot 21, Block 2, Edgewater	09-24-42	Fee
C-33 - Lot 8, Block 2, Edgewater	06-10-42	Fee
C-34 - Lot 7, Block 2, Edgewater	09-24-42	Fee
C-35 - Lot 6, Block 2, Edgewater	11-24-42	Fee
	11-24-42	Fee
C-36 - Lot 3, Block 2, Edgewater	09-24-42	Fee
C-37 - Lot 22, Block 2, Edgewater	07-28-42	Fee
Tract 16 - Lots 11-12, Riverlake	11-19-31	Fee
	03-18-43	Fee
Tract 17 - Lots 9-10, Riverlake	08-18-39	Fee
	02-07-30	Fee
	05-01-39	Fee
	03-04-43	Fee
Tract 18 - Lot 8, Riverlake	04-16-43	Fee
Tract 19 - Lots 5,6,7, Riverlake	03-17-43	Fee
	03-17-43	Fee
	03-17-43	Fee
Tract 20 - Lot 4, Riverlake	03-18-43	Fee
Tract 21 - Lot 3, Riverlake	06-13-39	Fee
	03-18-43	Fee
Tract 22 - Lot 2, Riverlake	03-17-43	Fee
	03-17-43	Fee
Tract 23 - East Part Lot 1, Riverlake	03-19-31	Fee
	04-16-43	Fee
Tract 24 - West Part Lot 1, Riverlake	03-19-31	Fee
	03-16-42	Fee
	03-18-43	Fee
Tract D-50 - in D. V. Farmer Survey	06-19-28	Fee
	06-24-42	Fee
Tract D-51 - W. 55', E. 150' Lot 7, Block 8, Timberlake	09-04-42	Fee
	09-04-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 3 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
Tract D-52 - W. 25' of E. 95', Lot 7, Block 8, Timberlake	02-16-39	Fee
	08-28-42	Fee
Tract 53 - W. 50', E. 70' Lot 7, Block 8, Timberlake	05-06-40	Fee
	06-26-42	Fee
Tract D-54 - Lot 8, Block 8, Timberlake	09-24-42	Fee
Tract D-55 - S. 20' of Lot 9, Block 8, Timberlake	01-05-38	Fee
	05-15-39	Fee
	09-05-42	Fee
Tract D-56 - Lot 10 and Lot 9 less 20' of Block 8, Timberlake Heights	09-24-42	Fee
Tract D-57 - E. 30' W. 60' Lots 11-12, Block 8, Timberlake	05-22-41	Fee
	06-26-42	Fee
Tract D-5B - E. 30' W. 90' Lots 11-12, Block 8, Timberlake	09-05-39	Fee
	09-04-42	Fee
Tract D-59 - W. 40.5' E. 160' Lots 11-12, Block 8, Timberlake	09-04-42	Fee
	09-04-42	Fee
Tract D-60 - E. 30' W. 120' Lots 11-12 Block 8 and	07-28-42	Fee
W. 30' E. 120' Lots 11-12, Block 8, Timberlake	09-24-42	Fee
Tract D-61 - E. 60' Lots 11-12, Block 8, Timberlake	11-07-41	Fee
	09-08-42	Fee
Tract D-62 - W. 1/2 Lot 1, Block 8, Timberlake	09-03-42	Fee
	09-03-42	Fee
Tract D-63 - E. 1/2 Lot 1, Block 8, Timberlake	09-04-42	Fee
	09-04-42	Fee
Tract D-64 - Lot 2, Block 8, Timberlake	09-02-42	Fee
	09-02-42	Fee
Tract D-65 Lot 3, Block 8, Timberlake	08-31-42	Fee
	08-31-42	Fee
Tract D-66 - N. 1/2 Lot 4, Block 8, Timberlake	06-26-42	Fee
Tract D-67 - S. 1/2 Lot 4, Block 8, Timberlake	09-26-42	Fee
	09-03-42	Fee
Tract D-68 - Lot 5, Block 8, Timberlake	09-08-42	Fee
	09-08-42	Fee
Tract D-69 - E. 20' of Lot 7, Block 8, Timberlake	07-08-38	Fee
	05-27-42	Fee
Tract D-70 S. 54.7' of N. 104.7' Lot 6, Block 8, Timberlake	09-19-42	Fee
	09-19-42	Fee
Tract D-71 - S. 100' of Lot 6, Block 8, Timberlake	09-08-42	Fee
	09-08-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 4 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
Tract D-72 - W. 46' of Lot 8, Block 7, Timberlake	09-10-42	Fee
Tract D-73 - W. 100.5' E. 125.5' Lot 8, Block 7, Timberlake	09-24-42	Fee
Tract D-74 E. 25' Lot 8, Block 7, Timberlake	08-21-39	Fee
	08-11-41	Fee
	09-08-42	Fee
Tract D-75 - Lot 7, Block 7, Timberlake	08-28-42	Fee
	08-28-42	Fee
Tract D-76 - Lot 6, Block 7, Timberlake	02-26-39	Fee
	07-04-42	Fee
	08-24-42	Fee
	08-24-42	Fee
Tract D-77 - S. 50' of Lot 5, Block 7, Timberlake	04-14-41	Fee
	02-20-42	Fee
	08-31-42	Fee
Tract D-78 - S. 25' of N. 50' of Lot 5, Block 7, Timberlake	04-18-38	Fee
	08-28-42	Fee
	11-23-42	
Tract D-79 - N. 25' of Lot 5, Block 7, Timberlake	05-09-38	Fee
	09-09-42	Fee
Tract D-80 - S. 25' of Lot 4, Block 7, Timberlake	12-08-37	Fee
	08-27-42	Fee
Tract D-81 - S. 50' N. 75' of Lot 4, Block 7, Timberlake	03-24-38	Fee
	07-17-42	Fee
	07-18-42	Fee
	09-05-42	Fee
Tract D-84 - N. 25' Lot 4, Block 7, Timberlake	01-17-38	Fee
	09-05-42	Fee
Tract D-85 - Lot 3, Block 7, Timberlake	04-04-39	Fee
	09-03-42	Fee
Tract D-86 - S. 60' of Lot 2, Block 7, Timberlake	09-10-42	Fee
	09-12-42	Fee
Tract D-87 S. 25' of N. 40' of Lot 2, Block 7, Timberlake	11-15-38	Fee
	09-08-42	Fee
Tract D-88 N. 15' of Lot 2, Block 7, Timberlake	09-30-38	Fee
	09-42	Fee
Tract D-89 - Lot 1, Block 7, Timberlake	07-22-42	Fee
	08-27-42	Fee
Tract D-90 - N. 96' of Lot 16, Block 7, Timberlake	08-26-42	Fee
Tract D-91 - S. 50.4' of Lot 16, Block 7, Timberlake	09-02-42	Fee
	09-02-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 5 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
Tract D-92 - Lot 15, Block 7, Timberlake	08-31-42	Fee
	08-31-42	Fee
	08-31-42	Fee
Tract D-93 - S. 1/2 Lot 13, N. 1/2 Lot 14, Block 7, Timberlake	09-24-42	Fee
Tract D-94 - S. 1/2 Lot 14, Block 7, Timberlake	02-17-42	Fee
	08-29-42	Fee
Tract D-95 - N. 1/2 Lot 13, Block 7, Timberlake	01-24-41	Fee
	08-31-42	Fee
Tract D-96 - N. 1/2 Lot 12, Block 7, Timberlake	09-24-42	Fee
Tract D-97 - S. 1/2 Lot 12, Block 7, Timberlake	02-01-41	Fee
	12-06-41	
	09-26-42	
Tract D-98 - N. 1/2 of Lot 11, Block 7, Timberlake	08-26-42	Fee
	08-26-42	Fee
Tract D-99 - Lot 10 and S. 1/2 of Lot 11, Block 7, Timberlake	08-31-42	Fee
	09-12-42	Fee
Tract D-100 - Lot 9, Block 7, Timberlake	08-25-42	Fee
	08-25-42	Fee
Tract D-101 - Lot 11, Block 3, Timberlake	09-08-42	Fee
	09-08-42	Fee
Tract E-102 - S. 1/2 Lot 12, Block 3, Timberlake	09-24-42	Fee
Tract E-103 - N. 1/2 Lot 12, Block 3, Timberlake	06-03-42	Fee
	06-26-42	Fee
Tract E-104 - Lot 13, Block 3, Timberlake	09-24-42	Fee
Tract E-105 - N. 20' of Lot 14, Block 3, Timberlake	05-19-41	Fee
	06-26-42	Fee
Tract E-106 - Lot 15, Block 3, Timberlake	09-04-42	Fee
Tract E-115 - N. 1/2 of Lot 6, Block 3, Timberlake	05-27-41	Fee
	12-06-41	Fee
	09-04-42	Fee
Tract E-116 - S. 1/2 Lot 6, Block 3, Timberlake	08-27-42	Fee
	08-27-42	Fee
Tract E-117 - Lot 7, Block 3, Timberlake	08-27-42	Fee
	08-27-42	Fee
Tract E-118 - N. 1/2 of Lot 8, Block 3, Timberlake	09-03-42	Fee
	10-29-42	Fee
Tract E-119 - S. 1/2 of Lot 8, Block 3, Timberlake	04-24-42	Fee
	09-03-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 6 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
Tract E-120 - Lot 10, Block 3, Timberlake	08-25-42	Fee
	08-25-42	Fee
Tract E-121 - Lot 10, Block 4, Timberlake	09-11-42	Fee
	09-11-42	Fee
Tract E-122 - Lot 9, Block 4, Timberlake	09-08-42	Fee
	09-08-42	Fee
Tract E-123 - Lot 8, Block 4, Timberlake	10-28-41	Fee
	08-28-42	Fee
Tract E-124 - Lot 7, Block 4, Timberlake	08-27-42	Fee
	08-27-42	Fee
Tract E-125 - Lot 6, Block 4, Timberlake	09-06-41	Fee
	09-01-42	Fee
	09-01-42	Fee
Tract E-138 - N. 1/2 of Lot 15, Block 4, Timberlake	06-17-41	Fee
	09-23-42	Fee
Tract E-139 - S. 1/2 Lot 15, Block 4, Timberlake	09-24-42	Fee
Tract E-140 - Lot 14, Block 4, Timberlake	08-22-40	Fee
	12-18-41	Fee
	09-05-42	Fee
Tract E-141 - Lot 13, Block 4, Timberlake	08-28-42	Fee
	08-28-42	Fee
Tract E-142 - N. 1/2 of Lot 12, Block 4, Timberlake	12-17-40	Fee
	08-28-42	Fee
Tract E-143 - Lot 11 and S. 1/2 of Lot 12, Block 4, Timberlake	08-29-42	Fee
	08-29-42	Fee
Tract E-107 - Lot 16 and S. 1/2 of Lot 17, Block 3, Timberlake	08-27-42	Fee
	08-27-42	Fee
Tract E-108 - N. 1/2 of Lot 17, Block 3, Timberlake	09-24-42	Fee
Tract E-109 - Lot 3, Block 3, Timberlake	03-31-38	Fee
	09-03-42	Fee
Tract E-110 - Lot 2, Block 3, Timberlake	08-31-42	Fee
	09-02-42	Fee
Tract E-111 - Lot 20, Block 3, Timberlake	06-26-42	Fee
Tract E-112 - Lot 1, Block 3, Timberlake	09-01-42	Fee
	09-01-42	Fee
Tract E-113 - Lot 4, Block 3, Timberlake	08-29-42	Fee
	08-29-42	Fee
Tract E-114 - Lot 5, Block 3, Timberlake	11-15-38	Fee
	09-02-42	Fee
Tract E-126 - Lot 5, Block 4, Timberlake	09-01-42	Fee
	09-01-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 7 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
Tract E-127 - Lot 4, Block 4, Timberlake	08-15-38	Fee
	09-02-42	Fee
Tract E-128 - Lot 3, Block 4, Timberlake	09-04-42	Fee
	09-08-42	Fee
Tract E-129 - Lot 2, Block 4, Timberlake	08-25-42	Fee
	08-25-42	Fee
Tract E-130 - Lot 1, Block 4, Timberlake	06-26-42	Fee
Tract E-131 - Lot 20, Block 4, Timberlake	08-28-42	Fee
	08-29-42	Fee
Tract E-132 - Lot 19, Block 4, Timberlake	01-18-41	Fee
	09-02-42	Fee
Tract E-133 - N. 1/2 Lot 18, Block 4, Timberlake	08-31-42	Fee
	08-31-42	Fee
Tract E-134 - S. 1/2 Lot 18, Block 4, Timberlake	09-10-42	Fee
	09-26-42	Fee
Tract E-135 - Lot 17, Block 4, Timberlake	02-15-38	Fee
	03-15-39	Fee
	06-17-42	Fee
	09-09-42	Fee
Tract E-136 - N. 1/2 Lot 16, Block 4, Timberlake	09-04-41	Fee
	08-25-42	Fee
Tract E-137 - S. 1/2 Lot 16, Block 4, Timberlake	02-21-41	Fee
	08-27-42	Fee
Tract E-144 - Lot 7, Block 5, Timberlake	08-25-42	Fee
	08-25-42	Fee
Tract E-145 - Lot 6, Block 5, Timberlake	11-10-39	Fee
	08-25-42	Fee
Tract E-146 - S. 1/2 Lot 5, Block 5, Timberlake	12-04-39	Fee
	09-02-42	Fee
Tract E-147 - N. 1/2 Lot 5, Block 5, Timberlake	08-28-42	Fee
	08-28-42	Fee
Tract E-148 - S. 1/2 Lot 4, Block 5, Timberlake	09-04-42	Fee
	09-04-42	Fee
Tract E-149 - N. 1/2 Lot 4, Block 5, Timberlake	09-01-42	Fee
	09-01-42	Fee
Tract E-150 - Lot 3, Block 5, Timberlake	06-26-42	Fee
Tract E-151 - S. 1/2 Lot 2, Block 5, Timberlake	06-26-42	Fee
Tract E-152 - N. 1/2 Lot 2, Block 5, Timberlake	08-31-42	Fee
	09-08-42	Fee
Tract E-153 - Lot 1, Block 5, Timberlake	08-28-42	Fee
	08-28-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 8 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
Tract E-154 - Lot 13, Block 5, Timberlake	09-24-42	Fee
Tract E-155 - N. 50' of Lot 2, Block 5, Timberlake	05-07-38	Fee
	07-06-38	Fee
	08-03-38	Fee
	08-28-42	Fee
Tract E-156 - S. 1/2 Lot 12, Block 5, Timberlake	11-13-41	Fee
	06-26-42	Fee
Tract E-157 - N. 1/2 of Lot 11, Block 5, Timberlake	04-24-42	Fee
	08-28-42	Fee
Tract E-158 - S. 1/2 Lot 11, Block 5, Timberlake	09-08-42	Fee
	09-08-42	Fee
Tract E-159 - N. 50' Lot 10, Block 5, Timberlake	05-31-40	Fee
	01-09-43	Fee
Tract E-160 - S. 1/2 Lot 10, Block 5, Timberlake	06-19-40	Fee
	08-28-42	Fee
Tract E-161 - N. 1/2 Lot 9, Block 5, Timberlake	01-26-39	Fee
	09-01-42	Fee
Tract E-162 - S. 1/2 Lot 9, Block 5, Timberlake	05-12-42	Fee
	09-01-42	Fee
Tract E-163 - W. 128' Lot 8, Block 5, Timberlake	08-31-42	Fee
	09-09-42	Fee
Tract E-164 - E. 128' Lot 8, Block 5, Timberlake	06-26-42	Fee
Tract E-165 - W. 105.2' Lot 3, Block 6, Timberlake	09-16-42	Fee
	10-01-42	Fee
Tract E-166 - E. 105.8' Lot 3, 5-6, Block 6, Timberlake	06-26-42	Fee
Tract E-167 - Lots 1-2, Block 6, Timberlake	09-24-42	Fee
Tract E-168 - D. V. Farmer	09-05-42	Fee
	09-05-42	Fee
	09-23-42	Fee
Tract E-169 - Lots 5-6, Block 6, Timberlake	06-26-42	Fee
Tract E-170 - Lot 4, Block 6, Timberlake	08-26-42	Fee
	08-26-42	Fee
Tract F-171 - Lot 13, Block 2, Timberlake	08-27-42	Fee
	08-27-42	Fee
Tract F-172 - S. 1/2 Lot 14, Block 2, Timberlake	09-24-42	Fee
Tract F-173 - S. 50' of Lot 15, N. 1/2 Lot 14, Block 2, Timberlake	08-28-42	Fee
	09-05-42	Fee
Tract F-174 - N. 50' Lot 15, Block 2, Timberlake	03-09-42	Fee
	09-01-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 9 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
Tract F-175 - Lot 17, Block 2, Timberlake	09-24-42	Fee
Tract F-176 - S. 1/2 Lot 20, Block 2, Timberlake	08-28-42	Fee
	08-28-42	Fee
Tract F-177 - N. 50' Lot 20, Block 2, Timberlake	09-03-42	Fee
	09-03-42	Fee
Tract F-178 - S. 1/2 Lot 21, Block 2, Timberlake	09-24-42	Fee
Tract F-179 - N. 1/2 Lot 21, Block 2, Timberlake	08-10-40	Fee
	06-26-42	Fee
Tract F-180 - S. 1/2 Lot 22, Block 2, Timberlake	09-24-42	Fee
Tract F-181 - N. 1/2 Lot 22, Block 2, Timberlake	01-31-40	Fee
	06-26-42	Fee
Tract F-182 - Lot 23, Block 2, Timberlake	09-24-42	Fee
Tract F-183 - W. 64' E. 147' Lots 1-2, Block 2, Timberlake	08-26-42	Fee
	08-26-42	Fee
Tract F-184 - E. 83' Lots 1-2, Block 2, Timberlake	06-26-42	Fee
Tract F-185 - N. 1/2 Lot 3, Block 2, Timberlake	06-26-42	Fee
Tract F-186 - S. 1/2 Lot 3, Block 2, Timberlake	01-08-41	Fee
	08-27-42	Fee
Tract F-187 - Lot 4, Block 2, Timberlake	08-31-42	Fee
	08-31-42	Fee
Tract F-188 - N. 1/2 Lot 5, Block 2, Timberlake	09-01-42	Fee
	09-01-42	Fee
Tract F-189 - S. 1/2 Lot 5, Block 2, Timberlake	06-26-42	Fee
Tract F-190 - N. 1/2 Lot 6, Block 2, Timberlake	03-26-42	Fee
	09-04-42	Fee
Tract F-191 - S. 1/2 of Lot 6, Block 2, Timberlake	01-08-42	Fee
	08-26-42	Fee
Tract F-192 - N. 1/2 of Lot 7, Block 2, Timberlake	06-26-42	Fee
Tract F-193 - S. 1/2 of Lot 7, Block 2, Timberlake	04-06-38	Fee
	12-13-39	Fee
	10-10-40	Fee
	08-31-42	Fee
Tract F-194 - N. 1/2 Lot 8, Block 2, Timberlake	06-26-42	Fee
Tract F-195 - S. 1/2 Lot 8, Block 2, Timberlake	09-01-42	Fee
	09-01-42	Fee
Tract F-196 - Lot 9, Block 2, Timberlake	02-21-42	Fee
	09-05-42	Fee
Tract F-197 - N. 50' Lot 10, Block 2, Timberlake	04-10-42	Fee
	08-29-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 10 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
Tract F-198 - S. 50' Lot 10, Block 2, Timberlake	09-01-42	Fee
	09-01-42	Fee
Tract F-199 - N. 1/2 Lot 11, Block 2, Timberlake	07-24-41	Fee
	08-26-42	Fee
Tract F-200 - S. 1/2 Lot 11, Block 2, Timberlake	09-01-42	Fee
	09-18-42	Fee
Tract F-201 - W. 1/2 Lot 12, Block 2, Timberlake	07-28-42	Fee
Tract F-202 - E. 1/2 Lot 12, Block 2, Timberlake	08-28-42	Fee
	08-28-42	Fee
Tract F-203 - Lot 12, Block 1, Timberlake	06-26-42	Fee
Tract F-204 - Lot 11, Block 1, Timberlake	09-01-42	Fee
	09-02-42	Fee
Tract F-205 - Lot 10, Block 1, Timberlake	08-29-42	Fee
	08-29-42	Fee
Tract F-206 - S. 1/2 Lot 9, Block 1, Timberlake	12-13-40	Fee
	08-25-42	Fee
Tract F-207 - Lot 8 and N. 1/2 Lot 9, Block 1, Timberlake	08-25-42	Fee
	08-25-42	Fee
Tract F-208 - Lot 7, Block 1, Timberlake	04-14-42	Fee
	08-26-42	Fee
Tract F-209 - S. 50' of Lot 6, Block 1, Timberlake	08-29-41	Fee
	08-31-42	Fee
	08-31-42	Fee
Tract F-210 - N. 50' of Lot 6, Block 1, Timberlake	01-26-38	Fee
	10-20-42	Fee
Tract F-211 - Lot 5, Block 1, Timberlake	08-29-42	Fee
	08-29-42	Fee
Tract F-212 - S. 50' of Lot 4, Block 1, Timberlake	04-25-38	Fee
	06-26-42	Fee
Tract F-213 - N. 50' of Lot 4, Block 1, Timberlake	08-31-42	Fee
	09-02-42	Fee
Tract F-214 - Lot 3, Block 1, Timberlake	09-01-42	Fee
	09-01-42	Fee
Tract F-215 - W. 77' Lot 2, Block 1, Timberlake	06-26-42	Fee
Tract F-216 - W. 180' Lot 23 and 24, Block 1, Timberlake	09-24-42	Fee
Tract F-217 - E. 77' Lots 23 and 24, Block 1, Timberlake	09-24-42	Fee
Tract F-218 - Lot 22, N. 1/2 Lot 21, Block 1, Timberlake	08-31-42	Fee
	08-31-42	Fee
Tract F-219 - S. 1/2 Lot 21, Block 1, Timberlake	08-31-42	Fee
	08-31-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 11 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
Tract F-220 - N. 1/2 Lot 20, Block 1, Timberlake	08-31-42	Fee
	08-31-42	Fee
Tract F-221 - S. 1/2 Lot 20, Block 1, Timberlake	09-01-42	Fee
	09-01-42	Fee
Tract F-222 - N. 1/2 of Lot 19, Block 1, Timberlake	09-24-42	Fee
Tract F-223 - N. 1/2 of Lot 18, S. 1/2 Lot 19, Block 1, Timberlake	09-02-42	Fee
	09-02-42	Fee
Tract F-224 - S. 1/2 Lot 18, Block 1, Timberlake	07-16-41	Fee
	11-28-41	Fee
	09-04-42	Fee
Tract F-225 - N. 1/2 Lot 17, Block 1, Timberlake	06-26-42	Fee
Tract F-226 - S. 1/2 Lot 17, Block 1, Timberlake	05-26-42	Fee
	08-25-42	Fee
Tract F-227 - Lot 16, Block 1, Timberlake	09-03-42	Fee
	09-03-42	Fee
Tract F-228 - Lot 15, Block 1, Timberlake	09-02-42	Fee
	09-02-42	Fee
Tract F-229 - N. 1/2 Lot 14, Block 1, Timberlake	05-26-42	Fee
	08-25-42	Fee
Tract F-230 - S. 1/2 Lot 14, Block 1, Timberlake	09-03-42	Fee
	09-03-42	Fee
Tract F-231 - Lot 13, Block 1, Timberlake	09-08-42	Fee
	09-08-42	Fee
E. 180' Lot 2, Block 1, Timberlake	09-24-42	Fee
E. 180' Lot 1, Block 1, Timberlake	09-24-42	Fee
W. 128' Lots 1-2, Block 2, Timberlake	05-24-37	Fee
	09-24-42	Fee
Lot 16, Block 2, Timberlake	05-24-37	Fee
	09-24-42	Fee
Lot 19, Block 2, Timberlake	05-24-37	Fee
	09-24-42	Fee
Lots 1, 2, 3, Block 9, Timberlake	06-15-25	Fee
	09-24-42	Fee
Lots 1 to 15, Block 10, Timberlake	06-15-25	Fee
	09-24-42	Fee
Lots 1 to 17, Block 11, Timberlake	06-15-25	Fee
	09-24-42	Fee
Lots 1 to 18, Block 12, Timberlake	06-15-25	Fee
	09-24-42	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 12 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
Lots 1 to 19, Block 13, Timberlake	06-15-25	Fee
	09-24-42	Fee
Lots 1 to 21, Block 14, Timberlake	06-15-25	Fee
	09-24-42	Fee
Tract F-232 - D. V. Farmer	08-24-42	Fee
	09-05-42	Fee
Tract F-233 - D. V. Farmer	08-05-42	Fee
	08-31-42	Fee
Tract F-234 - D. V. Farmer	08-05-42	Fee
	08-27-42	Fee
Tract F-235 - D. V. Farmer	08-01-42	Fee
	09-02-42	Fee
Tract F-236 - D. V. Farmer	08-01-42	Fee
	09-02-42	Fee
Tract F-237 - D. V. Farmer	08-27-42	Fee
	08-28-42	Fee
Tract F-238 - D. V. Farmer	08-01-42	Fee
	08-27-42	Fee
Tract F-239 - D. V. Farmer	08-27-42	Fee
	08-29-42	Fee
Tract F-240 - D. V. Farmer	08-05-42	Fee
	08-31-42	Fee
Tract F-241 - D. V. Farmer	06-26-42	Fee
	08-19-42	Fee
Tract F-242 - D. V. Farmer	11-17-41	Fee
	08-27-42	Fee
Tract F-243 - D. V. Farmer	08-01-42	Fee
	09-10-42	Fee
Tract F-244 - D. V. Farmer	08-05-42	Fee
	09-09-42	Fee
Tract F-245 - D. V. Farmer	08-01-42	Fee
	08-28-42	Fee
Tract F-246 - D. V. Farmer	08-01-42	Fee
	08-27-42	Fee
Tract F-247 - D. V. Farmer	08-01-42	Fee
	08-27-42	Fee
1 - Daniel McVean Survey	09-10-41	Fee
	09-24-41	Fee
RT-1 - Crawford Brown Survey	07-30-51	Fee
FH-1 - Shreeve Survey	06-12-34	Fee
	05-31-44	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 13 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
HL-1 - Lease	No Data	No Data
FH-2 - Shreeve Survey	06-11-37	Fee
	12-10-45	Fee
HL-2 - Lease	No Data	No Data
FH-3 - Shreeve Survey	02-28-47	Fee
HL-3 - Basques Tract	No Data	No Data
FH-4 - Shreeve Survey	02-12-38	Fee
	10-13-41	Fee
	01-19-42	Fee
	05-27-43	Fee
	08-10-41	Fee
	02-25-47	Fee
HL-4 - Lease, Basques Tract	No Data	No Data
FH-5 - Shreeve Survey	03-20-37	Fee
	02-28-47	Fee
HL-5 - Hagood Tract	No Data	No Data
FH-6 - Shreeve Survey	03-20-37	Fee
	08-28-39	Fee
	02-26-47	Fee
HL-6 - Lease, Hagood Tract	No Data	No Data
HL-7 - Lease, Covington Addition	No Data	No Data
FH-8 - Simpson Survey	02-28-47	Fee
HL-8 - Lease, Covington Addition	No Data	No Data
FH-9 - Shreeve Survey	06-30-32	Fee
	02-28-47	Fee
HL-9 - Lease, J. Rogers Addition	No Data	No Data
HL-10 - Lease, Jas. Cambo Addition	No Data	No Data
HL-11 - Lease, GH & BH RR Co.	No Data	No Data
HL-12 - Lease, J. H. Bursey Addition	No Data	No Data
HL-13 - Lease, C. Donaldson Addition	No Data	No Data
HL-14 - Lease, Van Nurdstrand Tract	No Data	No Data
25 - C. Connelly Survey	05-15-30	Fee
	04-06-43	Fee
26 - C. Connelly Survey	Date Unknown	Fee
	02-08-43	
		Fee
27 - Spur Track	04-26-43	Fee
28 - John Collet Survey	12-30-35	Fee
	04-07-43	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 14 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
29 - Portion of J. F. Elliott Survey	04-16-43	Fee
30 - C. Connelly Survey	03-11-43	Fee
31 - John Collett Survey	03-11-43	Fee
G-248 - Lease, City of Fort Worth	No Data	No Data
G-249 - Shacklett Survey	06-15-39	Fee
	06-16-42	Fee
	06-24-42	Fee
G-250 - Shacklett Survey	06-15-39	Fee
	01-03-40	Fee
	06-11-41	Fee
	06-16-42	Fee
	09-10-42	Fee
G-251 - Shacklett Survey	06-11-41	Fee
	09-16-42	Fee
G-252 - Shacklett Survey	04-19-40	Fee
	09-18-42	Fee
	09-18-42	Fee
	09-19-42	Fee
254 - Lake Worth Park/Shacklett Survey	12-14-45	Fee
256 - Lake Worth	No Data	No Data
256 - 1 - Lake Worth	No Data	No Data
257 - Crawford Brown Survey	12-14-45	Fee
258 - Lease, Yarbrough Survey	07-12-17	Fee
	No Subsequent Data	No Subsequent Data
A-100 - Shreeve Survey	07-03-1879	Fee
	11-13-52	Fee
A-101 - Shreeve Survey	10-25-35	Fee
	05-31-48	Fee
	11-27-48	Fee
	12-09-52	Fee
	11-08-54	Fee
A-102 - Shreeve Survey	12-14-33	Fee
	09-19-46	Fee
	05-27-53	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 15 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
A-103 - Shreeve Survey	11-26-35	Fee
	06-17-37	Fee
	02-05-40	Fee
	04-17-45	Fee
	09-10-45	Fee
	03-20-53	Fee
A-104 - Shreeve Survey	10-12-21	Fee
	03-20-53	Fee
A-105 - Shreeve Survey	03-12-45	Fee
	02-06-46	Fee
	02-17-53	Fee
A-106 - Shreeve Survey	04-02-37	Fee
	03-31-45	Fee
	02-23-46	Fee
	03-20-53	Fee
	12-11-53	Fee
A-107 - Shreeve Survey	04-22-37	Fee
	12-01-44	Fee
	03-31-45	Fee
	02-17-53	Fee
A-108 - Simpson Survey	07-28-24	Fee
	01-22-53	Fee
A-109 - Simpson/Collett Surveys	1885	Fee
	02-21-41	Fee
	12-09-52	Fee
A-110 - Simpson/Shreeve Surveys	12-09-52	Fee
A-111 - Collett Survey	07-12-41	Fee
	12-17-55	Fee
A-112 - Collett Survey	06-25-26	Fee
	01-02-42	Fee
	09-10-53	Fee
A-113 - Collett Survey	03-03-53	Fee
A-114 - Collett/Simpson Surveys	02-21-41	Fee
	12-09-52	Fee
A-115 - Collet/Simpson Surveys	02-21-41	Fee
	06-15-53	Fee
A-116 - Collett Survey	08-14-33	Fee
	03-20-53	Fee
A-117 - Lot 5, Block 13, Altadena Heights	07-07-47	Fee
	05-04-48	Fee
	03-20-53	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 16 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
A-118 - Lot 4, Block 13, Altadena Heights	05-04-48	Fee
	05-15-50	Fee
	03-20-53	Fee
A-119 - Lot 2, Block 13, Altadena Heights	05-04-48	Fee
	03-20-53	Fee
A-120 - Collett Survey	09-11-51	Fee
	04-10-53	Fee
A-121 - Lot 12, Block 19, Altadena Heights	06-10-52	Fee
	03-20-53	Fee
A-122 - Lots 3-4, Block 14, Altadena Heights	04-20-51	Fee
	03-13-53	Fee
A-123 - Lots 8-9, Block C, Altadena Heights	04-06-51	Fee
	03-12-53	Fee
A-124 - Lot 10, Block C, Altadena Heights	09-04-51	Fee
	11-07-53	Fee
A-125 - Lots 6-7, Block C, Altadena Heights	04-23-51	Fee
	04-09-53	Fee
A-126 - Lot 5, Block C, Altadena Heights	04-26-51	Fee
	06-04-52	Fee
	01-07-54	Fee
A-127 - Lots 3-4, Block C, Altadena Heights	12-10-49	Fee
	07-01-53	Fee
A-128 - Lots 11-12, Altadena Heights	12-01-48	Fee
	05-01-51	Fee
	12-19-51	Fee
	05-06-53	Fee
A-129 - Lot 13, Block B, Altadena Heights	08-31-53	Fee
	11-09-53	Fee
A-130 - Lots 14-15, Block B, Altadena Heights	06-18-51	Fee
	11-03-53	Fee
A-131 - Lot 16, Block B, Altadena Heights	02-16-51	Fee
	09-08-53	Fee
A-132 - Lot 4, Block B, Altadena Heights	09-06-53	Fee
	09-06-53	Fee
	11-10-53	Fee
A-133 - Lot 5, Block B, Altadena Heights	01-15-51	Fee
	10-05-53	Fee
A-134 - Lot 6, Block B, Altadena Heights	02-10-51	Fee
	10-31-53	Fee
A-135 - Lot 8, Block B, Altadena Heights	06-24-50	Fee
	11-05-53	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 17 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
A-136 - Lots 9-10, Block B, Altadena Heights	03-28-49	Fee
	05-29-50	Fee
	02-06-54	Fee
A-137 - Altadena Heights/Collett Survey	06-30-55	Fee
A-138 - Collett Survey	10-30-53	Fee
A-139 - Collett Survey	04-07-53	Fee
A-140 - Collett Survey	Prior to 1949	Fee
	11-18-49	
	04-24-53	Fee
		Fee
A-141 - Collett Survey	08-06-52	Fee
	10-23-53	Fee
A-142 - Collett Survey	01-18-46	Fee
	04-30-51	Fee
	10-30-53	Fee
A-143 - Collett Survey	11-17-47	Fee
	02-04-49	Fee
	05-07-53	Fee
A-144 - Collett Survey	03-20-53	Fee
A-145 - Collett Survey	04-02-53	Fee
A-146 - Collett Survey	06-25-26	Fee
	09-10-53	Fee
A-147 - Collett Survey	11-12-51	Fee
	09-04-53	Fee
A-148 - Lots 16-17, Altadena Heights	05-05-51	Fee
	09-39-53	Fee
A-149 - Lot 1, Block A, Altadena Heights	01-15-49	Fee
	04-24-53	Fee
A-150 - Lot 2, Block A, Altadena Heights	05-15-50	Fee
	02-06-54	Fee
A-151 - Lot 3, Block A, Altadena Heights	03-21-50	Fee
	11-05-53	Fee
A-152 - Lot 4, Block A, Altadena Heights	05-12-49	Fee
	10-21-53	Fee
A-153 - Lot 5, Block A, Altadena Heights	08-27-49	Fee
	11-09-53	Fee
A-154 - Lot 6, Block A, Altadena Heights	08-27-49	Fee
	10-16-53	Fee
A-155 - Lots 7-8, Block A, Altadena Heights	09-25-50	Fee
	10-30-53	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

Table D-1. Summary of Title Search[a]
Page 18 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
A-156 - Lot 9, Block A, Altadena Heights	04-16-51	Fee
	10-08-53	Fee
A-157 - Lot 10, Block A, Altadena Heights	03-14-51	Fee
	07-02-52	Fee
	03-05-53	Fee
A-158 - Block 11, Lot A, Altadena Heights	03-24-51	Fee
	12-06-51	Fee
	05-13-53	Fee
A-159 - Collett Survey	04-14-47	Fee
	03-20-53	Fee
A-159-I - Collett	12-15-45	Fee
	05-26-52	Fee
	02-58	Fee
A-160 - Part of Lot 15, Block 6, Altadena Heights	08-27-53	Fee
A-161 - Collett Survey	09-09-49	Fee
	02-06-54	Fee
A-162 - Lots 17, 18, 19, Block 6, Altadena Heights	04-29-46	Fee
	03-07-49	Fee
	07-15-50	Fee
	08-11-50	Fee
	12-07-53	Fee
A-163 - Lots 16-17, Block 7, Altadena Heights	08-17-46	Fee
	06-27-50	Fee
	11-23-53	Fee
A-164 - Lot 19, Block 7, Altadena Heights	05-23-51	Fee
	05-06-53	Fee
A-165 - Lot 18, Block 7, Altadena Heights	07-21-50	Fee
	08-22-53	Fee
A-166 - Lot 17, Block 15, Altadena Heights	07-18-50	Fee
	10-29-53	Fee
A-167 - Collett Survey	12-03-93	Fee
A-167-E - Easement, Collett Survey	11-19-54	Easement
A-167-I - Collett	11-19-54	Easement
A-168 - Lot 1, Block 14, Altadena Heights	07-18-50	Fee
	06-10-53	Fee
A-169 - Lot 1, Block B, Altadena Heights	12-06-48	Fee
	02-24-51	Fee
	12-01-53	Fee
A-170 - Lots 12-134, Block C, Altadena Heights	07-21-50	Fee
	07-02-53	Fee

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

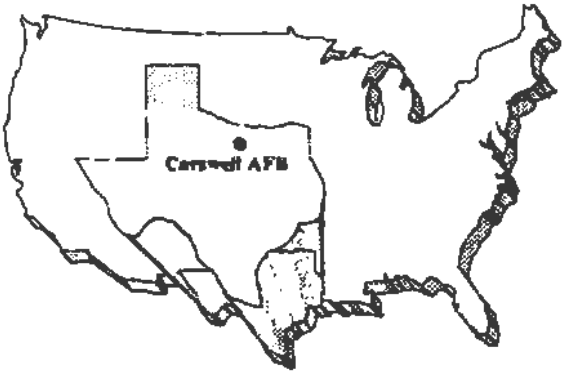
Table D-1. Summary of Title Search[a]
Page 19 of 19

Legal Description	Dates of Property Transfer[b]	Types of Transfer
A-171 - Lot 11, Block C, Altadena Heights	06-18-51	Fee
	05-13-53	Fee
A-172 - Lot 1, Block C, Altadena Heights	07-29-49	Fee
	05-06-53	Fee
A-173 - Lot 2, Block C, Altadena Heights	07-29-49	Fee
	03-11-53	Fee
A-174 - Lot 3, Block B, Altadena Heights	05-29-50	Fee
	10-26-53	Fee
A-175 - Lots 18-19, Block B, Altadena Heights	12-13-49	Fee
	03-17-52	Fee
	09-15-52	Fee
	10-20-53	Fee
A-176 - Lot 17, Altadena Heights	04-17-50	Fee
	05-16-53	Fee
A-177 - Lot 18, Part of Lot 19, Block 15, Altadena Heights	12-02-53	Fee
A-178 - Portion of Grant Lane, Collett	03-23-54	Fee
A-178-I - Portion of Grant Lane, Collett	02-17-58	Fee
A-179 - Collett Survey	03-20-53	Fee
A-180 - Collett Survey	03-20-53	Fee
A-181 - Shreeve/Collett Surveys	09-15-53	Fee
A-182 - John Collett Survey	12-02-53	Fee
A-183 - John Collett Survey	07-10-50	Fee
	12-02-53	Fee
A-184 - Collett Survey	02-58	Fee
A-184-E - Clearance Easement	01-06-55	Easement
A-185-E - Clearance Easement	01-06-55	Easement

Note: (a) A review of data obtained did not identify any areas of environmental concern related to past property usage.
(b) Dates given as month-day-year.

THIS PAGE INTENTIONALLY LEFT BLANK

217276



APPENDIX E

21722

APPENDIX E

HISTORY OF FACILITY USAGE

217275

HISTORY OF FACILITY USAGE

This appendix presents a summary of facilities where past activities may have required the storage of hazardous materials or the generation of hazardous waste, and which have undergone a change in use or have been demolished.

Facility 12-A was a Guard Security Tower. The facility was demolished in 1961.

Facility 230 was an Area Search Radar facility. This facility was demolished in 1970.

Facility 1025 was a technical lab. This facility was demolished in 1972.

Facility 274 and 275 were used as Youth Centers. These facilities were demolished in 1974.

Facility 1010 was a storage facility shop. This facility was demolished in 1983.

Facility 1028 was used as a shop. The facility was demolished in 1989.

Facility 1058 was a maintenance dock. This facility was demolished in 1965.

Facility 1103 was a multi-purpose shop that was disposed of in 1961. (Note: "Disposed of" refers to facilities removed, demolished, or moved to a new location. Real property records were not specific in stating the final disposition of a facility.)

Facility 1105 was used as a training aid facility. It was disposed of in 1961.

Facility 1105-A was used as a paint and dope storage facility. It was demolished in 1962.

Facility 1108 was used as an air base office. This facility was demolished in 1962.

Facility 1109-A was used as an exchange service outlet. This facility was demolished in 1962.

Facilities 1112 and 1113 were used as dormitories. These facilities were disposed of in 1959.

Facility 1114-A , 1114-E , 1114-H and 1114-K were pavement and ground facilities. These facilities were demolished in 1965.

Facility 1116-C was used as a maintenance shop. This facility was demolished in 1962.

Facility 1119-K was a loading platform. This facility was demolished in 1961.

Facilities 1114-B and D were used as supply facilities. They were disposed of in 1960.

Facility 1120-A was used as a commissary. The facility was disposed of in 1961.

Facility 1120-B was used as a shoe repair shop. It was disposed of in 1960.

Facility 1122-D was used as a supply and equipment base. This facility was demolished in 1962.

Facility 1128-A was used as an auto maintenance shop. This facility was demolished in 1962.

Facility 1125-F was used as a maintenance dock. The facility was disposed of in 1959.

Facility 1127-B was used as an administrative office. It was disposed of in 1961.

Facilities 1127-C and 1128-B were used as supply and equipment warehouses. They were disposed of in 1961.

Facility 1132 was used as an automotive maintenance shop. It was disposed of in 1960.

Facilities 1133-A and B were used as supply and equipment warehouses. These facilities were disposed of in 1959.

Facility 1133-J was used as an office and was disposed of in 1959.

Facility 1133-N and 1133-O were used as maintenance shops. These facilities were demolished in 1962.

Facility 1133-U was a general purpose shop. This facility was demolished in 1962.

Facility 1133-T was used as a supply and equipment warehouse. The facility was disposed of in 1959.

Facility 1134-A was used as an operations training facility. It was disposed of in 1959.

Facilities 1140, 1141, 1142, and 1143 were used as an automotive hobby shop. These facilities were demolished in 1988 and 1989.

Facility 1144 was used as a confinement facility. The facility was demolished in 1962.

Facility 1145 was used as a squadron headquarters. This facility was demolished in 1962.

Facilities 1148, 1149, 1150-B, 1151, 1155, 1156, and 1157 were used as dormitories. These facilities were disposed of in 1961.

Facility 1150-E was used as a maintenance dock. The facility was disposed of in 1959.

Facility 1152 was used as an administration office. This facility was demolished in 1962.

Facility 1154 was used for open storage and was demolished in 1986.

Facility 1158 and 1159 were used as education centers. These facilities were demolished in 1962 and 1963 respectively.

Facility 1160-A was a headquarters wing which was disposed of in 1960.

Facility 1161-B was used as a communication transmitter facility. This facility was demolished in 1962.

Facilities 1161-C and E were salvage warehouses. These facilities were disposed of in 1961.

Facilities 1161-E and 1162-E were maintenance docks which were disposed of in 1959.

Facility 1162 was used as an administration office. This facility was demolished in 1962.

Facility 1163 was used as a traffic check house. It was disposed of in 1960.

Facilities 1247 and 1248 were used as base package stores. These facilities were demolished in 1987.

Facility 1255 was used as a vehicle fuel station. It was demolished in 1990.

Facility 1257 was used as a supply and equipment warehouse. It was disposed of in 1962.

Facility 1373 was used for hazardous waste storage. The facility was demolished in 1988.

Facilities 1432 and 1434 were demolished in 1989. It is unknown what these facilities were used for.

Facility 1645 was used as a training facility and was demolished in 1989.

Facilities 1646 and 1647 were used as maintenance shops. These facilities were demolished in 1989.

Facility 2103 was used as an air base headquarters. This facility was demolished in 1963.

Facilities 2110 and 2111 were used as dormitories which were disposed of in 1960.

Facility 2111-C was used as a gymnasium. This facility was demolished in 1962.

Facility 2124-A was used as a supply and equipment warehouse. It was disposed of in 1961.

Facility 2125-B and 2125-C were used as storage facilities. These facilities were demolished in 1962.

Facility 2126 was used as a power equipment shop. This facility was demolished in 1962.

Facility 2128 was used as a squadron headquarters facility. It was disposed of in 1961.

Facility 2129 was used as a fire station. The facility was disposed of in 1961.

Facility 2130 was used as a supply and equipment base. This facility was demolished in 1962.

Facilities 2139, 2140, 2141, 2152, 2153, and 2159 were dormitories that were disposed of in 1960.

Facility 2142 was used as an office. This facility was demolished in 1962.

Facility 2154 was a dormitory that was disposed of in 1961.

Facility 2161-A and B was used as a supply and equipment warehouse. The facility was disposed of in 1962.

Facility 2163 was a squadron operations facility. It was disposed of in 1960.

Facilities 2166 and 2179 were dormitories. They were disposed of in 1960.

Facility 2196-B was the headquarters for Carswell AFB. It was disposed of in 1961.

Facilities 2220-E and F were supply and equipment sheds. These facilities were disposed of in 1960.

Facilities 2220-H, I, J, and K were used as maintenance docks. These facilities were disposed of in 1959.

Facilities 2221-C and D were used as electric shops. These facilities were disposed of in 1959.

Facilities 2221-F and K were used as supply and equipment warehouses. These facilities were disposed of in 1960.

Facility 2221-L was used as a lounge which was disposed of in 1960.

Facility 2221-Q was used as a cold storage facility which was disposed of in 1960.

Facility 2226 was a squadron operations facility that was disposed of in 1960.

Facility 2585 was a sanitary sewage pump station. The facility was demolished in 1988.

Facility 3101 was used as a traffic check house. The facility was demolished in 1988.

Facility 3112-D was used as a squadron operations facility. It was disposed of in 1960.

Facilities 3112-U and V, 3113, 3114, 3115, 3117, 3118, 3119, 3121, 3122, 3123, 3124, 3125, 3126, and 3127 were medical facilities and the hospital. All of these facilities were disposed of in 1960.

Facility 3116 was the commissary. It was disposed of in 1961.

Facility 3129 was a dormitory that was disposed of in 1960.

Facility 3134 was a base supply facility that was disposed of in 1960.

Facility 3135 was a clinic. It was disposed of in 1960.

Facility 3136 was used as an exchange sales store. The facility was disposed of in 1960.

Facility 3336 was used as a recreation facility and was demolished in 1990.

Facilities 4107 and 4129 were the squadron headquarters. They were disposed of in 1962.

Facility 4110 was used as a supply and equipment warehouse. The facility was disposed of in 1960.

Facilities 4111, 4112, and 4114 were administrative supply facilities. These facilities were disposed of in 1959 and 1960.

Facilities 4115, 4116, and 4117 were maintenance shops. These facilities were disposed of in

1959 and 1960.

Facility 4115 was demolished in 1991. It is unknown what the facility was used for.

Facility 4132 was the ammunition maintenance shop. It was disposed of in 1961.

Facility 4170 was used as a hydrant fuel station. The facility was demolished in 1993.

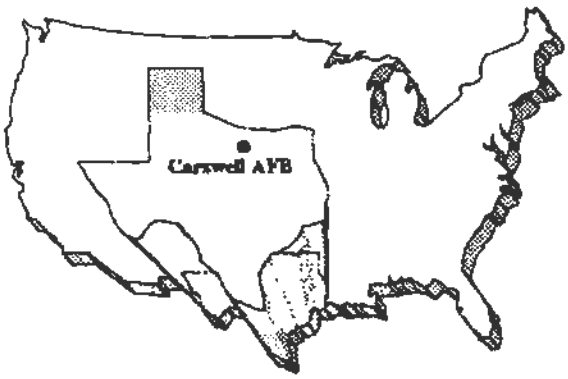
Facility 4183 was used as a traffic check house. It was demolished in 1988.

Facility 9519-A was used as a recreational workshop. The facility was disposed of in 1960.

Facilities 9526-B, E, and F were used as canine kennels. These facilities were disposed of in 1959 and 1960

THIS PAGE INTENTIONALLY LEFT BLANK

217264



APPENDIX F

APPENDIX F

HAZARDOUS WASTES GENERATED

Table F-1. Hazardous Waste Generation
Page 1 of 7

Facility	Type of Waste Generated	Years Generated	Amount Generated[a]
1015	Floor finish	1990-1992	2 gallons/month
	Hydraulic fluid	1990-1992	1 gallon/month
	JP-4	1990-1992	20 gallons/month
	Aircraft soap	1990-1992	1 gallon/month
	Engine gas path cleaner	1990-1992	2 gallons/month
	7808, 1010 Oil	1990-1992	5 gallons/month
1027	Aircraft soap	1991, 1992	55 gallons/month
	PD-680	1991, 1992	325 gallons/month
1048	Methyl ethyl ketone rags	1990-1992	Unknown
	PD-680	1990-1992	Unknown
	Isopropyl alcohol	1990-1992	Unknown
	Engine oil	1990-1992	Unknown
	Hydraulic fluid	1990-1992	Unknown
1050	PD-680	1990-1992	55 gallons/month
	Hydraulic fluid	1990-1992	0.25 gallon/month
	Lube oil	1990-1992	Unknown
	Citrikleen	1990-1992	Unknown
	Nickel/cadmium batteries	1992	Unknown
	Spill residue	1992	Unknown
1055	Freon/dump fluid	1991	Unknown
	PD-680	1990	Unknown
	PD-680	1991	9.2 gallons/month
1059	Methyl ethyl ketone	1991	Unknown
	Media bead waste	1991	Unknown
	Paint waste	1991	Unknown
	Cleaning compound	1991	Unknown
	Paint stripper	1991	Unknown
	Water soluble oil	1991	Unknown
	Speedy Dry	1991	Unknown
	Sand blaster waste	1991	Unknown
1060	Paint	1990-1992	50 gallons/month
	Hydrofluoric acid	1990-1992	0.125 gallon/month

(a) Information on amount of waste generated was not available for all entries.

Table F-1. Hazardous Waste Generation
Page 2 of 7

Facility	Type of Waste Generated	Years Generated	Amount Generated
1060 (Continued)	Alodine	1990-1992	10 gallons/month
	Paint remover	1990-1992	3 gallons/month
	Aircraft soap	1990-1992	10 gallons/month
	Surface stripper	1990-1992	3 gallons/month
	Methyl ethyl ketone	1990-1992	20 gallons/month
	Hot tank stripper	1990-1992	53.3 gallons/month
	Media bead waste	1991	Unknown
	Water soluble oil	1991	Unknown
1140	Safety Kleen	1990-1992	433.3 gallons/month
	Motor oil	1990-1992	250 gallons/month
	PD-680	1990-1992	55 gallons/month
1189	Potassium ferro cyanide	1990, 1991	Unknown
	Perchloroethylene	1990, 1991	Unknown
	Methylene chloride	1990, 1991	Unknown
1191	Paint and thinners	1990-1992	10 gallons/month
	Engine oil	1990-1992	150 gallons/month
	Safety Kleen	1990-1992	41.7 gallons/month
	Transmission and hydraulic fluid	1990-1992	50 gallons/month
	Antifreeze	1990-1992	50 gallons/month
	Battery acid	1990-1992	25 gallons/month
	Automotive fuel	1990-1992	20 gallons/month
	7808 Synthetic oil	1990-1992	Unknown
1194	Antifreeze	1990-1992	5.8 gallons/month
	PD-680	1990-1992	4.6 gallons/month
	Transmission fluid	1990-1992	2 gallons/month
	JP-4	1990-1992	416.7 gallons/month
	Engine oil	1990-1992	20 gallons/month
	Safety Kleen	1990-1992	25 gallons/month
	Aircraft soap	1990-1992	10 gallons/month
1215	Miscellaneous items	1992	Unknown
1250	Miscellaneous items	1991	Unknown
1251	Miscellaneous items	1990, 1992	Unknown

Table F-1. Hazardous Waste Generation
Page 3 of 7

Facility	Type of Waste Generated	Years Generated	Amount Generated
1320	Antifreeze	1990-1992	13 gallons/month
	Gas and diesel	1990-1992	9 gallons/month
	Battery acid	1990-1992	30 gallons/month
	7808 oil	1990-1992	13 gallons/month
	PD-680	1990-1992	9 gallons/month
	Transmission fluid	1990-1992	Unknown
1410	JP-4	1990-1992	15 gallons/month
	PD-680	1990-1992	30 gallons/month
	7808 oil	1990-1992	27 gallons/month
	Multi-Sheen	1990-1992	5 gallons/month
	Carbon remover	1990-1992	10 gallons/month
	Hydraulic fluid	1990-1992	2 gallons/month
	Safety-Kleen	1990-1992	31.7 gallons/month
	SE-377C	1990-1992	25 gallons/month
	Finger print remover	1992	Unknown
	Calibrating fluid	Unknown	Unknown
1413	Carbon remover	1991	Unknown
	JP-4	1991	Unknown
	PD-680	1991	Unknown
	7808 synthetic oil	1991	Unknown
	Finger print remover	1991	Unknown
	Safety-Kleen	1991	Unknown
1414	Antifreeze	1990-1992	80 gallons/month
	Gas, diesel, JP-4	1990-1992	165 gallons/month
	Citrikleen	1990-1992	55 gallons/month
	PD-680	1990-1992	80 gallons/month
	Hydraulic fluid	1990-1992	55 gallons/month
	Motor and synthetic oil	1990-1992	150 gallons/month
	Stop bath	1990-1992	5 gallons/month
	Emulsifier	1990-1992	18.3 gallons/month
	Fixer	1990-1992	5 gallons/month
	Developer	1990-1992	23.3 gallons/month
	Dye penetrant	1990-1992	18.3 gallons/month
	Mercury batteries	1992	Unknown

Table F-1. Hazardous Waste Generation
Page 4 of 7

Facility	Type of Waste Generated	Years Generated	Amount Generated
1415	Diesel	1991	Unknown
	Motor gasoline	1991	Unknown
	Paint waste	1991	Unknown
	PD-680	1991	Unknown
	Hydraulic fluid	1991	Unknown
	Antifreeze	1991	Unknown
	JP-4	1991	Unknown
	7808 synthetic oil	1991	Unknown
	Engine oil	1991	Unknown
1418	PD-680	1991, 1992	9.2 gallons/month
1420	PD-680	1990-1992	20 gallons/month
	Methyl ethyl ketone	1990-1992	0.04 gallon/month
	Soap	1990-1992	10 gallons/month
	Thinner	1990-1992	1.25 gallons/month
	Brake and hydraulic fluid	1990-1992	20 gallons/month
	7576 synthetic oil	1992	Unknown
	Cutting fluid	1992	Unknown
	Naphtha	1992	Unknown
	Lead-based paint	1992	Unknown
1425	Antifreeze	1990-1992	10 gallons/month
	Engine oil	1990-1992	40 gallons/month
	Hydraulic and transmission fluid	1990-1992	15 gallons/month
	Safety Kleen	1990-1992	7 gallons/month
1435	Diesel	1992	Unknown
	Motor gasoline	1992	Unknown
	Paint waste	1992	Unknown
	PD-680	1992	Unknown
	Hydraulic fluid	1992	Unknown
	Antifreeze	1992	Unknown
	JP-4	1992	Unknown
	7808 synthetic oil	1992	Unknown
	Engine oil	1992	Unknown

Table F-1. Hazardous Waste Generation
Page 5 of 7

Facility	Type of Waste Generated	Years Generated	Amount Generated
1436	Hydraulic fluid	1991	Unknown
	PD-680	1991	Unknown
	7808 synthetic oil	1991	Unknown
	Cutting fluid	1991	Unknown
	Naphtha	1991	Unknown
	Methyl ethyl ketone	1991	Unknown
	Lead-based paint	1991	Unknown
	Brake fluid	1991	Unknown
1602	PD-680	1990-1992	Unknown
	JP-4	1990, 1991	Unknown
	Hydraulic fluid	1990, 1991	Unknown
	Oil	1992	Unknown
	Epoxy thinner	1992	Unknown
	Lacquer thinner	1992	Unknown
	Methyl ethyl ketone	1992	Unknown
	Epoxy stripper	1992	Unknown
1615	Reverse bath	1990-1992	106.7 gallons/month
	Conditioner	1990-1992	106.7 gallons/month
	Fixer	1990-1992	106.7 gallons/month
	Bleach	1990-1992	106.7 gallons/month
	Stabilizer	1990-1992	106.7 gallons/month
	First developer	1990-1992	106.7 gallons/month
	Color developer	1990-1992	106.7 gallons/month
1617	Sodium persulfate etchant	1990-1992	4.6 gallons/month
	Solid paint waste, flammable	1990-1992	8.3 gallons/month
	Combustible gas (aerosol)	1990-1992	2.1 gallons/month
	DFD 12G developer	1990-1992	2.1 gallons/month
	Waste paint and thinners	1990-1992	12.5 gallons/month
1618	Sodium persulfate	1991	Unknown
	Solid paint waste	1991	Unknown

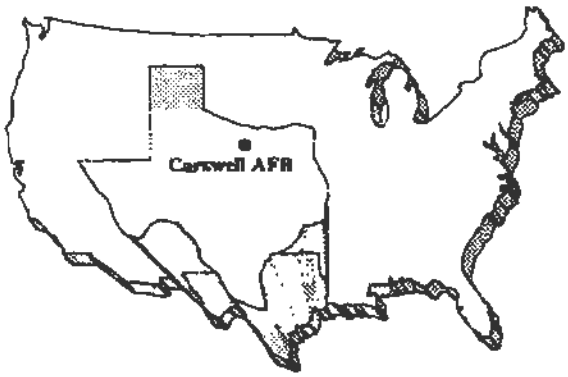
Table F-1. Hazardous Waste Generation
Page 6 of 7

Facility	Type of Waste Generated	Years Generated	Amount Generated
1618 (Continued)	Combustible gas	1991	Unknown
	DFD 12G developer	1991	Unknown
1628	Mean Green soap	1990-1992	55 gallons/month
	Battery acid	1990-1992	6 gallons/month
	Engine oil	1990-1992	55 gallons/month
	Methyl ethyl ketone	1990-1992	1 gallon/month
	PD-680	1990-1992	80 gallons/month
	Synthetic oil	1990-1992	41.7 gallons/month
	Antifreeze	1990-1992	5 gallons/month
	Hydraulic, transmission, and brake fluid	1990-1992	10 gallons/month
	Paint remover	1990-1992	9.2 gallons/month
	Paint and thinners	1990-1992	10 gallons/month
1643	Paint remover	1990-1992	8.3 gallons/month
	PD-680	1990-1992	98.3 gallons/month
	Mean Green soap	1990-1992	1 gallon/month
	Carbon remover	1990-1992	0.7 gallon/month
	JP-4	1990-1992	50 gallons/month
	Hydraulic fluid	1990-1992	16 gallons/month
	7808 synthetic oil	1991	Unknown
	Nickel/cadmium batteries	1992	Unknown
	Methyl ethyl ketone	Unknown	Unknown
	Poly thinner	Unknown	Unknown
3367	Paint waste	1991	Unknown
	Phosphoric acid	1991	Unknown
3369	Paint waste	1990	Unknown
	Phosphoric acid	1990	Unknown
4210	Alodine	1990, 1992	Unknown
	Methyl ethyl ketone	1990, 1992	Unknown
	Toluene	1990, 1992	Unknown
	Freon	1990, 1992	Unknown
	Hydraulic fluid	1990, 1992	Unknown
4213	Alodine	1991	Unknown
	Methyl ethyl ketone	1991	Unknown
	Toluene	1991	Unknown

Table F-1. Hazardous Waste Generation
Page 7 of 7

Facility	Type of Waste Generated	Years Generated	Amount Generated
	Freon	1991	Unknown
	Hydraulic fluid	1991	Unknown
4214	Paint waste	1991	Unknown
4215	Paint waste	1990	Unknown
8503	Paint waste	1990	Unknown
8512	Paint waste	1991	Unknown

THIS PAGE INTENTIONALLY LEFT BLANK



APPENDIX G

217233

APPENDIX G

GLOSSARY OF TERMS, ACRONYMS, AND ABBREVIATIONS

GLOSSARY OF TERMS, ACRONYMS, AND ABBREVIATIONS

GLOSSARY OF TERMS

Asbestos. A carcinogenic substance formerly used widely as an insulation material by the construction industry; often found in older buildings.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)(42 U.S.C. 9601 et seq.; and 26 U.S.C. 4611, 4612, 4622, 4671, and 4672). The federal law (P.L. 96-510) passed December 11, 1980, which provides a series of programs to address the cleanup of hazardous waste disposal and spill sites. It has been modified and amended several times, most significantly in 1986 by the Superfund Amendments and Reauthorization Act (SARA).

Corrosive. A material that has the ability to cause visible destruction of living tissue and has a destructive effect on other substances. An acid or a base.

Council on Environmental Quality (CEQ). Established by the National Environmental Policy Act (NEPA), the CEQ consists of three members appointed by the President. CEQ regulations (40 CFR Parts 1500-1508, as of July 1, 1986) describe the process for implementing NEPA, including preparation of environmental assessments and environmental impact statements, and the timing and extent of public participation.

Friable. Easily crumbled or ground into powder by hand pressure.

Fungicide. Any substance that kills or inhibits the growth of fungi.

Halogenated solvant. An aqueous solution that contains fluorine, chlorine, bromine or iodine that can dissolve or dissolves another substance.

Hazardous material. Generally, a substance or mixture of substances that has the capability of either causing or significantly contributing to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or posing a substantial present or potential risk to human health or the environment. Use of these materials is regulated by the Department of Transportation, the Occupational Safety and Health Administration (OSHA), and the Superfund Amendments and Reauthorization Act.

Hazardous substance (federal definition under CERCLA 42 U.S.C. 9601). Generally, a substance or mixture of substances that has the capability of either causing or significantly contributing to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or posing a substantial present or potential risk to human health or the environment. Use of these materials is regulated by Department of Transportation (DOT), Occupational Safety and Health Administration (OSHA), and Superfund Amendments and Reauthorization Act (SARA).

Hazardous waste (federal definition under 40 U.S.C. 6903-S100Y). A waste, or combination of wastes, which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may either cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Regulated under the Resource Conservation and Recovery Act (RCRA).

Installation Restoration Program (IRP). An Air Force program to identify, characterize, and remediate environmental contamination on its installations.

Jet Propellant Fuel Number 4 (JP-4). JP-4 is a kerosene-based aviation fuel with a volatile, gasoline-like component.

Lead (Pb). A heavy metal, used in many industries, which can accumulate in the body and cause a variety of negative effects.

Mitigation. A method or action to reduce or eliminate program impacts.

National Environmental Policy Act (NEPA). Public Law 91-190, passed by Congress in 1969. The Act established a national policy designed to encourage consideration of the influences of human activities (e.g., population growth, high-density urbanization, industrial development) on the natural environment. NEPA also established the Council on Environmental Quality. NEPA procedures require that environmental information be made available to the public before decisions are made. Information contained in NEPA documents must focus on the relevant issues in order to facilitate the decision-making process.

National Priority List (NPL). A list of sites (federal and state) that contains hazardous materials that may cause an unreasonable risk to the health and safety of individual property, or the environment.

PCB-contaminated equipment. Equipment that contains a concentration of PCBs from 50 to 499 ppm and is regulated by the U.S. EPA.

PCB equipment. Equipment that contains a concentration of PCBs of 500 ppm or greater and is regulated by the U.S. EPA.

Pesticides. Any substance, organic or inorganic, used to destroy or inhibit the action of plant or animal pests; the term thus includes insecticides, herbicides, fungicides, rodenticides, miticides, fumigants, and repellents. All pesticides are toxic to humans to a greater or lesser degree. Pesticides vary in biodegradability.

Physical Inspection. An inspection of a contiguous property that included a visit to the subject property, an interview with the property owner/operator (when present), and a walk-around of the property.

Physiographic Province. Region of similar geologic features and climates.

Polychlorinated biphenyls (PCBs). Any of a family of industrial compounds produced by chlorination of biphenyl. These compounds are noted chiefly as an environmental pollutant that accumulates in organisms and concentrates in the food chain with resultant pathogenic and teratogenic effects. They also decompose very slowly.

Sludge. A heavy, slimy deposit, sediment, or mass resulting from industrial activity; solids removed from wastewater.

Solvent. A substance that dissolves or can dissolve another substance.

Trichloroethylene. An organic solvent.

U.S. Environmental Protection Agency (U.S. EPA). The independent federal agency, established in 1970, that regulates environmental matters and oversees the implementation of environmental laws.

Visual Inspection. An inspection of a contiguous property that included a windshield survey of the subject property from public access roads or base property.

Visual Reconnaissance Survey. A physical inspection based on review of aerial photographs.

Visual Site Inspection. A physical inspection of base property.

ACRONYMS AND ABBREVIATIONS

217299

ACC	Air Combat Command
ACM	asbestos-containing material
AFB	Air Force Base
AFFF	aqueous film-forming foam
ALCM	air launch cruise missile
AST	aboveground storage tank
BCP	BRAC Cleanup Plan
BRAC	Base Realignment and Closure
BX	Base Exchange
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
CES	Civil Engineering Squadron
°F	degrees Fahrenheit
DOD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
EBS	Environmental Baseline Survey
ECAMP	Environmental Compliance Assessment and Management Program
EIS	Environmental Impact Statement
EOD	explosive ordnance disposal
FW	Fighter Wing
HOSP/SGPB	Hospital/Bioenvironmental Engineering Services
IRP	Installation Restoration Program
kg	kilogram
MOGAS	motor gasoline
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OU	operable unit
OWS	oil/water separator
PCB	polychlorinated biphenyl
pCi/l	picocuries per liter
POL	petroleum, oils, and lubricants
ppm	parts per million
RAMP	Radon Assessment and Mitigation Program
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	Remedial Investigation
SAC	Strategic Air Command
SWMU	solid waste management unit
TCE	trichloroethylene

TNRCC	Texas Natural Resources Conservation Commission
U.S. EPA	U.S. Environmental Protection Agency
UST	underground storage tank
VRS	visual reconnaissance survey
VSI	visual site inspection
WSA	Weapons Storage Area

THIS PAGE INTENTIONALLY LEFT BLANK

FINAL PAGE

ADMINISTRATIVE RECORD

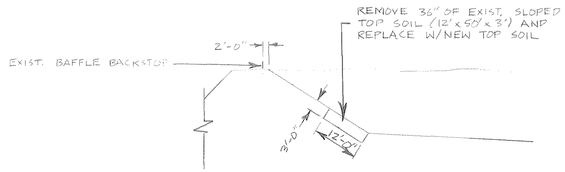
FINAL PAGE

2173.3

FINAL PAGE

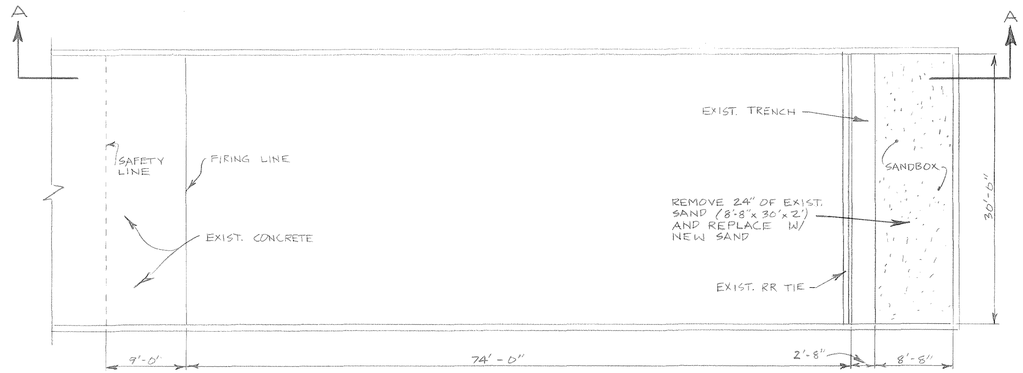
ADMINISTRATIVE RECORD

FINAL PAGE



SECTION "G-G"

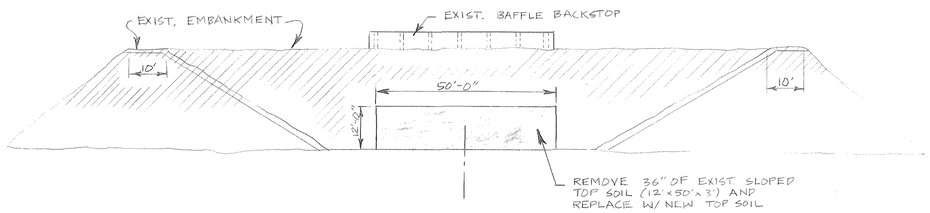
SCALE: 1"=20'



FLOOR PLAN

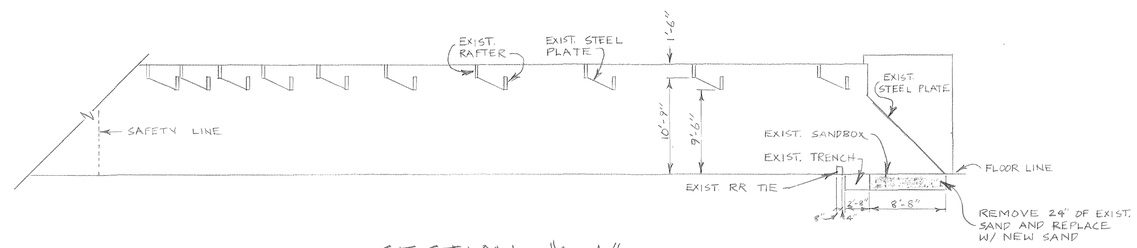
INDOOR PISTOL RANGE - FAC #1346

SCALE: 1/8"=1'-0"



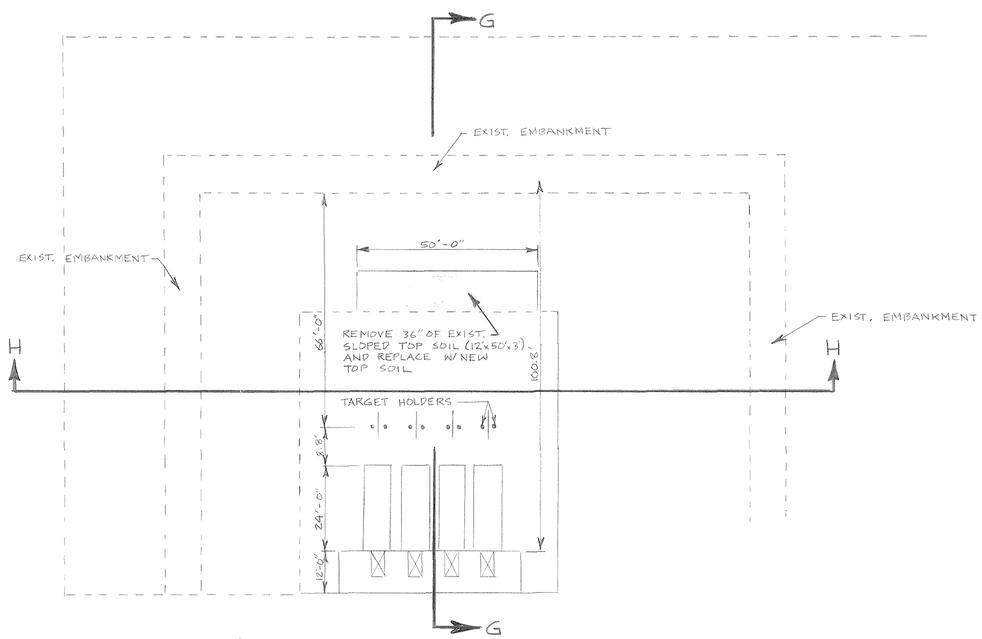
SECTION "H-H"

SCALE: 1"=20'



SECTION "A-A"

SCALE: 1/8"=1'-0"



SITE PLAN

M-60 GUN RANGE ~ FAC #1341

Air Force Base

PROJECT TITLE

REMOVE LEAD FROM RIFLE RANGES

PROJECT NUMBER DDPF 87-4036

APPROVED — BASE CIVIL ENGINEER

RECOMMENDED — CHIEF ENGINEER

SUBMITTED — CHIEF OF PLANNING

N/A — CORROSION ENGINEER

CONSTRUCTION MANAGEMENT

BIOENVIRONMENTAL ENGINEER

GROUND SAFETY

FIRE CHIEF

N/A — COMMUNICATIONS

USING AGENCY

PROFESSIONAL SEAL

SHEET TITLE

SITE PLAN & SECTION FAC #1340

Drawn BWF	Date 13 MAY 87
Designed LANGASTER	Scale AS SHOWN
SHEET 2	OF 3

AS-BUILT

Revisions	By	Date

DRAWING NUMBER

DDPF 5390

SAC FORM MAY 85 509a

☆U.S. GOVERNMENT PRINTING OFFICE: 1986-654-834

File: 17G
A.F.

NAVAL AIR STATION
FORT WORTH JRB
CARSWELL FIELD
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 06

File:
D.B. 1/A 1

04

INSTALLATION RESTORATION PROGRAM RECORDS SEARCH

For
Carswell Air Force Base, Texas

CH2M HILL

Prepared for

STRATEGIC AIR COMMAND
DEPUTY CHIEF OF STAFF, ENGINEERING AND SERVICES
OFFUTT AIR FORCE BASE, NEBRASKA 68113

FEBRUARY 1984

INSTALLATION RESTORATION PROGRAM RECORDS SEARCH

FOR

CARSWELL AIR FORCE BASE, TEXAS

Prepared for

STRATEGIC AIR COMMAND
DEPUTY CHIEF OF STAFF, ENGINEERING AND SERVICES
OFFUTT AIR FORCE BASE, NEBRASKA 68113

Prepared by

CH2M HILL
7201 N.W. Eleventh Place
P.O. Box 1647
Gainesville, Florida 32602

February 1984

Contract No. F08637-80-G0010-5009

NOTICE

This report has been prepared for the United States Air Force by CH2M HILL SOUTHEAST, INC., for the purpose of aiding in the implementation of the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, nor the Department of Defense.

Copies of this report may be purchased from:

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Federal Government agencies and their contractors registered with Defense Technical Information Center should direct requests for copies of this report to:

Defense Technical Information Center
Cameron Station
Alexandria, Virginia 22314

NOTICE

This report has been prepared for the United States Air Force by CH2M HILL SOUTHEAST, INC., for the purpose of aiding in the implementation of the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, nor the Department of Defense.

Copies of this report may be purchased from:

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Federal Government agencies and their contractors registered with Defense Technical Information Center should direct requests for copies of this report to:

Defense Technical Information Center
Cameron Station
Alexandria, Virginia 22314

CONTENTS

	Page
LIST OF TABLES	vi
LIST OF FIGURES	vii
EXECUTIVE SUMMARY	ES - 1
A. Introduction	ES - 1
B. Major Findings	ES - 2
C. Conclusions	ES - 5
D. Recommendations	ES - 8
I. INTRODUCTION	I - 1
A. Background	I - 1
B. Authority	I - 2
C. Purpose of the Records Search	I - 2
D. Scope	I - 4
E. Methodology	I - 6
II. INSTALLATION DESCRIPTION	II - 1
A. Location	II - 1
B. Organization and Mission	II - 1
III. ENVIRONMENTAL SETTING	III - 1
A. Meteorology	III - 1
B. Physical Geography	III - 3
C. Hydrology	III - 24
D. Ecology	III - 40
1. Habitat	III - 40
2. Threatened or Endangered Species	III - 41
IV. FINDINGS	IV - 1
A. Activity Review	IV - 1
1. Industrial Waste Disposal Practices	IV - 1
2. Industrial Operations	IV - 3
3. Fuels	IV - 20
4. Fire Department Training Exercises	IV - 22
5. Polychlorinated Biphenyls (PCBs)	IV - 23
6. Pesticides	IV - 24
7. Wastewater Treatment	IV - 25
8. Water Quality Data	IV - 27
9. Other Activities	IV - 35
B. Disposal Sites Identification and Evaluation	IV - 35
1. Landfills	IV - 41
2. Other Sites	IV - 46
C. Environmental Stress	IV - 53

CONTENTS--Continued

		Page
V.	CONCLUSIONS	V - 1
VI.	RECOMMENDATIONS	VI - 1
VII.	OFF-BASE FACILITIES	VII - 1
APPENDICES		
A	RESUMES OF TEAM MEMBERS	A - 1
B	OUTSIDE AGENCY CONTACT LIST	B - 1
C	CARSWELL AFB RECORDS SEARCH INTERVIEW LIST	C - 1
D	INSTALLATION HISTORY	D - 1
E	DESCRIPTIONS OF SOIL ASSOCIATIONS	E - 1
F	MASTER LIST OF INDUSTRIAL OPERATIONS	F - 1
G	INVENTORY OF EXISTING POL STORAGE TANKS	G - 1
H	HAZARD ASSESSMENT RATING METHODOLOGY	H - 1
I	SITE RATING FORMS	I - 1
J	GLOSSARY OF TERMS	J - 1
K	LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS USED IN THE TEXT	K - 1
L	REFERENCES	L - 1

TABLES

Table		Page
1	Priority Listing of Disposal and Spill Sites	ES - 6
2	Meteorological Data Summary for Carswell AFB, Texas	III - 2
3	Soil Properties	III - 10
4	Geologic Formations in Tarrant County, Texas	III - 15
5	Range of Constituents in Ground Water from Selected Wells in the Paluxy Formation	III - 33
6	Range of Constituents in Ground Water from Selected Wells in the Twin Mountains Formation	III - 38
7	Federal and State Listed Threatened or Endangered Species Known or Suspected to Occur in Tarrant County, Texas	III - 42
8	Major Industrial Operations Summary	IV - 6
9	Water Quality Data for Surface Waters in the Vicinity of Carswell AFB, Texas	IV - 29
10	NPDES Permit Requirements for 001, 002, and 004 Discharges at Carswell AFB, Texas	IV - 32
11	Summary of NPDES Violations at Carswell AFB, Texas	IV - 33
12	Disposal and Spill Sites Summary	IV - 37
13	Summary of Disposal and Spill Site Ratings	IV - 38
14	Priority Listing of Disposal and Spill Sites	V - 3
15	Recommended Phase II Analyses	VI - 2
16	Rationale for Recommended Analyses	VI - 3

FIGURES

Figure		Page
1	Location Map of Identified Disposal and Spill Sites at Carswell AFB	ES - 3
2	Site Map of Weapons Storage Area	ES - 4
3	Recommended Phase II Monitoring Sites at Carswell AFB	ES - 9
4	Location Map of Carswell AFB and the Off-Base Weapons Storage Area	I - 3
5	Records Search Methodology	I - 7
6	Site Map of Carswell AFB	II - 2
7	General Geologic Map	III - 4
8	Topograhy and Surface Drainage Map	III - 7
9	General Soil Map	III - 8
10	Detailed Geologic Map	III - 12
11	General Geologic Cross Section	III - 14
12	Approximate Altitude of the Top of the Paluxy Formation	III - 21
13	Approximate Thickness of the Paluxy Aquifer	III - 29
14	Potentiometric Surface of the Paluxy Aquifer, 1955	III - 30
15	Potentimetric Surface of the Paluxy Aquifer, 1976	III - 32
16	Approximate Altitude of the Top of the Twin Mountains Formation	III - 34
17	Potentiometric Surface of the Twin Mountains Aquifer, 1955	III - 36
18	Potentiometric Surface of the Twin Mountains Aquifer, 1976	III - 36
19	Surface-Water Quality Sampling Points at Carswell AFB	IV - 30

FIGURES--Continued

Figure		Page
20	Location Map of Identified Disposal and Spill Sites at Carswell AFB	IV - 39
21	Historical Summary of Activities at Disposal and Spill Sites at Carswell AFB	IV - 40
22	Recommended Phase II Monitoring Sites at Carswell AFB	VI - 4
23	Recommended Preliminary Sampling Locations for the Zone Consisting of Sites No. 4, 5, 10, 11, and 12	VI - 5
24	Recommended Preliminary Sampling Locations for Site No. 13--Flightline Drainage Ditch	VI - 6
25	Recommended Preliminary Sampling Locations for Site No. 17--POL Tank Farm	VI - 7
26	Recommended Preliminary Sampling Locations for Site No. 16--Unnamed Stream and Site No. 15--Entomology Dry Well	VI - 8
27	Recommended Preliminary Sampling Location for Site No. 1--Landfill No. 1	VI - 9
28	Site Map of Weapons Storage Area	VII - 2

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

A. INTRODUCTION

1. CH2M HILL was retained on August 31, 1983 to conduct the Carswell Air Force Base (AFB) records search under Contract No. F08637-80-G0010-5009, with funds provided by Strategic Air Command (SAC).

2. Department of Defense (DoD) policy, directed by Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, is to identify and fully evaluate suspected problems associated with past hazardous material disposal sites on DoD facilities, control the migration of hazardous contamination from such facilities, and control hazards to health and welfare that may have resulted from these past operations.

3. To implement the DoD policy, a four-phase Installation Restoration Program has been directed. Phase I, the records search, is the identification of potential problems. Phase II (not part of this contract) consists of the necessary field work to confirm the extent of contamination. Phase III (not part of this contract) consists of technology base development to support the development of project plans for controlling migration or restoring the installation. Phase IV (not part of this contract) includes those efforts which are required to control identified hazardous conditions.

4. The Carswell AFB records search included a detailed review of pertinent installation records, 10 agency contacts for documents relevant to the records search effort, and an onsite base visit conducted by CH2M HILL during the week of October 31 through November 4, 1983. Activities conducted

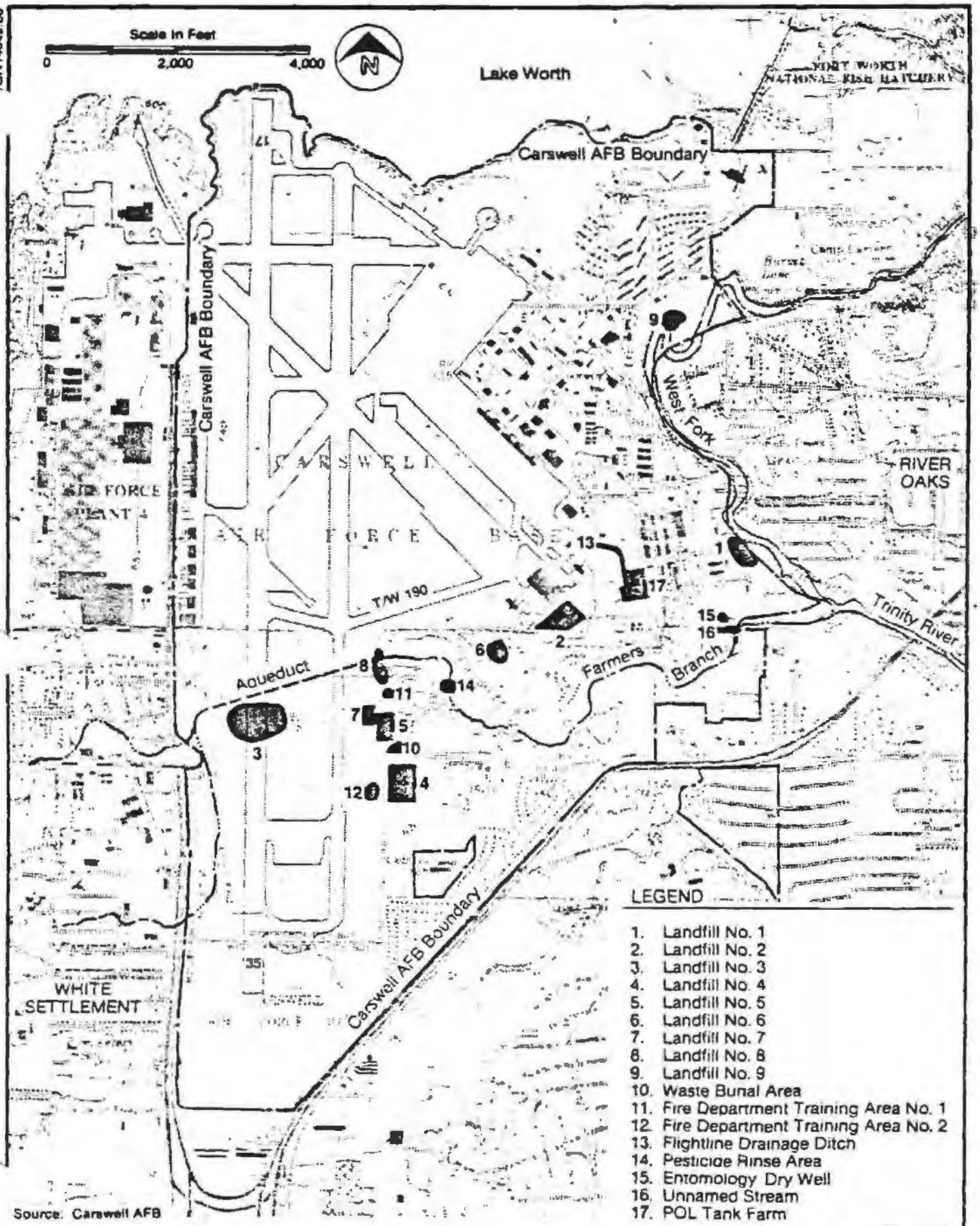
during the onsite base visit included interviews with 33 past and present base employees, ground and shop tours, a helicopter overflight, and a detailed search of relevant installation records. (The Public Affairs Office provided a press release announcing the study and requesting persons knowledgeable of past disposal practices at the installation to contact Carswell AFB.) The installations addressed in the records search include Carswell AFB; and the off-base Weapons Storage Area (WSA) and the ILS Marker Beacon.

B. MAJOR FINDINGS

1. The total quantity of waste oils, recoverable fuels, spent solvents, and cleaners generated at Carswell AFB is estimated to be approximately 55,000 gallons/year. This estimate was derived from a review of shop files and the best recollection of interviewees and is considered to be representative of the 1970s to 1983. Prior to the 1970s the waste quantities were probably less because fewer aircraft were maintained at the base.

2. Major procedures for the disposal of the majority of industrial wastes in the past have included fire department training exercises from 1942 to 1970; contractor removal, either direct or through DPDO from 1970 to 1982; and contractor removal through DPDO, since 1982. Since 1970, recovered fuels have primarily been disposed of through fire department training exercises; however, since 1979, recovered JP-4 has also been recycled and reused onbase.

3. Interviews with past and present base employees resulted in the identification of 17 disposal or spill sites at Carswell AFB and five sites at the Weapons Storage Area (WSA) located west of Carswell AFB. Figures 1 and 2 show the locations of the identified sites.



Source: Carswell AFB

FIGURE 1.
Location Map of Identified Disposal and Spill Sites at Carswell AFB.

CH2M HILL

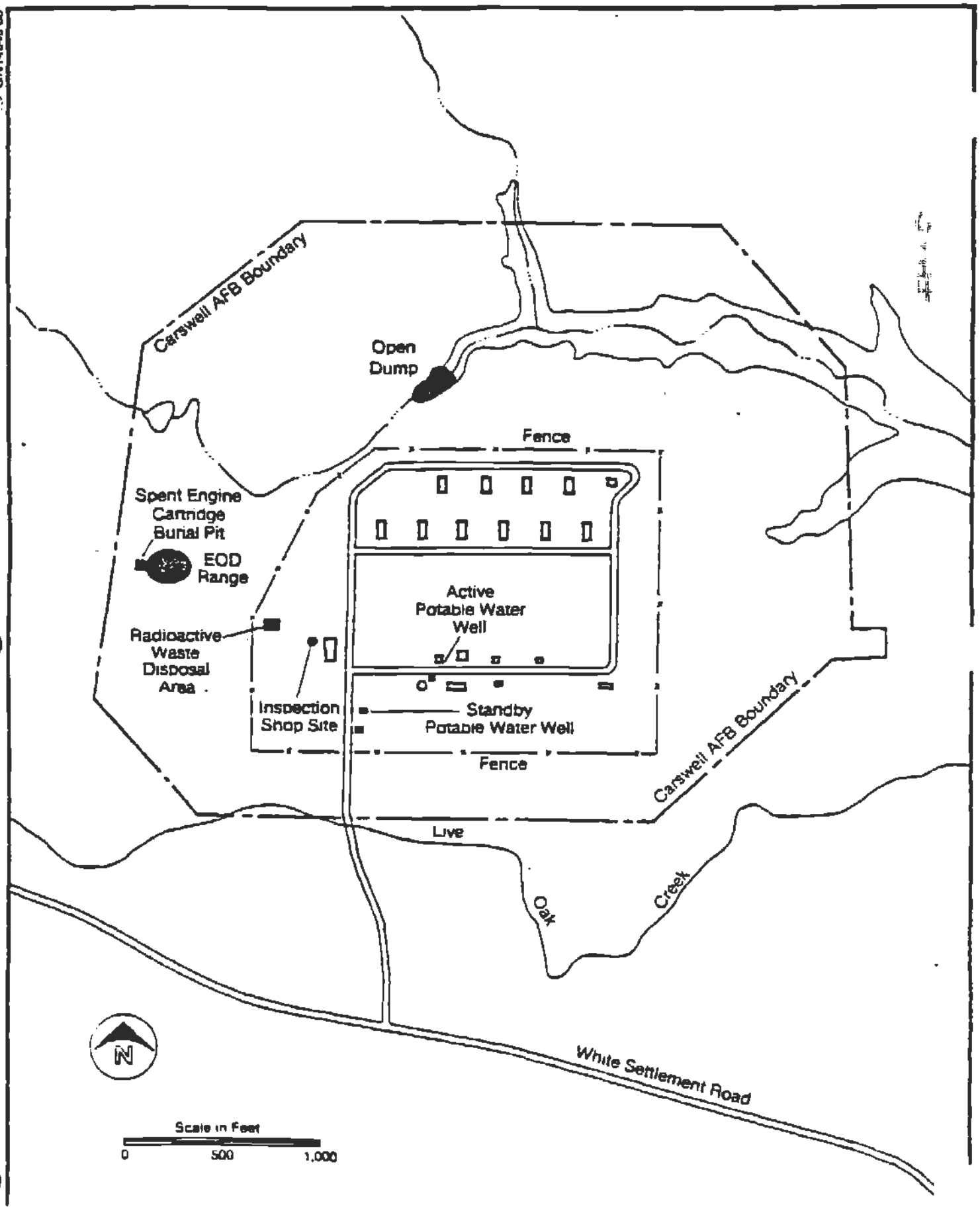


FIGURE 2.
Site Map of Weapons Storage Area.

CH2M HILL

C. CONCLUSIONS

1. Table 1 presents a priority listing of the rated sites and their overall scores. The following sites were designated as areas showing the most significant potential (relative to other Carswell AFB sites) for environmental concerns.

- Site No. 13, Flightline Drainage Ditch
- Site No. 12, Fire Department Training Area No. 2
- Site No. 17, POL Tank Farm
- Site No. 10, Waste Burial Area
- Site No. 16, Unnamed Stream
- Site No. 15, Entomology Dry Well
- Site No. 1, Landfill No. 1
- Site No. 4, Landfill No. 4
- Site No. 5, Landfill No. 5
- Site No. 11, Fire Department Training Area No. 1

2. Evidence of minor environmental stress due to past disposal/spills of hazardous wastes was observed at Carswell AFB. Vegetation was absent in fuel- or oil-saturated areas adjacent to the above ground and below ground tanks at the fire department training area No. 2 (Site No. 12). Vegetation was also absent along the edge of the Flightline Drainage Ditch (Site No. 13).

Table 1
PRIORITY LISTING OF DISPOSAL AND SPILL SITES

Ranking	Site No.	Site Description	Overall Score
1	13	Flightline Drainage Ditch	74
2	12	Fire Department Training Area No. 2	64
3	17	POL Tank Farm	63
4	10	Waste Burial Area	60
5	16	Unnamed Stream	58
6	15	Entomology Dry Well	57
7	1	Landfill No. 1	56
8	4	Landfill No. 4	56
9	5	Landfill No. 5	56
10	11	Fire Department Training Area No. 1	53
11	2	Landfill No. 2	53
12	14	Pesticide Rinse Area	53
13	6	Landfill No. 6	47
14	3	Landfill No. 3	46

3. Information obtained through interviews with 33 past and present base personnel, base records, shop folders, and field observations indicates that hazardous wastes have been disposed of on Carswell AFB in the past.

4. The potential for surface-water migration of hazardous contaminants is considered high primarily due to the proximity of identified sites to Farmers Branch, the West Fork Trinity River, and Lake Worth. In addition, shallow ground water, carrying dissolved contaminants, may discharge to these surface waters.

5. The potential for contamination of the shallow ground water, when present, is considered high due to the lack of a confining layer above the alluvium. The potential may also exist for contaminant migration into the deeper aquifers because of the variable nature of confining beds, and because of the proximity of the base to a recharge area (Lake Worth).

6. No direct evidence was found to indicate that migration of hazardous contaminants exists beyond the Carswell AFB boundary. Indirect evidence of contamination and/or contaminant migration within the installation boundary was found at three sites:

- <u>Flightline Drainage Ditch (Site No. 13)</u>:

  Aircraft soap from the washracks and fuel were observed in the ditch during the base visit.

- Fire Department Training Area No. 2 (Site No. 12):

  Unburned fuels were observed on the ground at the site of the existing fire department training area.

- Unnamed Stream (Site No. 16):

  An oil sheen and a POL odor were noted at this site during the base visit.

7. The remaining sites (Sites No. 2, 14, 6, and 3, and the unrated Sites No. 7, 8, and 9) are not considered to present significant concern for adverse effects on health or the environment.

8. One off-base site (Inspection Shop Site), located at the Weapons Storage Area, was considered to present a significant potential for environmental concern and was included in Phase II monitoring recommendations.

D. RECOMMENDATIONS

1. A Phase II monitoring program is recommended for: (1) a zone consisting of Landfills No. 4 and 5 (Site No. 4 and 5, respectively), the Waste Burial Area (Site No. 10), and Fire Department Training Areas No. 1 and 2 (Sites No. 11 and 12, respectively); (2) the Flightline Drainage Ditch (Site No. 13); (3) the POL Tank Farm (Site No. 17); (4) the Unnamed Stream (Site No. 16); (5) the Entomology Dry Well (Site No. 15); and (6) Landfill No. 1 (Site No. 1). The recommended Phase II Monitoring Sites are shown in Figure 3.

2. Locate and remove solvent drums reportedly buried at Site No. 10, the Waste Burial Area.

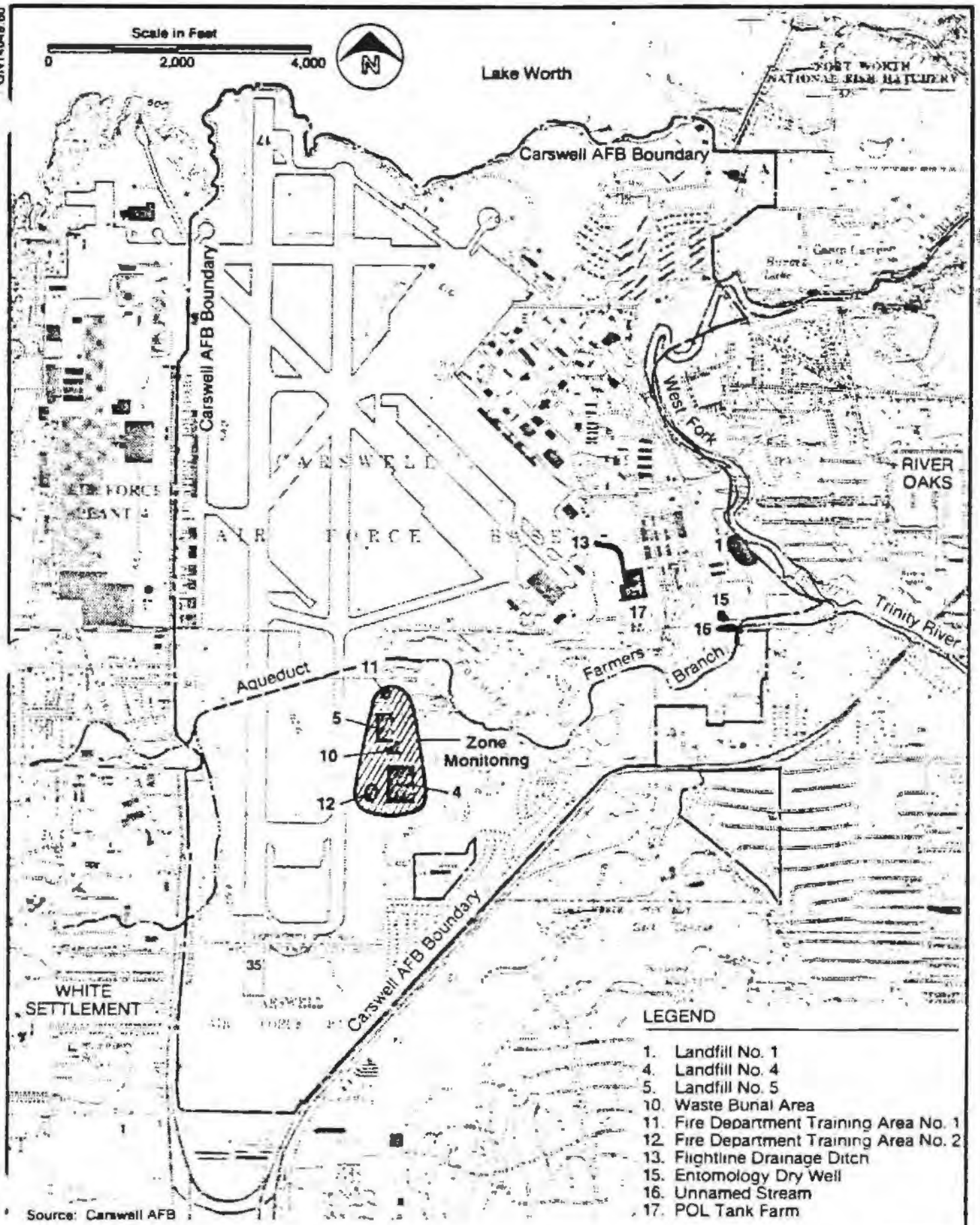


FIGURE 3.
Recommended Phase II Monitoring Sites at Carswell AFB.

CH2M HILL

3. The priority for monitoring at Carswell AFB is considered moderate to high. Details of the proposed Phase II monitoring program are included in Section VI of this report.

4. A Phase II monitoring program has been recommended for the Inspection Shop Site at the off-base Weapons Storage Area. Details are presented in Section VII of this report.

5. The specific details of the monitoring program, including the exact locations of sampling points, should be finalized as part of the Phase II program. In the event that contaminants are detected at significant levels, a more extensive field survey program should be implemented to determine the extent of contaminant migration.

6. Other environmental recommendations include: (1) repair the ruptured JP-4 pipe discharging into the Flightline Drainage Ditch (Site No. 13) and concrete line the ditch; (2) clean the oil/water separator at the Unnamed Stream (Site No. 16), routinely inspect/clean the separator, and analyze the stream on a quarterly basis until it is consistently free of contamination; and (3) locate and properly close all abandoned wells on base.

I. INTRODUCTION

I. INTRODUCTION

A. BACKGROUND

The United States Air Force (USAF), due to its primary mission, has long been engaged in a wide variety of operations dealing with toxic and hazardous materials. Federal, state, and local governments have developed strict regulations to require that disposers identify the locations and contents of disposal sites and take action to eliminate the hazards in an environmentally responsible manner.

The Department of Defense (DoD) developed the Installation Restoration Program (IRP) to ensure compliance with hazardous waste regulations. The current DoD IRP policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated 11 December 1981 and implemented by Headquarters Air Force message dated 21 January 1982. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the IRP. DoD policy is to identify and fully evaluate suspected problems associated with past hazardous material contamination, and to control hazards to health and welfare that may have resulted from these past operations. The IRP will be the basis for assessment and response actions on Air Force installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as implemented by Executive Order 12316 and provisions of Subpart F of 40 CFR 300 (National Contingency Plan). CERCLA is the primary Federal legislation governing remedial actions at uncontrolled hazardous waste sites.

To conduct the IRP Hazardous Materials Disposal Sites Records Search for Carswell AFB, Texas, CH2M HILL was retained on August 31, 1983 under Contract No. F08637-80-G0010-5009

with funds provided by Strategic Air Command. A location map of Carswell AFB is shown in Figure 4.

The records search, Phase I of the DoD IRP, is intended to review installation records for the purpose of identifying possible hazardous waste-contaminated sites and assessing the potential for contaminant migration. Phase II (not part of this contract) consists of the necessary fieldwork to confirm the extent of contamination. Phase III (not part of this contract) consists of technology base development to support the development of project plans for controlling migration or restoring the installation. Phase IV (not part of this contract) includes those efforts which are required to control identified hazardous environmental conditions.

B. AUTHORITY

The identification of hazardous waste disposal sites at Air Force installations was directed by Defense Environmental Quality Program Policy Memorandum 81-5 (DEQPPM 81-5) dated 11 December 1981, and implemented by Headquarters Air Force message dated 21 January 1982, as a positive action to ensure compliance of Air Force installations with existing environmental regulations.

C. PURPOSE OF THE RECORDS SEARCH

The Phase I records search is designed to identify and evaluate suspected problems associated with past hazardous material disposal sites and spill sites on DoD facilities. The existence and potential for migration of hazardous material contaminants were evaluated at Carswell AFB by reviewing the existing information and conducting an analysis of installation

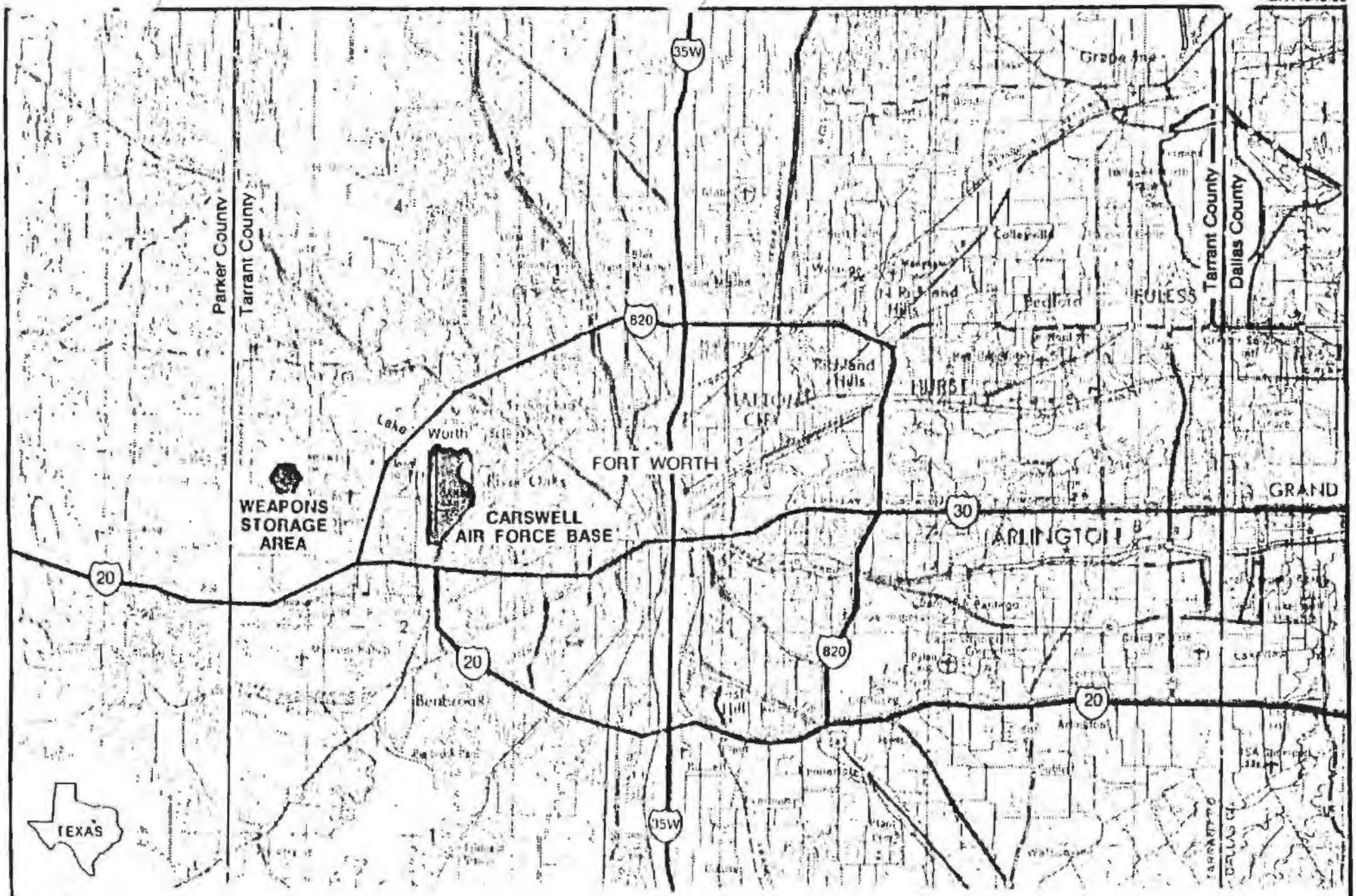


FIGURE 4.
Location Map of Carswell AFB and the Off-Base Weapons Storage Area.

CH2M HILL

records. Pertinent information included the history of operations, the geological and hydrogeological conditions which may have contributed to the migration of contaminants, and the ecological settings which indicated environmentally sensitive habitats or evidence of environmental stress. The evaluation is to determine which identified sites, if any, exhibit a significant potential for environmental impact and warrant further investigation. Sampling is not conducted during Phase I. If required, sampling will be conducted during Phase II.

D. SCOPE

The records search program included a pre-performance meeting, an onsite installation visit, a review and analysis of the information obtained, and preparation of this report.

The pre-performance meeting was held at Carswell AFB, Texas, on September 22, 1983. Attendees at this meeting included representatives of the Air Force Engineering and Services Center (AFESC), Air Force Plant 4, the Strategic Air Command Headquarters (SAC), Carswell AFB, and CH2M HILL. The pre-performance meeting provided detailed project instructions, provided clarification and technical guidance by AFESC, and defined the responsibilities of all parties participating in the Carswell AFB records search.

The onsite installation visit was conducted by CH2M HILL from October 31 through November 4, 1983. Activities performed during the onsite visit included a detailed search of installation records, ground and shop tours, a helicopter overflight, and interviews with installation personnel. At the conclusion of the onsite visit, the Base Commander, the Base Civil Engineer, the

Deputy Base Civil Engineer, the Vice Wing Commander, the Base Bioenvironmental Engineer, and the Public Affairs Officer were briefed on the preliminary findings. The CH2M HILL records search team included the following individuals:

1. Mr. David Moccia, Project Manager (B.S. Chemical Engineering, 1971)

2. Mr. Gary Eichler, Hydrogeologist (M.S. Engineering Geology, 1974).

3. Dr. Robert Knight, Ecologist (Ph.D. Systems Ecology, 1980)

Resumes of these team members are included in Appendix A.

Government organizations were contacted for information and relevant documents. Appendix B lists the organizations contacted.

Individuals from the Air Force who assisted in the Carswell AFB records search include:

1. Captain Gail Graban, AFESC, Program Manager, Phase I

2. Major Jim Karasek, SAC, Command Representative

3. Mr. Steven Sanders, Carswell AFB, Environmental Engineer

4. Capt. David Carpenter, Carswell AFB, Chief of Bioenvironmental Engineering Services

E. METHODOLOGY

The methodology used in the Carswell AFB records search is shown in Figure 5. First, a review of past and present industrial operations was conducted at the installation. Information was obtained from available records such as shop files and real property files, as well as interviews with past and present base employees from the various operating areas of the installation. The information obtained from interviewees on past activities was based on their best recollection. A list of 33 interviewees from Carswell AFB, with areas of knowledge and years at the installation, is presented in Appendix C.

The next step in the activity review process was to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from all the industrial operations on the base. This part of the activity review included the identification of past landfill sites and burial sites; as well as other possible sources of contamination such as major PCB or solvent spills, or fuel-saturated areas resulting from significant fuel spills or leaks.

The records search team conducted a general ground tour of identified sites to gather site-specific information including evidence of environmental stress and the presence of nearby drainage ditches or surface-water bodies. These water bodies were visually inspected for any evidence of contamination or leachate migration.

A decision was then made, based on all of the above information, as to whether a potential existed for hazardous material contamination from any of the identified sites. If not, the site was deleted from further consideration.

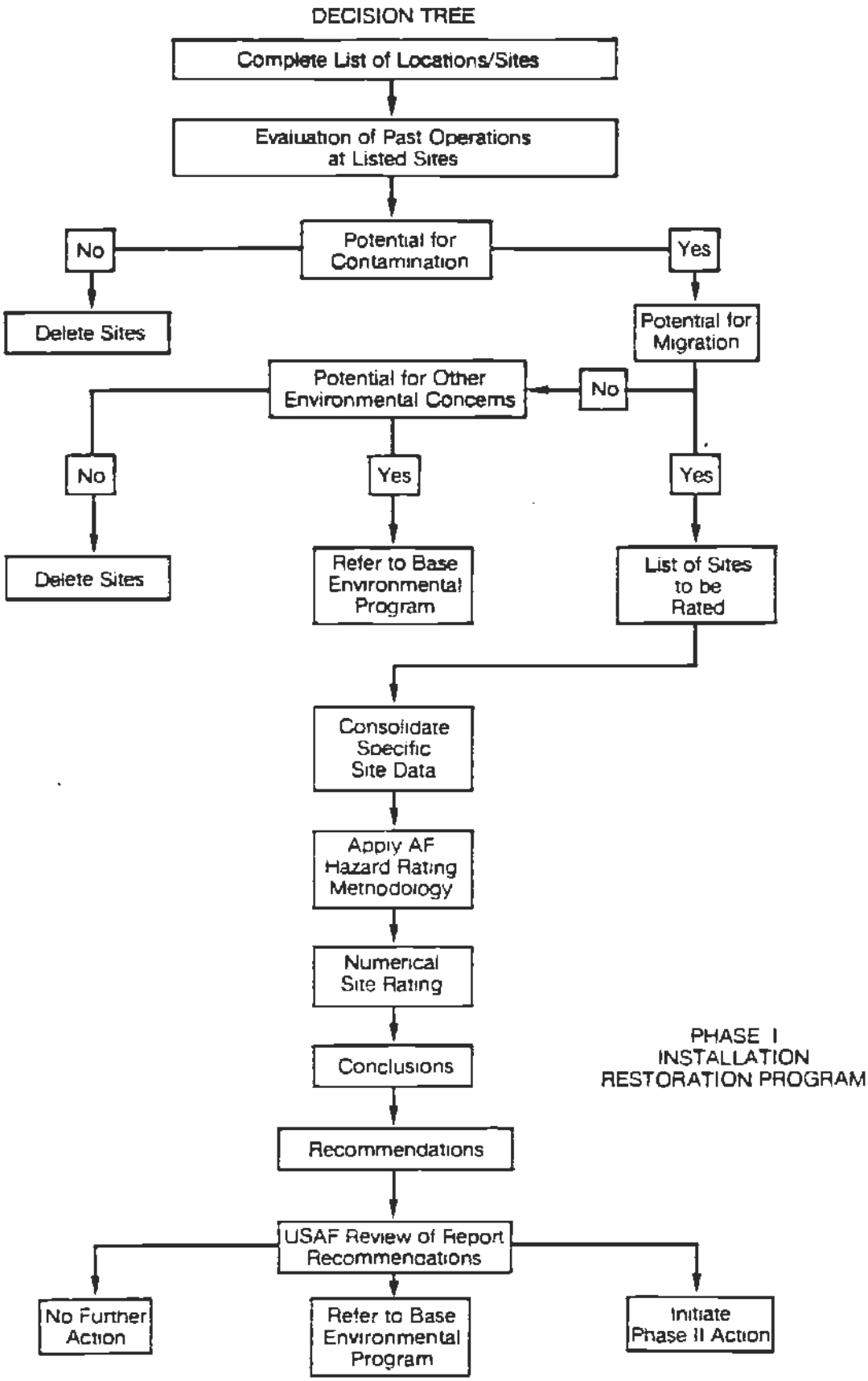


FIGURE 5.
Records Search Methodology.

For those sites at which a potential for contamination was identified, the potential for migration of this contamination was evaluated by considering site-specific soil and ground-water conditions. If there was no potential for contaminant migration, but other environmental concerns were identified, the site was referred to the base environmental program. If no further environmental concerns were identified, the site was deleted from consideration. If the potential for contaminant migration was identified, then site specific information was evaluated and the site was rated and prioritized using the site rating methodology described in Appendix H, "Hazard Assessment Rating Methodology."

The site rating indicates the relative potential for adverse environmental impact at each site. For those sites showing a significant potential, recommendations were made to conduct a more detailed investigation of the potential contaminant migration problem under Phase II of the Installation Restoration Program. For those sites showing a low potential, no Phase II work was recommended.

II. INSTALLATION DESCRIPTION

II. INSTALLATION DESCRIPTION

A. LOCATION

Carswell AFB is located on 2,751 acres of land in Tarrant County, Texas, 6 miles west of the center of Fort Worth and lies between the communities of White Settlement and River Oaks. Carswell AFB lies within a bend of the West Fork of the Trinity River which flows along the northern and eastern boundaries of the base. The river is dammed to form Lake Worth, a drinking water supply and recreation reservoir bordering Carswell AFB to the north. To the west, Carswell AFB is neighbored by AF Plant 4, an Air Force-owned, General Dynamics Corporation-operated, aircraft production plant that shares the runway and several facilities with Carswell AFB. To the south Carswell AFB is hemmed in by rapidly growing urban areas. The current base boundaries are shown in Figure 6.

Off-base facilities include the ILS Marker Beacon west of Carswell AFB and the Weapons Storage Area (WSA), 4 miles west of Carswell AFB. A description of this facility is given in Section VII, Off-Base Facilities, and the location is shown in Figure 4.

B. ORGANIZATION AND MISSION

Carswell AFB is the home of the Strategic Air Command's (SAC) 7th Bombardment Wing. As such, the mission of Carswell AFB is to maintain the capability of strategic warfare and air refueling operations. Assigned weapon systems include the Boeing B-52 "H" model bomber and the KC-135A tanker.

As host unit, the 7th Bombardment Wing oversees aircraft operations and maintenance agencies. In addition to

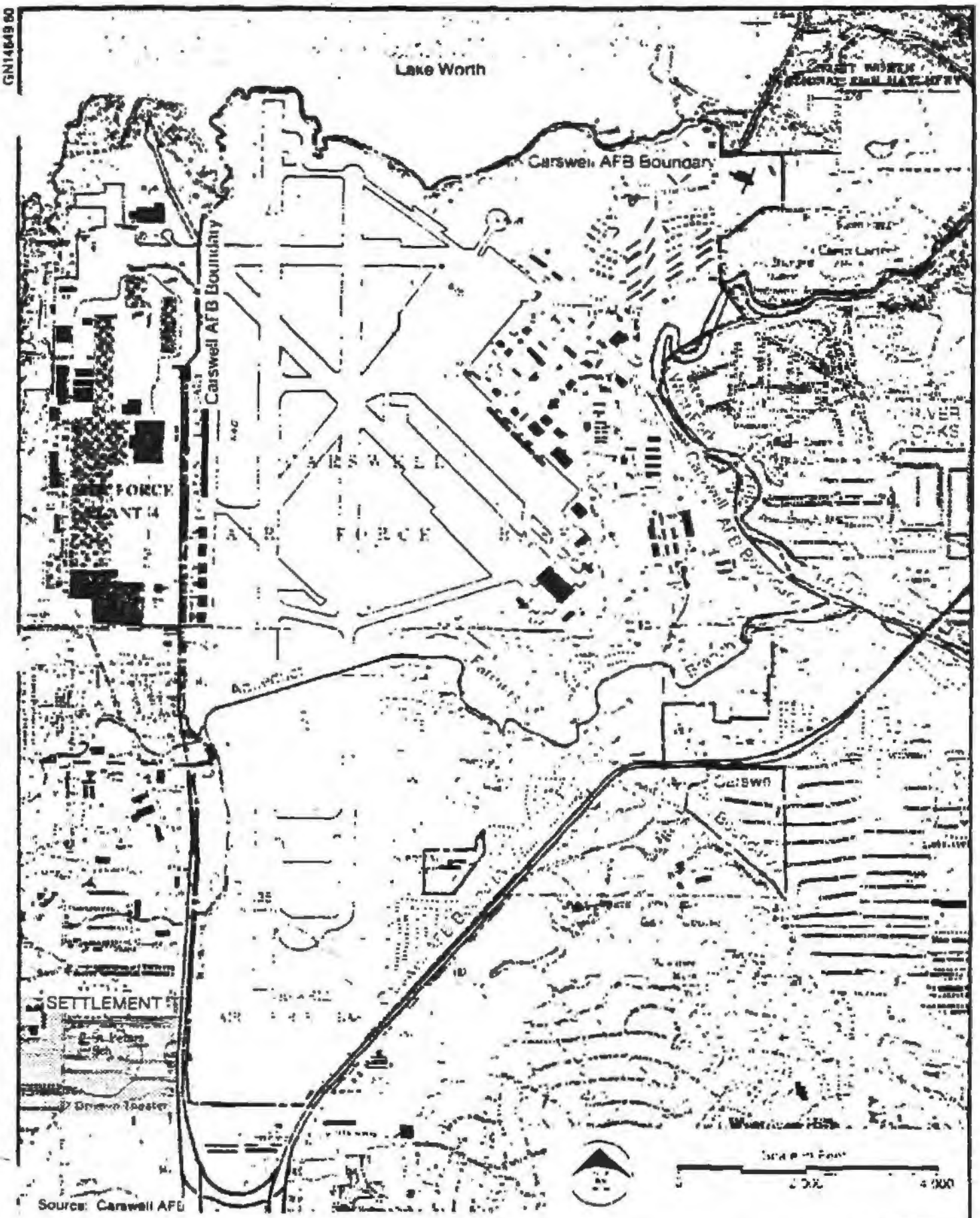


FIGURE 6.
Site Map of Carswell AFB.

CH2M HILL

maintaining bombers, tankers, and combat crews capable of strategic warfare, Carswell AFB also houses an extensive air training effort which includes the air training requirements of three tactical squadrons. The 7th Combat Support Group and the USAF Regional Hospital Support the combat mission of the Wing. The total work force present at Carswell AFB is approximately 5,100 military and 1,000 civilian personnel. A detailed history of Carswell AFB as well as descriptions of tenant missions is included in Appendix D, Installation History.

III. ENVIRONMENTAL SETTING

III. ENVIRONMENTAL SETTING

A. METEOROLOGY

Carswell AFB is located near 33° north latitude in north central Texas. The climate is humid subtropical with hot summers and dry winters. Tropical maritime air masses control the weather during much of the year; however, the passage of polar cold fronts and continental air masses create large variations in winter temperatures. Meteorological data summarizing the period 1946 through 1978 are presented in Table 2 and discussed briefly below.

The average annual temperature for Carswell AFB is 66°F and monthly mean temperatures vary from 45°F in January to 86°F in July. The average daily minimum temperature in January is 35°F and the lowest recorded temperature is 2°F. The average daily maximum temperature in July and August is 95°F and the highest temperature recorded at the base was 111°F in the month of June. On the average, freezing temperatures occur at Carswell AFB on 33 days per year.

Mean annual precipitation recorded at Carswell AFB is 32 inches. The wettest month is May with a secondary maximum in September. The period from November to March is generally dry with a secondary minimum in August. Snowfall accounts for a small percentage of the total precipitation between November and March. On the average, measurable snowfall occurs on 2 days per year. Lake evaporation at Carswell AFB is estimated to be approximately 57 inches per year. Evapotranspiration over land areas may be greater or less than lake evaporation depending on vegetative cover type and moisture availability. Average net precipitation

Table 2
METEOROLOGICAL DATA SUMMARY FOR CARSWELL AFB, TEXAS
(1946-1978)

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Temperature (°F)													
Mean	45	50	57	66	74	82	86	85	78	68	56	49	66
Average Daily Maximum	55	60	67	76	83	91	95	95	88	78	66	59	76
Average Daily Minimum	35	39	46	56	64	72	75	75	68	57	46	38	56
Highest Recorded	88	88	85	89	100	111	109	110	107	105	89	91	110
Lowest Recorded	2	6	11	31	42	55	61	60	46	33	17	11	2
Precipitation (inches)													
Mean	1.7	1.9	2.1	3.9	4.2	3.1	2.5	2.1	3.6	3.1	1.8	1.9	31.9
Maximum Monthly	5.9	4.7	6.5	14.2	15.2	8.8	9.0	6.0	9.6	10.7	7.4	6.7	15.2
Minimum Monthly	0.1	0.1	a	0.8	0.8	0.1	a	a	a	a	a	a	a
Maximum in 24 hours	2.8	3.2	3.4	3.3	5.7	3.5	5.9	3.1	4.0	3.2	2.8	2.9	5.9
Days with Thunderstorms	1	2	3	6	8	6	5	5	4	3	1	1	45
Snowfall (inches)													
Mean	2	1	6	0	0	0	0	0	0	0	b	b	3
Maximum Monthly	8	12	7	0	0	0	0	0	0	0	4	3	8
Maximum in 24 hours	5	8	7	0	0	0	0	0	0	0	4	3	8
Relative Humidity (%)													
Mean	62	61	61	64	68	64	58	60	65	65	63	62	63
Surface Winds (knots)													
Mean	8	8	9	9	7	8	6	5	6	6	8	8	7
Maximum	50	63	69	64	68	65	56	54	80	45	54	58	80
Prevailing Direction	S	S	S	S	S	S	S	S	S	S	S	S	S

Source: United States Air Force, Carswell AFB, Texas. Period of Record: 1946-1978.

[a]Less than one tenth inch.

[b]Less than 1 inch.

is expected to be equal to the difference between average total precipitation and average lake evaporation or approximately minus 25 inches per year.

Thunderstorm activity occurs at Carswell AFB an average of 45 days per year. The greatest number of these storms occurs between April and June. Hail may fall on two to 3 days per year and the maximum precipitation recorded in a 24-hour period is 5.9 inches.

Mean cloud cover averages 50 percent at Carswell AFB with clear weather occurring frequently during all months. Some fog is present on an average of 83 days per year. Wind speed averages 7 knots; however, a maximum of 80 knots has been recorded. Wind direction is predominantly from the south during all months.

B. PHYSICAL GEOGRAPHY

The physiographic subdivisions in the vicinity of Carswell AFB are coincident with geologic outcrop. For example, the Grand Prairie section is underlain by alternating limestones and marls of the Washita and Fredericksburg groups. Figure 7 illustrates a general geologic map in the vicinity of Carswell AFB. This figure can also be used to locate physiographic subdivisions once the relationship between physiography and the underlying geology is understood.

Physiographic subdivisions, like geologic outcrops are arranged in north-south trending bands as illustrated in Figure 7.

Carswell AFB is located within the Grand Prairie section of the Central Lowlands physiographic province which is

GN14649.80

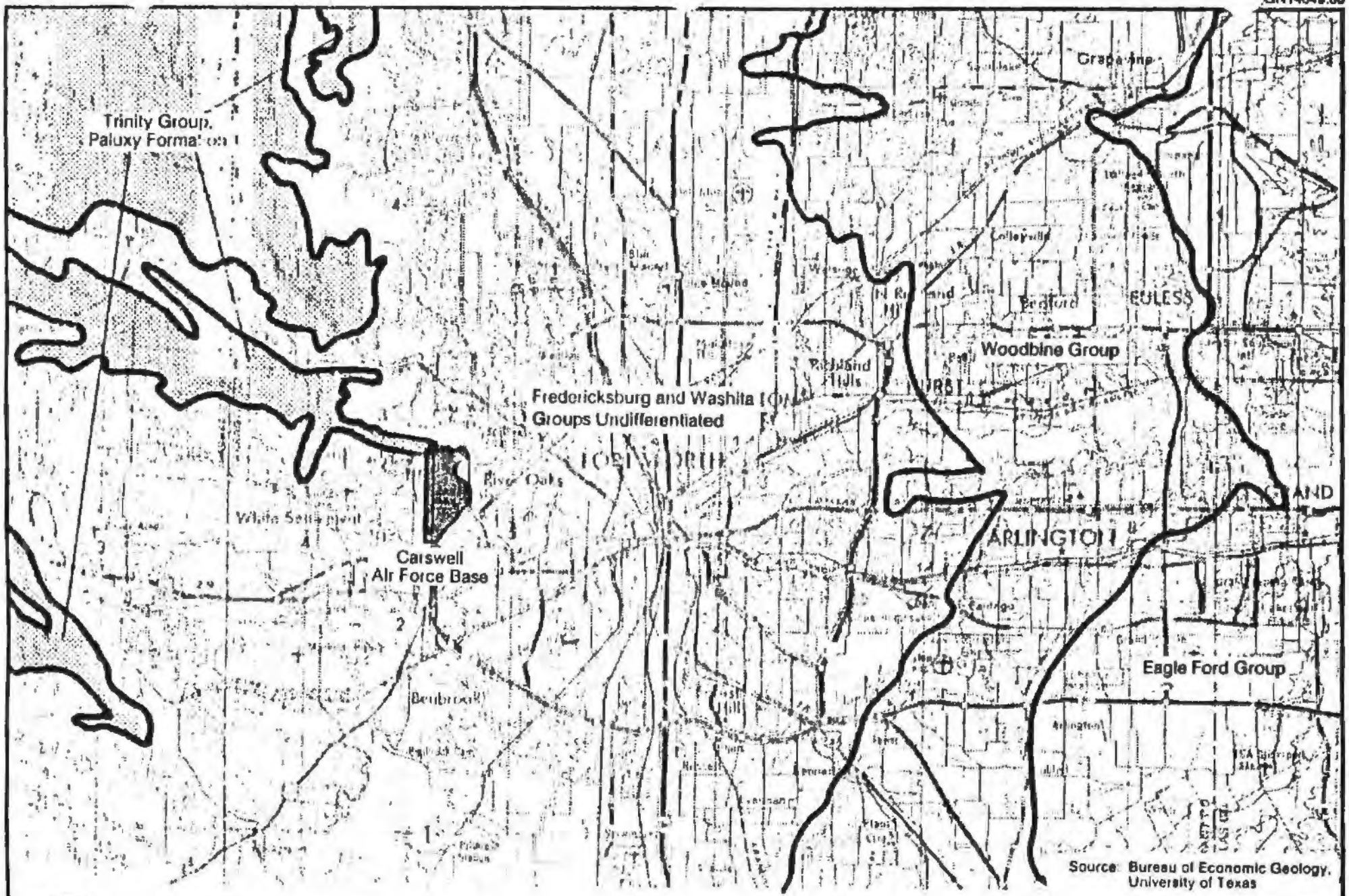


FIGURE 7.
General Geologic Map.

CH2M HILL

coincident with the Fredericksburg and Washita Groups (see Figure 7). This section is characterized by terrace surfaces sloping gently eastward, interrupted by westward-facing escarpments. The Grand Prairie section is, in general, mantled by a thin layer of light brown to black loamy soil with characteristics differing depending on the nature of the underlying material. The broad, gently sloping terrace is grass covered and typically treeless except for isolated stands of upland timber.

The Grand Prairie section is bounded on the east by the Eastern Cross Timbers section. This section, coincident with the narrow band of the Woodbine Group (see Figure 7), is characterized by low, rounded, wooded hills along the eastern margin. The section is well dissected by streams, leaving some areas rugged in appearance. Typical soils occurring in this section are reddish sand with iron concretions and some clay.

The Western Cross Timbers physiographic section lies west and adjacent to the Grand Prairie section. Parts of Carswell AFB lie within the Western Cross Timbers section, although most of the base is located within the Grand Prairie section. The Western Cross Timbers section, underlain by the Trinity Group (see Figure 7), is characterized by a rolling to hilly topography that is dissected into steep hills and deep ravines. This section is typified by sandy soils supporting a heavy growth of post oak and blackjack oak.

The base itself is located due south of Lake Worth. The shoreline of the lake is the north base boundary. This lake was man made, created by damming the Trinity River at a point just northeast of the base and is used as a potable water reservoir. Elevation of lake water surface is fairly constant at approximately 594 feet mean sea level (msl), the fixed elevation of the dam spillway.

Topography at the base is fairly flat except for areas adjacent to Farmer's Branch and the Trinity River (see Figure 8). Elevations range from approximately 690 feet msl at the southwest corner of the base and slope gently northeast towards Lake Worth and east towards the West Fork Trinity River. Elevations at the West Fork Trinity River east of the base are approximately 575 feet msl. Elevations along the main north-south runway are approximately 650 feet msl, while elevations in the cantonment area are approximately 600 feet msl.

Four soil associations have been identified by the U.S.D.A. Soil Conservation Service at the base (see Figure 9). Three of the four associations can be generally described as nearly level to gently sloping clayey soils. The fourth association is a loamy soil.

These include the Sanger-Purves-Slidell Association, Aledo-Bolar-Sanger Association, and Frio-Trinity Association. Of these associations, most of the base is situated on Sanger-Purves-Slidell and Aledo-Bolar-Sanger Association. The Frio-Trinity Association, a clayey soil and the Bastsil-Silawa Association occur along and adjacent to the Trinity River flood plain.

The U.S.D.A. Soil Conservation Service describes the soil associations at Carswell AFB as follows:

- <u>Sanger-Purves-Slidell Association</u>--Nearly level and gently sloping, deep and shallow, clayey soils; on uplands.

- <u>Aledo-Bolar-Sanger Association</u>--Gently sloping to moderately steep, very shallow to deep, loamy and clayey soils; on uplands.

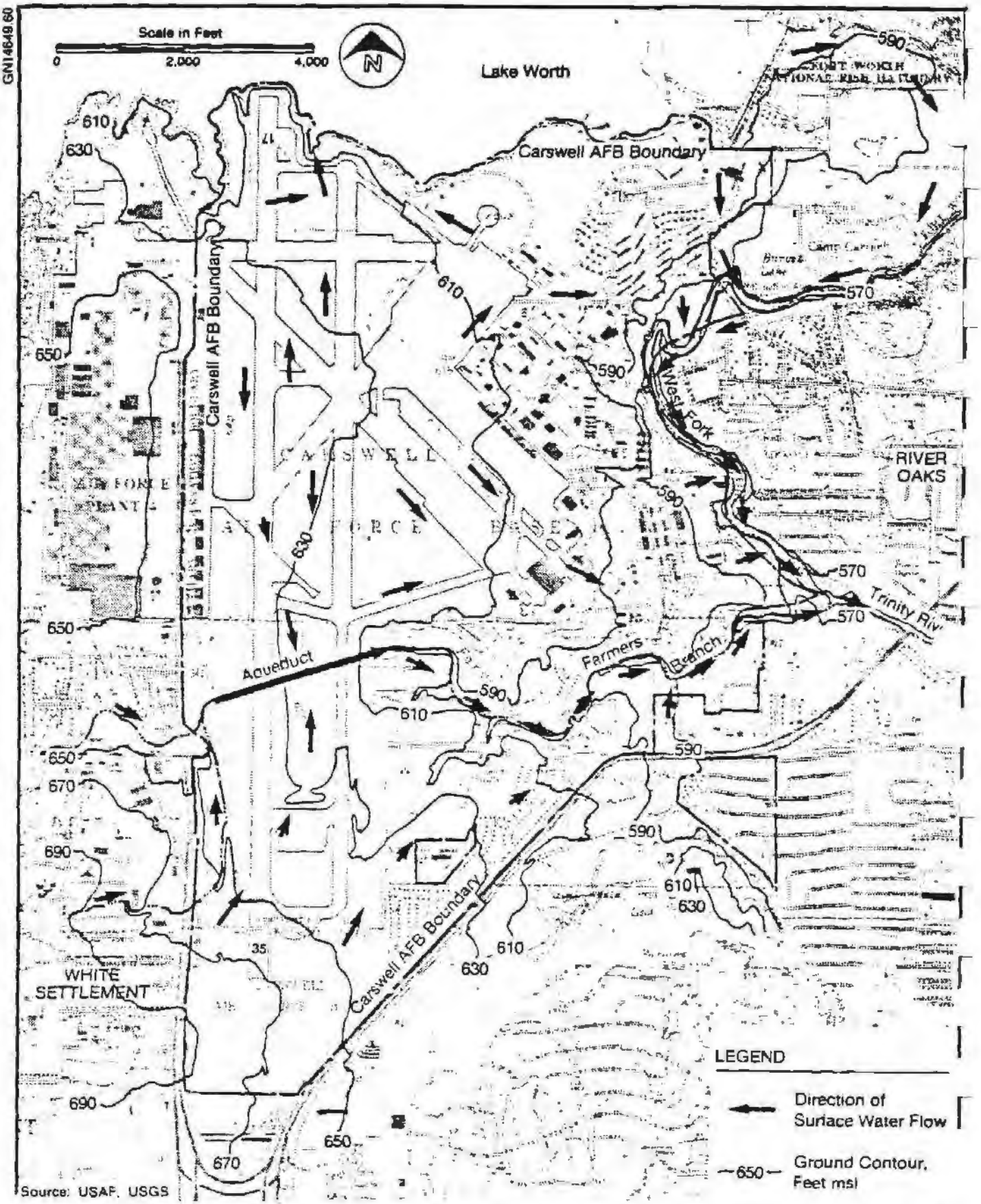


FIGURE 8.
Topography and Surface Drainage Map.

CH2M HILL

GN14649.60

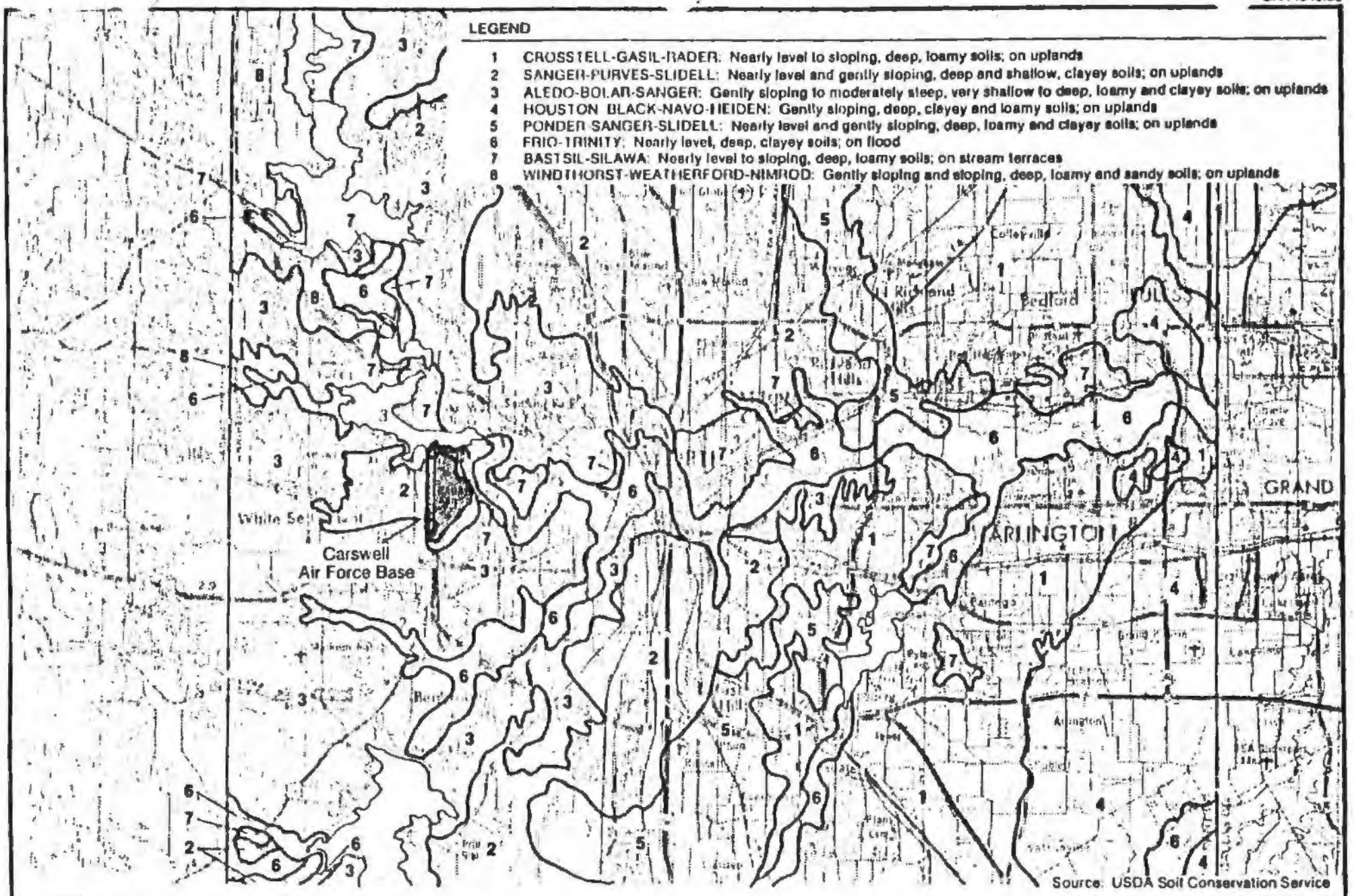


FIGURE 9.
General Soil Map.

CH2M HILL

- Frio-Trinity Association--Nearly level, deep, clayey soils; on flood plains.

- Bastsil-Silawa Association--Nearly level to sloping, deep, loamy soils; on stream terraces.

A more complete description of these soil associations is presented in Appendix E. Properties of soils occurring on base are summarized in Table 3.

The geologic history of Tarrant county and north-central Texas is complex. The sedimentary rock record goes back to Cambrian times (approximately 540 million years ago), when the area where Carswell AFB is located was a large, northwest-trending depositional trough, called the Fort Worth Basin. From the Cambrian period to the Pennsylvanian period (approximately 300 million years ago), sediments eroded from upland areas accumulated in the Fort Worth Basin.

The Paleozoic era ended (240 million years ago) with considerable orogenic (mountain building) movement which resulted in the westward tilting of the Pennsylvanian strata.

The Triassic (230 million years ago) and the Jurassic (170 million years ago) periods were marked by an uplift of the land surface in north-central Texas. This uplift brought the marine sediments above sea level and changed the direction of surface-water flow.

What was once a depositional basin receiving sediments from nearby upland areas, became a source of sediments, removed by stream erosion and transported and deposited in the Gulf Coast Embayment. This period of erosion led to extensive truncation of Pennsylvanian strata in the Fort

Table 3
SOIL PROPERTIES

Soil Associations	USDA Texture	Permeability (cm/sec)	Shrink-Swell Potential	Erosion[a] Factor (K)	Depth to Bedrock (in)	Depth to High Water Table (ft)
Sanger	Clay Loam	$<4.2 \times 10^{-5}$	High	0.32	>60	>6
Purves	Clay Over Bedrock	3×10^{-4}	High	0.32	8-20	>6
Slidell	Silty Clay	$<4.2 \times 10^{-5}$	High	0.32	>60	>6
Aledo	Clay Loam Over Bedrock	9×10^{-4}	Moderate to Low	0.32	8-20	>6
Bolar	Clay Loam over Bedrock	9×10^{-4}	Moderate	0.32	20-40	>6
Frio	Silty Clay Loam	3×10^{-4}	Moderate	0.32	>60	>6
Trinity	Clay	$<4.2 \times 10^{-5}$	Very High	0.32	>60	0-3
Bastsil	Sandy Clay Loam	9×10^{-4}	Moderate to Low	0.24	>60	>6
Silawa	Sandy Clay Loam	3×10^{-3}	Low	0.24	>60	>6

Source: U.S.D.A. Soil Conservation Service.

[a]Erosion factor indicates soil susceptibility to sheet and rill erosion by water. K factor used in Universal Soil Loss Equation. K values range from 0.05 to 0.69, the higher the value the more susceptible the soil is to erosion.

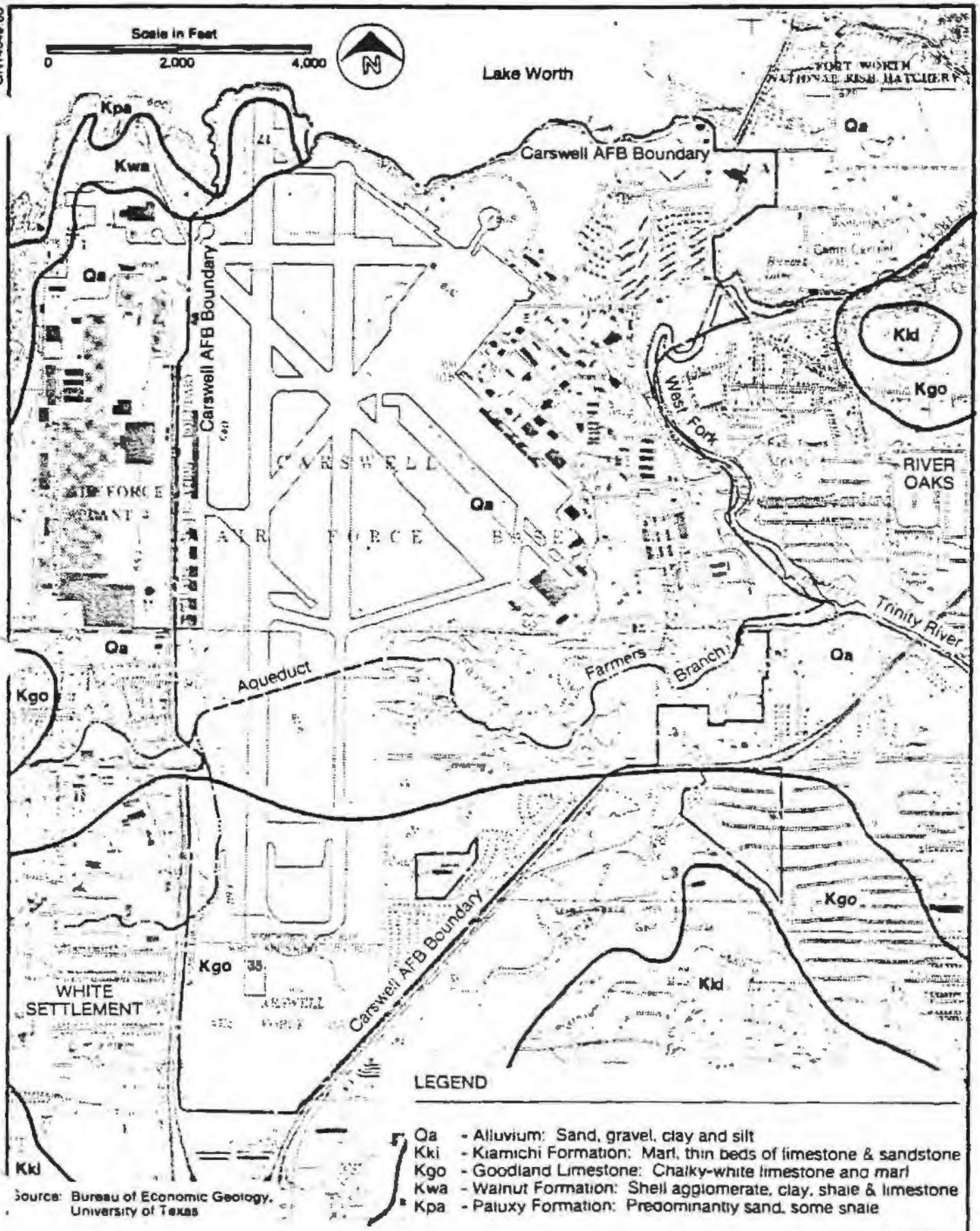
Worth Basin. At the end of the Jurassic period, Paleozoic age rocks were reduced to a nearly flat surface. This flat, eroded surface was then covered by marine sediments deposited during the invading seas of the Cretaceous period (100 million years ago). Two major invasions of the sea during Cretaceous time are evident from the rock record represented by the Comanche and Gulf series.

As the Cretaceous period ended and the seas withdrew, the surface rose above sea level. Throughout the Tertiary period (2 to 65 million years), except for minor periods of subsidence, the surface was eroded and modified by streams flowing toward the Gulf. During the Quaternary period, streams deposited alluvium on top of the Cretaceous sediments, producing the surface features present today.

Figure 10 illustrates a more detailed geologic map in the vicinity of the base. This map shows that the northern two-thirds of the base is manteled with alluvium.

In the southern one-third of the base, the alluvium is absent and rocks of the Cretaceous Goodland limestone and Kiamichi formation occur at or near the surface.

Alluvium overlying the older formations at Carswell was deposited by the Trinity River during flood stages, over the past million years. The alluvium varies in thickness and permeability throughout, resulting in a non-homogeneous, unconsolidated deposit. In general, alluvium thickness increases towards the river. Permeability is also higher closer to the river. During flood stage, as the river over-topped its banks, unconsolidated sediments would be deposited within the flood plain. The coarser, heavier material would be dropped nearest the river with finer and finer material



Source: Bureau of Economic Geology, University of Texas

FIGURE 10.
Detailed Geologic Map.

CH2M HILL

being carried farther away. Successive flooding events cause the build up of the alluvium at Carswell AFB.

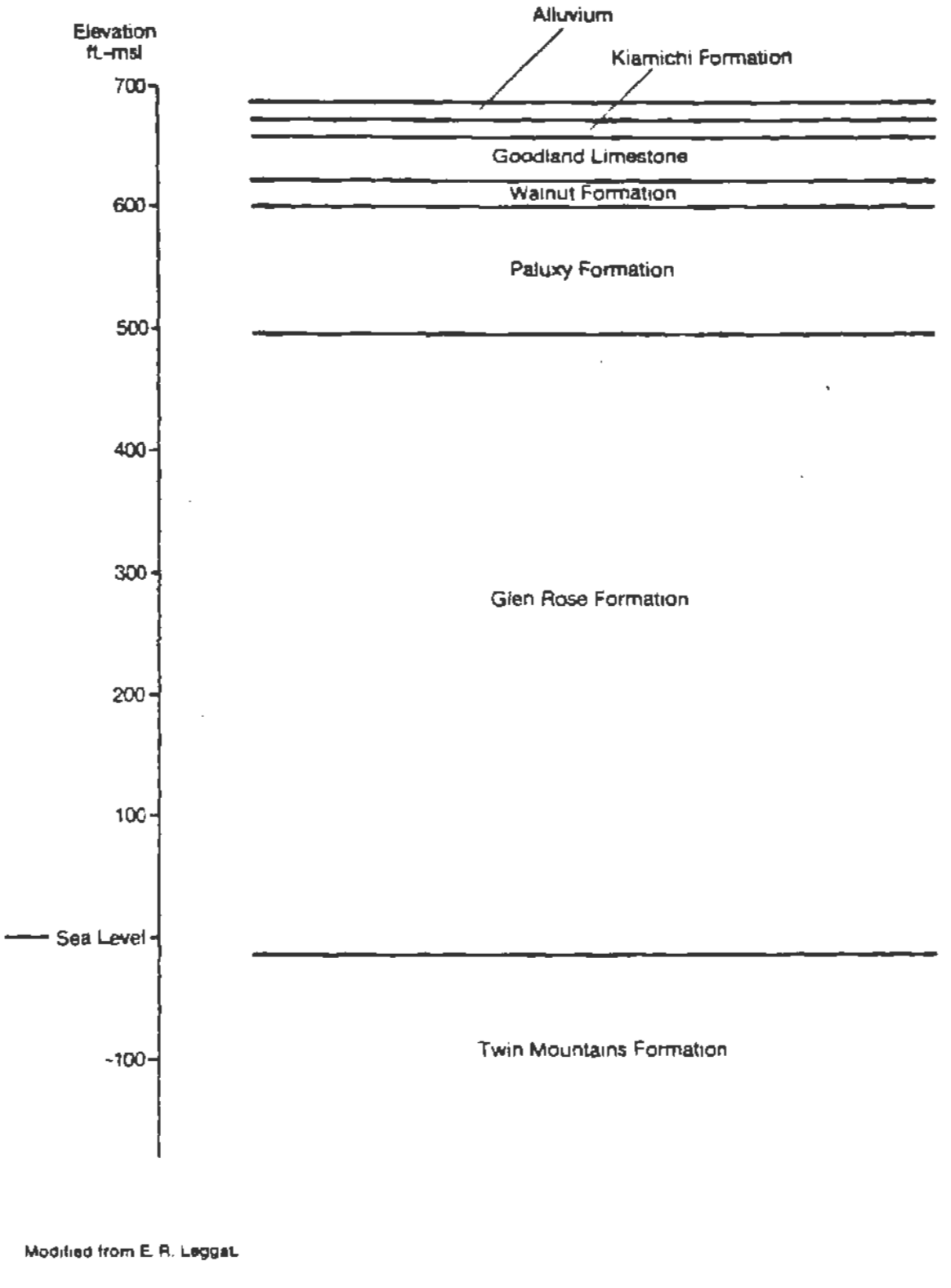
The varying intensity of the flood events resulted in varying deposition. This, together with the ever changing course of the river itself, results in the non-homogeneous nature of the alluvium.

Figure 11 illustrates a general geologic cross section typical of Carswell AFB.

Geologic formations important to this study include the surficial alluvium, and the Cretaceous strata whith outcrop at or occur below the base. Table 4 lists the geologic formations, a brief description of each, and an indication of water bearing properties. Of most significance to ground-water contamination are the alluvium deposits: the Kiamichi, Goodland limestone, and Walnut formation of the Fredericksburg group; and the Paluxy sand, Glen Rose limestone, and the Twin Mountains formations (formerly identified as the Travis Peak Formation), of the Trinity group.

E. R. Leggat of the U.S. Geological Survey described the Cretaceous and younger strata in a report on the geology ground-water resources of Tarrant County as follows:

- The Trinity group, the outcrop of which underlies the Western Cross Timbers physiographic section, includes the Twin Mountains formation, the Glen Rose limestone, and the Paluxy sand and has a maximum thickness of approximately 1,090 feet in Tarrant County. The Twin Mountains formation was deposited on an eroded surface by a shallow northward-transgressing sea. Seaward of this area



Modified from E. R. Leggat.

FIGURE 11.
General Geologic Cross Section.

CH2M HILL

Table 4
GEOLOGIC FORMATIONS IN TARRANT COUNTY, TEXAS

System	Series and Group	Formation and Member	Thickness (ft)	Character of Rocks	Topographic Expression	Water-Bearing Properties
Quaternary	Recent and Pleistocene	Alluvium	0-45	Sand, gravel, clay, and silt.	Terrace and flood-plain deposits.	Small to moderate yields. Water unsatisfactory for use unless treated.
Cretaceous	Gulf Series	Eagle Ford Shale	0-200	Bluish-black shale; thin sandstone and limestone beds.	Gently, rolling, treeless, black waxy soil. Forms Black Prairie belt.	Not known to yield water to wells in Tarrant County.
		WOODBINE FORMATION				
		Louisville Member	0-200+	Ferruginous sandstone, vari-colored clay and sandy clay, lignite, and gypsum.	Low hills, sandy soils, heavily wooded with oaks. Forms Eastern Cross Timbers belt.	Yields small supplies of water, generally more mineralized than water from Dexter member. Water in some areas highly mineralized.
		Dexter Member	0-110	Crossbedded ferruginous fine-grained sandstone, clay, and sandy clay.	Ditto	Important source of water for domestic supplies in eastern Tarrant County. Water typically is high in iron.
		UNCONFORMITY				
	Comanche Series Washita Group	Grayson Shale	0-85	Yellowish-brown and grayish-blue fossiliferous marl, clay, and thin limestone.	Slope, generally covered with wash from the Woodbine formation.	Not known to yield water to wells in Tarrant County.
		Main Street Limestone	0-45	Hard white limestone and marl.	Conspicuous and extensive upland prairie, westward facing escarpment.	Ditto
		Pawpaw Formation	0-40	Reddish-brown shale characterized by dwarfed pyrite fossils.	Narrow treeless slope separating terraces on Weno and Main Street formations.	Ditto

Table 4--Continued

System	Series and Group	Formation and Member	Thickness (ft)	Character of Rocks	Topographic Expression	Water-Bearing Properties
Cretaceous	Comanche Series Washita Group	Weno Clay	0-75	Bluish-Gray marl and limestone, fossiliferous.	Terrace topography produced by limestones of middle and upper parts of the Weno.	Ditto
		Denton Clay	0-35	Blue-gray marl, marly ledges, shell agglomerate in upper part.	Grassy slope between resistant Fort Worth and Weno formations.	Ditto
		Fort Worth Limestone	0-35	Alternating limestone and marl, fossiliferous.	Upland prairie and black-land soils.	Ditto
		Duck Creek Formation	0-90	Impure limestone and marl, which is blue when fresh and straw-colored when weathered. Fossiliferous with distinctive ammonities.	Bench topography produced by lower limestone unit. Upper marl forms slope separating the Duck Creek from Fort Worth limestone.	Ditto
	Comanche Series Fredericksburg Group	Kiamichi Formation	0-40	Blue and brownish-yellow marl, thin limestone and sandstone flags.	Grassy slope separating scarps of Goodland and Duck Creek formations.	Ditto
		Goodland Limestone	0-130	Chalky-white fossiliferous limestone, and blue to yellowish brown marl.	Prominent glaring-white escarpment along streams.	Ditto
		Walnut Clay	0-28	Shell agglomerate fossiliferous clay and limestone, sandy clay, and black shale.	Forms conspicuous escarpment and waterfalls in western Cross Timbers belt.	Not known to yield water to wells in Tarrant County.

Table 4--Continued

System	Series and Group	Formation and Member	Thickness (ft)	Character of Rocks	Topographic Expression	Water-Bearing Properties
		UNCONFORMITY				
Cretaceous	Comanche Series Trinity Group	Paluxy Sand	140-190	Fine-grained sand, shale, sandy shale, lignite and pyrite.	Sandy soil, hummocky topography, heavily wooded with oaks.	Source of supply for most households, smaller cities, and some industries.
		Glen Rose Limestone	250-450	Fine-grained limestone, shale, marl, and sandstone.	Not exposed in Tarrant County.	Sands yields small supplies to wells in Fort Worth and western Tarrant County. Water too highly mineralized east of Fort Worth.
		Twin Mountains Formation (Formerly Travis Peak Formation)	250-450	Course to fine-grained sandstone, red shale, red and yellow clay at base.	Ditto	Principal aquifer in Tarrant County. Yields large supplies for municipal and industrial purposes. Water in upper sands east of Fort Worth may be highly mineralized.
		MAJOR UNCONFORMITY				
Pennsylvanian	Undifferentiated		6,000-7,000	Gray, sandy shale, tight quartzitic sandstone, black limestone. Probably represents Strawn formation.	Ditto	Not tested. Probably would not yield fresh water.

Source: E. R. Leggat

of deposition, limestone, shale, and sand were deposited. These constitute the Glen Rose limestone, which represents the seaward facies of part of the Twin Mountains formation, being deposited simultaneously to the north. Overlying the Glen Rose limestone is the Paluxy sand, which is considered to be a deposit of the regressive phase of the sea.

The sands of the Trinity group are the most important sources of ground water in Tarrant County.

The Twin Mountains formation is the oldest formation used for water supply in the vicinity of Carswell AFB. Leggat describes this formation as follows:

- In ascending order, the Twin Mountains formation is divided into the Sycamore sand member, the Cow Creek limestone member, and the Hensell sand member. The Twin Mountains formation does not crop out in Tarrant County.

  The thickness of the Twin Mountains formation increases eastward (downdip), ranging from approximately 250 feet at the Lake Worth to 430 feet at Arlington. The formation maintains a fairly uniform thickness of approximately 370 to 400 feet along the strike.

  The Twin Mountains formation consists of a basal conglomerate of chert and quartz, grading upward into coarse- to fine-grained sand interspersed with varicolored shale.

The depth to the Twin Mountains increases toward the east, ranging from 550 feet at Lake Worth to 1,490 feet at Arlington. The average dip of the formation is about 40 feet per mile.

The Twin Mountains formation is the most productive aquifer in the county. Water from the Twin Mountains generally is satisfactory for most purposes; however, some sand strata may contain highly mineralized water.

The Glen Rose formation is described as follows:

- The Glen Rose limestone does not crop out in Tarrant County but is penetrated in wells drilled to the underlying Twin Mountains formation. The Glen Rose consists primarily of calcareous sedimentary rocks (limestone) and some sands, clays, and anhydrite.

  The Glen Rose limestone is not an important source of water in Tarrant County. In the Lake Worth-Eagle Mountain Lake area, the Glen Rose furnished small quantities of water to wells for domestic use. East of Fort Worth, wells were reported to obtain highly mineralized water from the Glen Rose. The driller reported that he encountered highly mineralized water at a depth of 1,120 to 1,140 feet.

The Glen Rose acts as a confining bed or at least an aquitard between the Twin Mountains and Paluxy sand aquifers, as evident by differing water levels in both formations.

The Paluxy sand is the uppermost aquifer at the base and is therefore most vulnerable to ground-water contamination. This stratum outcrops on the extreme northwest corner of the base and within the bed of Lake Worth. In fact, Lake Worth is a recharge area for the Paluxy sand.

Leggat provides a more complete description of the Paluxy sand as follows:

> The Paluxy sand crops out in the northwestern part of the county; it forms the surface of the Western Cross Timbers belt in that area and underlies the rest of the county. Above one-half to three-fourths of the Paluxy is sand; the remainder consists of clay, sandy clay, shale, lignite, silicified wood fragments, and nodules of pyrite. In general, coarse-grained sand is in the lower part of the Paluxy and grades upward into fine-grained sand with variable amounts of shale and clay.
>
> The Paluxy sand ranges in thickness from 140 to 190 feet and averages about 160 feet in Tarrant County. Northward, in Denton and Cooke Counties, the Paluxy sand, Glen Rose limestone, and Twin Mountains formation are not differentiated; southward the Paluxy sands are extremely thin at Whitney Dam, Hill County. The approximate altitude of the Paluxy sand in Tarrant County is shown in Figure 12. The Paluxy dips uniformly at a rate ranging from 35 to 40 feet per mile and averaging 37 feet per mile. It is encountered at increasing depths eastward, reaching a maximum depth of about 900 feet.

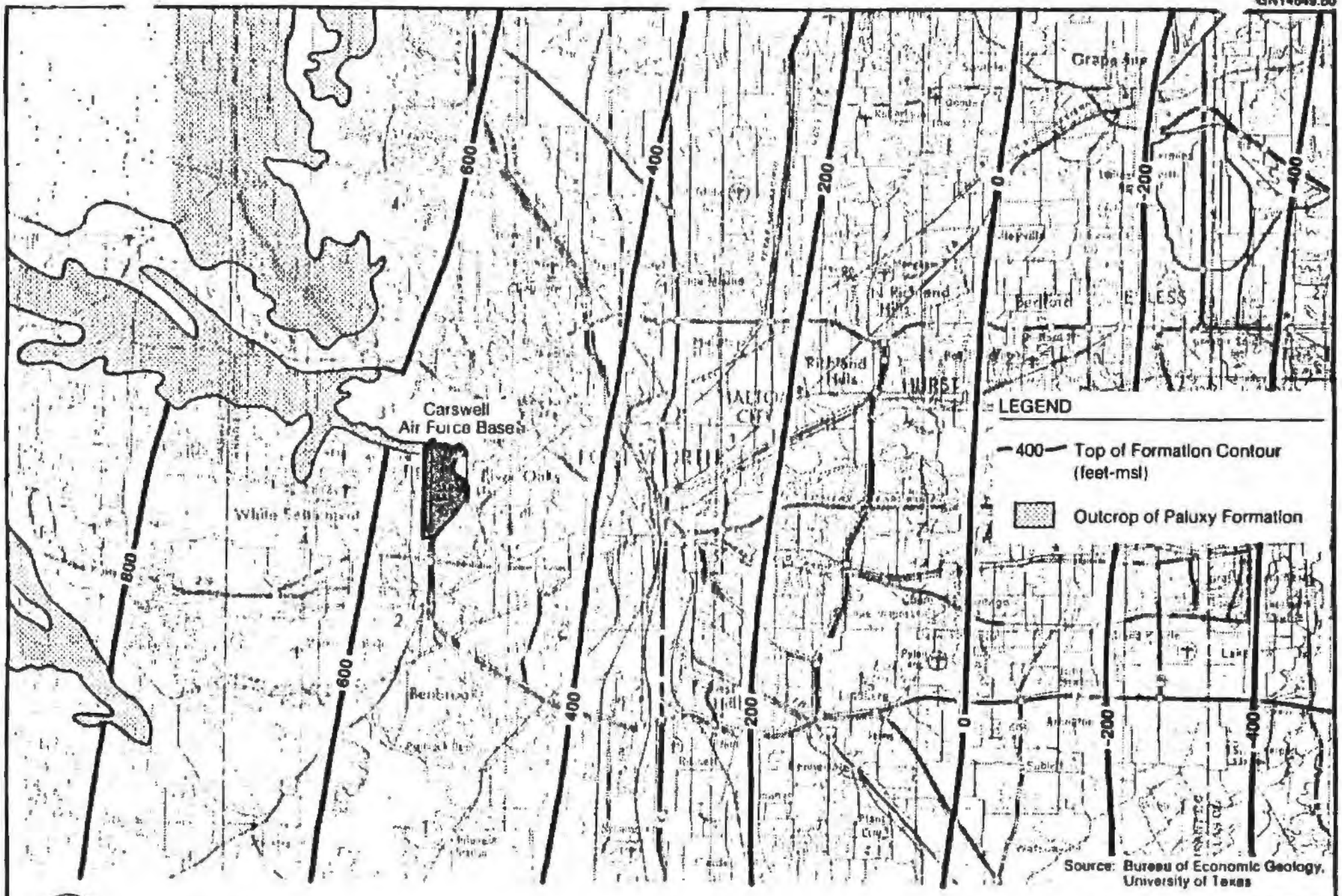


FIGURE 12.
Approximate Altitude of the Top of the Paluxy Formation.

CH2M HILL

> The Paluxy sand may be divided into upper and lower sand members. The sands in the upper part of the Paluxy are reported by drillers to be fine-grained and shaley. Most wells drilled to the Paluxy, therefore, are completed in the lower sand member which ranges from 100 to 120 feet in thickness. The lower sand member generally consists of two separate and distinct sand strata, but the individual sand beds do not maintain constant thickness or lithology over long distances.

Sections of the Fredericksburg group overlie the Paluxy sand over most of the base. Leggat describes the Fredericksburg group as follows:

> The Fredericksburg group in Tarrant County includes the Walnut clay, the Goodland limestone, and the Kiamichi formation, in ascending order. During the deposition of the Fredericksburg group, the seas were shallow, the depths ranging between 42 and 120 feet. The sedimentary rocks of the Fredericksburg group are mainly limestone and marl and lesser amounts of sandstone, shale, and shell aggregate. The thickness of the group ranges from 135 to 185 feet, increasing southward; and the rocks dip southeastward at a uniform rate of 38 feet per mile. The Kiamichi wedges out toward the south between the Goodland and the overlying Washita group.

The Fredericksburg group is not a source of ground water in Tarrant County, but is rather a confining bed for the underlying Paluxy sand.

The alluvium deposits occurring on base consist primarily of clay, silt, sand, and gravel deposited by the once meandering course of the Trinity River. Alluvium for the most part, is low in permeability due to the preponderance of clay and silt. However, permeable gravel strata occur within the alluvium which represent former stream channel deposits. Leggat describes the alluvium deposits in the vicinity of Carswell AFB as follows:

> Detrital alluvial deposits veneer the Cretaceous rocks in Tarrant County, particularly along the incised stream valleys and on the uplands. The alluvium is probably Pleistocene and Recent in age but is undifferentiated on the geologic map. The oldest alluvial deposits, known as upland gravels, are scattered patches of unconsolidated sand and gravel capping interstream divides. Because of their small areal extent and relative thinness, most of these deposits were not mapped. Younger deposits, known as bottom-land gravels, form terraces or benches closer to the stream valleys. These terraces become more distinct toward the present stream channel. The lowermost terrace is the present flood plain, which includes the stream bed.
>
> The alluvial deposits consist of material derived from formations that crop out within the drainage basin. The upland gravels are composed of angular gravel, sand, red clay, and silt. The sand and gravel is composed mostly of poorly sorted fragments of platy limestone. The lower terraces and flood-plain deposits consist of rounded gravel, sand, and clay. The thickness of the alluvial deposits ranges from a feather-edge to approximately 45 feet.

Flood-plain deposits are extensive along the West Fork and Clear Fork of the Trinity River, and range in width from a few feet in the upper reaches of the stream course to more than 2 miles. The most extensively developed terrace is in the Haltom City-northeast Fort Worth area, where the deposits extend a distance of more than 4 miles from the present river channel and as much as 110 feet above it. This extensive deposit probably consists of several terraces formed by the gradual shift southward of the ancestral channel of the West Fork of Trinity River, but the typical terrace or bench topography has been obscured by erosion and slumping.

The alluvial deposits in Tarrant County furnish small to moderate quantities of ground water, the larger yields coming from wells on the lower terraces and flood plains. The water generally is polluted from street runoff, fertilizer, and septic tanks and is used only for irrigation of lawns and crops. Where treatment is economical, the water from the alluvium may be used for public supply. The primary importance of the alluvial deposits, however, is a source of sand and gravel for building and road construction.

C. HYDROLOGY

Carswell AFB is located within the Trinity River basin just south of Lake Worth, a man-made reservoir on that river. Part of the base is drained by Farmers Branch which discharges into the West Fork Trinity River just south of the Cantonment area. Farmers Branch begins within the community

of White Settlement and flows eastward. Just south of Air Force Plant 4, Farmers Branch flows under the runway within two large culverts identified in Figure 8 as an aqueduct.

Most of the base surface drainage is intercepted by a series of storm drains and culverts, directed to oil/water separators and discharged to the West Fork Trinity River downstream of Lake Worth. A small portion of the north end of the base drains into Lake Worth.

Ground water occurs under perched water table, water table, and artesian conditions at Carswell AFB. Within the alluvium deposits as discussed above, discontinuous strata of higher permeability are associated with relict or ancient stream channel deposits. Although variable in occurrence, these strata are limited in areal extent and isolated by surrounding low permeability alluvium deposits. Ground water occurs within these coarse sand and gravel deposits and, in parts of Tarrant County, is developed for irrigation and residential potable use. Wells once located near the USAF Hospital developed water from the alluvium deposits for the community of River Oaks. As discussed above, the alluvium is generally thicker and most permeable closer to the River. The wells at the hospital were located within a few hundred feet of the river and downgradient from a continuous source of recharge--Lake Worth. These wells were abandoned immediately after Carswell AFB purchased this property for hospital construction. No records exist relative to location, well construction, or abandonment methods. An attempt was made to locate the wells during the site visit; however, no evidence of the wells could be found.

Ground water within these strata occurs as a perched water table and, in general, is not hydraulically connected to the underlying aquifers.

Recharge to these deposits is local and, for the most part, direct from rainfall and via ditches and stream channels where hydraulically connected. Direction of flow is controlled by surface topography, recharge/discharge areas (natural or by way of ponds, lagoons, drainage ditches or leaking pipelines) permeability, strata thickness and hydraulic gradient. Although site-specific information is insufficient to identify local flow direction within the alluvium deposits, in general, ground water most likely mirrors the surface drainage pattern, influenced somewhat by the potentiometric high created by Lake Worth. Flow within the alluvium, over most of the base, is probably eastward towards the Trinity River.

For the most part, ground water is not economically developable within the alluvium due to its limited distribution and susceptibility to surface/stormwater pollution. On base, according to some, a fairly extensive gravel deposit occurred in the vicinity of Building 1050 ("Jumbo Hangar"). This deposit was extensively mined for fill for base construction. The fill material, placed on natural low permeability clayey soils, is relatively high in permeability, and would readily transmit water.

Studies done by Hargis and Montgomery, Inc. for General Dynamics (Air Force Plant 4) refer to both the alluvium and/or fill as the upper zone and correctly do not refer to this zone as an aquifer.

In general, ground water occurring within the upper zone is isolated from the deeper aquifers by the occurrence

of low permeability members of the Fredericksburg Group. The Fredericksburg Group, specifically the Goodland limestone and the Walnut formation, is irregular in occurrence and may have been removed by erosion under parts of the base. If the upper zone is in contact with the underlying Paluxy sand (uppermost aquifer), ground water could infiltrate from the upper zone to the Paluxy aquifer.

The Paluxy sand is the uppermost economically developable aquifer at Carswell AFB. This formation, together with the deeper Twin Mountains aquifer are the primary sources of potable ground water in the Fort Worth area. The communities surrounding Carswell AFB, primarily White Settlement, develop municipal water supplies from these formations.

Ground water occurs under both water table and confined conditions within the Paluxy sand. As discussed above, Cretaceous strata dip to the east in north central Texas. Erosion has in turn truncated the deposits, resulting in a relatively flat plain, with variations due to differences in erosional resistance of different geologic materials. This geologic history has resulted in the surface expression evident today, in that eastward dipping strata outcrop as successive, parallel bands, as seen in Figure 7. Where permeable strata outcrop, recharge to that aquifer occurs. In those areas of outcrop, ground water occurs under water table or unconfined conditions.

As recharge water moves downgradient it becomes confined by the occurrence of overlying, low permeability strata. In those areas, ground water occurs under confined or artesian conditions and the water surface is restricted from rising above the top of the aquifer.

Direction of ground-water flow within the Paluxy sand is generally down dip or eastward. At Carswell AFB ground-water flow is influenced by the Lake Worth recharge area creating a potentiometric high and the ground-water withdrawals of White Settlement causing a potentiometric low. At the base, the direction of ground-water flow is probably more south than east because of these two local influences.

The Paluxy sand, as discussed above, outcrops west of the base but, more importantly, it outcrops within the bed of Lake Worth. Lake Worth is a recharge area for the Paluxy sand. The aquifer occurs under water table conditions at areas where the Paluxy sand outcrops.

With the exception of the outcropping at the extreme northwest corner of the base and with the possible exception of areas where the Walnut Formation may be discontinuous, the Goodland limestone and the Walnut formations confine the Paluxy sand under artesian conditions. Figure 12 depicts the altitude and configuration at the top of the Paluxy sand. At Carswell AFB, the top of the Paluxy occurs at approximately 550 to 650 feet msl or approximately 115 feet below land surface (bls). Figure 13 illustrates the approximate saturated thickness of the Paluxy sand. At Carswell AFB the Paluxy aquifer is approximately 100 feet thick.

The Paluxy sand is used extensively in the vicinity of the base for water supply. As a result, water levels within the aquifer throughout most of Fort Worth have declined significantly over the years. Figure 14 illustrates the potentiometric surface of the Paluxy aquifer as it appeared in 1955. At that time, water levels at Carswell AFB were approximately 500 feet msl, which is near the top of the aquifer. Since the base does not develop water from the

GN14649.60

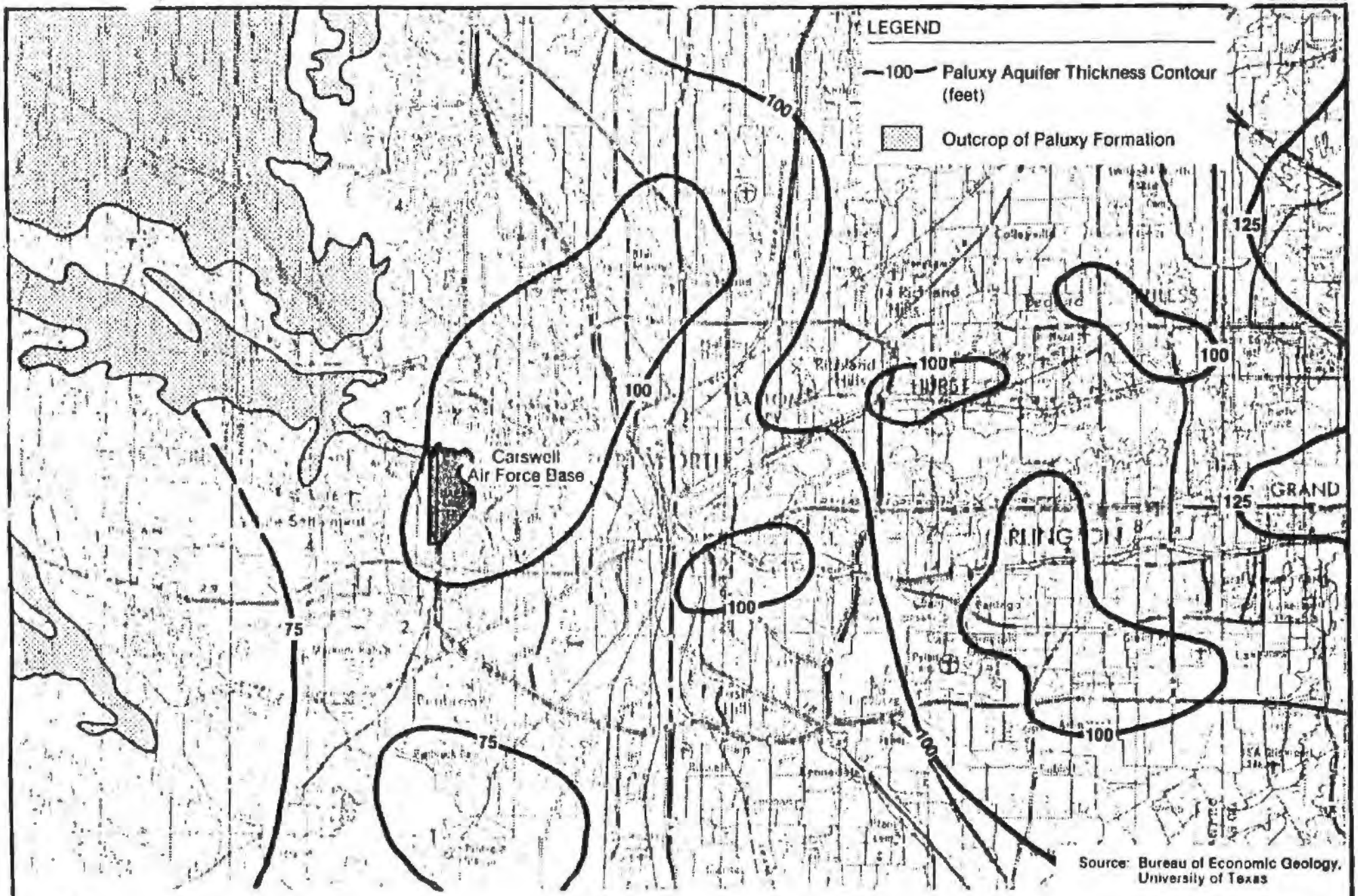


FIGURE 13.
Approximate Thickness of the Paluxy Aquifer.

CH2M HILL

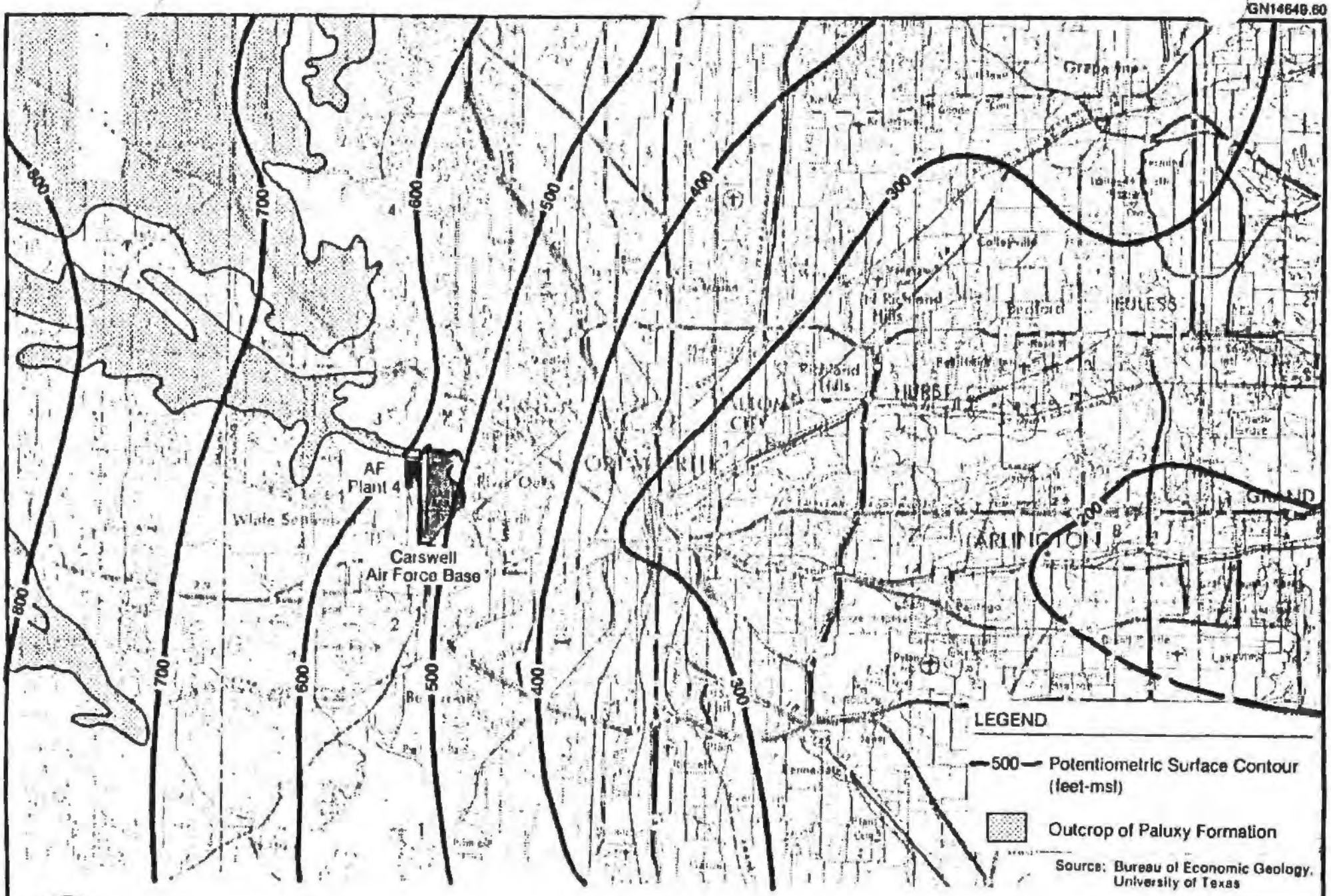


FIGURE 14.
Potentiometric Surface of the Paluxy Aquifer, 1955.

Paluxy sand and because of the proximity to a constant recharge source (Lake Worth), water levels at the base have not declined to the extent evident in other parts of the county. Figure 15 illustrates a more recent potentiometric surface of the Paluxy aquifer. Water levels at that time (1976) in the vicinity of the base remain at approximately 500-feet msl.

Transmissivities within the Paluxy aquifer range from 1,263 to 13,808 gallons per day per foot (gpd/ft) and average 3,700 gpd/ft. Given an aquifer thickness of approximately 100 feet at Carswell AFB, permeabilities range from 13 to 140 gpd/ft^2 and average 37 gpd/ft^2. Well yields within the Paluxy aquifer range from 10 to 480 gallons per minute (gpm) and average approximately 100 gpm.

Water quality within the Paluxy aquifer is generally good for potable use. Table 5 lists the range of chemical constituents occurring within the Paluxy sand in Tarrant County.

The Paluxy aquifer is separated from the deeper Twin Mountains formation by the Glen Rose limestone. As discussed above, the Glen Rose formation consists of calcareous sedimentary rock interbedded with sands, clays, and anhydrite. This formation is absent north and west of Fort Worth and in those areas the Paluxy sand and the Twin Mountains formation coalesce and become the Antlers formation.

At Carswell AFB, the Twin Mountains formation is hydraulically separated from the younger Paluxy sand by the Glen Rose formation. Figure 16 illustrates the elevation of the top of the Twin Mountains formation in Tarrant County. At Carswell AFB, the top of the Twin Mountains formation is at approximately 80 feet msl or 545 ft bls.

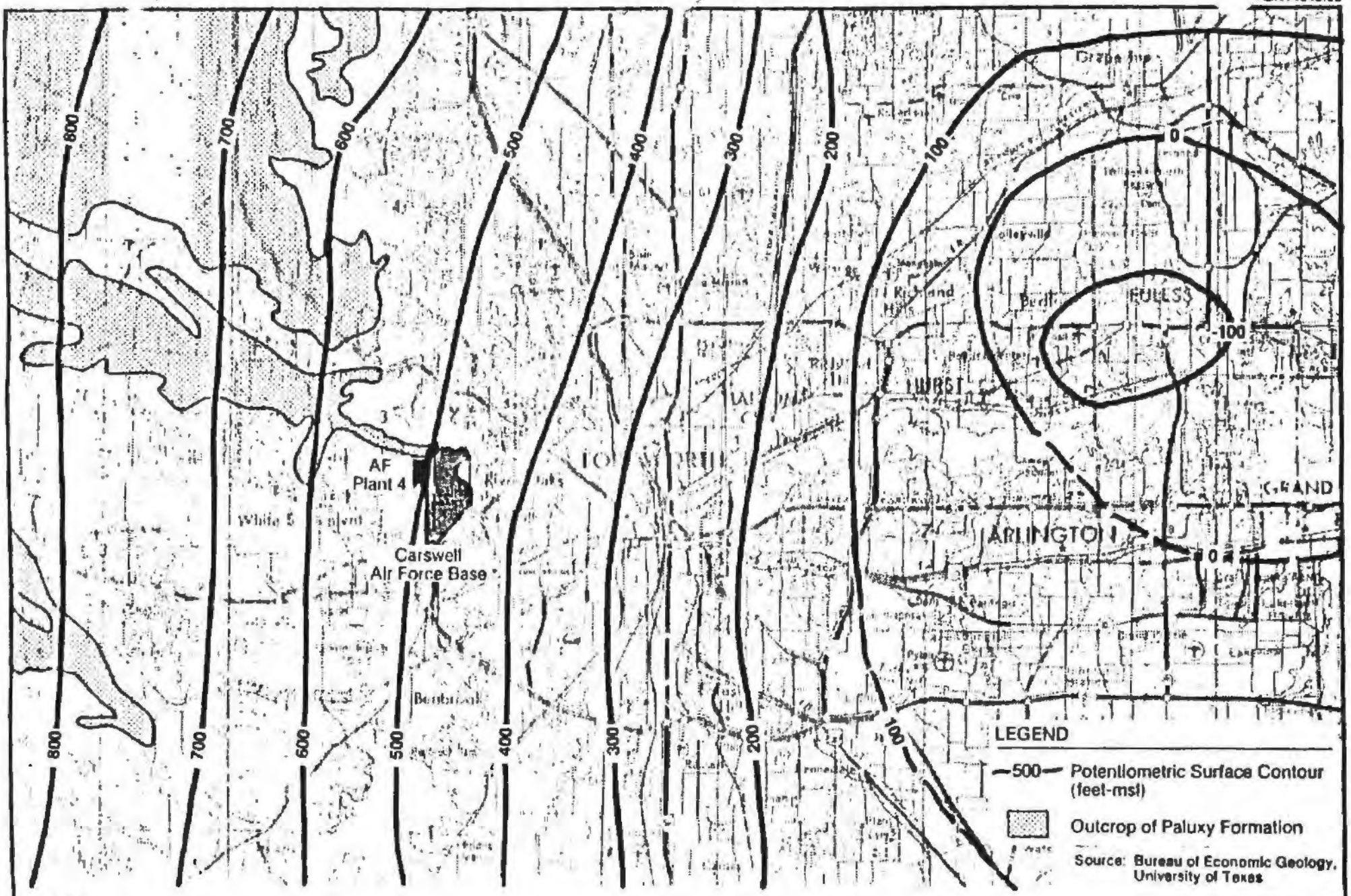


FIGURE 15.
Potentiometric Surface of the Paluxy Aquifer, 1976.

CH2M HILL

Table 5
RANGE OF CONSTITUENTS IN GROUND WATER FROM
SELECTED WELLS IN THE PALUXY FORMATION

Constituent or Property	Tarrant County
Silica (SiO_2)	1-30
Iron (Fe)	0-9.9
Calcium (Ca)	0-120
Magnesium (Mg)	0-43
Sodium (Na)	11-740
Bicarbonate (HCO_3)	177-689
Sulfate (SO_4)	6-1,080
Chloride (Cl)	5-117
Fluoride (F)	0-4.5
Nitrate (NO_3)	0-10.0
Boron (B)	0.1-.6
Dissolved Solids	264-2,176
Total Hardness ($CaCO_3$)	2-401
Percent Sodium (%)	7.1-99.5
pH	7.1-9.2
Sodium-Absorption Ratio (SAR)	0.2-68.8
Residual Sodium Carbonate (RSC)	0-10.0
Specific Conductance (umhos at 25°C)	427-3,193

Note: Analyses given are in milligrams per liter except percent sodium, specific conductance, pH, SAR, and RSC.

Source: Texas Department of Water Resources, 1982.

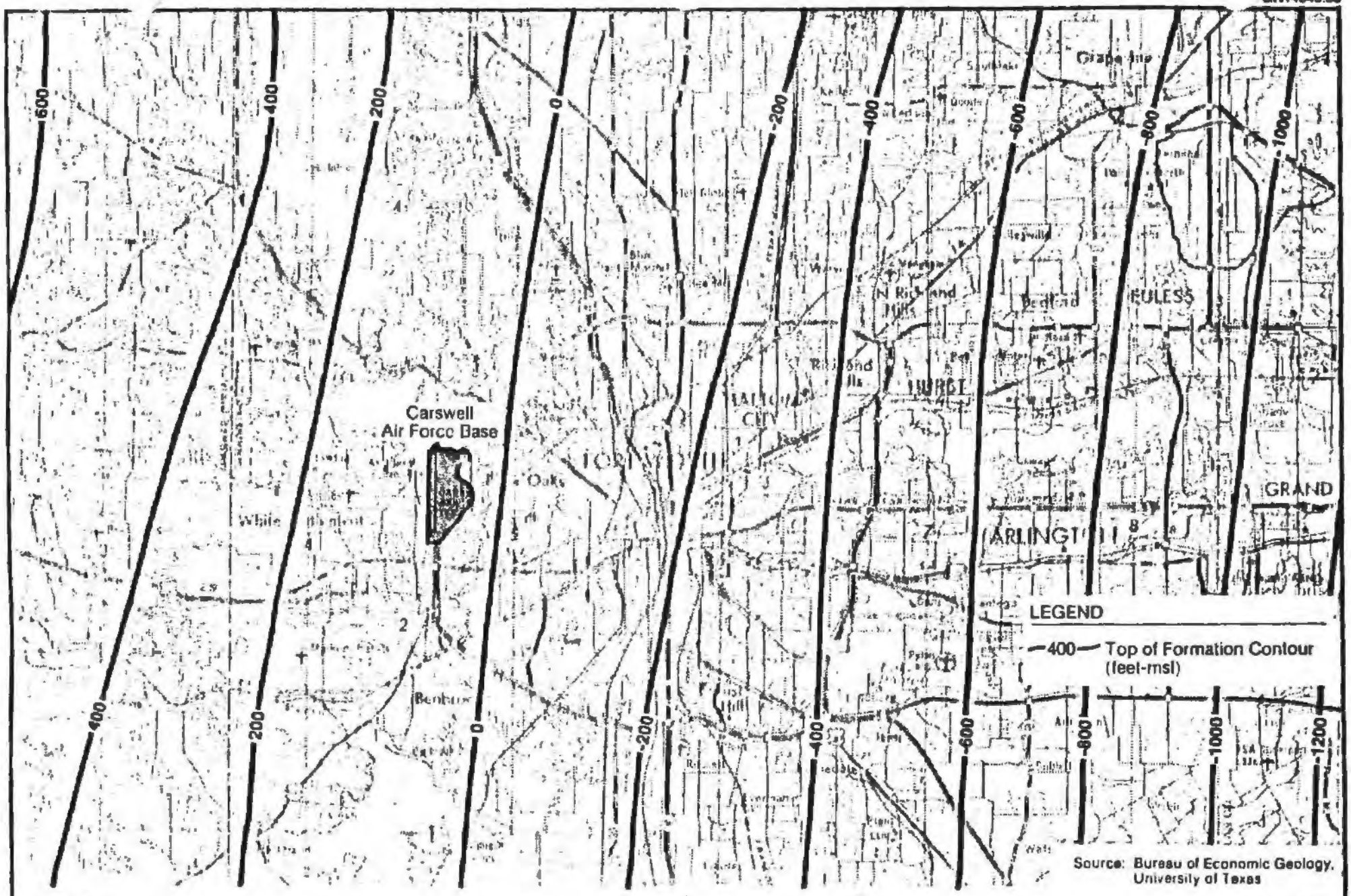


FIGURE 16.
Approximate Altitude of the Top of the Twin Mountains Formation.

Recharge to the Twin Mountains formation, like the Paluxy sand, occurs in areas of outcrop, located west of Carswell AFB. Here ground water occurs under water table conditions and flow is eastward. Like the Paluxy sand, the formation dips to the east and east of the recharge area, ground water occurs under confined, artesian conditions.

Also, like the Paluxy sand, ground-water withdrawals from the Twin Mountains aquifer have resulted in declining water levels. Figure 17 illustrates the 1955 potentiometric surface of the Twin Mountains aquifer. At that time, the potentiometric surface of this aquifer at Carswell AFB was approximately 250-feet msl. Figure 18 illustrates the 1976 potentiometric surface of the same aquifer. In 1976, the potentiometric surface was at elevation 0-feet msl, indicating a decline of approximately 250 feet from 1955 to 1976. Most of the decline was due to ground-water withdrawals for municipal water supply.

Transmissivities within the Twin Mountains aquifer range from 1,950 to 29,700 gpd/ft and average 8,450 gpd/ft in Tarrant County. Permeabilities range from 8 to 165 gpd/ft^2 and average approximately 68 gpd/ft^2 in Tarrant County.

Water quality within the Twin Mountains aquifer is suitable for potable water supply with regard to chemical concentrations. Table 6 lists the range of chemical constituents found in Tarrant County.

The potential for upper-zone ground-water contamination from past base activities is fairly high. In those areas where surface contamination has reached the ground water occurring in the upper zone, migration could occur laterally through relict buried stream channels discharging to the Trinity River or seeping downward to the Goodland and Walnut

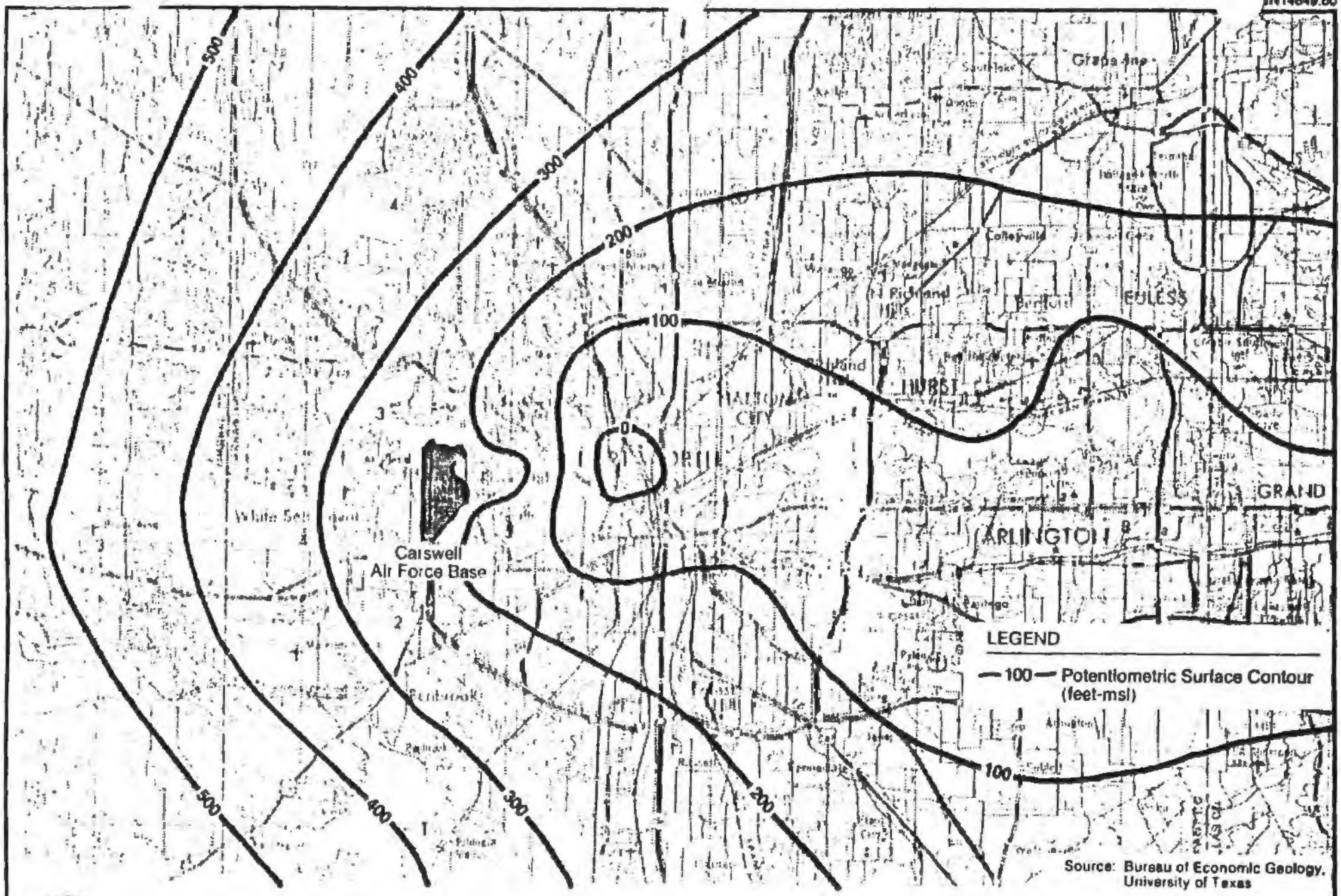


FIGURE 17.
Potentiometric Surface of the Twin Mountains Aquifer, 1955.

CH2M HILL

GN14649.60

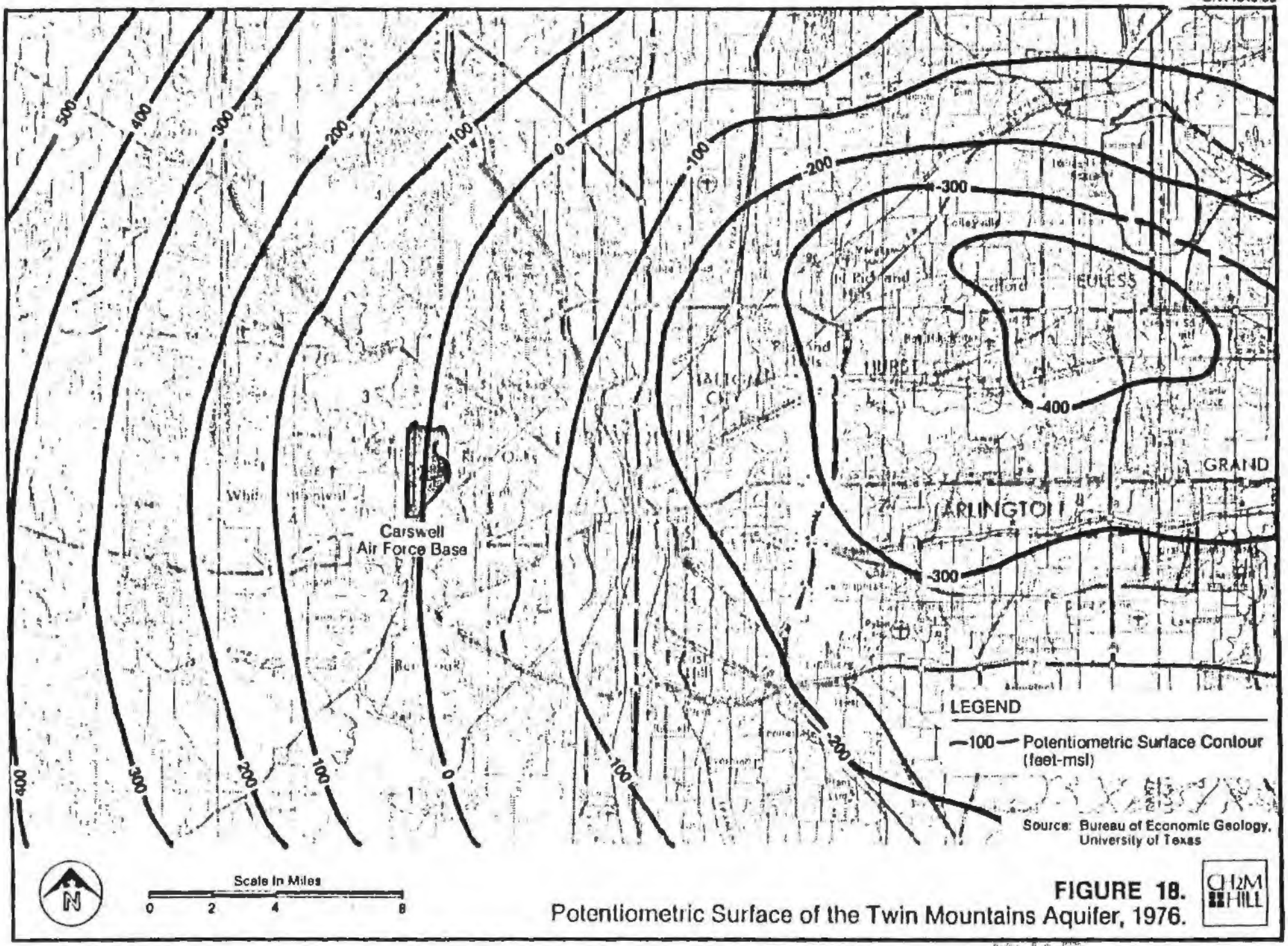


FIGURE 18.
Potentiometric Surface of the Twin Mountains Aquifer, 1976.

Table 6
RANGE OF CONSTITUENTS IN GROUND WATER FROM
SELECTED WELLS IN THE TWIN MOUNTAINS FORMATION

Constituent or Property	Tarrant County
Silica (SiO_2)	5-79
Iron (Fe)	0-2.6
Calcium (Ca)	1-114
Magnesium (Mg)	0-11
Sodium (Na)	141-670
Bicarbonate (HCO_3)	288-659
Sulfate (SO_4)	21-579
Chloride (Cl)	14-650
Fluoride (F)	0-7.0
Nitrate (NO_3)	0-5.9
Boron (B)	0.2-1.9
Dissolved Solids	381-1,735
Total Hardness ($CaCO_3$)	5-302
Percent Sodium (%)	12.8-99.3
pH	7.4-9.1
Sodium-Absorption Ratio (SAR)	0.4-72
Residual Sodium Carbonate (RSC)	0-10.1
Specific Conductance (umhos at 25°C)	607-3,317

Note: Analyses given are in milligrams per liter except percent sodium, specific conductance, pH, SAR, and RSC.

Source: Texas Department of Water Resources, 1982.

formations. In areas where these strata are absent, hydraulic connection between the permeable sections of the upper zone and the Paluxy sand may provide a pathway to that aquifer. The occurrence of buried sewer and pipelines may also act as permeable conduits similar to the buried stream channels.

Although the Goodland limestone and the Walnut formation are low in permeability, leakage through these strata is possible, especially in those areas where it has been thinned by erosion. In areas where it is thin, and there is a continuous driving force (i.e., pit, lagoon, or ditch) contaminants could migrate from the upper zone, through the Goodland and Walnut formations to the Paluxy sand. Another possible contaminant pathway is by way of Lake Worth. Some of the base stormwater discharge goes to Lake Worth. Not only is this a water supply reservoir for Fort Worth but it is also a recharge area for the Paluxy Aquifer. Any contaminants entering Lake Worth would result in both surface- and ground-water degradation. The Twin Mountains formation is protected from direct recharge via downward leakance by the overlying Paluxy aquifer.

Still, another potential pathway to the uppermost aquifers (Paluxy and Twin Mountains) is the existence of old, abandoned water wells. The records search indicated that at least eight abandoned wells are located near the base hospital. State of Texas records lists two wells completed in the Paluxy sand. The remaining six are completed in the shallow alluvium based on information developed from an interviewee. No disposal sites were identified near the hospital; therefore, the existence of these wells probably does not present a serious threat to ground-water contamination. At least one interviewee recalled the existence of one or two wells in the vicinity

of Facility 1809 (water tower). Further, prior to construction of the base, this area was farmland. Some of the farms undoubtedly had wells for irrigation and potable water. Also, several older homes on base which were once owned by private citizens may have had wells at one time.

Wells, especially those constructed years ago by cable tool methods, sometimes provide a direct pathway to the aquifer via the annular space between the casing and hole. Efforts should be made to locate and properly close all abandoned wells on Carswell AFB.

D. ECOLOGY

1. Habitat

Approximately 374 acres or 14 percent of Carswell AFB is considered unimproved, indicating the presence of semi-natural to natural ecological conditions. The base lies in the Cross Timbers and Prairies Region of Texas and native vegetation of the area is characterized by alternating bands of prairies and woodlands. High ground on the base is dominated by native and cultivated grasses such as little blue stem, indian grass, big bluestem, side-oats grama, and buffalo grass.

Forested areas on Carswell AFB occur primarily on lower land and along the banks of lakes and streams. Common native woody species include oaks, elms, pecan, hackberry, and sumac. Several non-native species such as catalpa and china-berry are common on Carswell AFB.

Typical wildlife on base includes black-tailed jack rabbits in the grassy areas along the runway and cotton-

tail rabbits, gray squirrels, and opposums in the wooded areas. Common birds include mourning doves, meadowlarks, grackles, and starlings. Hunting and trapping are not allowed on base. One small pond occurs on base near the golf course equipment shed. Lake Worth borders the entire northern edge of the base. Game fish reported from these waters and from Farmers Branch include black bass, sunfishes, and catfish.

2. Threatened or Endangered Species

According to the Texas Department of Parks and Wildlife and the United States Fish and Wildlife Service, there are no threatened or endangered species known to occur on Carswell AFB. None of the federally-listed plant species for Texas are known to occur within 100 miles of Tarrant County. Of the federally-listed animal species only the peregrine falcon (endangered), the bald eagle (endangered), and the whooping crane (endangered) are known to occasionally occur in the area; however, none of these are expected to reside in the vicinity of Carswell AFB. Several state-listed species are known or suspected to occur in Tarrant County (Table 7) but no inventory of these species has been made at Carswell AFB.

Table 7
FEDERAL AND STATE LISTED THREATENED OR ENDANGERED SPECIES KNOWN OR SUSPECTED TO OCCUR IN TARRANT COUNTY, TEXAS

Common Name	Scientific Name	State[a]	Federal[a]	Habitat
Bald Eagle	*Haliaeetus leucocephalus*	E	E	Near rivers and lakes
Peregrine Falcon	*Falco peregrinus*	E	E	Migrant
Whooping Crane	*Grus americana*	E	E	Migrant
Interior Least Tern	*Sterna albifrons athalasseos*	E	E	Migrant
White-faced Ibis	*Plegadis chihi*	T	--	Near ponds
Swallow-tailed Kite	*Elanoides forficatus*	T	--	River swamps
Osprey	*Pandion haliaetus*	T	--	Lakes and rivers
Wood Stork	*Mycteria americana*	T	--	Wetlands
Golden-cheeked Warbler	*Dendroica chrysoparia*	T	--	Cedar/oak woodlands
American Alligator	*Alligator Mississippiensis*	E	E	Permanent waterways
Texas Horned Lizard	*Phrynosoma cornutum*	T	--	Brushlands, grasslands
Louisiana Milk Snake	*Lampropeltis triangulum amaura*	T	--	Throughout
Paddle Fish	*Polyodon spathula*	E	--	Permanent waterways
Blue Sucker	*Cycleptus elongatus*	T	--	Permanent waterways

Source: Texas Parks and Wildlife Department; USFWS.

[a]E = endangered; T = threatened.

IV. FINDINGS

IV. FINDINGS

A. ACTIVITY REVIEW

1. Industrial Waste Disposal Practices

Industrial operations at Carswell AFB have been in existence since about 1942 and have been continuous since. The major industrial operations include: (1) maintenance of jet engine, aerospace ground equipment (AGE), fuel systems, weapons systems, and pneudraulic systems; (2) maintenance of general and special purpose vehicles; (3) aircraft corrosion control; and (4) non-destructive inspection (NDI) activities. These industrial operations generate varying quantities of waste oils, recoverable fuels, spent solvents, and cleaners.

The total quantity of waste oils, recoverable fuels, spent solvents, and cleaners generated at Carswell AFB is estimated to be approximately 55,000 gallons/year. This estimate was derived from a review of shop files and the best recollection of interviewees and is considered to be representative of the 1970s to 1983. Prior to the 1970s the waste quantities were probably less because fewer aircraft were maintained at the base (see Section IV.a.2, "Industrial Operations").

Practices for past (based on information obtained from shop files and on the best recollection of interviewees) and present industrial waste disposal are summarized below:

- 1942-1970: The majority of waste oils, recovered fuels, spent solvents, and cleaners were burned at the fire department training areas during practice exercises. Some waste oils and spent solvents were disposed of

through contractor removal, while some waste paints (contaminated with thinners and solvents), waste oils, and PD-680 are suspected of having been disposed of in the base landfills. Some waste oils, recovered fuels, spent solvents, and cleaners were also discharged to sanitary and storm sewers. These discharges occurred primarily at the washracks. In 1955, an oil/water separator (Facility 1190) was installed to recover waste materials discharged from the washracks. Materials from the oil/water separators were pumped out and disposed of through contractor removal. Discharge from the oil/water separator was and still is into the sanitary sewers.

- 1970-1975: During this period, most waste oils, spent solvents, and cleaners were disposed of by contractor removal. A private contractor would pump the materials from oil/water separators and from 55-gallon drums and bowsers. Recovered JP-4 was still stored at the fire department training area and burned in practice exercises. Recovered JP-4 was also reused by AGE. Some waste paints (contaminated with thinners and solvent), waste oils, and PD-680 are suspected of having been disposed of in the base landfills. Some waste oils, solvents, and cleaners were discharged into sanitary drains. This was primarily occurring at the washracks that discharge to the Facility 1190 oil/water separator. This oil/water separator was

routinely pumped out by a private contractor and the recovered materials removed from the base by the contractor.

- 1975-1982: The majority of waste oils, spent solvents and cleaners were disposed of by service contract either directly or through Defense Property Disposal Office (DPDO). Recovered JP-4 was stored at the fire department training area and burned during practice exercises. Recovered JP-4 was also used by AGE. PD-680 used at the washracks was discharged to the Facility 1190 oil/water separator which discharges to the sanitary sewers.

- 1982-Present: Waste oils, solvents, and cleaners are collected in 55-gallon drums and temporarily (less than 90 days) stored at 12 hazardous waste accumulation points located throughout the flightline area. They are subsequently disposed of by contractor removal through DPDO. Recovered JP-4 fuel is stored at the fire department training area for subsequent burning in practice exercises or is reused by AGE. Removal of waste oils and PD-680 (Type II) from oil/water separators is also handled by an off-base contractor through DPDO.

2. Industrial Operations

Industrial operations at Carswell AFB have been primarily involved with the maintenance and servicing of bomber, fuel tanker, and fighter jet aircrafts. The types and approximate dates are shown below.

- o 1946-1948: B-29 Heavy Bomber

- o 1948-1958: B-36B (Bomber)
  B-36D (Bomber)

- o 1958-1964: B-52D Stratofortress (Bomber)
  B-58 Hustler (Bomber)
  KC-135 Stratotanker

- o 1964-1968: B-52D Stratofortress (Bomber)
  KC-135 Stratotanker

- o 1968-1971: B-52D Stratofortress (Bomber)
  KC-135 Stratotanker
  FB-111 (Bomber)

- o 1971-1983: B-52D Stratofortress (Bomber)
  KC-135 Stratotanker
  F-4 Phantom (Fighter Jet)

- o 1983-Present: B-52D Stratofortress (Bomber)
  B-52H Stratofortress (Bomber)
  KC-135 Stratotanker
  F-4 Phantom (fighter Jet)

The B-29 and B-36B aircraft were powered by reciprocating engines, while the B-36D had both reciprocating and jet engines. The B-52, B-58, KC-135, FB-111, and F-4 aircraft are powered entirely by jet engines. Servicing and maintenance of the engines and equipment of the multi-engined B-52 (eight engines) and the KC-135 (four engines) aircrafts generates the majority of waste liquids at Carswell AFB. A master list of the industrial operations is contained in Appendix F.

Most of the liquid wastes generated by the industrial operations can be categorized as waste oils, recoverable fuels, spent solvents and cleaners. Waste oils generally refer to lubricating fluids, such as crankcase oils and synthetic turbine oils. Hydraulic fluids have also been included in this category. Recoverable fuels refer to fuels drained from aircraft tanks and vehicles, such as JP-4 and MOGAS. Spent solvents and cleaners refer to liquids used for degreasing and general cleaning of aircraft, aircraft systems, electronic components, and vehicles. This category includes PD-680 and various chlorinated organic compounds such as carbon tetrachloride, trichloroethylene (TCE) and 1,1,1-trichloroethane. Specific types of solvents in use by the Air Force have changed over the years. In the 1950s, carbon tetrachloride was in common use. Its use was replaced by TCE about 1960. Since then, TCE and 1,1,1-trichloroethane have been commonly used; however, TCE usage has decreased in favor of 1,1,1-trichloroethane. Today, PD-680 (Type II), 1,1,1-trichloroethane and, to a limited extent, TCE are in common use.

Waste paint solvents or thinners and strippers are generated by corrosion control activities. Typical thinners include iso-butyl acetate, toluol, methyl ethyl ketone (MEK), isopropanol, naptha and xylene. Paint strippers generally contain such compounds as methylene chloride, toluene, ammonium hydroxide and phenolics.

A review of base records and interviews with base personnel resulted in the identification of the industrial operations in which the majority of industrial chemicals are handled and hazardous wastes are generated. Table 8 summarizes the major industrial operations, including the

Table 8
MAJOR INDUSTRIAL OPERATIONS SUMMARY

Shop Name	Present Location (Bldg. No.)	Waste Material	Current Estimated Quantity (gal/yr)	Waste Management Methods (1940 1945 1950 1955 1960 1965 1970 1975 1980 1985)
7th Avionics Maintenance Squadron				
Fire Control Shop	1055	ID-680 (Type II)	150	FDT 1 → FDT 2 → CR → DPDO
7th Field Maintenance Squadron				
AGE Maintenance Shop	1414	7808 Engine Oil Engine Oils Hydraulic Fluids	3,300	FDT 1 → FDT 2 → CR → DPDO
		ID-680 (Type II)	75	
		JP-4	1,500	FDT 1 → FDT 2 → DPDO
		MOGAS	100	
		Aircraft Soap	1,800	Sanitary Sewer
Battery Shop	1410	Battery Electrolyte	500	Neutralized-Sanitary Sewer
Corrosion Control Shop	1403 1405 1434	Waste Paints Thinners Strippers Solvents	1,500	FDT 1 → FDT 2 → CR → DPDO

LEGEND

FDT 1 = Fire Department Training Area No. 1 (wastes burned during fire department training exercises).
FDT 2 = Fire Department Training Area No. 2 (wastes burned during fire department training exercises).
CR = Contractor removal (wastes sold direct to private contractor).
DPDO = Defense Property Disposal Office (wastes disposed of by contractor removal through DPDO).
OWS--Sanitary Sewer = wastes discharged to oil/water separator (OWS) with underflow discharged to sanitary sewer. Floating materials removed from OWS are disposed of by contractor removal through DPDO.

Table 8--Continued

Shop Name	Present Location (Bldg. No.)	Waste Material	Current Estimated Quantity (gal/yr)	Waste Management Methods (1940 1945 1950 1955 1960 1965 1970 1975 1980 1985)
Engine Shop	1410	7808 Engine Oil	600	FDT 1; FDT 2; CR; DPDO
		Carbon Remover (Cresylic Acid)	200	
		ID-680 (Type II)	550	
		JP-4	300	FDT 1; FDT 2
Fuel Systems Shop	1048	JP-4	300	OWS--Sanitary Sewer; Storm Sewer
		JP-4	1,200	FDT 1; FDT 2
Pneudraulics Shop	1050	Hydraulic Fluid	25	CR; DPDO
		PD-680 (Type II)	150	
NDI Lab	1414	ID-680 (Type II)	200	FDT 1; FDT 2; CR; DPDO
		Penetrant	200	
		Emulsifier	200	Sanitary Sewer; DPDO
		Developer	100	Sanitary Sewer
		Fixer	200	Silver Recovery-Sanitary Sewer
		7808 Engine Oil (Test Samples)	150	FDT 1; FDT 2; CR; DPDO

LEGEND

FDT 1 = Fire Department Training Area No. 1 (wastes burned during fire department training exercises).
FDT 2 = Fire Department Training Area No. 2 (wastes burned during fire department training exercises).
CR = Contractor removal (wastes sold direct to private contractor).
DPDO = Defense Property Disposal Office (wastes disposed of by contractor removal through DPDO).
OWS--Sanitary Sewer = wastes discharged to oil/water separator (OWS) with underflow discharged to sanitary sewer. Floating materials removed from OWS are disposed of by contractor removal through DPDO.

Table 8--Continued

Shop Name	Present Location (Bldg. No.)	Waste Material	Current Estimated Quantity (gal/yr)	Waste Management Methods (1940 1945 1950 1955 1960 1965 1970 1975 1980 1985)
Repair and Reclamation Shop	1050	FD-680 (Type II)	1,200	FDT 1, FDT 2, CR, DPDO
Jet Engine Test Cell	1015	JP-4 7808 Engine Oil Hydraulic Fluid	350 200 25	OWS-Sanitary Sewer
7th Organizational Maintenance Squadron				
Wash Rack	29	FD-680 (Type II) Aircraft Soap	15,000 5,000	OWS-Sanitary Sewer
7th Transportation Squadron				
Vehicle Maintenance Shop	1065	Engine Oils Transmission Fluids	3,000	CR, DPDO
		FD-680 (Type II) MOGAS	150 75	FDT 1, FDT 2, CR, DPDO
AIR FORCE RESERVES				
301 St. Consolidated Aircraft Maintenance Squadron				
AGE Maintenance Shop	1628	7808 Engine Oil	1,000	DPDO

LEGEND

FDT 1 = Fire Department Training Area No. 1 (wastes burned during fire department training exercises).
FDT 2 = Fire Department Training Area No. 2 (wastes burned during fire department training exercises).
CR = Contractor removal (wastes sold direct to private contractor).
DPDO = Defense Property Disposal Office (wastes disposed of by contractor removal through DPDO).
OWS--Sanitary Sewer = wastes discharged to oil/water separator (OWS) with underflow discharged to sanitary sewer. Floating materials removed from OWS are disposed of by contractor removal through DPDO.

Table 6--Continued

Shop Name	Present Location (Bldg. No.)	Waste Material	Current Estimated Quantity (gal/yr)	Waste Management Methods (1940 1945 1950 1955 1960 1965 1970 1975 1980 1985)
Engine Shop	1410	Engine Oils Hydraulic Fluids	150 150	FDT 1, FDT 2, CR, DPDO
		FD-680 (Type II)	100	FDT 1, FDT 2, CR, OWS-Sanitary Sewer
		JP-4	2,500	FDT 1, FDT 2
		7808 Engine Oil FD-680 (Type II)	300 300	CR, DPDO
		JP-4	125	FDT 1, FDT 2
Wash Rack	18	FD-680 (Type II) Aircraft Soap	9,000 3,100	Storm Sewer; OWS-Sanitary Sewer

LEGEND

FDT 1 = Fire Department Training Area No. 1 (wastes burned during fire department training exercises).
FDT 2 = Fire Department Training Area No. 2 (wastes burned during fire department training exercises).
CR = Contractor removal (wastes sold direct to private contractor).
DPDO = Defense Property Disposal Office (wastes disposed of by contractor removal through DPDO).
OWS--Sanitary Sewer = wastes discharged to oil/water separator (OWS) with underflow discharged to sanitary sewer. Floating materials removed from OWS are disposed of by contractor removal through DPDO.

current estimated quantities of wastes generated and the past and present major waste management practices (i.e., treatment, storage, and disposal) since 1942 when industrial operations began. The information reported on the waste quantities is developed from data extracted from shop files and interviews with shop personnel. Data furnished by shop personnel are based on their best recollection.

a. 7th Avionics Maintenance Squadron

i. Fire Control Shop

The Fire Control Shop, located in Building 1055, provides service and maintenance to aircraft gun systems. This operation uses PD-680 (Type II) as a cleaner and generates up to 150 gallons/year of waste PD-680 (Type II). Trichloroethylene (TCE) and perchloroethylene solvents were used in the past. TCE was in use prior to January 1981. From January 1981 to January 1983, perchloroethylene was used.

Waste PD-680 (Type II) is temporarily (less than 90 days) stored in 55-gallon drums located at a designated hazardous waste accumulation point adjacent to Building 1055. Final disposition of the waste is by contract disposal through DPDO. Prior to 1970, the wastes were drummed in 55-gallon containers and taken to the fire department training area for use in practice burn exercises. From 1970 to 1975, the wastes were sold directly to an off-base private contractor.

b. 7th Field Maintenance Squadron

i. AGE Maintenance Shop

The AGE Maintenance Shop, located in Building 1414, provides repair and maintenance to aerospace ground equipment (AGE). Wastes generated include about 3,300 gallons/year of 7808 engine oils, crankcase engine oils, and hydraulic fluids; 75 gallons/year of PD-680 (Type II); 1,600 gallons/year of waste JP-4 and MOGAS; and 1,800 gallons/year of aircraft soap. All wastes, except aircraft soap, are separately stored in 55-gallon drums located at a designated temporary (less than 90 days) hazardous waste accumulation point near Building 1414. Final disposal of the wastes is by contract removal through DPDO. The aircraft soap is used on the AGE washrack located inside Building 1414 and discharges to the sanitary sewer system.

Prior to 1970, commingled oils and PD-680 were stored in 55-gallon drums and taken to the fire department training area for use in practice burns. Waste JP-4 and small quantities of MOGAS were also taken to the fire department training area and burned. Between 1970 and 1982, the waste oils and PD-680 were segregated in 55-gallon drums and sold to an off-base contractor.

ii. Battery Shop

The Battery Shop services lead acid batteries. Approximately 500 gallons/year of waste battery electrolyte is generated. The electrolyte is neutralized with sodium bicarbonate and discharged into the sanitary sewer. This was also the common practice in the past.

iii. Corrosion Control Shop

Corrosion control activities include cleaning, stripping, sanding, wiping, priming, and repainting portions of aircraft and AGE equipment. The Corrosion Control Shop operates in three different buildings. Building 1434 contains a paint booth (for painting small aircraft parts) and a wheel stripping vat. Aircraft painting is conducted in Building 1403 and 1405. Wastes generated by corrosion control activities include approximately 1,500 gallons/year of waste paints, thinners (e.g., toluol, methyl ethyl ketone, isopropanol, naptha, xylene), strippers (e.g., compounds containing methylene chloride and toluene), and solvents. Commingled waste paints, thinners, and solvents generated in Building 1434 are stored in 55-gallon drums. Wheel stripper is segregated and stored in 55-gallon drums. The drums are stored at a designated temporary (less than 90 days) hazardous waste accumulation point located south of Building 1434. Commingled waste paints and thinners generated in Buildings 1403 and 1405 are stored in 55-gallon drums and stored at a designated temporary (less than 90 days) hazardous waste accumulation point located east of Buildings 1403 and 1405. Final disposition of the wastes is by contract removal through DPDO.

Until 1970, these wastes were commingled, stored in 55-gallon drums, and taken to the fire department training area and burned in practice burn exercises. Between 1970 and 1982, the wastes were sold directly to an off-base private contractor.

iv. Engine Shop

The Engine Shop is located in Building 1410. Activities include draining, maintenance,

repair, tear-down, and modification of jet engines. Wastes generated include 7808 engine oil (600 gallons/year), carbon remover (cresylic acid, 200 gallons/year), PD-680 (Type II, 550 gallons/ year), and JP-4 (300 gallons/year). These wastes are segregated in 55-gallon drums and stored at a designated temporary (less than 90 days) hazardous waste accumulation point located on the southeast side of Building 1410. Final disposition of the waste oils, carbon removers (cresylic acid), and PD-680 (Type II) is by contract removal through DPDO. The accumulated JP-4 is taken to the fire department training area and burned in practice exercises. Prior to the use of PD-680 in the Engine Shop, trichloroethylene (TCE) was likely in common use.

Prior to 1970, the wastes were taken to the fire department training area and burned. Some of these wastes may have been disposed of in base landfills. Bewteen 1970 and 1982, the waste oils, carbon remover, and PD-680 (Type II) were sold directly to an off-base contractor, while waste JP-4 was still taken to the fire department training area for burning.

v. Fuel Systems Shop

The Fuel Systems Shop, located in Building 1048, provides repair and maintenance to aircraft fuel systems and tanks. The only significant hazardous waste generated by this shop is JP-4 fuel drained from tanks. Small spills of JP-4 (less than one gallon) discharge into the floor drains which currently discharge into the flightline drainage ditch. The quantity of waste JP-4 generated in this manner is approximately 300 gallons/year.

Prior to 1978, this fuel was piped by gravity to the Facility 1190 oil/water separator. The pipe was routed through the much larger stormwater culvert that begins the flightline drainage ditch. About 5 years ago, the pipe ruptured and, since then, JP-4 has been allowed to enter the stormwater culvert and thus the flightline drainage ditch. This is the probable explanation for some of the material observed in the flightline drainage ditch during the records search team's base visit (see discussion of Site No. 13, Flightline Drainage Ditch in Section IV.B "Disposal Sites Identification and Evaluation"). Base civil engineering has plans to correct this problem.

Large quantities of JP-4 collected during draining of tanks (1,200 gallons/year) is either taken to the fire department training area and burned in practice exercises or reused by AGE.

vi. Pneudraulics Shop

The Pneudraulics Shop, located in Building 1050, provides maintenance and repair to aircraft pneumatic and hydraulic systems. Wastes generated include hydraulic fluid (25 gallons/year) and PD-680 (Type II, 150 gallons/year). Segregated wastes are stored in 55-gallon drums at a designated temporary (less than 90 days) hazardous waste accumulation point located outside of Building 1050. Final disposition of the wastes is by contract removal through DPDO. Prior to 1982, the wastes were sold directly to an off-base contractor.

vii. NDI Lab

The NDI lab is located in Building 1414. Non-destructive testing methods including x-ray, magnaflux,

and ultrasound, are performed to determine structural integrity and material defects of aircraft structures, component parts, and related ground equipment. Wastes generated include PD-680 (Type II, 200 gallons/year), penetrant (contains aromatic naptha, ethoxylated octophenol, biphenyl octyl phosphate, and fluorescent dye; 200 gallons/year), emulsifier (contains petroleum sulfonate, paraffin oil, ethoxylated octylenal and butyl zyethyl phosphate; 200 gallons/year), developer (contains sodium chromate; 100 gallons/year), fixers (200 gallons/year), and 7808 engine oil test samples (150 gallons/year). The waste PD-680 (Type II), penetrants, emulsifiers, and the 7808 engine oil test samples are segregated and disposed of by contract removal through DPDO. Developer solutions are discharged directly into the sanitary drains. Fixer solutions are sent to the base photo lab where silver recovery is practiced. The waste fixers are ultimately discharged to the sanitary drains.

Prior to 1970, waste PD-680, penetrant, and 7808 engine oils were taken to the fire department training area and burned in practice exercises. Between 1970 and 1975, these same wastes were sold directly to an off-base contractor. Since 1975, DPDO has been handling the disposition of these wastes. Past disposal of emulsifiers was by discharge to the sanitary drains until about 1975.

viii. Repair and Reclamation Shop

The Repair and Reclamation Shop, located in Building 1050, provides for the inspection, repair, and maintenance of aircraft wheels and bearings. Wastes generated include 1,200 gallons/year of PD-680 (Type II). This material is separately stored in 55-gallon drums located at a

designated temporary (less than 90 days) hazardous waste accumulation point located outside of Building 1050. Final disposition is by contract removal through DPDO.

Prior to 1970, the waste PD-680 was taken to the fire department training area and burned in practice exercises. Between 1970 and 1982, the waste was sold directly to an off-base contractor.

ix. Jet Engine Test Cell

The Jet Engine Test Cell is located at Building 1015. Approximately 15 jet engines are tested each month. Waste generated includes recovered JP-4 (350 gallons/year), 7808 engine oil (200 gallons/year), and hydraulic fluids (25 gallons/year). Wastes are collected in floor drains that drain to an oil/water separator located outside the test cell building. Discharge from the separator goes to the sanitary sewer system. The recovered JP-4, 7808 engine oil, and hydraulic fluids are periodically sold to an off-base contractor through DPDO.

c. 7th Organizational Maintenance Squadron

i. Washrack

The OMS Washrack is located at Pad 29, north of Building 1050 and directly west of Building 1048. This is the largest washrack on the flightline and is used to wash approximately 16 bombers and tankers per month. Washing is accomplished with PD-680 (Type II) and aircraft soap. Approximately 15,000 gallons/year of waste PD-680 (Type II) and 5,000 gallons/year of aircraft soap are discharged through the washrack drain and into the oil/water separator (Facility 1190) located next to the flightline

drainage ditch. Discharge from the separator goes into the sanitary sewer system. Waste PD-680 (Type II) collected in the oil/water separator is sold to an off-base contractor through DPDO.

An overflow pipe is located in the drain line between the washrack and the oil/water separator. This overflow pipe discharges to the storm drainage system that begins the flightline drainage ditch. If the valve to the oil/water separator is closed or the flow from the washrack is too great, the excess flow will enter the storm drains and thence the flightline drainage ditch. This is the probable explanation for some of the material observed in the ditch during the record search team's base visit (see discussion of Site No. 13, Flightline Drainage Ditch in Section IV.B, "Disposal Sites Identification and Evaluation").

The washrack and oil/water separator were installed in 1955. Prior to that time, all major aircraft washing would have been conducted at the smaller washrack at Pad 18 (currently in use by the 301st CAM Squadron). Discharge from that washrack would have entered directly into the storm drains.

d. 7th Transportation Squadron

i. Vehicle Maintenance Shop

The Vehicle Maintenance Shop, located in Building 1065, provides maintenance and repair for base special and general purpose vehicles. Wastes generated include 3,000 gallons/year of commingled oils and transmission fluids, 150 gallons/year of PD-680 (Type II), and 75 gallons/year of MOGAS. The wastes are segregated and stored in 55-gallon drums located at a designated temporary

(less than 90 days) hazardous waste accumulation point outside of Building 1065. Final disposition is by contract removal through DPDO.

Prior to 1982, the waste oils and transmission fluids were sold directly to an off-base contractor. Prior to 1970, the waste PD-680 and MOGAS were burned during fire department training exercises. From 1970 to 1982, these wastes were sold directly to an off-base contractor.

e. 301st Consolidated Aircraft Maintenance Squadron (AFRES)

i. AGE Maintenance Shop

The AGE Maintenance Shop, located in Building 1628, provides maintenance and repair of aerospace ground equipment. Wastes generated include 7808 engine oil (1,000 gallons/year), engine oil (150 gallons/year), hydraulic fluids (150 gallons/year), PD-680 (Type II, 100 gallons/year), and recovered JP-4 (2,500 gallons/year). Waste 7808 and other oils and hydraulic fluids are stored in 55-gallon drums and disposed of by contract removal through DPDO. Recovered JP-4 fuel is burned at the fire department training area during practice burn exercises. PD-680 (Type II) is used at a small AGE washrack at Building 1628 and discharges to an oil/water separator. The separator is periodically pumped out and the recovered PD-680 (Type II) sold to an off-base contractor through DPDO. The oil/water separator discharge to the sanitary sewer system.

Prior to 1970, waste oils, hydraulic fluids, and PD-680 were burned at the fire department training area during practice exercises. Between 1970 and

1982 waste oils and hydraulic fluids were sold directly to an off-base contractor, as was waste PD-680 between 1970 and 1981.

This shop has had several previous locations: (1) Building 1640, prior to 1979, and (2) Building 1647, from 1979 to 1981. Building 1640 was located at the site of the newly constructed Building 1643 ("Blue Hangar").

ii. Engine Shop

The Engine Shop, located in Building 1410, provides maintenance and repair of jet engines. Wastes generated include 7808 engine oil (300 gallons/year), PD-680 (Type II, 300 gallons/year), and recovered JP-4 (125 gallons/year). The 7808 engine oil and PD-680 (Type II) are segregated and stored in 55-gallon drums. Disposition is by contract removal through DPDO. Recovered JP-4 has always been delivered to the fire department training area and burned during practice exercises.

Prior to 1982, the waste oil and PD-680 were sold directly to an off-base contractor.

iii. Washrack

This washrack, located at Pad 18 adjacent to Building 1410, is operated by the 301st CAM Squadron and is used primarily for cleaning F-4 Phantom aircraft. Approximately 26 aircraft are washed per month, generating about 8,000 gallons/year of waste PD-680 (Type II) and 3,000 gallons/year of aircraft soap. Discharge of these wastes, along with water, is into an inactive oil/water separator (no facility number) located adjacent to 3rd Street and approximately 300 feet southeast of Building 1410.

Discharge from the oil/water separator is pumped directly to a second oil/water separator located at Facility No. 1190. Discharge from this separator goes into the sanitary sewer system. Waste PD-680 (Type II) collected in the oil/water separator is sold to an off-base contractor through DPDO.

Routing of the washrack discharge as discussed above occurs only when a valve on the inlet line to the inactive oil/water separator is opened. If the valve is closed the discharge will bypass the inactive oil/water separator and enter the storm sewer. The storm sewer flows into a main oil/water separator at Facility 38 prior to discharge off-base.

3. Fuels

Two major fuel storage areas exist at Carswell AFB--the Bulk Fuel Storage Area and the Diesel Fuel and MOGAS Storage Area, both located on Knights Lake Road. A list of the fuels and capacities of storage tanks for each is shown below.

Facility No.	Fuel	Tank Capacity (gal)
1) Bulk Fuels Storage Area:		
1156	JP-4	840,000
1157	JP-4	840,000
2) Diesel Fuel and MOGAS Storage Area:		
1263	Diesel	11,580
1264	MOGAS	12,032
1261	MOGAS	11,580
1259	MOGAS	11,580
1265	MOGAS	11,580
1256	MOGAS	5,500

Fuels are primarily received by truck; however, fuels can also be received by railcar. JP-4 fuel is pumped by pipeline to five flightline fuel pumphouses (Facilities 4150, 4152, 4153, 4154, and 4170), each equipped with 150,000 gallons of underground fuel storage capacity. From the pumphouses, fuel is pumped to individual hydrants used for aircraft refueling. An inventory of major POL storage tanks, included in Appendix G, provides the location, type of POL stored, capacity, and type of tank (i.e., aboveground, belowground, etc.)

POL storage tanks are inspected every 3 years and cleaned as necessary. During the summer of 1983, 18 tanks were inspected and cleaned. Residual liquids and sludges collected from the tanks were disposed of through DPDO. In the past, sludges removed during tank cleaning operations were allowed to weather or dry out and then buried. One burial site has been identified at Carswell AFB (Site No. 10--Waste Burial Area).

Numerous fuel spills have occurred in the flightline areas. Spills are normally washed down by the fire department personnel. Runoff would either enter the nearest storm drain or seep into the ground when the spill occurred near unpaved areas. Spills that have been washed into the storm drains would pass through an oil/water separator prior to entering the Trinity River.

Three spills of greater than 500 gallons have been recorded since 1974. In 1974, 2,600 gallons of JP-4 were spilled in the flightline area when an aircraft fuel tank was accidentally punctured. The fuel was reportedly recovered in the drainage ditches leaving the area; however, it was suspected that some of the fuel did enter the Trinity River. In 1976, 1,560 gallons of JP-4 was spilled during a

fuel cell repair accident at Facility 1048 (Fuel Systems Shop). Fire department personnel washed the spill into the storm drainage system that discharged into Farmers Branch. Farmers Branch was dammed at five locations and the spilled fuel was recovered. No fuel was suspected of entering the Trinity River. In November 1982, a JP-4 fueling pump accident at the alert parking apron resulted in the release of approximately 9,000 gallons of JP-4. This fuel was washed into the stormwater collection system that discharges into the Trinity River after just passing through an oil/water separator. The drainage ditch between the oil/water separator and the Trinity River was diked with sand bags and most of the fuel was recovered. Reportedly, less than 500 gallons of JP-4 entered the Trinity River.

4. Fire Department Training Exercises

Since activation of the base, fire department training exercises have taken place at two locations on Carswell AFB, both located just east of the north-south taxiway (see Section IV.B. "Disposal Sites Identification and Evaluation"). Both of these facilities have been described as "gravel-lined." The former facility was used between 1942 and 1963. The later facility has been in use since 1963. Waste oils and recovered fuels have been burned at each site. Also, waste solvents may have been burned at both sites. Reportedly, only recovered or clean JP-4 has been burned at the later site since 1970.

Wastes brought to the former site were normally stored in 55-gallon drums until needed for a practice burn. Some of these wastes may have been poured onto the ground well in advance of the training exercises. At the current training area, wastes have been stored in an

aboveground 8,500-gallon tank and pumped into the burn area when needed for a practice burn. Most of the liquid wastes disposed of at the fire department training areas would have been consumed in the fires; however, small quantities probably infiltrated into the ground.

Since 1970, fire department training exercises have been conducted approximately two to three times per month, consuming an average 1,300 gallons/month of clean or recovered JP-4 fuel. Fire department training exercises in the past were probably conducted with approximately the same frequency. Accordingly, up to 15,000 gallons/year of waste oils, fuels, solvents, and cleaners have gone to fire department training areas prior to 1970.

5. Polychlorinated Biphenyls (PCBs)

Typical sources of PCBs at Carswell AFB are electrical transformers and capacitors. Currently, approximately 40 to 50 out-of-service PCB transformers are stored on base. Twenty to thirty of these contain less than 50 ppm of PCBs and are stored at the DPDO storage yard. Twenty transformers have more than 50 ppm of PCBs and are stored in Facility 1269, a building constructed in 1982 specifically for storage of PCB transformers and other PCB-contaminated items. At present, approximately 10 55-gallon drums of PCB-contaminated liquid and rags are also stored in Facility 1269. All out-of-service transformers are currently, and have in the past, been turned over to DPDO for proper disposition.

All in-service transformers on base have been sampled and analyzed for PCBs. At present, only seven known

PCB-contaminated transformers are located on base and these are located in Facility 4175 and the alert area. Six PCB-contaminated transformers are in-service at the Weapons Storage Area located west of Carswell AFB. All in-service PCB transformers are routinely inspected for leakage. No records or reports of PCB spills were identified at Carswell AFB.

6. Pesticides

Pesticides are in common use at Carswell AFB for the control of pests and weeds. Pesticides have been stored at Facility 1217 since 1981. Prior to that time, pesticides were stored at Facility 1338, the old entomology building. The major insecticides currently used at Carswell AFB, based on quarterly "Pest Control Summary Reports" (October 1982 through September 1983), are shown below.

Pesticide	Pests	Usage (lb/yr)
Anticoagulant	Mice Rats	204
Baygon	Cockroaches	15
Chlordane	Termites	92
Diazinon	Cockroaches	100
Malathion	Adult Mosquitoes Ticks	250
Organophosphate	Cockroaches Fleas Ticks Mosquitoes	760

Monosodium arsenate is used by golf course pesticide control personnel for insect control.

Used pesticide containers are triple rinsed, punctured, and disposed of in dumpsters. Empty bags are also disposed of in dumpsters. Waters from container and equipment rinsing discharge to a tank located outside Facility 1217. To date the tank has not been filled to capacity. When full, the tank will be pumped out and the water properly disposed of. In the past (prior to 1981), rinse waters at the former entomology facility (Building 1338) discharged into a "dry well" sump located outside the facility. Some pesticides may have entered the ground at this location. This "dry well" sump has been identified as a potentially contaminated site (Site No. 15) and is discussed in Section IV.B, "Disposal Sites Identification and Evaluation." The records search did not provide any indication of disposal of large quantities of pesticides in past base landfills or other burial sites.

7. Wastewater Treatment

All wastewater generated at Carswell AFB is pumped to the City of Fort Worth for treatment. This has been the practice since the base was first constructed. The wastewater is largely domestic in origin; however, industrial wastewater discharges from several oil/water separators installed on base are also included. The average daily quantity of wastewater is estimated to be less than one million gallons. The City of Fort Worth charges Carswell AFB based on the quantity of city water used at the installation.

The industrial discharges mentioned above come from four oil/water separators. The locations and approximate dates of installation are shown below.

Location	Date Installed
1015--Jet Engine Test Cell	1968
1190--Wash Rack (29)	1955
1194--Refueling Vehicle Maintenance	1982
1628--AGE Maintenance (301st CAM Squadron)	1981

These separators were installed to collect fuels and PD-680 prior to discharge into sanitary sewers. Reportedly, oil/water separators are located at Building 1050 (Maintenance Hangar) and 1430; however, the existence of these separators could not be verified. If they do exist, they too probably discharge to the sanitary sewer system.

The schedule requires cleaning and inspecting the oil/water separators every 3 years. The materials removed (sludge, oils, fuels, and PD-680) are disposed of by contract removal through DPDO.

Two more oil/water separators are located on the east side of the base between the old entomology building (Building 1338) and Farmers Branch. One of these separators is installed on the sanitary sewer line that leads to the City of Fort Worth and appears to be abandoned. The sanitary sewer map of the base shows a bypass line around this separator and states "no treatment." The second oil/water separator does not show on the base map; however, it is believed to be connected to a french drain system installed about 1965 to capture fuels suspected of leaking from the POL tank farm (see discussion of Site No. 16, Section IV.B, "Disposal Sites Identification and Evaluation"). This oil/water separator has not been routinely cleaned and apparently contained hydrocarbon constituents at the time of

the records search team's base visit. Discharge from this separator is into Farmers Branch and not into the sanitary sewers.

One other oil/water separator, Facility No. 36, exists on base to skim oils and fuels prior to discharge of stormwater from the base. This facility, built in 1978, is located on Rogner Road near the east gate. Stormwater runoff from the flightline and industrial shop areas is intercepted at four points and pumped to this oil/water separator. Fuels and oils are routinely pumped from this separator and disposed of by contract removal through DPDO. Discharge from the separator is into the Trinity River.

8. Water Quality Data

All potable water for Carswell AFB is provided under contract by the City of Fort Worth. Total contracted capacity is 2,500 gallons per minute (gpm) at a minimum pressure of 45 pounds per square inch (psi). The total annual consumption in 1981 was over 270,000,000 gallons, with maximum and minimum monthly demands of 43,000,000 gallons and 14,000,000 gallons, respectively.

The potable water storage system at Carswell AFB consists of two concrete ground storage tanks with capacities of 250,000 gallons and 300,000 gallons; and two elevated steel tanks with capacities of 200,000 gallons and 250,000 gallons. One non-potable steel ground storage tank with 500,000-gallon capacity is located in the hangar area for fire protection. Also, a non-potable system on the golf course pumps water from Farmers Branch for irrigation of the greens.

The City of Fort Worth receives its water from Lake Worth, located to the north of Carswell AFB. Lake Worth

is an impounded segment of the west fork of the Trinity River and has a surface area of roughly 2,500 acres. Lake Worth is immediately adjacent to Carswell AFB and receives a limited amount of stormwater runoff from Carswell during and immediately after rainfall events. Typical water quality of Lake Worth and the west fork of the Trinity River several miles downstream of the Lake Worth Dam and Carswell AFB is shown in Table 9. These waters are moderately hard, and contain slightly elevated salt levels during the warm summer season.

Although water wells exist in the area of Carswell AFB, no active or open wells were identified on base. Several closed wells are known to exist in the hospital area, and a few other inactive wells are suspected to be on base. Since no wells provide water supply to Carswell AFB, no data are given in this section concerning the quality of local ground water.

Carswell AFB currently has three stormwater discharge points that are subject to National Pollutant Discharge Elimination System (NPDES) permits from the Environmental Protection Agency. The location of these NPDES outfall points 001, 002, and 004 are shown in Figure 19. Outfall 001 is located on a stormwater ditch in the weapons storage area adjacent to Lake Worth. Outfall 002 is located in a small stormwater ditch flowing southwest from the hospital area, through the YMCA Camp Center, to the west fork of the Trinity River. Outfall 004 is located just below the main base oil/water separator (Facility No. 38) near the East Gate. Stormwater flows from much of the base are pumped to this location for treatment prior to discharge to the west fork of the Trinity River. Permit requirements for these three NPDES discharge points are summarized in

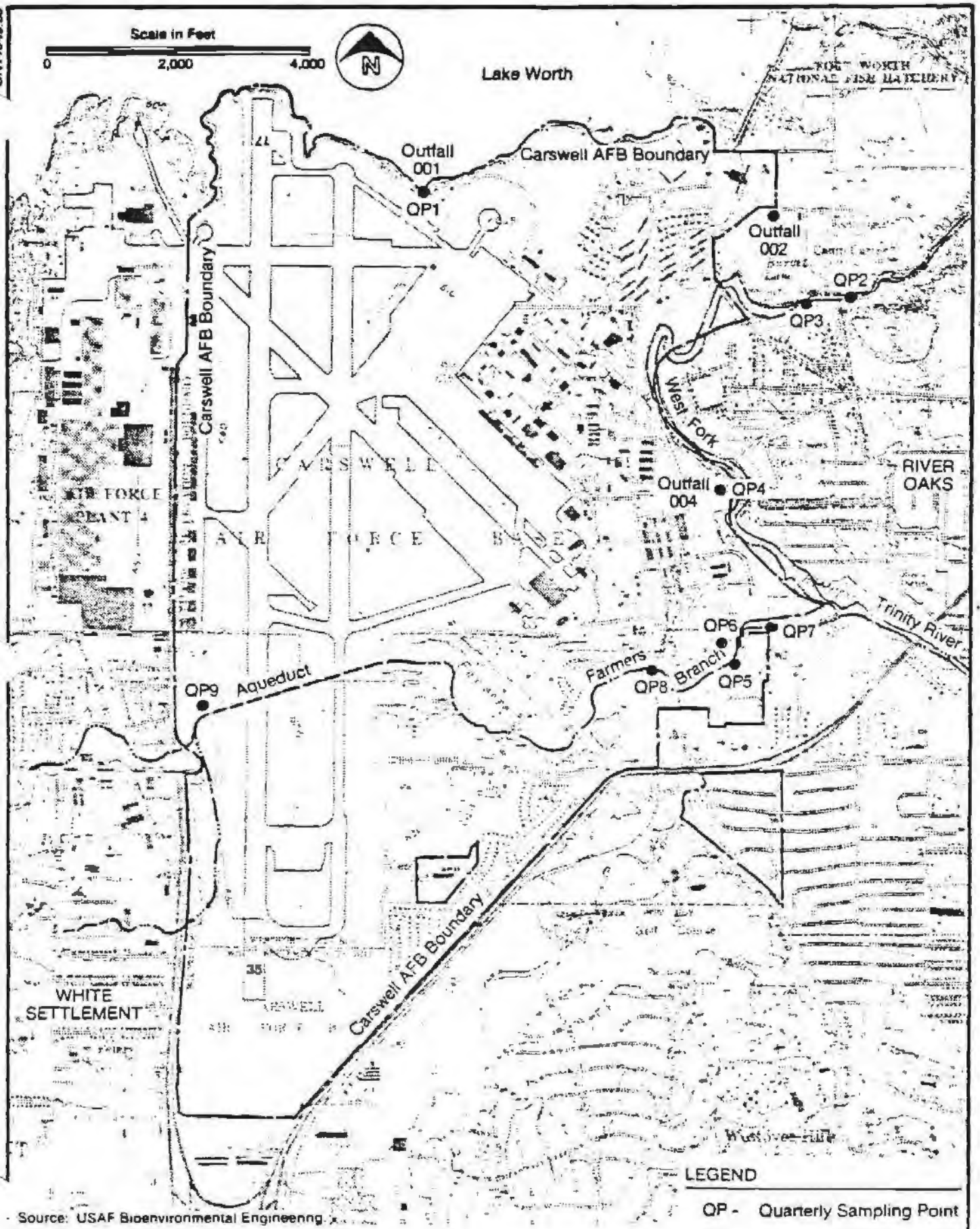
Table 9
WATER QUALITY DATA FOR SURFACE WATERS IN THE VICINITY OF CARSWELL AFB, TEXAS

Parameter	Lake Worth 9/08/80	West Fork Trinity River at Beach Street 2/14/80	9/18/80
Specific Conductance (μmhos/cm)	418	448	610
pH (units)	--[a]	7.9	8.6
Temperature (°C)	22.0	9.5	30.0
Dissolved Oxygen	--	11.0	17.0
Oxygen Saturation (%)	--	96	227
BOD_5	--	2.0	6.7
Total Hardness (as $CaCO_3$)	130	180	150
Calcium	38	62	47
Magnesium	9.0	5.9	8.7
Sodium	30	24	63
Sodium Adsorption Ratio (SAR)	1.1	0.8	2.2
Potassium	6.8	5.3	8.4
Bicarbonate (as HCO_3)	140	180	150
Carbonate (as CO_3)	0	0	7
Sulfate	27	43	63
Chloride	43	28	73
Fluoride	0.3	0.4	1.0
Silica	5.5	2.7	1.8
Dissolved Solids	229	260	347
Nitrate (as N)	--	0.39	0.02
Nitrite (as N)	--	0.03	0.05
Ammonia (as N)	--	0.39	0.88
Organic Nitrogen	--	0.71	1.6
Total Phosphorus	--	0.13	0.58

Source: USGS (1980).

[a]Dash indicates that no data were available.

[b]Units in mg/l unless otherwise indicated.



Source: USAF Bioenvironmental Engineering

FIGURE 19.
Surface-Water Quality Sampling Points at Carswell AFB.

CH2M HILL

Table 10. Monitoring for each parameter is required once weekly.

Samples collected at the NPDES discharge points on Carswell AFB have shown numerous violations during the past 6 years. Table 11 summarizes the number of violations at each of the points and maximum (and minimum where applicable) parameter values measured at these points. Although the period of record at each outfall is different and tends to inflate the number of violations at Outfall 004, nevertheless, this outfall to the Trinity River has a high rate of documented violations, with some extremely high COD and oil and grease values recorded. Since samples at outfall 004 are only taken weekly, these documented violations are only an indication of the actual quantities of contaminants leaving the base at this discharge point. Also, the parameters chosen for monitoring give only a rough overview of the specific pollutants likely to be present in these discharges.

In a letter dated April 25, 1979, the EPA formally demanded corrective action concerning the numerous NPDES violations occurring at the Carswell AFB stormwater discharge points, specifically including Outfall 004. Air Force action identified several potential sources for the high COD levels observed at this outfall, including the JP-4 bulk storage tanks, fuel cell storage yard, oil/water separator, motor pool and aircraft washracks, fuel cell repair shop, motor pool, hydraulic shop, demineralization plant regeneration waste, and the Taxiway 77 stormwater runoff. In spite of the investigations instigated in response to EPA's letter, NPDES violations have continued since 1979, including a total of 20 COD violations at Outfall 004 since January 1980.

Table 10
NPDES PERMIT REQUIREMENTS FOR 001, 002, AND 004
DISCHARGES AT CARSWELL AFB, TEXAS

Parameter	
Chemical Oxygen Demand, mg/l	
Average Daily Value	60
Maximum Daily Value	90
Oil and Grease, mg/l	
Average Daily Value	10
Maximum Daily Value	15
pH	
Minimum	6.0
Maximum	9.0

Table 11
SUMMARY OF NPDES VIOLATIONS AT CARSWELL AFB, TEXAS

Parameter	Outfall 001[a]	Outfall 002[b]	Outfall 004[c]
Chemical Oxygen Demand			
Number of Samples > 90 mg/l	5	4	50
Maximum Value Recorded (mg/l)	400	173	4,900
Oil and Grease			
Number of Samples > 15 mg/l	1	1	11
Maximum Value Recorded (mg/l)	24.5	26.6	112
pH			
Number of Samples <6 or >9	2	0	7
Maximum Value Recorded	9.2	8.7	9.9
Minimum Value Recorded	5.9	6.1	6.1

Source: Carswell AFB Bioenvironmental Engineering.

[a]Period of record: April 1980 through August 1983.

[b]Period of record: August 1979 through August 1983.

[c]Period of record: December 1977 through August 1983.

Additional surface-water quality sampling points have been added by the base bioenvironmental engineer to establish flows of other pollutants onto or off of the base. Known as Quarterly Points (QP), several of these stations have been moved since this program began. The locations shown in Figure 19 represent the most recent monitoring program.

The QP stations are sampled for a variety of parameters as circumstances (spills, fish kills, odors, and oil sheen) dictate. For example, recent sampling at the Unnamed Stream (formerly QP 5, now QP 6; also Site No. 16) has documented elevated levels of iron (2,800 to 10,500 µg/l), manganese (288 µg/l), and copper (57 µg/l).

During the summer of 1983, a detailed study was conducted of volatile organics in streams originating off base and also from on-base sources. This study included three successive episodes at several of the QP stations at monthly intervals. Measurable quantities of organics were found in a tributary to Farmers Branch which receives drainage from AF Plant 4. Samples were collected in the tributary at the point where it flows onto Carswell AFB (near QP 9; see Figure 19). Findings included: trichloroethylene (2.7 and 51.3 µg/l); 1,2 dichloroethylene (0.4 µg/l); bromodichloromethane (0.9 µg/l); and chloroform (trace). Sampling for these compounds in Farmers Branch on Carswell AFB (QP 8) and at the Trinity River (QP 7) indicated that they were still present in measurable quantities. At QP 8, volatile organics that were detected include: trichloroethylene (1.0, 1.4, and 3.1 µg/l) and 1,2 dichloroethylene (1.5 µg/l). At QP 7, where Farmers Branch flows into the West Fork Trinity River, trace quantities of these compounds were still present (trichloroethylene--0.9 µg/l and 1,2 dichloroethylene--0.3 µg/l).

Volatile organics were also detected in a few streams assumed to be arising totally on Carswell AFB property. At NPDES Outfall 002 near the YMCA Camp Carter, and at Outfall 004 near the east gate, trace quantities of trichloroethylene were detected. Also at the Unnamed Stream (QP 6 in Figure 19; also Site No. 16), trichloroethylene was detected during each of the three months at trace levels (≤ 0.2 to 0.3 μg/l). The actual source of these compounds in the streams was not identified during the records search study.

9. Other Activities

The records and information obtained during the interviews produced no evidence of past or present storage, disposal, or handling of biological or chemical warfare agents at Carswell AFB.

Explosive Ordnance disposal activities are handled at the Weapons Storage Area (WSA) located west of the base (see Section VII, "Off-Base Facilities"). No evidence suggests that routine ordnance disposal was practiced at Carswell AFB; however, one interviewee suspected that some type of ordnance was buried at Site No. 10, the Waste Burial Area (see Section IV.B, "Disposal Sites Identification and Evaluation").

B. DISPOSAL SITES IDENTIFICATION AND EVALUATION

Interviews were conducted with past and present base personnel (Appendix C) to identify disposal and spill sites at Carswell AFB. Each site was screened based on the information obtained from the interviews and available records from the base and outside agencies. Using the decision tree process described in the "Methodology" section

(page I-6), a determination was made whether a potential exists for hazardous material contamination in any of the identified sites. For those sites where hazardous material contamination was considered significant, a determination was made whether significant potential exists for contaminant migration from these sites. These sites were then rated using the U.S. Air Force Hazard Assessment Rating Methodology (HARM), which was developed jointly by the Air Force, CH2M HILL, and Engineering-Science for specific application to the Air Force Installation Restoration Program. The HARM system considers four aspects of the hazard posed by a specific site: (1) the receptors of the contamination, (2) the waste and its characteristics, (3) potential pathways for waste contaminant migration, and (4) any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating. A more detailed description of the HARM system is included in Appendix H.

A total of 17 disposal and spill sites were identified at Carswell AFB. Of these, 14 were rated using the HARM rating system. A complete listing of all of the sites, indicating potential hazards, is presented in Table 12. Copies of the completed rating forms are included in Appendix I, and a summary of the hazard ratings for the sites is given in Table 13.

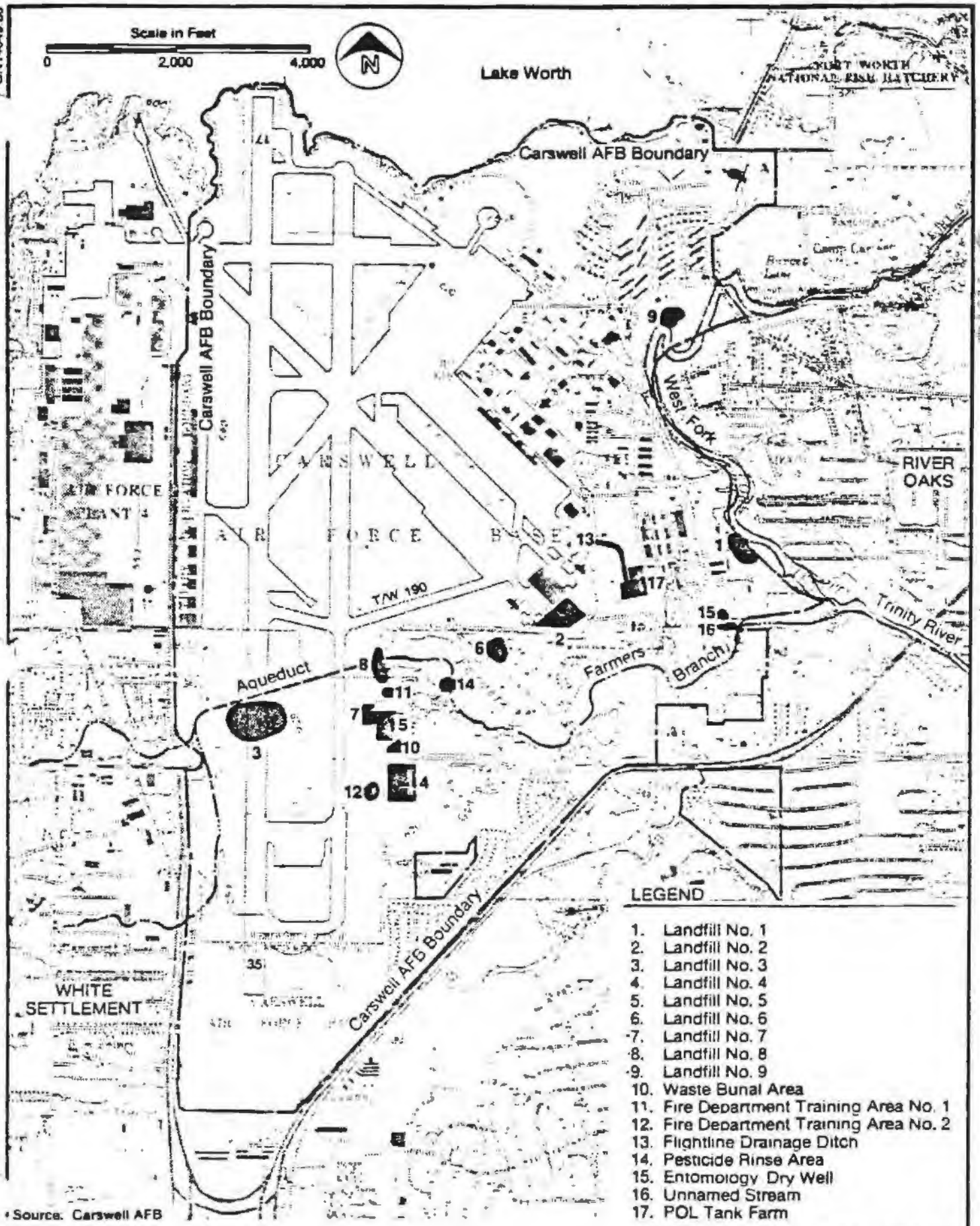
Descriptions of each site, including a brief discussion of the rating results, are presented below. Approximate locations of the sites are shown in Figure 20. Approximate operating dates for the identified disposal and spill sites are shown in Figure 21.

Table 12
DISPOSAL AND SPILL SITES SUMMARY

Site No.	Site Description	Potential Hazard		
		Contamination	Migration	Rating
1	Landfill No. 1	Yes	Yes	Yes
2	Landfill No. 2	Yes	Yes	Yes
3	Landfill No. 3	Yes	Yes	Yes
4	Landfill No. 4	Yes	Yes	Yes
5	Landfill No. 5	Yes	Yes	Yes
6	Landfill No. 6	Yes	Yes	Yes
7	Landfill No. 7	No	--	No
8	Landfill No. 8	No	--	No
9	Landfill No. 9	No	--	No
10	Waste Burial Area	Yes	Yes	Yes
11	Fire Department Training Area No. 1	Yes	Yes	Yes
12	Fire Department Training Area No. 2	Yes	Yes	Yes
13	Flightline Drainage Ditch	Yes	Yes	Yes
14	Pesticide Rinse Area	Yes	Yes	Yes
15	Entomology Dry Well	Yes	Yes	Yes
16	Unnamed Stream	Yes	Yes	Yes
17	POL Tank Farm	Yes	Yes	Yes

Table 13
SUMMARY OF DISPOSAL AND SPILL SITE RATINGS

Site No.	Site Description	Subscore (% of Maximum Possible Score in Each Category) Receptors	Characteristics	Pathways	Factor for Waste Management Practices	Overall Score	Page Reference of Site Rating Form
1	Landfill No. 1	68	50	50	1.0	56	I-1
2	Landfill No. 2	59	50	50	1.0	53	I-3
3	Landfill No. 3	56	40	43	1.0	46	I-5
4	Landfill No. 4	49	70	50	1.0	56	I-7
5	Landfill No. 5	49	70	50	1.0	56	I-9
6	Landfill No. 6	52	40	50	1.0	47	I-11
7	Landfill No. 7	- - - - - - - - - - - - - -	Not Rated	- - - - - - - - - - - - - -			
8	Landfill No. 8	- - - - - - - - - - - - - -	Not Rated	- - - - - - - - - - - - - -			
9	Landfill No. 9	- - - - - - - - - - - - - -	Not Rated	- - - - - - - - - - - - - -			
10	Waste Burial Area	49	80	50	1.0	60	I-13
11	Fire Department Training Area No. 1	46	64	50	1.0	53	I-15
12	Fire Department Training Area No. 2	49	64	80	1.0	64	I-17
13	Flightline Drainage Ditch	63	80	80	1.0	74	I-19
14	Pesticide Rinse Area	49	60	50	1.0	53	I-21
15	Entomology Dry Well	63	60	49	1.0	57	I-23
16	Unnamed Stream	63	32	80	1.0	58	I-25
17	POL Tank Farm	59	80	50	1.0	63	I-27



Source: Carswell AFB

FIGURE 20.
Location Map of Identified Disposal and Spill Sites at Carswell AFB.

CH2M HILL

GN14649 60

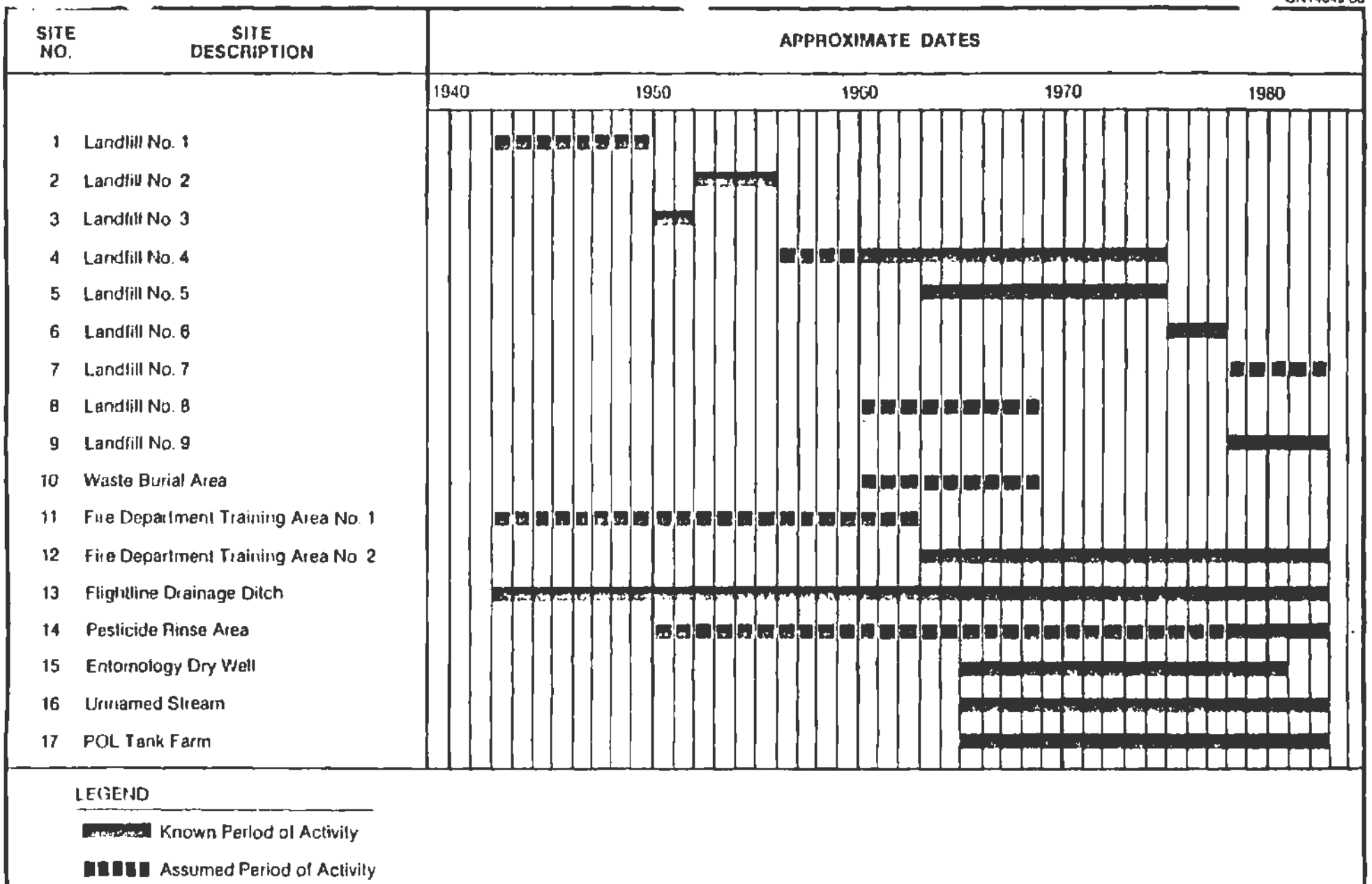


FIGURE 21.
Historical Summary of Activities at Disposal and Spill Sites at Carswell AFB.

CH2M HILL

1. Landfills

Landfill sites have been in use at Carswell AFB from the beginning of construction in 1942, until the present time. Some base landfills were located in borrow areas created for runway construction, and others were placed in naturally low or irregular areas adjacent to creeks to increase the usable land area for expansion of runway and flightline areas. At least nine landfill sites were confirmed to be present at Carswell AFB and are described below.

a. Site No. 1, Landfill No. 1

Landfill No. 1 (overall score of 56) was reported to be the original base landfill and was operated during the 1940s. This site is located adjacent to the Trinity River levee at the same spot as the current DPDO storage yard. Due to the time elapsed since this site was closed, no information was available concerning past waste disposal practices at this location.

Landfill No. 1 (Site No. 1) received an overall HARM rating score of 56, primarily due to: (1) the suspected disposal of moderate quantities of hazardous wastes, (2) the proximity of the site to the base boundary (approximately 200 feet), (3) the proximity of the site to the West Fork Trinity River (approximately 300 feet), (4) the presence of residential areas within one mile, (5) an estimated population greater than 100 people within 1,000 feet of the site, (6) the suspected presence of groundwater within 10 feet of the ground surface, and (7) the presence of potable water wells serving the suburbs of Fort Worth less than 3,000 feet from the site.

b. Site No. 2, Landfill No. 2

Landfill No. 2 (overall score of 53) was reported to be located in the vicinity of Haile Drive and Hobby Shop Road, lying at least partially under Building 1055. This site was reported to be a borrow pit for runway construction during the 1940s and then was used as a landfill from approximately 1952 until 1956. One interviewee reported that refuse was buried in shallow trenches, while others indicated the presence of rubble and construction materials.

Landfill No. 2 (Site No. 2) received an overall HARM rating score of 53, primarily due to: (1) the suspected disposal of moderate quantities of hazardous wastes, (2) an estimated population greater than 100 people within 1,000 feet of the site, (3) the proximity of the site to a tributary of Farmers Branch (approximately 200 feet), and (4) the presence of residential areas within one mile of the site.

c. Site No. 3, Landfill No. 3

Landfill No. 3 (overall score of 46) is located under the present runway, immediately south of the culvert carrying the flow of Farmers Branch. During the period from 1950 until 1952, Site No. 3 was used for burial of all types of wastes, but primarily construction rubble. During this period, the runway ended north of Farmers Branch, and a ravine present at this site was used as a fill area.

Landfill No. 3 (Site No. 3) received an overall HARM rating score of 46, primarily due to: (1) the suspected disposal of small quantities of hazardous wastes, (2) the proximity of the site to the base boundary

(approximately 800 feet), (3) a population greater than 1,000 people (White Settlement) served by a groundwater supply within 3 miles of the site, (4) the presence of residential areas within one mile, and (5) the proximity of the site to Farmers Branch (approximately 100 feet).

d. Site No. 4, Landfill No. 4

Landfill No. 4 (overall score of 56) was operated from approximately 1956 until 1975. This site, which includes 10 acres of land east of the runway and is currently the location of the radar site, was the main landfill during much of the history of Carswell AFB. All base refuse was buried here and burning was a regular practice. At least six large pits, approximately 12 feet deep were filled with refuse which was burned and buried. Various materials suspected of being hazardous were reported disposed of at this site, including drums of waste liquids, partially full paint cans, and cadmium batteries. Written records (Reference No. 12) indicate that routine disposal of waste paints, thinners, and strippers; oil containing adsorbent materials; PD-680; and oils may have been practiced at this location.

Landfill No. 4 (Site No. 4) received an overall HARM rating score of 56, primarily due to: (1) the suspected disposal of large quantities of hazardous wastes, (2) the proximity of the site to a tributary of Farmers Branch (approximately 100 feet), (3) the presence of residential areas within one mile, and (4) the presence of a population greater than 1,000 people (White Settlement) served by a groundwater supply within 3 miles of the site.

e. Site No. 5, Landfill No. 5

Landfill No. 5 (overall score of 56) was reportedly used between 1963 and 1975. This site is located northwest of landfill No. 4 and was constructed adjacent to a small tributary to Farmers Branch. The landfill site was constructed by building a clay berm adjacent to the creek and then filling the area behind the berm up to its existing level. This fill site received all types of flightline wastes and refuse, and was regularly burned prior to covering.

Landfill No. 5 (Site No. 5) received an overall HARM rating score of 56, primarily due to: (1) the suspected disposal of large quantities of hazardous wastes, (2) the proximity of the site to a tributary of Farmers Branch (approximately 100 feet), and (3) the presence of a population greater than 1,000 people (White Settlement) served by a groundwater supply within 3 miles of the site.

f. Site No. 6, Landfill No. 6

Landfill No. 6 (overall score of 47) was operated between 1975 and 1978. This site is approximately one acre in size and is located between the golf course and the flightline perimeter road. The site is currently being used as a contractor storage area with equipment and some rubble present within the fenced area.

Landfill No. 6 was originally a gravel pit used for base construction activities. After the gravel had been removed, the site was used for the burial of construction rubble, trees, and miscellaneous trash. Several drums of hydraulic fluid were reportedly buried in a centrally-located pit used to collect ground water. Due to the

proximity of Site No. 6 to the flightline shops, small quantities of other hazardous materials are also suspected of being buried there.

Landfill No. 6 (Site No. 6) received an overall HARM rating score of 47, primarily due to: (1) the confirmed disposal of small quantities of hazardous wastes, (2) the presence of residential areas within one mile (3) the proximity of the site to a tributary of Farmers Branch (approximately 500 feet), and (4) the presence of a population greater than 1,000 people (White Settlement) served by a groundwater supply within 3 miles of the site.

g. Site No. 7, Landfill No. 7

Landfill No. 7 (not rated) has been used from 1978 until 1983. This site is located on 4 acres adjacent to the north-south taxiway, west of the base golf course. The site is partially covered by grasses, but over much of the area, rubble and piles of fill dirt are still evident. Only clean construction rubble and fill dirt were reportedly disposed of at Site No. 7. Because no hazardous wastes are suspected of being buried at this site, Landfill No. 7 was not rated.

h. Site No. 8, Landfill No. 8

Landfill No. 8 (not rated) was used as a fill area during the 1960s. This site is located just east of the north-south taxiway and south of Taxiway 190. This site lies over the culverts carrying Farmers Branch under the runway. Site No. 8 was reportedly filled with wood, metal, construction rubble, asphalt, concrete, and trees. No hazardous materials are suspected of being buried at Landfill No. 8 and, therefore, this site was not rated.

i. Site No. 9, Landfill No. 9

Landfill No. 9 (not rated) has been used from 1978 until 1983. This site is located southeast of the NCO Club, adjacent to the West Fork Trinity River. Currently, the area is used for disposal of clean construction rubble and trees. No hazardous materials are suspected of being buried at Landfill No. 9, and, therefore, this site was not rated.

2. Other Sites

a. Site No. 10, Waste Burial Area

Site No. 10 (overall score of 60), located adjacent to and north of White Settlement Road, where it dead-ends at the taxiway, was used for burial of wastes during the 1960s. Various types of hazardous materials, including drums of cleaning solvents, leaded sludge, and possibly ordnance materials, were reported disposed of at this site. The potential exists for the buried ordnance to be live and caution should be exercised in any follow-on activities that may be conducted at this site. Reportedly, these materials were buried in a natural, impermeable clay strata. The site is currently identified by several signs reporting the presence of buried tetraethyl lead sludge.

The Waste Burial Area (Site No. 10) received an overall HARM rating score of 60, primarily due to: (1) the confirmed disposal of moderate quantities of hazardous wastes, (2) the presence of residential areas within one mile, and (3) the proximity of the site to a tributary of Farmers Branch (approximately 200 feet).

b. Site No. 11, Fire Department Training Area No. 1

Site No. 11 (overall score of 53) was located near Landfill No. 5. This training area is suspected of being the primary fire pit prior to 1963. The pit reportedly was adjacent to a small tributary to Farmers Branch, was gravel-lined, and had a low concrete curb around its perimeter. Several fire training exercises are suspected to have taken place at this site each month, with waste oils and contaminated fuels being the primary flammable liquids used in the exercises. Small quantities of solvents are also suspected to have been used in these exercises.

The Fire Department Training Area No. 1 (Site No. 11) received an overall HARM rating score of 53, primarily due to: (1) the confirmed disposal of a large quantity of medium hazard wastes, (2) the presence of residential areas within one mile, and (3) the proximity of the site to a tributary of Farmers Branch (approximately 100 feet).

c. Site No. 12, Fire Department Training Area No. 2

Site No. 12 (overall score of 64) is located between the north-south taxiway and the radar facility. This site, with only slight modifications, has been used as a fire department training area since 1963. The fire ring is gravel-lined with a low earthen berm around its perimeter. In the past, a pit was present at the site to collect runoff from training exercises, but this pit was later filled. Currently, the berm has been breached by erosion and some runoff collects outside the northeast corner of the ring. Unburned JP-4 was present on the ground during

the site visit, indicating incomplete consumption of fuels during the exercises.

Two tanks located at the site have been used for storage of flammable liquids prior to training exercises. An 8,500-gallon aboveground tank is used to store clean or contaminated fuels, which are delivered to the ring via a pump and various pipes. An underground tank of approximately 9,500 gallons has been used for storage of waste oils and solvents from the flightline shops. Although normal disposition of the underground tank contents has been to off-base contractors, some interviewees indicated that contents of this tank have also been used for training exercises in the past.

The Fire Department Training Area No. 2 (Site No. 12) received an overall HARM rating score of 64, primarily due to: (1) the confirmed disposal of a large quantity of hazardous waste, (2) the presence of residential areas within one mile, (3) a population greater than 1,000 people (White Settlement) served by a groundwater supply within 3 miles of the site, (4) the proximity of the site to a tributary of Farmers Branch (approximately 200 feet), and (5) indirect evidence of contaminant migration from the site due to the observed presence of unburned fuel on the ground.

d. Site No. 13, Flightline Drainage Ditch

Site No. 13 (overall score of 74) is located across Haile Drive, directly east of the main base washrack (Pad 29) and Hangars 1049 and 1048. The ditch is unlined from Haile Drive to where it intersects the POL tank farm, at which point it enters a concrete-lined channel. Visible evidence of migration was present at Site No. 13 during the

base visit in the form of a white liquid (aircraft soap) originating at the washrack and entering the ditch through a small pipe; the presence of petroleum products on the surface of the water further downstream; and the presence of a dark zone of fuel or oil saturation along the banks of the ditch at least 10 inches above the surface of the water.

In addition to normal storm drainage, this ditch receives discharges from the aircraft washracks (18 and 29) and discharges from the Fuel Systems Shop (Building 1048). Washrack wastes (PD-680 and soap) can be discharged directly to the Facility 1190 oil/water separator, located adjacent to the flightline drainage ditch, or into the drainage ditch via an overflow pipe in the drain line between the washracks and the oil/water separator. Discharge to the oil/water separator or to the drainage ditch is controlled by a valve in the drain line just upstream of the separator.

Discharges from the Fuel Systems Shop consists of JP-4 fuel drained from fuel tanks. Prior to 1978, this fuel was piped via gravity to the Facility 1190 oil/water separator. The pipe was routed through the much larger stormwater culvert that begins the flightline drainage ditch. Approximately 5 years ago, the pipe ruptured and, since then, JP-4 has been allowed to enter the stormwater culvert and thus the flightline drainage ditch. Base civil engineering has plans to correct this problem.

The Flightline Drainage Ditch (Site No. 13) received an overall HARM rating score of 74, primarily due to: (1) the confirmed presence of a moderate quantity of hazardous wastes, (2) the proximity of the site to a potable water well (approximately 3,000 feet), (3) the presence of residential areas within one mile, (4) the nature of the

site as a surface-water pathway, and (5) indirect visible evidence of contaminant migration at the site.

e. Site No. 14, Pesticide Rinse Area

Site No. 14 (overall score of 53) is located next to the golf course maintenance building and adjacent to Farmers Branch. This site has been used for an undetermined number of years as a disposal spot for rinsewaters from pesticide spray equipment. Pesticides used by the golf course personnel include diazinon and monosodium methylarsenate. Equipment rinsing is performed on a small concrete pad, from where the water flows over a grassy lawn to Farmers Branch, about 30 feet distant. Reportedly, no effort is taken to save rinsewaters for additional pesticide dilution. The grass is missing and the ground surface eroded in a small area adjacent to where the rinsing is performed, but no clear vegetational stress was apparent. None of the reported fishkills in Farmers Branch have been associated with this rinsing practice.

The Pesticide Rinse Area (Site No. 14) received an overall HARM rating score of 53, primarily due to: (1) the confirmed disposal of a small quantity of hazardous wastes, (2) the presence of residential areas within one mile, (3) and the proximity of the site to Farmers Branch (approximately 30 feet).

f. Site No. 15, Entomology Dry Well

Site No. 15 (overall score of 57) is located immediately west of the old entomology shed (Building 1338), in the present Civil Engineering Compound, off Rogner Drive. This site was used for disposal of insecticide rinsate between 1965 and 1981. Building 1338 was used

for the storage and mixing of insecticides including malathion, diazinon, dursban, and chlordane, and for storage and cleaning of spray equipment. Chlordane has been reported in samples taken from the dry well next to Building 1338, although no analyses could be found during the records search to substantiate this report.

The Entomology Dry Well (Site No. 15) received an overall HARM rating score of 57, primarily due to: (1) the confirmed disposal of a small quantity of hazardous wastes, (2) an estimated population greater than 100 people within 1,000 feet of the site, (3) the presence of residential areas within one mile, (4) the proximity of the site to the base boundary (approximately 200 feet), and (5) the proximity of the site to Farmers Branch (approximately 200 feet) and the West Fork Trinity River (approximately 1,000 feet).

g. Site No. 16, Unnamed Stream

Site No. 16 (overall score of 58) is a small tributary of Farmers Branch, located south of the old entomology shed, and near the confluence of Farmers Branch and the Trinity River. This small stream is the discharge from an oil/water separator located immediately south of the fenced civil engineering yard, and receives it perennial flow from ground water entering the separator. The separator is connected to a french underdrain system which was reportedly built in 1965 to capture POL leaking from the POL Tank Farm into the sewer pipes (also see discussion of Site No. 17 below). This separator has not been routinely cleaned for a number of years and apparently contains hydrocarbon constituents. Overflow from this separator is apparently polluting the little stream with POL and high levels of iron. The discharge stream has a petroleum odor,

an oil sheen, and is reddish brown with extensive growths of what appears to be iron-reducing bacteria. Analyses completed on the stream have detected trace quantities of trichloroethylene (see Section IV.A.8, "Water Quality Data").

The Unnamed Stream (Site No. 16) received an overall HARM rating score of 58, primarily due to: (1) the suspected presence of small quantities of hazardous wastes, (2) an estimated population greater than 100 people within 1,000 feet of the site, (3) the presence of residential areas within one mile, (4) the proximity of the site to the base boundary (approximately 100 feet), (5) the proximity of the site to Farmers Branch (approximately 150 feet), and (6) indirect evidence of contaminant migration in the form of observed fuel sheen and odor.

h. Site No. 17, POL Tank Farm

Site No. 17 (overall score of 63) is located on the eastern side of Carswell AFB, adjacent to Knight's Lake Road. Currently, three aboveground tanks are located at this location; formerly, three additional tanks were also located here. During the early 1960s, fuels were discovered in the ground in this area, and also downgradient from this site. A french drain system was installed downgradient from this area to collect fuels in the ground. The french drain discharged through the oil/water separator mentioned above under Site No. 16. At that same time, the underground leaking POL pipes were reportedly located and replaced. No additional loss of POL to the ground is suspected to have occurred in this area since 1965. The french drain system is still continuing to collect POL as evidenced by the contents of the unnamed stream observed during the site visit. As a result, fuel is still suspected to be present in the ground in the area of the POL tank farm and downgradient (southeast and east) from it.

The POL Tank Farm (Site No. 17) received an overall HARM rating score of 63, primarily due to: (1) the confirmed presence of large quantities of hazardous wastes in the ground, (2) an estimated population greater than 100 people within 1,000 feet of the site, (3) the presence of residential areas within one mile, and (4) the proximity of the site to a drainage ditch (flows through the site) which could serve as a surface-water pathway.

C. ENVIRONMENTAL STRESS

During the base visit in November 1983, major known former or present disposal areas were examined for signs of vegetative stress possibly related to the presence or migration of hazardous wastes. Several small areas of stressed or dead vegetation were noted at the sites discussed above. All vegetation was absent from oil or fuel-saturated areas adjacent to the aboveground and belowground tanks at the current fire department training area (Site No. 12) and along the edge of the flightline drainage ditch (Site No. 13).

A number of fish kills have been noted on base in Farmers Branch, reportedly resulting from fuel spills on the flightline or from sanitary wastewater overflows from a sewer line owned by the City of Fort Worth. This sewer line is routed under the main runway within the Farmers Branch culvert that comes from the White Settlement/Air Force Plant 4 area, west of Carswell AFB. During high flow periods this sewer line occasionally spills over through manholes and into Farmers Branch. Fish kills associated with these events have been attributed to the high oxygen demand of the wastewater, and this is apparently confirmed by the reported rapid recovery of fish populations in Farmers Branch following these episodes.

Another historical environmental stress reported by interviewees was the mortality of 10 to 12 large oak trees assumed to be downgradient from Site No. 6, on the east side of Haile Drive. A continuous gravel bed is reported to occur in this area with considerable subsurface flow from the flightline area. Whether or not the tree mortality is in any way related to the migration of hazardous materials has not been determined.

V. CONCLUSIONS

V. CONCLUSIONS

A. No direct evidence was found to indicate that migration of hazardous contaminants exists beyond the Carswell AFB boundary. Indirect evidence of contamination and/or contaminant migration within the installation boundary was found at three sites:

- Flightline Drainage Ditch (Site No. 13):

  Aircraft soap from the washracks and fuel were observed in the ditch during the base visit.

- Fire Department Training Area No. 2 (Site No. 12):

  Unburned fuels were observed on the ground at the site of the existing fire department training area.

- Unnamed Stream (Site No. 16):

  An oil sheen and a POL odor were noted at this site during the base visit.

B. Evidence of environmental stress due to past disposal/spills of hazardous wastes was observed at Carswell AFB. Vegetation was absent in fuel- or oil-saturated areas adjacent to the aboveground and belowground tanks at the fire department training area No. 2 (Site No. 12). Vegetation was also absent along the edge of the Flightline Drainage Ditch (Site No. 13).

C. Information obtained through interviews with 33 past and present base personnel, base records, shop folders, and field observations indicates that hazardous wastes have been disposed of on Carswell AFB in the past.

D. The potential for surface-water migration of hazardous contaminants is considered high primarily due to the proximity of identified sites to Farmers Branch, the West Fork Trinity River, and Lake Worth. In addition, shallow ground water, carrying dissolved contaminants, may discharge to these surface waters.

E. The potential for contamination of the shallow ground water, when present, is considered high due to the lack of a confining layer above the alluvium. The potential may also exist for contaminant migration into the deeper aquifers because of the variable nature of confining beds, and because of the proximity of the base to a recharge area (Lake Worth).

F. Table 14 presents a priority listing of the rated sites and their overall scores. The following sites were designated as areas showing the most significant potential (relative to other Carswell AFB sites) for environmental concerns.

1. Site No. 13, Flightline Drainage Ditch

This ditch is unlined and has been receiving wash-rack discharges (PD-680, aircraft soap) and also drained JP-4 fuel from the Fuel Systems Shop. Presence of a white liquid (assumed to be aircraft soap) and a POL substance (assumed to be JP-4 fuel) were observed in the ditch during the base visit. In addition, a dark zone of fuel or oil saturation was noted along the edge of the banks of the ditch at least 10 inches above the surface of the water. The Flightline Drainage Ditch (Site No. 13) received an overall HARM rating score of 74, primarily due to: (1) the confirmed presence of a moderate quantity of hazardous wastes, (2) the proximity of the site

Table 14
PRIORITY LISTING OF DISPOSAL AND SPILL SITES

Ranking	Site No.	Site Description	Overall Score
1	13	Flightline Drainage Ditch	74
2	12	Fire Department Training Area No. 2	64
3	17	POL Tank Farm	63
4	10	Waste Burial Area	60
5	16	Unnamed Stream	58
6	15	Entomology Dry Well	57
7	1	Landfill No. 1	56
8	4	Landfill No. 4	56
9	5	Landfill No. 5	56
10	11	Fire Department Training Area No. 1	53
11	2	Landfill No. 2	53
12	14	Pesticide Rinse Area	53
13	6	Landfill No. 6	47
14	3	Landfill No. 3	46

to a potable water well (approximately 3,000 feet), (3) the presence of residential areas within one mile, (4) the nature of the site as a surface-water pathway, and (5) indirect visible evidence of contaminant migration at the site.

2. Site No. 12, Fire Department Training Area No. 2

This site, used since 1963, is gravel-lined with low earthen berms around its perimeter. Waste oils and recovered fuels have been the primary materials burned at the site. Waste solvents may also have been burned at the site in the past. Unburned JP-4 fuel was observed on the ground during the base visit, indicating incomplete consumption of fuels during the burn exercises. The Fire Department Training Area No. 2 (Site No. 12) received an overall HARM rating score of 64, primarily due to: (1) the confirmed disposal of a large quantity of hazardous waste, (2) the presence of residential areas within one mile, (3) a population greater than 1,000 people (White Settlement) served by a groundwater supply within 3 miles of the site, (4) the proximity of the site to a tributary of Farmers Branch (approximately 200 feet), and (5) indirect evidence of contaminant migration from the site due to the observed presence of unburned fuel on the ground.

3. Site No. 17, POL Tank Farm

During the early 1960s, fuels were discovered in the ground in the area of the tank farm and also down-gradient from the tank farm. An underground collection system consisting of a french drain discharging through an oil/water separator was installed to collect the fuels. Fuels were collected by the french drain system; however, fuels may still remain in the ground in the area of the

tank farm and downgradient because POL type material continues to discharge from the oil/water separator (see discussion of Site No. 16, Unnamed Stream, in Section IV.B). The POL Tank Farm (Site No. 17) received an overall HARM rating score of 63, primarily due to: (1) the confirmed presence of large quantities of hazardous wastes in the ground, (2) an estimated population greater than 100 people within 1,000 feet of the site, (3) the presence of residential areas within one mile, and (4) the proximity of the site to a drainage ditch (flows through the site) which could serve as a surface-water pathway.

4. Site No. 10, Waste Burial Area

This site was used during the 1960s for burial of various hazardous wastes including cleaning solvents, leaded sludge from tank cleaning operations, and possibly ordnance materials. The Waste Burial Area (Site No. 10) received an overall HARM rating score of 60, primarily due to: (1) the confirmed disposal of moderate quantities of hazardous wastes, (2) the presence of residential areas within one mile, and (3) the proximity of the site to a tributary of Farmers Branch (approximately 200 feet).

5. Site No. 16, Unnamed Stream

This small stream arises from an oil/water separator believed to be receiving flow from a french drain system installed in 1965 to collect fuel suspected of entering the ground at the POL Tank Farm (see discussion of Site No. 17, POL Tank Farm, in Section IV.B). The stream discharges into Farmers Branch. The oil/water separator has not been routinely cleaned and apparently contains hydrocarbon constituents. During the site visit, the stream was

noted to have a POL odor and an oil sheen. The Unnamed Stream (Site No. 16) received an overall HARM rating score of 58, primarily due to: (1) the suspected presence of small quantities of hazardous wastes, (2) an estimated population greater than 100 people within 1,000 feet of the site, (3) the presence of residential areas within one mile, (4) the proximity of the site to the base boundary (approximately 100 feet), (5) the proximity of the site to Farmers Branch (approximately 150 feet), and (6) indirect evidence of contaminant migration in the form of observed fuel sheen and odor.

6. Site No. 15, Entomology Dry Well

This site was used for disposal of pesticide rinsate from before 1960 until 1981. Chlordane has been reportedly found in samples collected from the well; however, no records of the analyses could be found to substantiate this report. The Entomology Dry Well (Site No. 15) received an overall HARM rating score of 57, primarily due to: (1) the confirmed disposal of a small quantity of hazardous wastes, (2) an estimated population greater than 100 people within 1,000 feet of the site, (3) the presence of residential areas within one mile, (4) the proximity of the site to the base boundary (approximately 200 feet), and (5) the proximity of the site to Farmers Branch (approximately 200 feet) and the West Fork Trinity River (approximately 1,000 feet).

7. Site No. 1, Landfill No. 1

This site was reported to be the original base landfill in the 1940s and is located adjacent to the Trinity River in the same location as the current DPDO storage yard. No information was available concerning the waste disposal

practices at this landfill; however, because it was not unusual practice to dispose of hazardous wastes in landfills as far back as the 1940s, hazardous wastes are suspected of being buried at this landfill. Landfill No. 1 (Site No. 1) received an overall HARM rating score of 56, primarily due to: (1) the suspected disposal of moderate quantities of hazardous wastes, (2) the proximity of the site to the base boundary (approximately 200 feet), (3) the proximity of the site to the West Fork Trinity River (approximately 300 feet), (4) the presence of residential areas within one mile, (5) an estimated population greater than 100 people within 1,000 feet of the site, (6) the suspected presence of groundwater within 10 feet of the ground surface, and (7) the presence of potable water wells serving the suburbs of Fort Worth less than 3,000 feet from the site.

8. Site No. 4, Landfill No. 4

This site was the main landfill during much of Carswell AFB history (1956-1973) and is the site of the current radar facility. Waste liquids, including oils and solvents, waste paints, cadmium batteries, and other base refuse were reportedly burned and buried at this landfill. Landfill No. 4 (Site No. 4) received an overall HARM rating score of 56, primarily due to: (1) the suspected disposal of large quantities of hazardous wastes, (2) the proximity of the site to a tributary of Farmers Branch (approximately 100 feet), (3) the presence of residential areas within one mile, and (4) the presence of a population greater than 1,000 people (White Settlement) served by a groundwater supply within 3 miles of the site.

9. Site No. 5, Landfill No. 5

This site, operated from 1963 until 1970, received all types of flightline wastes and refuse and was regularly burned prior to covering. Landfill No. 5 (Site No. 5) received an overall HARM rating score of 56, primarily due to: (1) the suspected disposal of large quantities of hazardous wastes, (2) the proximity of the site to a tributary of Farmers Branch (approximately 100 feet), and (3) the presence of a population greater than 1,000 people (White Settlement) served by a groundwater supply within 3 miles of the site.

10. Site No. 11, Fire Department Training Area No. 1

This site is believed to be the fire department training area prior to 1963. Waste oils and fuels were the primary liquids burned at the site; however, smaller quantities of solvents are suspected of having been burned in the training exercises. The Fire Department Training Area No. 1 (Site No. 11) received an overall HARM rating score of 53, primarily due to: (1) the confirmed disposal of a large quantity of medium hazard wastes, (2) the presence of residential areas within one mile, and (3) the proximity of the site to a tributary of Farmers Branch (approximately 100 feet).

F. The remaining sites (Sites No. 2, 14, 6, 3, and the unrated Sites No. 7, 8, and 9) are not considered to present significant concern for adverse effects on health or the environment.

VI. RECOMMENDATIONS

VI. RECOMMENDATIONS

A. PHASE II PROGRAM

The priority for monitoring at Carswell AFB is considered moderate to high, although no imminent hazard has been identified. Therefore, a Phase II monitoring program is recommended to confirm or rule out the presence and/or migration of hazardous substances.

Tables 15 and 16 present a summary of recommended monitoring sites, parameters to be measured, and the rationale for the analyses. Specifically, monitoring is recommended for: (1) a zone consisting of Landfills No. 4 and 5 (Site No. 4 and 5, respectively), the Waste Burial Area (Site No. 10), and Fire Department Training Areas No. 1 and 2 (Sites No. 11 and 12, respectively); (2) the Flightline Drainage Ditch (Site No. 13); (3) the POL Tank Farm (Site No. 17); (4) the Unnamed Stream (Site No. 16); (5) the Entomology Dry Well (Site No. 15); and (6) Landfill No. 1 (Site No. 1). The recommended preliminary monitoring locations are shown in Figures 22 through 27. Additional recommendations for Sites No. 13 and 16 are presented in Section VI.B., "Other IRP Recommendations."

1. Zone Monitoring (Sites No. 4, 5, 10, 11, and 12)

Due to the proximity of Sites No. 4, 5, 10, 11, and 12 to each other, zone monitoring is recommended for the area encompassing these sites. Zone monitoring recommendations include monitoring wells, surface-water sampling and soil borings.

Table 15
RECOMMENDED PHASE II ANALYSES

Sample Location	Sample Type: Ground Water	Sample Type: Soil	Sample Type: Surface Water	Analyses: VOC[b]	Analyses: Heavy Metals	Analyses: Phenols	Analyses: Pesticides	Analyses: COD[a] TOC[c]	Analyses: Oil & Grease
1. Zone Monitoring (Sites No. 4, 5, 10, 11, and 12)	X	--	--	X	X	X	X	X	X
	--	X[d]	--	X	X	--	--	X	X
	--	--	X	X	--	--	X	X	--
2. Flightline Drainage Ditch (Site No. 13)	--	X	--	X	X	--	--	X	X
3. POL Tank Farm (Site No. 17)	X	--	--	X	X[e]	--	--	X	X
4. Unnamed Stream (Site No. 16)	--	X	--	X	X	--	--	X	X
	--	--	X	X	X	--	--	X	X
5. Entomology Dry Well (Site No. 15)	X	--	--	--	--	--	X	X	--
6. Landfill No. 1 (Site No. 1)	X	--	--	X	X	X	X	X	X

[a]COD = Chemical Oxygen Demand

[b]VOC = Volatile Organic Compounds

[c]TOC = Total Organic Carbon

[d]Site No. 12 only

[e]Lead only

Table 16
RATIONALE FOR RECOMMENDED ANALYSES

Parameter	Rationale
VOC	Organic solvents used on base (past and present); persistent components of fuels and other POL products, e.g., benzene and toluene.
Heavy Metals (lead, nickel, chromium, cadmium, and silver)	Potential sources identified (leaded fuel, battery electrolytes, paint wastes, photographic chemicals).
Phenols	Phenolic cleaners and paint strippers used in the past.
Pesticides	Known or suspected use at Carswell AFB[a].
COD, TOC, and Oil and Grease	Fuel spill indicators and indicators of non-specific contamination.

[a]Pesticide analysis should include Baygon, 2,4-D, Chlordane, Diazinon, Dursban, Endrin, Lindane, Malathion, Methoxychlor, Sevin, Toxaphene, and Warfarin.

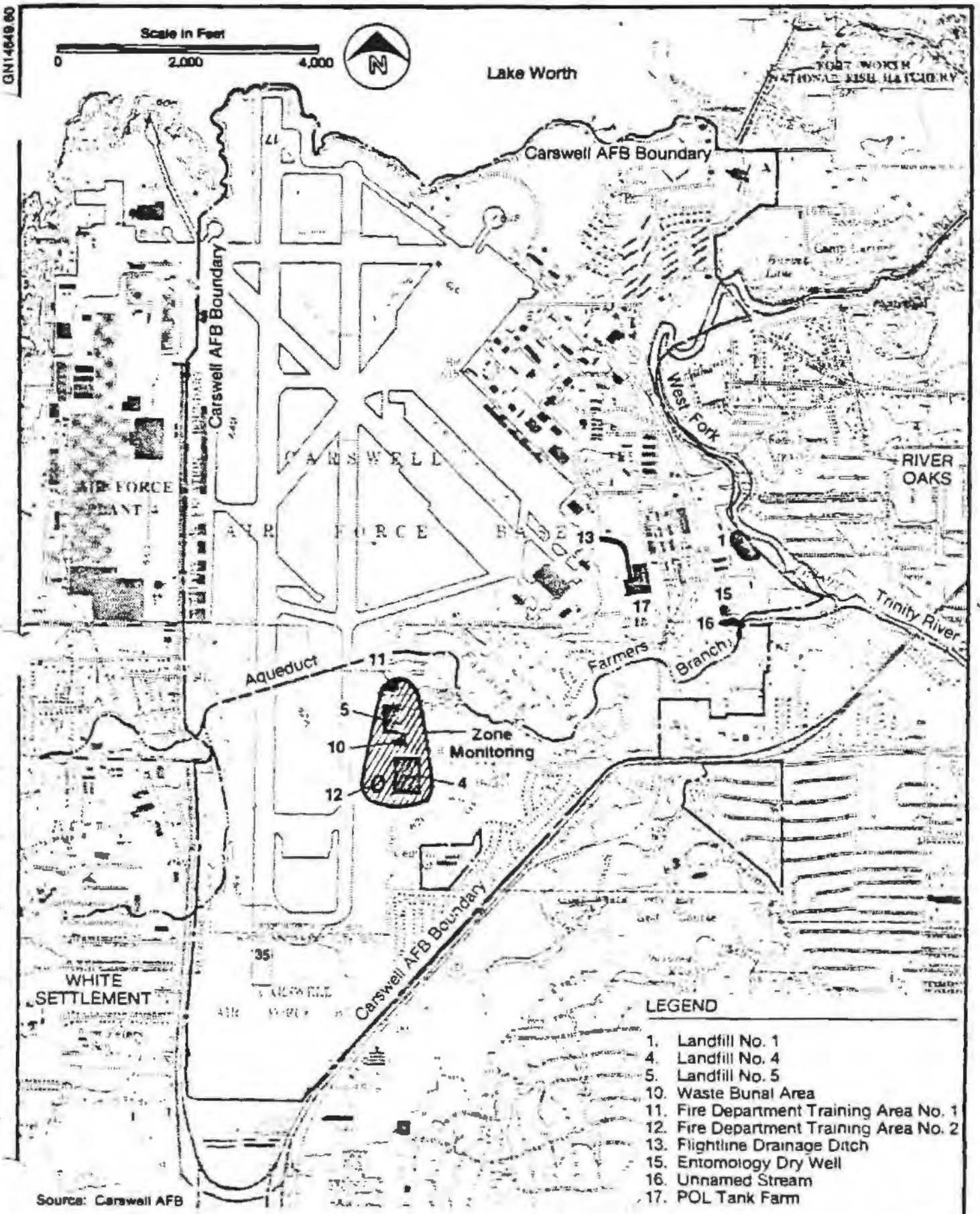


FIGURE 22.
Recommended Phase II Monitoring Sites at Carswell AFB.

CH2M HILL

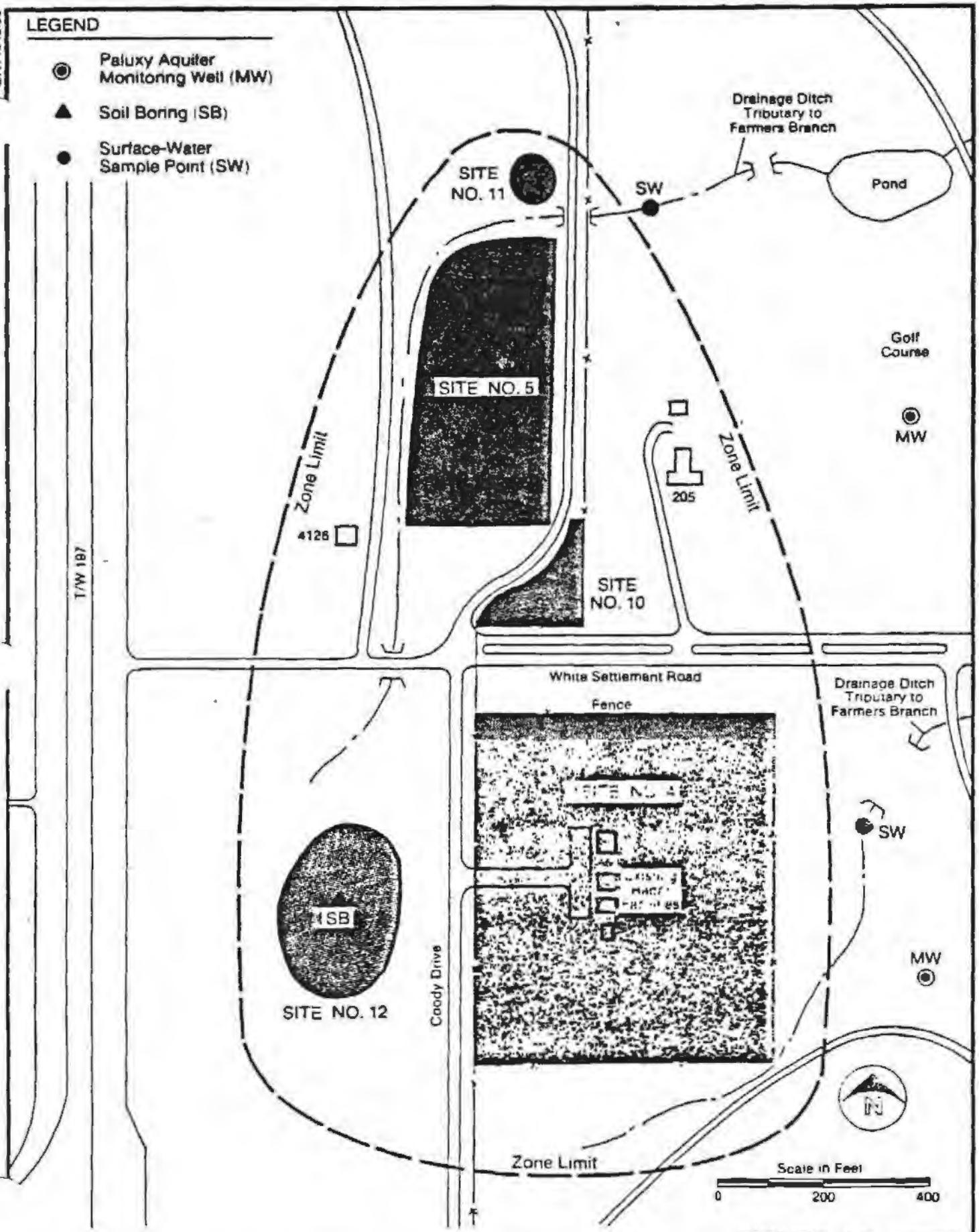


FIGURE 23.
Recommended Preliminary Sampling Locations for the Zone Consisting of Sites No. 4, 5, 10, 11 and 12.

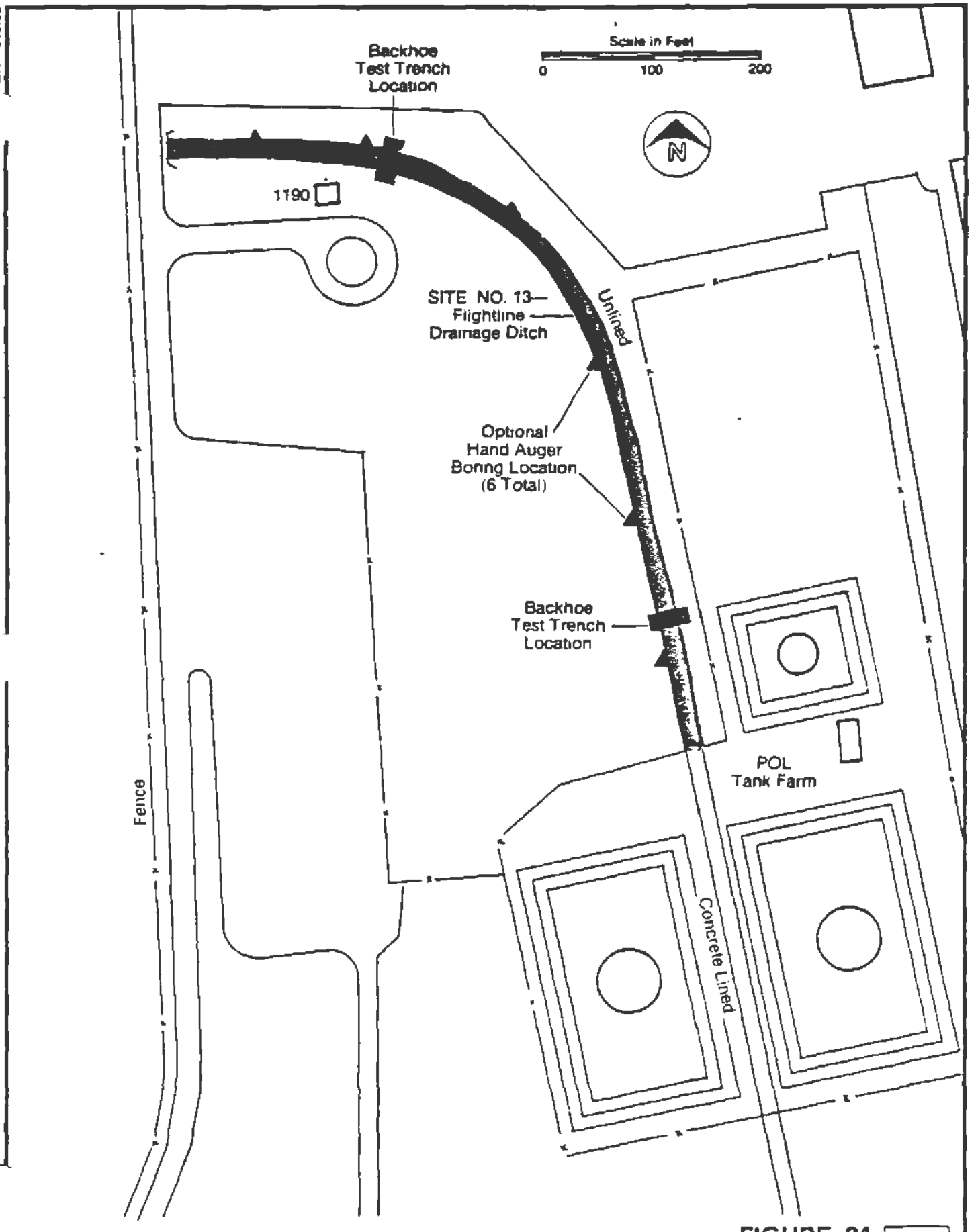


FIGURE 24.
Recommended Preliminary Sampling Locations for Site No. 13—
Flightline Drainage Ditch.

CH2M HILL

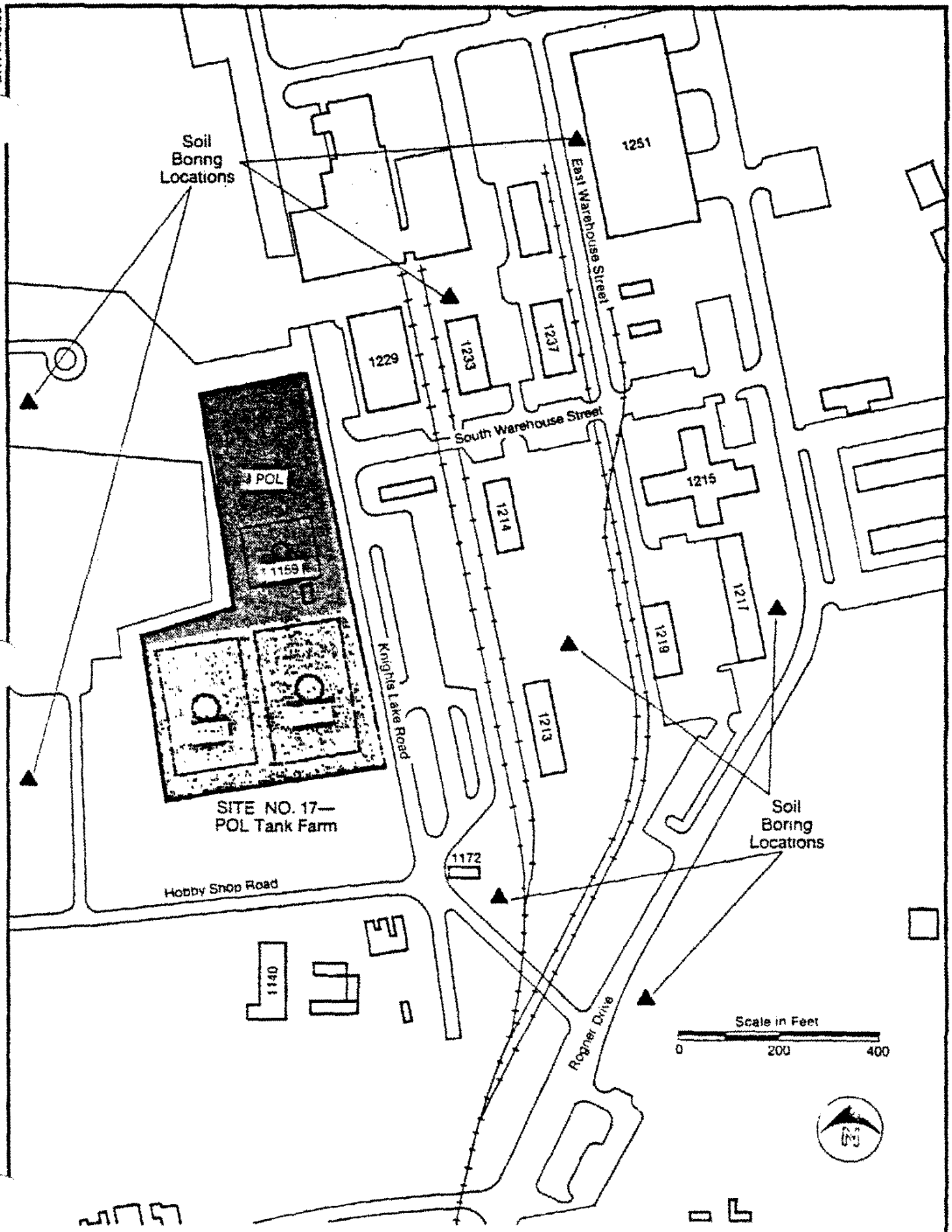


FIGURE 25.
Recommended Preliminary Sampling Locations for Site No. 17—POL Tank Farm.

CH2M HILL

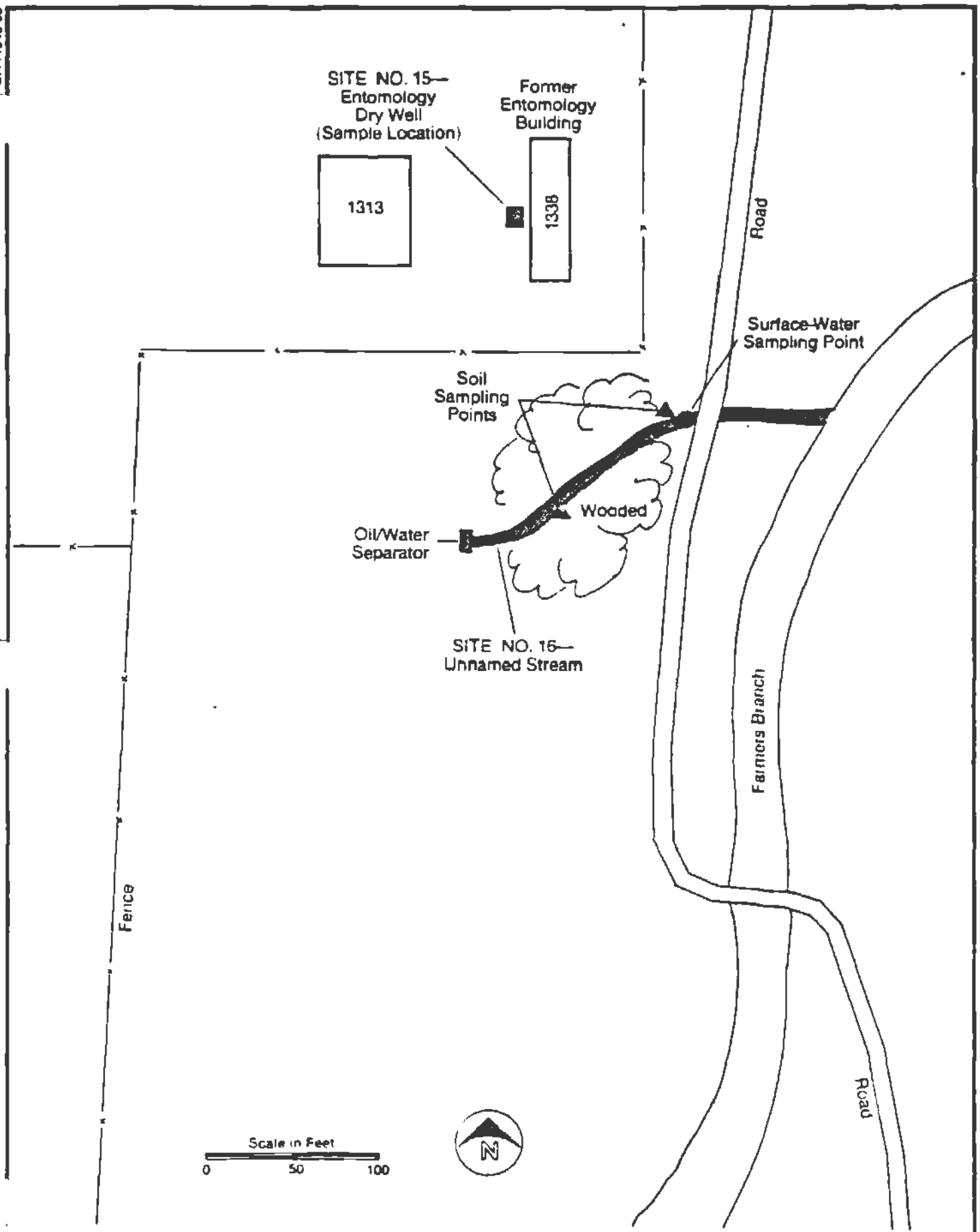


FIGURE 26.
Recommended Preliminary Sampling Locations for Site No. 16—Unnamed Stream and Site No. 15—Entomology Dry Well.

CH2M HILL

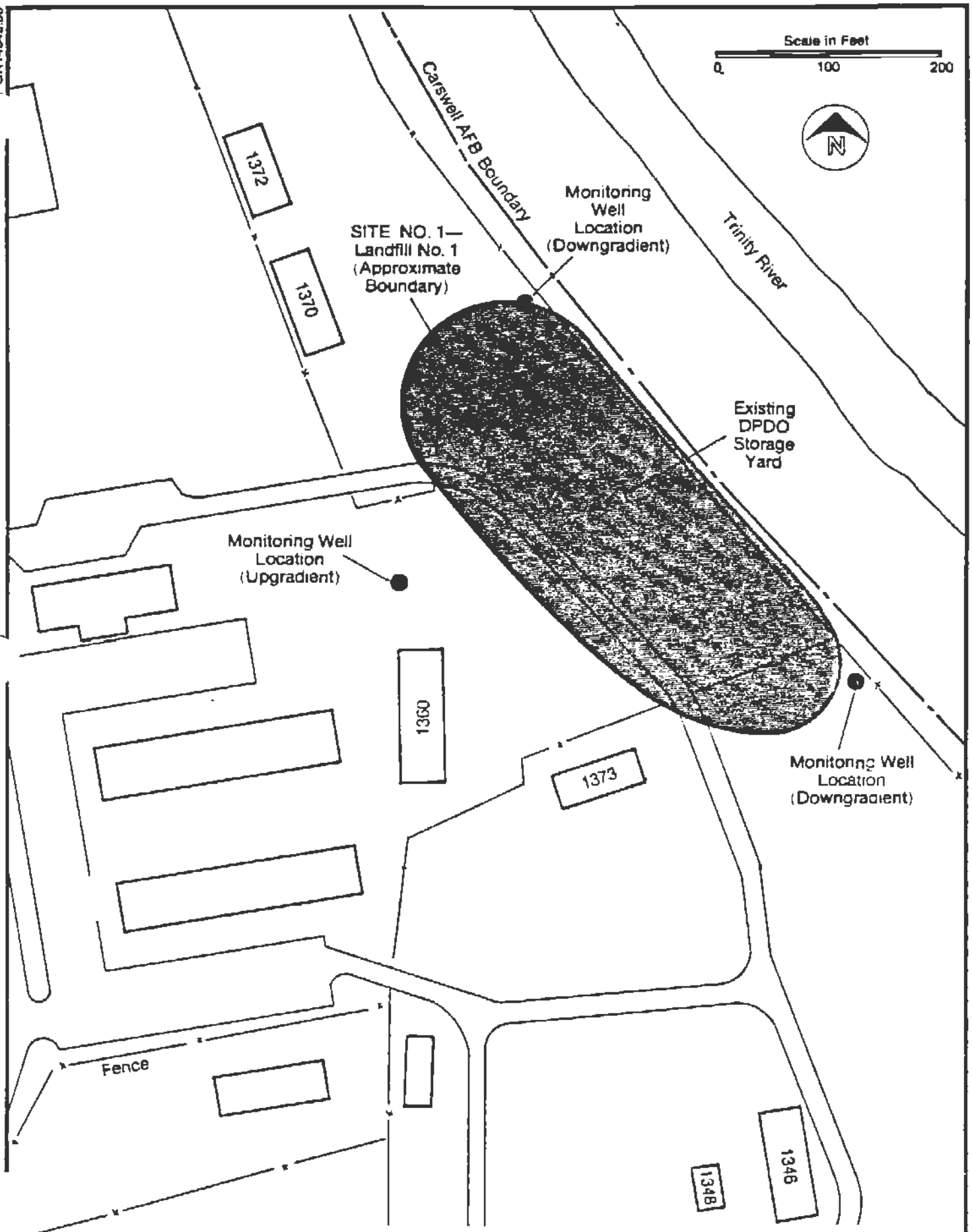


FIGURE 27.
Recommended Preliminary Sampling Locations for Site No. 1—
Landfill No. 1.

CH2M HILL

a. Monitoring Wells

Monitoring wells are recommended to monitor the shallow alluvium and to monitor the deeper Paluxy aquifer. Prior to placement of the shallow alluvium wells, conducting appropriate geophysical surveys is suggested to define the thickness and distribution of permeability within the alluvium. Wells should be located upgradient and downgradient from the zone. Approximately 5 to 10 wells are contemplated, each drilled to a depth of 20 to 30 feet.

At least one downgradient monitoring well should be installed into the Paluxy aquifer to determine if hazardous contaminants are present. This well should be located as shown in Figure 23, drilled to the bottom of the Paluxy aquifer (approximately 200 feet), and screened throughout the ground-water zone. Precautions should be taken to avoid cross contamination between the shallow alluvium and the Paluxy aquifer.

The shallow alluvium wells and the Paluxy well, should be analyzed for the parameters given in Table 15 on two occasions at least 30 days apart. If signs of contamination are detected in either the alluvium wells or the Paluxy aquifer well, additional alluvium and/or Paluxy aquifer wells may be required to define the nature and extent of contamination.

b. Surface-Water Monitoring

Drainage creeks or ditches that pass through this zone should be sampled to determine if hazardous contaminants are leaching from the ground. Figure 23 shows the recommended locations for sampling. Samples from each

location should be analyzed for the parameters shown in Table 15. At least two grab samples should be collected at each location during wet-weather flow conditions.

c. Soil Borings

One soil boring should be completed at Site No. 12, Fire Department Training Area No. 2. The boring should be located as shown in Figure 23, and completed to a maximum depth of 10 feet. A certified geologist should be present to examine the soil profile and characteristics and to inspect for signs of fuel or VOC contamination. Soil samples should be collected and analyzed in accordance with Table 15. The number of samples collected should be at the discretion of the geologist. If ground water is encountered in the borehole, analyses should also be completed on a water sample. After sampling has been completed, the borehole should be properly sealed to prevent a pathway for contaminant migration.

d. Other

Reportedly, drums of solvent and, possibly, ordnance materials have been buried at Site No. 10, the Waste Burial Area. Due to the potential for steel drums to corrode and the potential contamination hazard of solvents, consideration should be given to verifying the existence and location of these drums (via ground penetrating radar) and to removing them from the site. Because of the possible presence of buried ordnance and the further possibility that the ordnance materials may be live, proper safety measures should be employed during any onsite activity.

2. Flightline Drainage Ditch (Site No. 13)

Two backhoe test trenches should be dug at this site to allow visual examination of the subsurface below the ditch. The trenches should be located as shown in Figure 24. The trenches should cut across the ditch and to a depth of approximately 10 feet below the stream bed. A certified geologist should be present to examine the soil profile and characteristics and to inspect for signs of contamination such as abnormal odor (e.g., POL, solvent odors) or discoloration. Soil samples should be collected and analyzed in accordance with Table 15. The number of samples collected should be at the discretion of the geologist; however, one to five samples per trench will probably be adequate.

An alternative to backhoe test trenches is six soil borings. The requirement and role of a certified geologist, the depth of the borings, the number of samples required (one to five per boring), and the recommended analyses are the same as recommended for above for the backhoe test trenches. The recommended locations for the borings are shown in Figure 24.

After completion of the backhoe test trenches or the boreholes, they should be properly closed and sealed to prevent a pathway for contaminant migration.

3. POL Tank Farm (Site No. 17)

Eight soil borings should be completed, two upgradient and six downgradient from the site. Each borehole should be completed to a depth of 3 feet below the ground water, but no deeper than top of bedrock, and should be located as shown in Figure 25.

Samples of water taken from each boring should be analyzed for the parameters given in Table 15. The existence and thickness of a hydrocarbon lens in each borehole should be determined. After sampling, the boreholes should be properly sealed to prevent a pathway for contaminant migration. If water is not encountered within the upper zone, the soil should be sampled for the same parameters recommended for the water samples.

If the results of the analyses confirm the presence of contamination, then based upon the type and concentration of contaminants, consideration should be given to installation of upgradient and downgradient monitoring wells into the Paluxy aquifer to define the presence and/or extent of migration. The precise number, depth and location of wells should be determined by the Phase II contractor.

4. Unnamed Stream (Site No. 16)

Two soil borings should be completed at this site. Each should be completed to a maximum depth of 10 feet or to the top of bedrock, whichever occurs first, and located as shown in Figure 26. A certified geologist should be present to examine the soil profile and characteristics and to inspect for signs of fuel contamination. Soil samples should be collected and analyzed in accordance with Table 15. The number of samples collected should be at the discretion of the geologist. After sampling has been completed, the boreholes should be properly sealed to prevent a contaminant pathway.

In addition to soil borings, surface-water sampling is recommended to define the characteristics of the stream. On at least two occasions, preferably once during wet-weather flow conditions and once during dry-weather conditions,

samples should be collected at the locations shown in Figure 26. The samples should be analyzed in accordance with Table 15.

5. Entomology Dry Well (Site No. 15)

Analysis of water or soil collected at the entomology dry well is recommended in accordance with Table 15. Water analyses are preferable to soil analyses; however, due to the nature of the well design (dry well), properly collecting a representative water sample may be impractical or even impossible. If the latter is the case, then slant soil borings should be completed beneath the well and soil analyzed for the parameters indicated in Table 15. Even if no contamination is found, the entomology dry well should be filled and closed to prevent its use in the future.

6. Landfill No. 1 (Site No. 1)

One upgradient and two downgradient shallow monitoring wells should be installed at this site. The wells should be drilled into the alluvium, approximately 20 to 30 feet deep, and located as shown in Figure 27. Each well should be analyzed in accordance with Table 15, on two occasions, at least 30 days apart. If contamination is found, then depending on the type and concentration of the contamination, consideration should be given to the installation of monitoring wells into the Paluxy aquifer. The precise location, number, and depth of these wells should be determined by the Phase II contractor.

B. OTHER IRP RECOMMENDATIONS

The following additional recommendations have resulted from the base visit and records search.

1. Flightline Drainage Ditch (Site No. 13)

Irrespective of the outcome of Phase II monitoring at the flightline drainage ditch, the following actions should be considered:

a. Repair or remove the ruptured pipe that currently carries JP-4 fuel from the Fuel Systems Shop to the drainage ditch. As discussed in Section IV.B, "Disposal Sites Identification and Evaluation," this pipe is routed through the storm culvert that begins the drainage ditch and, until 1978, transported the JP-4 to the Facility 1190 oil/water separator located adjacent to the ditch.

b. Line the flightline drainage ditch with concrete. A concrete lining would not only be more aesthetically acceptable but would also provide assurances that future discharges into the ditch would not enter the ground.

2. Unnamed Stream (Site No. 16)

To minimize or eliminate the potential for contaminants in this stream, the oil/water separator located near Building 1338 should be thoroughly cleaned and routinely inspected/cleaned in the future. A program should be established to sample the stream on at least a quarterly basis until the stream is consistently free of contamination. Analyses should be based upon the findings of the Phase II monitoring effort.

3. Abandoned Wells on Base

Efforts should be made to locate and properly close all abandoned wells on base (see Section IV.C, "Hydrology").

VII. OFF-BASE FACILITIES

VII. OFF-BASE FACILITIES

A. INTRODUCTION

Two off-base facilities exist under the ownership and control of Carswell AFB. The first is a conventional weapons storage area. The second is the site of an ILS marker beacon.

B. WEAPONS STORAGE AREA

1. Description

The Weapons Storage Area (WSA) is located about 4 miles west of Carswell AFB, just north of White Settlement Road (see Figure 3). The facility, built in 1956, consists of 247 acres of fee-owned land surrounded by an additional 264 acres of easements. A site map of the WSA is shown in Figure 28.

2. Environmental Setting

a. Physical Geography and Hydrology

The WSA is located within the Grand Prairie section of the central lowlands physiographic province. Soils in the area generally consist of the Aledo-Bolar-Sanger Association which is defined as gently sloping to moderately steep, very shallow to deep, loamy and clayey soils; on uplands. Soil permeabilities range from less than 4.2×10^{-5} to 9×10^{-4} cm/sec.

The WSA is located in an area where the Fredericksburg and Washita Groups outcrop. In some areas, this formation has been eroded away, exposing the underlying Paluxy sand.

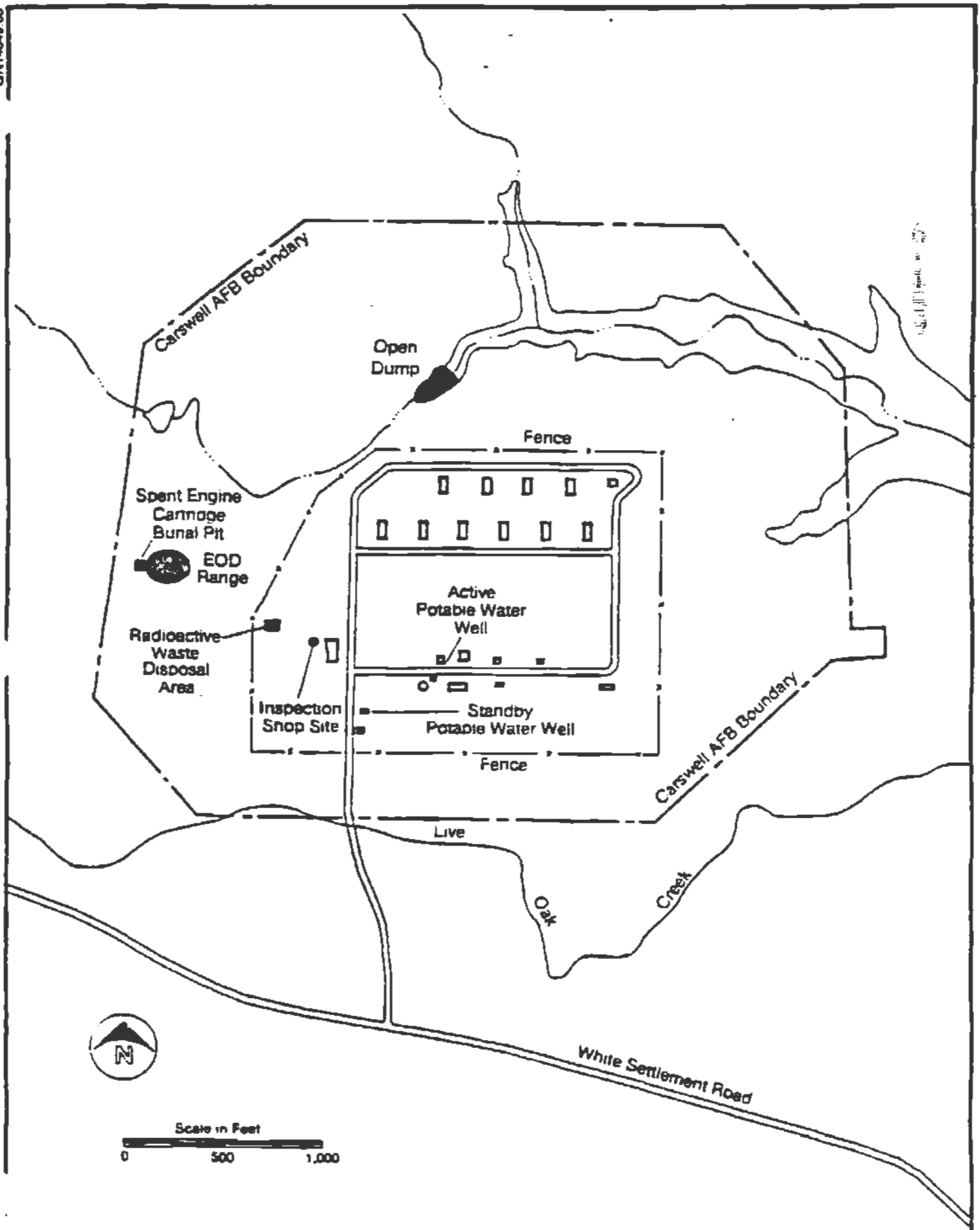


FIGURE 28.
Site Map of Weapons Storage Area.

The WSA is located between two forks of Live Oak Creek, which flows east, discharging into Lake Worth (see Figure 26). All surface runoff discharges to this creek. Elevations in the area range from 720 to 800 feet mean sea level (msl).

Potable water is supplied by two wells (one is standby), each reported to be 218 feet deep. It is probable that these wells develop water from the Paluxy and Twin Mountains Aquifers.

b. Ecology

The WSA is located on gently rolling land in the Cross Timbers and Prairies Region of Texas. Most of this land is in unimproved pasture and is heavily grazed by beef cattle. Also, part of the WSA area is in natural, xeric, oak woodlands, especially on hillsides and in ravines. Wildlife populations are similar to those on Carswell AFB, with the addition of some larger mammals such as white-tailed deer and coyotes.

3. Findings

Facilities at the WSA include two munitions inspection shops, 16 ordnance storage buildings (including 11 igloos), one entry control building, an emergency power plant, an EOD range, a radioactive waste disposal facility, a water storage tank, and two water wells.

Investigations conducted included a helicopter overflight, a ground tour of the facility, and interviews with personnel knowledgeable about the facility.

Potable water is supplied by a system of two pumps and an elevated storage tank. A septic tank/drain field system is used for the disposal of domestic sewage. Domestic garbage and solid wastes generated at the WSA is collected by a private contractor.

One interviewee employed at the WSA reported that waste cleaners and solvents (suspected paint thinners and trichloroethylene) have occasionally been disposed of on the ground behind Building 8503, the Inspection Shop (see Figure 28). Quantities were estimated to be 5 to 10 gallons per year. This site was rated using the HARM system and given an overall score of 61, primarily due to: (1) the proximity of the site to a potable water well (approximately 600 feet); (2) the land use (residential and agricultural) within one mile of the site; (3) proximity of the site to the reservation boundary (approximately 800 feet); (4) populations (greater than 1,000 people) served by surface waters (Lake Worth) within 3 miles downstream of the site and served by ground waters within 3 miles of the site; and (5) the confirmed disposal of a small quantity of hazardous material.

Other sites of interest observed at the WSA included: (1) an open dump, (2) an EOD range, (3) a radioactive waste disposal facility, and (4) a spent engine cartridge burial pit. (See Figure 28).

a. Open Dump

This site is located outside of the fenced area but within the WSA property boundary. According to WSA personnel, the site is occasionally used by them for disposal of debris (wood, metal, paper, etc.) and is not used for disposal of hazardous or other liquid wastes. An inspection

of the site by the record search team during the base visit seemed to substantiate the above. The site, however, is still of some concern due to two factors: (1) the public has access to the site and has used it on occasion and (2) the site is in a gorge that drains into a tributary to Live Oak Creek which flows into Lake Worth. The site should be closed to prevent its possible use for disposal of hazardous materials. The site was not rated since hazardous materials were not suspected of being present at the site.

b. EOD Range

Prior to 1975, this range was an active EOD area; however, since 1975 it has been used only for training. The explosive limit is 5 pounds. Burning at the range is not authorized. A specific burial site for exploded ordnance does not exist. According to a WSA interviewee, the EOD range is periodically graded over and any scrap material is buried in the process.

c. Radioactive Waste Disposal Area

The radioactive waste disposal area consists of three dry waste wells. Each is constructed from 12-inch-diameter cast iron pipes encased in 2-1/4 inches of grout. The pipes are vertically embedded 18 feet into the ground. The wells were used from 1957 to 1969 to dispose of radioactive and non-radioactive material wastes. Reportedly the wells contain plutonium contaminated swipe samples, rubber gloves, paper bags, and uranium oxide. In 1969 the wells were permanently capped. The area around the wells is fenced and radiation caution signs are in place. Routine radiation measurements are made around the site and to date have reportedly been negative. Due to the containment provided by the cast iron pipes in conjunction with the 2-1/4 inches

of grout, no potential exists for contaminant migration from the disposal site; as a result, this site was not rated. No records were available to indicate whether or not radiological analyses have been completed on the potable water wells located onsite.

d. Spent Engine Cartridge Burial Pit

This site consists of an approximately 10-foot by 10-foot open hole enclosed within a fence. The hole is used for the burial of spent engine starter cartridges. The cartridges are mostly rubber and would contain minimal, if any, explosive residues. This site was not considered to pose a potential for contamination and was not rated.

4. Conclusions

Potential pathways for contaminant migration at the WSA includes wells in the area and direct access to the top of the Paluxy Aquifer where confining beds may have been removed by erosion. Of the sites discussed above, only the Inspection Shop Site was considered to present a significant potential for environmental concerns.

5. Recommendations

A limited Phase II monitoring effort is recommended for the Inspection Shop Site to confirm or rule out the presence and/or migration of hazardous contaminants. It is two to three soil borings, spaced about 5 feet apart, should be taken at the site. These borings should be made to a depth of at least 5 feet. A certified geologist should be present to examine the soil profile and inspect for signs of contamination. Soil samples should be collected and analyzed for Volatile Organic Compounds (VOC), COD, and TOC.

In addition, VOC and radiological analyses should be completed on the onsite potable water wells at least once.

C. ILS MARKER BEACON

The ILS Marker Beacon is a one-acre site located west of Carswell. Facilities include a marker beacon and an emergency power generator. Due to the nature and purpose of this site, it was not considered to present a potential for environmental concern and was not investigated during the record search team's base visit.

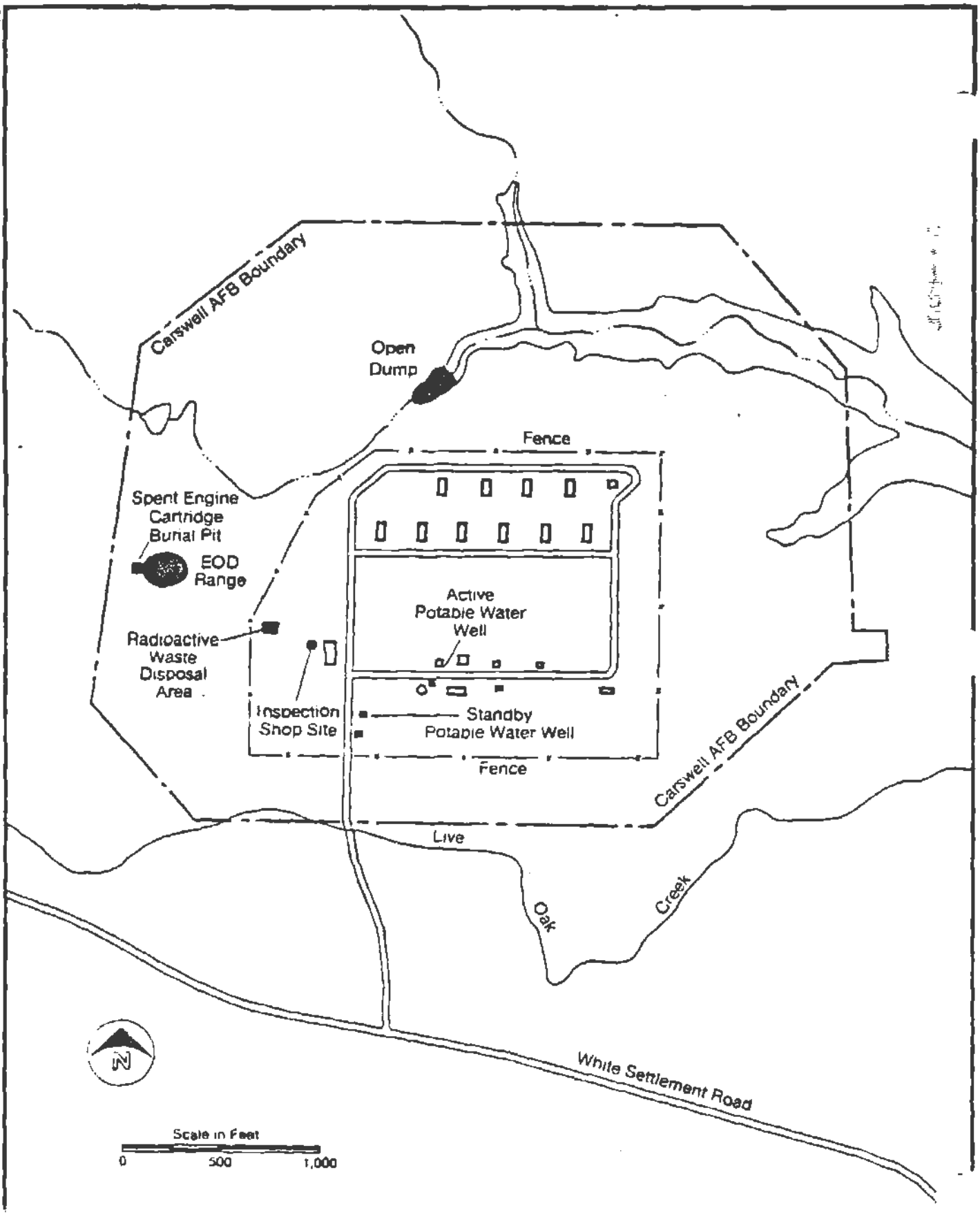


FIGURE 2.
Site Map of Weapons Storage Area.

Appendix A

RESUMES OF TEAM MEMBERS

DAVID M. MOCCIA
Industrial Reclamation
Department Manager

Education

B.S., Chemical Engineering, University of Florida

Experience

Since joining CH2M HILL, Mr. Moccia has developed expertise in water and wastewater treatment and hazardous waste management. Projects for municipal clients include the design of a reverse osmosis water treatment plant and several preliminary designs for activated sludge wastewater treatment facilities. He has also completed wastewater investigations, pilot studies, and engineering designs for clients in the food, chemicals, and metal treating industries. In hazardous waste projects, Mr. Moccia has been involved with the identification of possible hazardous waste contaminated sites, assessments of potential for contaminant migration, and the preparation of master plans for the management of uncontrolled hazardous waste sites.

In his present position as Manager of the Industrial Reclamation Department, Mr. Moccia is responsible for project execution, fiscal management, business development, and staffing for the department.

In the area of water treatment, Mr. Moccia completed the process design and managed the engineering design of a 3.0-mgd reverse osmosis water treatment plant for the Englewood Water District in south Florida. The facility was designed to provide potable water from brackish well water having a total dissolved solids concentration of 4,700 ppm. The design included chemical addition to prevent precipitation of minerals, micron filtration to remove fine particles in the raw water, spiral-wound membranes to reduce the total dissolved solids concentration, degassification to remove hydrogen sulfide and carbon dioxide, chemical addition to adjust pH, chlorination to provide disinfection, and potable water storage. Prior to distribution, the treated water is combined with treated water from three lime softening water treatment plants.

Mr. Moccia participated in the design of a 9.5-mgd wastewater treatment plant for Alexander City, Alabama. He was responsible for the process design of an activated sludge process, including sludge thickening and dewatering. Components of the system included aeration basins, clarifiers, chlorination facilities, a dissolved air flotation system for thickening sludge, a thickened sludge holding basin, and

belt filter presses for sludge dewatering prior to off-site disposal. Although the plant was a municipal facility, the raw wastewater was comprised largely of wastewaters from a large textile plant in Alexander City.

Mr. Moccia's experience in industrial wastewater treatment includes a study and process design completed for a south Georgia organic chemicals plant. He was responsible for the wastewater characterization, pretreatment, laboratory and pilot plant studies, and process design of a facility to treat up to 39,000 pounds per day of BOD_5. Studies showed that the wastewater was very amenable to biological treatment but was nutrient-deficient and would require addition of nitrogen and phosphorus. The wastewater temperature was found to be excessively high, requiring cooling prior to biological treatment. Various toxic shock loading tests determined the potential impact of uncontrolled spills. The process design included modification to existing pretreatment equipment, in-line equalization basins, a pH neutralization basin, aeration basins, clarifiers, belt filter press sludge dewatering facilities and chemical addition facilities for nutrient addition and pH adjustment.

In the food processing industry, Mr. Moccia has been involved in various wastewater studies and designs for Perdue, Inc., a poultry processor. Projects were completed for plants located in North Carolina, Virginia, Maryland, and Delaware. Poultry processing wastewater is generally high in oil and grease, solids, BOD_5 and blood and requires pretreatment prior to effective biological treatment. At the Virginia location wastewater characterization and pretreatment studies were completed followed by process and engineering designs for a 2.0 mgd activated sludge treatment system. Due to water quality limitations on the receiving creek, Mr. Moccia was involved in various stages of negotiations with the regulatory agencies concerning discharge criteria and discharge permit requirements. Similar services provided to the other plants included an effluent spray irrigation feasibility study, design of a complete pretreatment system utilizing a dissolved air flotation tank, and evaluation and recommendations for improvements to two activated sludge treatment systems.

Examples of Mr. Moccia's involvement in hazardous waste projects include several studies completed for the U.S. Air Force in accordance with the Department of Defense's (DoD) Installation Restoration Program (IRP). The IRP represents DoD's policy to identify and fully evaluate suspected problems associated with past hazardous materials disposal

sites on DoD facilities (e.g., Air Force bases), to control the migration of hazardous contamination, and to control hazards to health and welfare that may have resulted from these past operations. Phase I of this program, the Records Search, included a search and review of installation records to identify possible hazardous waste-contaminated sites and to assess the potential for contaminant migration from the installation. Mr. Moccia participated in and managed Phase I Records Searches at MacDill AFB, Florida; Dobbins AFB, Georgia; Richards-Gebaur AFB, Missouri; Bergstrom AFB, Texas; and Cannon AFB, New Mexico.

Mr. Moccia has directed the preparation of Remedial Action Master Plans (RAMP) for several uncontrolled hazardous waste sites including a landfill and refinery/petrochemical waste disposal sites. The documents served to identify the scope and sequence of remedial investigations, feasibility studies, and other onsite or offsite remedial actions applicable to the uncontrolled site. The plans included work statement and order-of-magnitude cost estimates for recommended remedial projects, preliminary health and safety requirements, and community relations strategies.

Professional Registration

Professional Engineer, Florida, Georgia, North Carolina

Membership in Professional Organizations

Florida Engineering Society
Florida Pollution Control Association
National Society of Professional Engineers
Water Pollution Control Federation
Tau Beta Pi

GNRE2

GARY E. EICHLER
Hydrogeologist

Education

M.S., Geology with Minor in Civil Engineering, University of Florida
B.S., Cum Laude, Construction and Geology, Utica College of Syracuse University

Experience

Mr. Eichler has been responsible for groundwater projects for both water supply and effluent disposal. Studies have included site selection, well design, construction services, monitoring and testing programs, determination of aquifer characteristics, and well field design. In addition, he has conducted numerous studies to determine pollution potential of toxic and hazardous wastes. Prior to joining CH2M HILL, Mr. Eichler was an engineering geologist with an environmental consulting firm. His responsibilities included project management, soils investigations, siting studies, groundwater and surface-water reports, and federal and state environmental impact studies.

Mr. Eichler has been responsible for exploration drilling, testing and design of well fields having a combined total installed capacity of over 75 mgd. Many of these well fields for potable water supply are located in the coastal aquifer in close proximity to saltwater.

His experience includes responsibility for the design and installation of shallow aquifer well fields in unconsolidated formations. Mr. Eichler has designed and installed screened wells, both natural and gravel packed, as well as open hole wells using both cable tool and rotary drilling methods.

Project responsibilities have included management and team participation on more than 20 hazardous waste disposal projects. The studies included initial site investigations, determination of pollutant travel time and direction, and evaluation of the potential for contaminant migration.

Mr. Eichler has been involved in geophysical logging and performance testing of deep disposal wells for both municipal effluent and hazardous waste.

He has conducted projects to determine saltwater intrusion potential and has been responsible for the design of monitoring programs to warn against intrusion.

GARY E. EICHLER

Mr. Eichler has conducted hydrogeological projects using aquifer computer modeling techniques to predict the effects of future large scale groundwater withdrawals.

Professional Registration

Certified Professional Geologist, Certificate No. 4544

Membership in Professional Organizations

American Institute of Professional Geologists
American Water Resources Association
Association of Engineering Geologists
Geological Society of America
Southeastern Geological Society
National Water Well Association
Florida Well Drillers Association

Publications

With U. P. Singh, C. R. Sproul, and J. I. Garcia-Bengochea. "Aquifer Testing of the Boulder Zone of South Florida." ASCE Publication Preprint 82-030. 1982.

Engineering Properties and Lime Stabilization of Tropically Weathered Soils. Master's Thesis. Department of Geology, University of Florida. August 1974.

GNRE3

ROBERT L. KNIGHT
Ecologist

Education

Ph.D., Systems Ecology, University of Florida
M.S.P.H., Environmental Chemistry and Biology, University of North Carolina
B.A., Zoology, University of North Carolina

Experience

Dr. Knight's responsibilities at CH2M HILL involve all aspects of environmental study, including design and implementation of field studies, data analysis and interpretation, project management, environmental systems overview analysis, impact analysis, prediction, and assessment. His experience has covered a wide range of applied research problems in aquatic and terrestrial environments, including computer simulation analyses.

Dr. Knight has managed several marine ecology field studies in Florida including: a 4-year study of estuarine metabolism at the Crystal River Nuclear Power Plant; a baseline conditions assessment of seagrass and oyster reef ecology in the Withlacoochee and Crystal Bays; and a 1-year productivity study and preparation of a simulation model of the Indian River estuary.

Dr. Knight participated in the design and implementation of long-term studies of fate and effects of toxic metals in stream mesocosms. He had direct responsibility for the chemical and biological monitoring of algal and insect populations, prepared a toxicity simulation model for cadmium, and developed general techniques for quantification of toxicity in biological systems.

Dr. Knight performed extensive field work at Silver Springs, Florida, to investigate the relationship between plant productivity and consumer organizations. As one part of that study, he developed a new microcosm design for the study of flowing aquatic systems.

Dr. Knight has conducted several studies on the feasibility of using natural and artificial wetlands for the assimilation of domestic wastewaters. Wetland systems include Spartina salt marshes and pocosins in North and South Carolina, hardwood swamp and prairie wetlands in Florida, and a marsh wetland in Mississippi. He has played a major role in site investigations and in developing management criteria for wetland and land treatment systems.

ROBERT L. KNIGHT

Dr. Knight has participated in a number of hazardous waste studies, including three Superfund sites, a hazardous waste landfill, and six Air Force bases, nationwide. He has prepared ecological assessments of susceptible environments and has participated in water quality sampling in groundwater studies.

Dr. Knight has considerable expertise in the study of phytoplankton and other algae in aquatic systems. He has conducted field verification studies of the Algal Assay Procedure, studied the effects of power plant entrainment on phytoplankton, and provided taxonomy and enumeration of phytoplankton and periphyton from rivers and streams.

Publications

Dr. Knight has authored several technical papers on ecosystem metabolism, phytoplankton ecology, and heavy metal dynamics in aquatic systems. Representative papers include:

Energy Model of a Cadmium Stream with Correlation of Embodied Energy and Toxicity Effect. EPA-600/53-048. U.S. EPA, Athens, Georgia. 1982.

"In Defense of Ecosystems," co-authored with D. Swaney. American Naturalist, 117:991-992, 1981.

"A Control Hypothesis for Ecosystems--Energetics and Quantification with the Toxic Metal Cadmium," in W. Mitsch, R. W. Bosserman, and J.M. Klopatek (eds.) Energy and Ecological Modelling. Elsevier Publishing Co., pp. 601-615, 1981.

Record of Estuarine and Salt March Metabolism at Crystal River, Florida, 1977-1981, co-authored with W. F. Coggins. Final Summary Report to Florida Power Corporation, Dept. of Environmental and Engineering Sciences, University of Florida, Gainesville. 1982.

"Large-Scale Microcosms for Assessing Fates and Effects of Trace Contaminants," co-authored with J. W. Bowling, J. P. Giesy, and H. J. Kania. In: J. P. Giesy (ed.) Microcosms in Ecological Research, USDE pp. 224-247, 1980.

"Fates of Cadmium Introduced into Channel Microcosms," co-authored J. P. Giesy, J. W. Bowling, H. J. Kania, and S. Mashburn. Environment International, 5:159-175, 1981.

Energy Basis of Control in Aquatic Ecosystems. Ph.D. Dissertation, University of Florida. 1980.

ROBERT L. KNIGHT

Fate and Biological Effects of Mercury Introduced into Artificial Streams, co-authored with H. J. Kania and R. J. Beyers. PEA-600/3-76-060. U.S. EPA, Athens, Georgia. 1976.

Effects of Entrainment and Thermal Shock on Phytoplankton Numbers and Diversity. Department of Environmental Sciences and Engineering, Publication 336, University of North Carolina, Chapel Hill. 1973.

RE2

Appendix B

OUTSIDE AGENCY CONTACT LIST

Appendix B
OUTSIDE AGENCY CONTACT LIST

1. Mr. Ralph Ollman
   Hydrologist
   U.S. Geological Survey
   P.O. Box 6976
   Fort Worth, Texas 76115
   817/334-5551

2. Mr. Richard Francher
   Soil Conservationist
   United States Department of Agriculture
   5009 South Hulen Drive, Suite 104
   Fort Worth, Texas 76115
   817/334-4685

3. Mr. Harold Beierman
   Wildlife Biologist
   United States Fish and Wildlife Service
   Fort Worth, Texas
   817/334-3871

4. Mr. Bruce Thompson
   Program Leader
   Non-Game Wildlife Program
   Texas Parks and Wildlife Department
   Austin, Texas
   512/479-4979

5. Mr. Dennis Palafox
   Pollution Surveillance Program Leader
   Texas Parks and Wildlife Department
   Austin, Texas
   512/479-4864

6. Mr. Donald Eubank
   Assistant District Supervisor
   Solid Waste Branch
   Texas Department of Water Resources
   Duncanville, Texas
   214/298-6171

7. Mr. David Barker
   Solid Waste Section
   Texas Department of Water Resources
   Austin, Texas
   512/475-5695

8. Mr. Seyed M. Mohammadi
   Field Engineer
   Solid and Hazardous Wastes
   Texas Department of Health
   Arlington, Texas
   817/261-2911

9. Mr. James Highland
Federal Facilities Coordinator
United States Environmental Protection Agency
Region 6
Dallas, Texas
214/767-9930

10. Mr. William B. Hathaway
Deputy Administrator
Air and Waste Management Division
United States Environmental Protection Agency
Region 6
Dallas, Texas
214/767-9708

Appendix C

CARSWELL AFB RECORDS SEARCH INTERVIEW LIST

Appendix C
CARSWELL AFB RECORDS SEARCH INTERVIEW LIST

Interviewee	Area of Knowledge	Years at Installation
1	Civil Engineering	22
2	Civil Engineering	13
3	Heavy Equipment Operation	31
4	Heavy Equipment Operation	27
5	Pavement and Grounds	31
6	Exterior Electric	10
7	Fire Department	4
8	Defense Property Disposal Office	10
9	Entomology	7
10	Base Bioenvironmental Engineering	8
11	Base Bioenvironmental Engineering	1
12	Water and Waste	28
13	Water and Waste	13
14	Aircraft Maintenance (7th FMS)	7
15	Aircraft Maintenance (7th FMS)	4
16	Aircraft Maintenance (7th FMS)	3
17	Aircraft Maintenance (7th FMS)	3
18	Aircraft Maintenance (7th FMS)	2
19	Aircraft Maintenance (7th FMS)	1
20	Aircraft Maintenance (7th FMS)	1
21	Aircraft Maintenance (7th AMS)	8
22	Aircraft Maintenance (7th AMS)	8
23	Aircraft Maintenance (301st CAM)	20
24	Aircraft Maintenance (301st CAM)	18
25	Aircraft Maintenance (301st CAM)	17
26	Aircraft Maintenance (301st CAM)	5
27	Vehicle Maintenance	10
28	Liquid Fuels Maintenance	1
29	Liquid Fuels Management	7
30	Golf Course Maintenance	13
31	Real Estate	10
32	Weapons Storage Area (Off-Base)	10
33	Air Force Plant 4	2

Appendix D

INSTALLATION HISTORY

Appendix D
INSTALLATION HISTORY

In November 1940, the U.S. War Department authorized Major Rueben H. Fleet, President of the Consolidated Aircraft Corporation, to select a site for a bomber plant and in January 1941, a site 6 miles west of Fort Worth was chosen to be the location for both the bomber plant and a military base. The 1,450 acres that were selected consisted of woods and pasture in an area called White Settlement. The City of Fort Worth acquired the property through condemnation.

By 24 September 1941, the Army Corps of Engineers, utilizing the Fort Worth Youth Force, had cleared 150 of 240 acres of timberland in the area. With progress of both projects running smoothly, a contract to pave the runways was awarded on 3 November, to the Bitulithic Company of Dallas at a cost of $473,188. By now the steel workers were positioning the last truss for the bomber plant while the L. J. Miles Company had half of the excavation and grading of the airfield completed.

On 28 June 1942, the unfinished field, called Tarrant Field Airdrome, was assigned to the Army Air Forces Training Command. In turn it was placed under the control of the Gulf Coast Army Air Force Training Command on 25 July 1942.

In August 1942, the base was opened and operations began. There was no ceremony of dedication to make any one particular day in August memorable because the nation was now 9 months into the war and the primary mission of the training base was to train B-17 and other pilots to fly the new B-24 Liberator which was being constructed across the runway by the Consolidated Aircraft Corporation. Training was hampered by lack of training aircraft and flying instructors. Also, numerous mechanical problems were encountered with the

operation of the B-24. With war engulfing the globe it was vital to obtain the maximum training hours for aircrews and mechanics. The base, therefore, established a 24-hour flying schedule and allowed cancellations for only the worst weather.

Construction projects at the airfield continued into 1943 with a $500,000 major improvement project under way in February. This project was a part of the expansion program for the field and included extending the runway and taxiways, construction of more bachelor officers' quarters, a recreation hall, a skeet range, a crash boat house, and a hangar. Later that month contracts for another hangar and additional facilities were let at a cost of $128,000.

In addition to B-24 training, the field had programs for training pilots in the B-25 Mitchell medium bomber and was operating a B-26 "Marauder" transition school until the B-26 training school (later Laughlin Air Force Base) at Del Rio, Texas could be established.

In May 1943, the field was redesignated as Fort Worth Army Air Field. The training mission continued throughout 1944 and in January 1945 the Fort Worth Army Air Field began to operate a transition school for the B-32 aircraft. By that time more than 40,000 students had been trained at the B-24 transition school. Like the B-24, the B-32 was also manufactured across the runway. This was an ideal situation in that when mechanical problems were encountered with the new aircraft they could easily be resolved through cooperation between officials of the corporation (also known as Air Force Plant 4) and the field.

The 7th Bombardment Group was activated and assigned to the Fort Worth Army Air Field on 1 October 1946. It consisted of the 9th, 436th, and 492nd Bomb Squadrons together with support squadrons. The group was assigned B-29 aircraft.

During World War II, the 20th Bombardment Squadron (Heavy) had remained assigned to the 2nd Bombardment Wing (Very Heavy). While the 7th was in the South Pacific raiding Japanese installations, the 20th was fighting battles in Algeria, Tunisia, and Italy. On 28 February the Wing and its assigned squadrons were inactivated. They were not reactivated again until 1 July 1947 and stationed at Andrews Field, Maryland. They too were assigned B-29 aircraft after the war.

On 5 November 1946, Brigadier General Roger M. Pamey, Chief of Staff, Eighth Air Force, announced that approximately 700 officers and enlisted personnel would arrive in the Fort Worth area within the next few weeks as Headquarters Eighth Air Force was reassigned here on 1 November 1946. The 58th and 7th Bomb Groups, combined with Eighth Air Force personnel, brought the field population to more than 5,600 personnel.

On 13 January 1948, the field was redesignated as Griffiss Air Base in honor of Lieutenant Colonel Townsend Griffiss who was the first U.S. airman to die in the line of duty in Europe after the U.S. entered World War II. He was a passenger on an aircraft that was accidently shot down by the Polish Air Force. Fort Worth had a hero of its own. He was Major Horace S. Carswell, Jr., who was killed in combat in the South Pacific. On 30 January 1948, the base was again renamed as Carswell Air Force Base in honor of Major Carswell.

In June of 1948, the group began equipping itself with B-36 "B" model aircraft and, like the B-24s, they were manufactured across the runway. The builders' name had changed from Consolidated Aircraft Corporation to Consolidated-Vultee Corporation but it was still Air Force Plant 4.

On 1 December 1948, the 11th Bombardment Group was reactivated at Carswell after a 2-year period of inactivation. It was comprised of the 26th, 42nd, and 98th Bomb Squadrons. These squadrons were also equipped with B-36 "B" model aircraft. On 24 August 1950, the 26th Bomb Squadron received its first B-36 "D" model bomber. The difference between the "B" and "D" models was that the "B" had six engines while the "D" had four additional engines.

A B-50 called the "Lucky Lady II" of the 43rd Bombardment Group, completed the first non-stop round-the-world flight on 2 March 1949. The "Lucky Lady II" took off and landed at Carswell after staying aloft for 94 hours and 1 minute and travelling a distance of 23,108 miles. Ten days later a 7th Bomb Group B-36 "B" model aircraft set a B-36 long distance record flight by completing a 9,600 mile flight in 43 hours and 37 minutes without refueling.

On 15 February 1951, the 19th Air Division was activated and assigned to Carswell. The 7th and 11th Bomb Groups were assigned to the new air division on that day. On 16 June 1952, the 7th and 11th Bomb Groups became Bombardment Wings (Heavy). During 1952, the 7th Bomb Wing crews flew training missions against targets from California to Maine and from the Arctic Circle to the Yucatan Peinsula. During that year the wing took first place in the SAC Bombing and Navigation competition. In this year of extensive training in every conceivable type of weather and climate, flying safety awards and crew of the month honors were often won by 7th Bomb Wing crews.

Each of the two bomb wings at Carswell had air base groups assigned to them until 20 June 1953, when the 824th Air Base Group was activated and the other two

were inactivated. During this year aircraft and personnel of the 7th Bomb Wing could be found flying training missions in Labrador, England, and Africa.

On 12 June 1955, Headquarters, Eighth Air Force moved from Carswell to Westover Air Force Base, Massachusetts. Nineteen days later, on 1 July 1955, the 7th and 11th Bomb Wings were transferred to the operational control of Second Air Force.

In August 1957, Carswell began a program to phase out B-36 aircraft and replace them with Boeing B-52 Stratofortresses. On 10 December the 4123rd Strategic Wing had been activated and assigned to Carswell. On 13 December 1957, the 11th Bomb Wing moved from Carswell to Altus Air Force Base, Oklahoma as a result of this bomber conversion. The 7th had its first B-36 aircraft reassigned on 7 January 1958. On 19 February 1958, the 4123rd Strategic Wing received Carswell's first B-52 which was called "The City of Fort Worth."

On 1 March 1958, the 3958th Operational Evaluation and Training Squadron was activated at Carswell and assigned to the 19th Air Division. This unit, which was commanded by Lt. Col. Alphus W. Blizzard, Jr., was one of two units developed to test the B-58 Hustler aircraft. The B-58 was a three-seat, supersonic bomber manufactured by the firm across the runway which was now called General Dynamics.

On 1 April 1958, the 7th Air Refueling Squadron was activated and assigned to the 7th Bombardment Wing. In June of that year, the wing received its first two B-52s and in July the air refueling squadron received its first KC-135A.

The conversion was completed by 1 January 1959 and by 8 January the wing was combat ready. The last B-36 stationed here was transferred to Carter Field in February. This field was located between Dallas and Fort Worth. On 1 March 1959, the 4123rd Strategic Wing moved from Carswell to Clinton Sherman Air Force Base, Oklahoma.

On 15 March 1960, the 43rd Bombardment Wing was moved, without personnel or equipment, from Davis-Monthan Air Force Base, Arizona to Carswell. It was then equipped with the B-58 aircraft.

On 1 September 1964, the 43rd Bombardment Wing moved to Little Rock Air Force Base, Arkansas and on the same day the 824th Combat Support Group (formerly Air Base Group) was inactivated. In its place the 7th Combat Support Group was activated on that date.

In June 1965, the 7th Bomb Wing participated in the first B-52 bombing mission over Vietnam. For 10 years, Carswell-based operations were affected by the Vietnam conflict. At times, flying and support activities were devoted almost exclusively to augmenting SAC forces in the Western Pacific and Southeast Asia.

On 2 July 1968, the 340th Bombardment Group was organized and assigned to Carswell. This unit was the first SAC unit to receive the FB-111A which was a two-seat strategic bomber manufactured by General Dynamics. The FB-111A could carry six external AGM-69 Short Range Attack Missiles (SRAMs). It replaced the B-58 and earlier versions of the B-52.

The 340th was first commanded by Colonel Frank L. Voightman. Its mission was to train combat crews to operate the FB-111A through the 4007th Combat Crew Training Squadron and the 9th Bombardment Squadron, which became assigned to

that group in July 1968. The group received its first FM-111A in October 1969, and the 9th became the first unit to fly this aircraft. By the end of September 1970 the unit had 20 FB-111As assigned. In June 1971, the 340th was notified that its personnel and equipment were going to be reassigned to units at Pease and Plattsburgh Air Force Bases. By the end of September 1971 most of the personnel and equipment had been transferred and on 31 December 1971 the group was inactivated.

On 1 January 1972, the 9th Bomb Squadron, which was a part of the 340th Bombardment Group for a short period of time, was reactivated as part of the 7th Bombardment Wing with Lt. Col. C. Wayne Calhoun as the squadron commander. Four months later the 7th was tasked to become the "D" model B-52 Consolidated Training Unit for SAC. This did not actually occur until 1 April 1974 when the 4018th Combat Crew Training Squadron became assigned to the wing.

By November 1983, the last B-52 "D" aircraft had left Carswell AFB and the entire bomber fleet had been changed to the new B-52 "H" model bomber.

A. PRIMARY MISSION

Strictly speaking the mission of Carswell is synonymous with the mission of the 7th Bomb Wing; that is, to maintain the capability to conduct strategic warfare and air refueling operations. Assigned weapon systems include the Boeing B-52 "H" model bomber and KC-135A tanker. In a broader sense, however, the mission encompasses much more.

As host unit, the 7th Bomb Wing oversees aircraft operations and maintenance agencies. In addition to maintaining bombers, tankers, and combat crews capable of

strategic warfare, Carswell also provides air training to three tactical squadrons. The 7th Combat Support Group and USAF Regional Hospital support the combat mission of the Wing.

B. TENANT MISSION

General: As part of the Strategic Air Command, Carswell AFB's mission is to provide the required support for its tenants in order to maintain combat readiness. The following sections describe the major and minor tenants and their missions.

Major Tenants: 19th Air Division: Ensures that assigned units are capable of conducting strategic warfare, sustained and effective air refueling, missile warfare, and strategic reconnaissance according to the Emergency War Order.

7th Bombardment Wing: Develops and maintains a combat ready force capable of conducting strategic warfare as directed by the Strategic Air Command.

7th Combat Support Group: Provides housekeeping and service functions vital to the operation of the installation. Serves as monitor and community point of contact for all AICUZ affairs.

415th Field Training Detachment: Provides job-oriented system, associate and aircrew familiarization training on specific weapons systems, and associated aerospace ground equipment.

2048th Communications Squadron: Provides the AFCS/USAF approved communications-electronics (C-E) services to include the American Central NOTAM Facility (ACNF), CONUS

Automatic Digital Weather Switch (ADWS), TRACALS required to support the missions of Strategic Air Command (SAC), Carswell AFB, Texas, and AFCS, and to provide the operational management of the Automated Weather Network Management Center (AWNMC).

Detachment 22, 26 Weather Squadron: Provides or arranges for aerospace environmental staff and operational support services required by USAF and other U.S. Governmental agencies and activities in the Carswell area.

301st Tactical Fighter Wing (AFRES): Provides training for Reservists to achieve the capability for worldwide deployment; and to be prepared, upon mobilization, to deploy with sufficient personnel, aircraft, and equipment to execute directed tactical fighter missions designed to destroy enemy forces, supplies, equipment, communications systems and installations with conventional weapons within the limits of weapons systems capabilities.

USAF Regional Hospital Carswell: The mission of USAF Regional Hospital Carswell is to provide medical service for all authorized personnel. The number of authorized operating beds is as prescribed by separate letter from Hq. USAF (AFMSHAB). The Surgeon General of the United States Air Force has, as of 20 November 1967, further designated this hospital as a Military Consultant Center, a Regional Hospital, and a Physical Evaluation Board Hospital (PEBH). In addition, this hospital will also provide as specialized missions:

1. Referral Hospital service in the medical specialties indicated on the "Listing of Specialties Available at Specified Air Force Hospitals," published quarterly by HQ USAF (AFMSHAB).

2. Autopsies on all fatally injured air crew personnel within the geographical area prescribed in AFR 160-55, The Armed Forced Institute of Pathology and Armed Forces Histopathology Centers.

3. Histopathology services for satellite facilities within the geographic area prescribed in AFR 160-55, The Armed Forces Institute of Pathology and Armed Forced Histopathology Centers.

4. Direct Referral Hospital to the Physical Evaluation Board at Randolph AFB, Texas.

5. Training:

a. Medical Laboratory Specialist (Phase II)

b. Dietetic Training

c. Medical Radiology Specialist (Phase II)

d. Physician Assistant (Phase II)

e. Family Practice Residency FY 77

Minor Tenants: Detachment 35, CINCSAC (Instructional Systems Development): Provides professional, educational, and training support for all CINCSAC/DOT combat crew operations training programs that CINCSAC/DOT may direct.

Detachment 7, Air Force Global Weather Central (MAC), 6 WW, represents Air Weather Service (MAC) at the hub of the Automated Weather Network, a jcint AWS/AFCS system for real-time automatic distribution of environmental data.

Conventional environmental (weather) data from all over the world is sent here and then redistributed by UNIVAC 1108 computers to hundreds of DOD users. Primary sources of the data are high-speed circuits from England, Japan, Phillipines, Washington, DC and Kansas City, and low-speed circuits from each weather station in the CONUS. The primary recipient of the data and, in fact, the reason the AWN exists is the Air Force Global Weather Central at Offutt AFB, but the Carswell computers are the source of conventional weather data for all CONUS weather units and a major supplier of data to overseas weather units. Detachment 7 has three branches (seven sections) dealing in the acquisition, editing, and computer programming tasks required to maintain a steady flow of data to users.

Naval Weather Service Detachment: Provide, as directed, specialized services to support the mission of the Naval Weather Service Command.

Detachment 9, 3904 Management Engineering Squadron (SACMET): Develop manpower standards to determine manning requirements with relation to increased or decreased workloads. The team provides this service to all SAC units assigned and/or attached to Carswell. In addition, SACMET assists requesting work center managers in solving their management problems through a management advisory service.

Defense Property Disposal Office (DPDO): Receive, segregate, inspect, classify, and store excess, surplus, and scrap property turned in by all organizations at this installation and 57 other activities in this geographic area. Dispose of property through redistribution/utilization, transfer, donation, sale, or destruction. To provide technical assistance to generating activities with regard to disposal/turn-in excess, surplus, and scrap property, and to

maintain liaison with generating activities to ensure visibility of generation to avoid unmanageable fluctuations in workload.

Defense Investigative Service: Administration, operation, and maintenance of an investigative service for the Department of Defense to accomplish the following:

1. Conducting, directing, and controlling of all personnel security investigations for DOD components and other U.S. Government activities when authorized by the Secretary of Defense.

2. Other such special investigations as the Secretary of Defense may direct.

3. Criminal/fraud investigations and crime prevention surveys in support of Defense Supply Agency.

4. Investigate major offenses against a person, personal property or the U.S. Government or its property.

5. Detachment 1108, Air Force Office of Special Investigations (AFOSI): Provides professional, criminal, counterintelligence, and fraud investigative work to the commanders.

Detachment 1, 1365 Photo Squadron (MAC): Operates an all color television production facility that provides the Strategic Air Command (SAC) with instructional television productions and copies of these productions for distribution to the SAC combat aircrews. Television programming focuses on three SAC weapons systems, the B-52, FB-111, and the KC-135.

The American National Red Cross (USAF Regional Hospital): Provide social services which are available to all patients and medical squadron personnel who need assistance in resolving personal and family problems. Services include assistance with urgent communications for patients and their families; obtaining medical and social data for use by medical staff in diagnosis and treatment; providing for special needs of relatives of seriously ill patients officially summoned by the hospital, the Red Cross provides assistance needed in making travel plans, arranging for reception on arrival, and keeping family at home informed. Therapeutic recreation is also part of the mission in respect to the patient. Medically approved activities are available, as are games and crafts for use by the patient with much leisure time. Red Cross hospital staff perform Red Cross social welfare services for able-bodied personnel attached to the medical facility and their families as needed.

The American National Red Cross (Field Director Office): The mission of the Red Cross at Carswell is to give assistance, where needed, and to help in the overall morale of military personnel and their dependents. To accomplish this, the Red Cross has established the Field Director's Office at Carswell, which is located in Building 1525 (CBPO). This office serves all military personnel and their dependents residing in base housing and in the dormitories. Some of the many services provided by this office are 24-hour emergency coverage, counseling, communication services, instruction in water safety and first aid, and extensive volunteer services.

USAF-U.S. Postal and Courier Region (HQ COMD USAF): The Carswell Postal Service Center is a facility operated by the South Central District, USAF Postal and Courier Service, HQ Command, that delivers personal mail to an individual served through a lockbox assigned for his exclusive use.

Appendix E

DESCRIPTIONS OF SOIL ASSOCIATIONS

Appendix E
DESCRIPTIONS OF SOIL ASSOCIATIONS

1. Sanger-Purves-Slidell Association--Nearly level and gently sloping, deep and shallow, clayey soils; on uplands.

This map unit is dominantly made up of well drained soils that have slopes of 0 to 5 percent. Wide cracks form in these soils when they are dry. This unit makes up about 21 percent of the county. It is about 28 percent Sanger soils, 15 percent Purves soils, 10 percent Slidell soils, and 47 percent less extensive areas of Aledo, Bolar, Frio, Lindale, Mingo, and San Saba soils and Urban land.

The gently sloping Sanger soils are on uplands. Permeability is very slow. Typically, the surface layer is clay about 20 inches thick. It is very dark grayish brown in the upper part and dark grayish brown in the lower part. From a depth of 20 to 80 inches is brownish silty clay.

The nearly level and gently sloping Purves soils are on uplands. Permeability is moderately slow. Typically, the surface layer is dark grayish brown clay about 7 inches thick. At a depth of 7 to 15 inches is brown clay. Below that is fractured limestone interbedded with thin layers of clayey marl.

The nearly level and gently sloping Slidell soils are on uplands. Permeability is very slow.

Typically, these soils are clay to a depth of 70 inches. They are very dark gray in the upper part, grading to grayish brown in the lower part. The underlying material from a depth of 70 to 80 inches is light brownish gray silty clay containing yellowish mottles.

2. Aledo-Bolar-Sanger Association--Gently sloping to moderately steep, very shallow to deep, loamy and clayey soils; on uplands.

This map unit is dominantly made up of well drained soils that have slopes of 1 to 20 percent. This unit makes up about 20 percent of the county. It is about 38 percent Aledo soils, 12 percent Bolar soils, 12 percent Sanger soils, and 38 percent less extensive areas of Brackett, Fric, Luckenbach, Maloterre, Purves, San Saba, Slidell, and Suney soils and Urban land.

The gently sloping to moderately steep Aledo soils are on high ridgetops and moderately steep side slopes, where they are mixed with narrow bands of Bolar and Maloterre soils. Permeability is moderate. Typically, the surface layer is dark grayish brown clay loam about 8 inches thick. The subsoil, to a depth of 31 inches, is clay loam that is brown in the upper part, grading to light yellowish brown loam in the lower part. Below that is fractured limestone interbedded with clayey marl.

The gently sloping Sanger soils are on uplands. These soils are very slowly permeable. Typically, the surface layer is clay about 20 inches thick

that is very dark grayish brown in the upper part and dark grayish brown in the lower part. From a depth of 20 to 80 inches is brownish silty clay.

3. Frio-Trinity Association--Nearly level, deep, clayey soils; on flood plains.

This map unit is dominantly made up of well drained and somewhat poorly drained soils that have slopes of 0 to 1 percent. The unit makes up 7 percent of the county. It is about 50 percent Frio soils, 9 percent Trinity soils, and 41 percent less extensive areas of Arents, Ovan, Pulexas, and Whitesboro soils, and Urban land.

Frio soils are on broad flood plains. The soils are well drained, and permeability is moderately slow. Typically, the surface layer is silty clay about 24 inches thick. It is very dark grayish brown in the upper part and dark grayish brown in the lower part. From a depth of 24 to 80 inches is brown silty clay loam.

Trinity soils are on broad flood plains, and the largest areas in the map unit are along the West Fork of the Trinity River in the eastern part of the county. These soils are somewhat poorly drained, and permeability is very slow. Typically, these soils are dark gray clay to a depth of about 63 inches. They have very dark grayish brown mottles below a depth of 32 inches.

4. Bastsil-Silawa Association--Nearly level to sloping, deep, loamy soils; on stream terraces.

This map unit is dominantly made up of well drained soils that have slopes of 0 to 8 percent. The unit makes up about 4 percent of the county. It is about 40 percent Bastsil soils, 20 percent Silawa soils, and 40 percent less extensive areas of Arents, Aquilla, Pulexas, Rader, and Silstid soils and Urban land.

The nearly level and gently sloping Bastsil soils are on high terraces. Permeability is moderate. Typically, the surface layer is pale brown fine sandy loam about 11 inches thick. The subsoil, from a depth of 11 to 80 inches, is sandy clay loam that is yellowish red in the upper part, red in the middle part, and yellowish red in the lower part.

The gently sloping to sloping Silawa soils are on terraces, typically below the Bastsil soils. Permeability is moderate. Typically, the surface layer is dark yellowish brown fine sandy loam about 6 inches thick. The subsoil, to a depth of about 46 inches, is sandy clay loam. It is red in the upper 15 inches and yellowish red below. From a depth of 46 to 60 inches, it is reddish yellow fine sandy loam.

Appendix F

MASTER LIST OF INDUSTRIAL OPERATIONS

Appendix F
MASTER LIST OF INDUSTRIAL OPERATIONS

Shop Name	Present Locations (Bldg. No.)	Past Locations (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Current Waste Management Methods
7th Supply Squadron					
Fuels Laboratory	1101		X	X	DPDO
Base Service Station	1255		X	X	DPDO
7th Transportation Squadron					
Vehicle Maintenance	1065		X	X	DPDO
Fire Truck Maintenance	1425		X	X	DPDO
Refueling Maintenance	1195	1027 (1976-1983)	X	X	DPDO
7th Combat Support Group					
Auto and Wood Hobby Shop	1140		X	X	DPDO
7th Civil Engineering Squadron					
Carpentry	1217		X	--	Consumed in use
Entomology	1217	1338 (1965-1981)	X	X	DPDO
Exterior Electric	1217		X	--	Consumed in use
Fire Department	1425		X	--	Consumed in use
Fire Extinguisher Maintenance	1425		X	--	Consumed in use
Golf Course Maintenance	235		X	X	Ground
Heating	1217		X	--	Consumed in use
Housing Maintenance	619		X	--	Consumed in use
Interior Electric	1217		X	--	Consumed in use
Liquid Fuels Maintenance	4156		X	X	DPDO
Paint	1217		X	--	Consumed in use
Paving and Grounds/Heavy Equipment	1214		X	--	Consumed in use
Plumbing	1217		X	--	Consumed in use
Power Production	1320		X	X	DPDO
Refrigeration	1217		X	X	DPDO
Sanitation	1082		X	--	Consumed in use
Welding	1217		X	--	Consumed in use

LEGEND

DPDO = Defense Property Disposal Office (hazardous wastes disposed of by Contractor removal through DPDO)
FDT = Fire Department Training (JP-4 consumed during fire department training exercises)
OWS = Oil/water separator (separators discharge to sanitary sewers)

Notes:

[1]Battery electrolyte neutralized and discharged into sanitary drain.

[2]Silver recovered from fixer solutions prior to discharge into sanitary drain.

Appendix F--Continued

Shop Name	Present Locations (Bldg. No.)	Past Locations (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Current Waste Management Methods
7th Avionics Maintenance Squadron					
Doppler	1055		--	--	--
ECM	1055		X	--	Consumed in use
Radar	1055		X	--	Consumed in use
Radio	1055		X	--	Consumed in use
Bomb/Navigation	1055		X	--	Consumed in use
Fire Control	1055		X	X	DPDO
Photographic	1055		X	X	Sanitary Sewer
TMEL	1445		X	X	DPDO
7th Field Maintenance Squadron					
AGE Repair and Inspection	1414		X	X	DPDO
Battery	1410		X	X	Neutralized to sanitary drain[1]
Corrosion Control	1403,05,34		X	X	DPDO
Egress	1050		X	--	Consumed in use
Electric	1050		X	--	Consumed in use
Environmental Systems	1050		X	--	Consumed in use
Fuel Systems	1048		X	X	FDT exercises; storm ditch
Jet Engine	1410		X	X	DPDO; FDT exercises
Machine	1434		X	--	Consumed in use
NDI	1414		X	X	DPDO; silver recovery to sanitary drain[2]
Pneudraulics	1050		X	X	DPDO
Repair and Reclamation	1050		X	X	DPDO
Sheet Metal	1434		X	--	Consumed in use
Structural Repair	1434		X	--	Consumed in use
Survival Equipment	1416		X	--	Consumed in use
Test Cell	1015		X	X	OWS to sanitary sewer
Welding	1434		--	--	--

LEGEND

DPDO = Defense Property Disposal Office (hazardous wastes disposed of by Contractor removal through DPDO)
FDT = Fire Department Training (JP-4 consumed during fire department training exercises)
OWS = Oil/water separator (separators discharge to sanitary sewers)

Notes:

[1]Battery electrolyte neutralized and discharged into sanitary drain.

[2]Silver recovered from fixer solutions prior to discharge into sanitary drain.

Appendix F--Continued

Shop Name	Present Locations (Bldg. No.)	Past Locations (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Current Waste Management Methods
7th Munitions Maintenance Squadron					
Equipment Maintenance	1418		X	X	DPDO
Weapons Release	1410		X	X	DPDO
Inspection Shop	1803		X	X	Ground
7th Organization Maintenance Squadron					
Inspection Branch	1050		X	X	OWS to sanitary sewer
Non-Powered AGE	1405		X	X	OWS to sanitary sewer
USAF HOSP					
Dental Clinic (Base)	1740		X	--	Consumed in use
Dental Clinic (HOSP)	3000		X	--	Consumed in use
Laboratory	3000		X	--	Consumed in use
X-Ray	3000		X	X	Silver recovery to sanitary drain
301st Consolidated Aircraft Maintenance Squadron					
AGE	1628 (1981-present)	1640 (1962-1979)	X	X	DPDO; OWS to sanitary sewer; FDT exercises
Communication/Navigation	1650 (1963-present)		X	--	Consumed in use
Electrical Systems	1643 (1980-present)		X	--	Consumed in use
Corrosion Control	1643		X	X	DPDO
ECM	1650		X	--	Consumed in use
Egress	1642		X	--	Consumed in use
Engine	1410		X	X	DPDO; FDT exercises
Environmental Systems	1643		X	X	DPDO
Fire Control	1650		X	X	DPDO
Fuel Systems	1045		X	X	DPDO
Inertial Navigation	1650		X	--	Consumed in use

LEGEND

DPDO = Defense Property Disposal Office (hazardous wastes disposed of by Contractor removal through DPDO)
FDT = Fire Department Training (JP-4 consumed during fire department training exercises)
OWS = Oil/water separator (separators discharge to sanitary sewers)

Notes:

[1]Battery electrolyte neutralized and discharged into sanitary drain.

[2]Silver recovered from fixer solutions prior to discharge into sanitary drain.

Appendix F--Continued

Shop Name	Present Locations (Bldg. No.)	Past Locations (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Current Waste Management Methods
Instrument/Auto Pilot	1650		--	--	
Machine	1643		X	--	Consumed in use
Munitions Maintenance	1648		X	X	DPDO
Munitions Storage/Missile Maintenance	4160		X	X	DPDO
NDI	1414		X	X	DPDO; silver recovery to sanitary drain
Pneudraulics	1643		X	X	DPDO
Radio	1650		X	--	Consumed in use
Repair and Reclamation	1643		X	X	DPDO
Sheet Metal	1643		X	--	Consumed in use
Survival	1416		--	--	
Weapons Control	1650		X	--	Consumed in use
Welding	1643		--	--	
2048th Communications Squadron					
Crypto Maintenance	1750		--	--	--
DSIE Maintenance	1730		--	--	--
Intrabase Radio Maintenance	1268		--	--	--
Navaids Maintenance	1418		--	--	--
Power Production	1750		X	--	Consumed in use
Radar Maintenance	4135		--	--	--
Radio/CCTV Maintenance	1268		--	--	--
SACCS Maintenance	1510		--	--	--
Teletype Maintenance	1730		--	--	--

LEGEND

DPDO = Defense Property Disposal Office (hazardous wastes disposed of by Contractor removal through DPDO)
FDT = Fire Department Training (JP-4 consumed during fire department training exercises)
OWS = Oil/water separator (separators discharge to sanitary sewers)

Notes:

[1]Battery electrolyte neutralized and discharged into sanitary drain.

[2]Silver recovered from fixer solutions prior to discharge into sanitary drain.

Appendix G

INVENTORY OF EXISTING POL STORAGE TANKS

Appendix G
INVENTORY OF EXISTING POL STORAGE TANKS

Facility No./ Location	Type POL	Capacity (gal)	Aboveground (AG) Belowground (BG)
1156	JP-4	840,000	AG
1157	JP-4	840,000	AG
4150	JP-4	150,000 (6 @ 25,000 ea.)	BG
4152	JP-4	150,000 (6 @ 25,000 ea.)	BG
4153	JP-4	150,000 (6 @ 25,000 ea.)	BG
4154	JP-4	150,000 (6 @ 25,000 ea.)	BG
4170	JP-4	150,000 (6 @ 25,000 ea.)	BG
1263	Diesel	11,580	AG
1261	MOGAS	11,580	AG
1259	MOGAS	11,580	AG
1265	MOGAS	11,580	AG
1256	MOGAS	5,500	AG
1050	No. 2 Fuel Oil	20,000	BG
3000	No. 2 Fuel Oil	20,000	BG
3000	No. 2 Fuel Oil	20,000	BG
1264	MOGAS	12,032	AG
1411	MOGAS	2,000	BG
Fire Training Area	Waste Petroleum	10,000	BG
Fire Training Area	Waste Fuel	8,500	AG

Source: USAF (Reference No. 21).

Appendix H

HAZARD ASSESSMENT RATING METHODOLOGY

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DoD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DoD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from the USAF Occupational and Environmental Health Laboratory (OEHL), Air Force Engineering and Services Center (AFESC), Engineering-Science (ES) and CH2M HILL. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of

USAF OEHL, AFESC, various major commands, Engineering Science, and CH2M HILL met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD program needs.

The model uses data readily obtained during the Record Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly

no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1). The site rating form is provided on Figure 2 and the rating factor guidelines are provided in Table 1.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, the potential pathways for waste contaminant migration, and any efforts to contain the contamination. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant, and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface-water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites at which there is no containment are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART

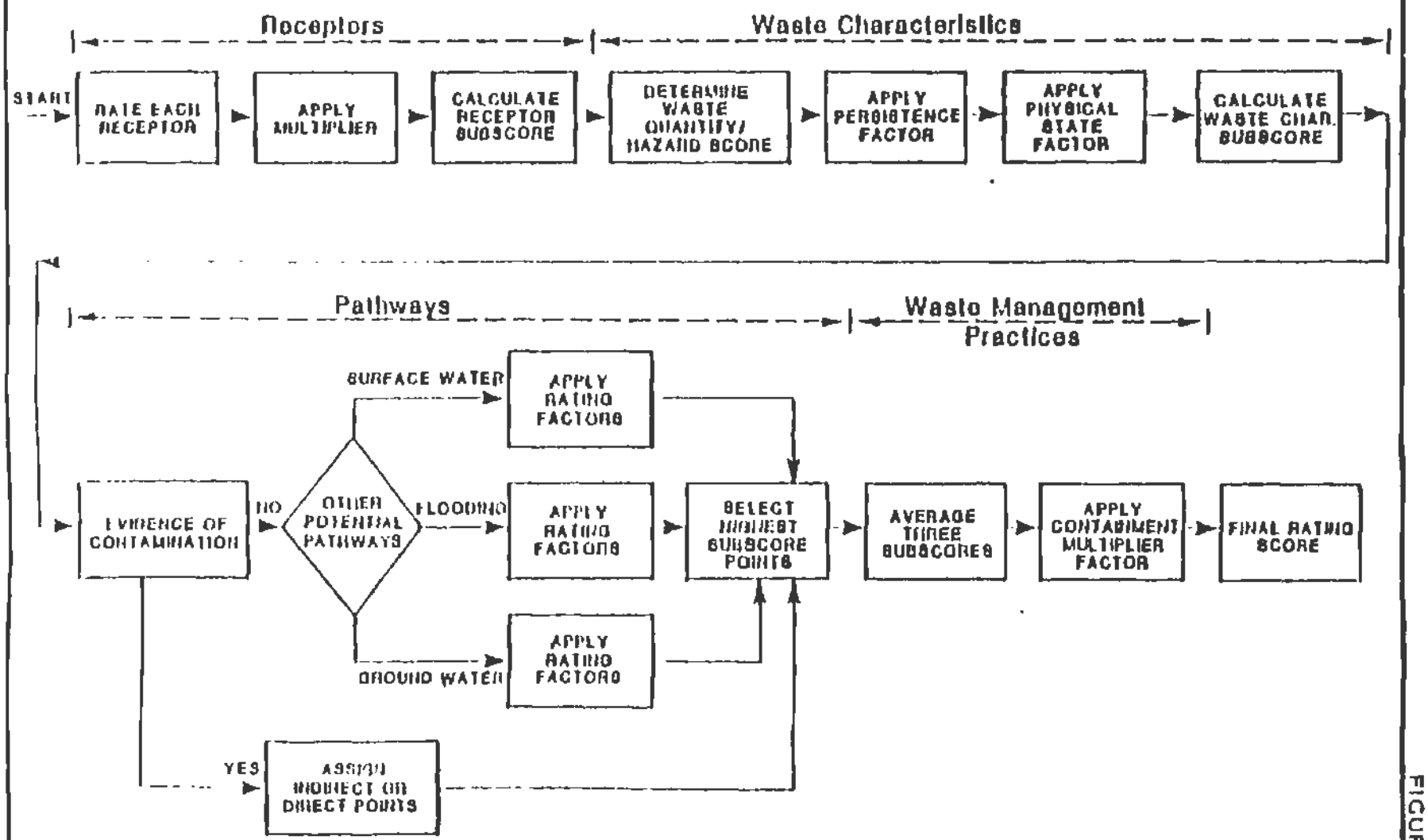


FIGURE 1

FIGURE 3

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE _____

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY _____

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	_____	_____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) _____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____
2. Confidence level (C = confirmed, S = suspected) _____
3. Hazard rating (H = high, M = medium, L = low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix) _____

B. Apply persistance factor
Factor Subscore A X Persistance Factor = Subscore B

_____ X _____ = _____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

_____ X _____ = _____

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	_____	_____

Subscore (100 X factor score subtotal/maximum score subtotal) _____

2. Flooding

		1		

Subscore (100 x factor score/3) _____

3. Ground-water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	_____	_____

Subscore (100 x factor score subtotal/maximum score subtotal) _____

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore _____

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors _____
Waste Characteristics _____
Pathways _____

Total _____ divided by 3 = _____
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

_____ X _____ = _____

Table 1
HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-15	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

Table 1--Continued

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence level of information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels 0	1	2	3
Toxicity	Sax's level 0	Sax's level 1	Sax's level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

Table 1--Continued

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	H
	L	C	L
	M	S	H
	S	C	H
40	S	S	H
	M	S	H
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Multiply Point Rating Persistence Criteria	From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

Table 1--Continued

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-3}$ cm/sec)	15% to 30% clay (10 to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($>10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall	<1.0 inch	1.0 to 2.0 inches	2.1 to 3.0 inches	>3.0 inches	8

B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Ground-Water Contamination

Depth to ground water	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	less than -10 inches	-10 to +5 inches	+5 to + 20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8

Table 1--Continued

B-3 Potential for Ground-Water Contamination--Continued

Rating Factors	Rating Scale levels 0	1	2	3	Multiplier
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items 1-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.

Appendix I

SITE RATING FORMS

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 1--Landfill No. 1

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1942-1950

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Original Landfill, Suspected Hazardous Wastes

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	3	4	12	12
B.	Distance to nearest well	3	10	30	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	123	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 68

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M

2. Confidence level (C = confirmed, S = suspected) S

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

50 x 1.0 = 50

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

50 x 1.0 = 50

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108
Subscore (100 x factor score subtotal/maximum score subtotal)				50
2. Flooding	1	1	1	3
	Subscore (100 x factor score/3)			33
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
		Subtotals	48	114
Subscore (100 x factor score subtotal/maximum score subtotal)				42

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	68
Waste Characteristics	50
Pathways	50
Total 168 divided by 3 =	56
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

56 x 1.0 = 56

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 2--Landfill No. 2

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1952-1956

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Site of Building 1055; Wastes Buried in Trenches

SITE RATED BY: David Moccia, Bob Knight, Gray Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	3	4	12	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	107	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M

2. Confidence level (C = confirmed, S = suspected) S

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

50 x 1.0 = 50

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

50 x 1.0 = 50

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	—
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108
Subscore (100 x factor score subtotal/maximum score subtotal)				50
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
		Subtotals	40	114
Subscore (100 x factor score subtotal/maximum score subtotal)				35

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	59
Waste Characteristics	50
Pathways	50
Total 159 divided by 3 =	53
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

53 x 1.0 = 53

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 3--Landfill No. 3

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1950-1952

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Located Under Runway; Adjacent to Farmers Branch

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	101	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 56

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	46	108
Subscore (100 x factor score subtotal/maximum score subtotal)				43
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
		Subtotals	32	114
Subscore (100 x factor score subtotal/maximum score subtotal)				28

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 43

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	56
Waste Characteristics	40
Pathways	43
Total 139 divided by 3 =	46
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

46 x 1.0 = 46

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 4--Landfill No. 4

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1956-1975

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Long History; Burning/Burial Practiced; Hazardous Wastes Suspected

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	1	10	10	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	89	160

Receptors subscore (100 x factor score subtotal/maximum subtotal) 49

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

70 x 1.0 = 70

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

70 x 1.0 = 70

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore --

B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface-water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108

Subscore (100 x factor score subtotal/maximum score subtotal) 50

2. Flooding

	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
		Subtotals	40	114

Subscore (100 x factor score subtotal/maximum score subtotal) 35

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	49
Waste Characteristics	70
Pathways	50
Total 169 divided by 3 =	56
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

56 x 1.0 = 56

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 5--Landfill No. 5

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1963-1975

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Adjacent to Tributary to Farmers Branch; All Types of Flightline Wastes

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	1	10	10	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	89	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 49

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

70 x 1.0 = 70

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

70 x 1.0 = 70

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108
Subscore (100 x factor score subtotal/maximum score subtotal)				50
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
		Subtotals	48	114
Subscore (100 x factor score subtotal/maximum score subtotal)				42

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	49
Waste Characteristics	70
Pathways	50
Total 169 divided by 3 =	56
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

56 x 1.0 56

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 6--Landfill No. 6

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1975-1978

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Originally a Gravel Pit; Current Contractor Storage Area; Suspect Hazardous Wastes

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	2	4	8	12
B.	Distance to nearest well	1	10	10	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	93	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 52

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

50 x 0.8 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108
Subscore (100 x factor score subtotal/maximum score subtotal)				50
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to ground water	0	8	0	24
		Subtotals	56	114
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	52
Waste Characteristics	40
Pathways	50
Total 142 divided by 3 =	47
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

47 x 1.0 = 47

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 10—Waste Burial Area

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1960-1969

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Buried Cleaning Solvents, Tank Sludge, Possible Ordnance

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	1	10	10	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	89	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 49

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108
Subscore (100 x factor score subtotal/maximum score subtotal)				50
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
		Subtotals	40	114
Subscore (100 x factor score subtotal/maximum score subtotal)				35

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	49
Waste Characteristics	80
Pathways	50
Total 179 divided by 3 =	60
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

60 x 1.0 = 60

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 11--Fire Department Training Area No. 1

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1942-1963

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Original Fire Training Area

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	1	10	10	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	1	6	6	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	83	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 46

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

80 x 0.8 = 64

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

64 x 1.0 = 64

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108
Subscore (100 x factor score subtotal/maximum score subtotal)				50
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
		Subtotals	32	114
Subscore (100 x factor score subtotal/maximum score subtotal)				28

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	46
Waste Characteristics	64
Pathways	50
Total 160 divided by 3 =	53
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

53 x 1.0 53

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 12—Fire Department Training Area No. 2

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1963-1983 (Present)

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Current Fire Department Training Area; Gravel Lined; POL Material on Ground

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	1	10	10	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	89	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 49

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

80 x 0.8 = 64

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

64 x 1.0 = 64

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	80
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108
Subscore (100 x factor score subtotal/maximum score subtotal)				50
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
		Subtotals	32	114
Subscore (100 x factor score subtotal/maximum score subtotal)				28
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	49
Waste Characteristics	64
Pathways	80
Total 193 divided by 3 =	64
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

64 x 1.0 = 64

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 13--Flightline Drainage Ditch

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1942-Present

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Unlined Channel Until it Intersects with POL Tank Farm; Observed POL Material in Ditch; Oil/Fuel Saturation Along Banks

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	2	4	8	12
B.	Distance to nearest well	3	10	30	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	113	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 63

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	80
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	62	108
Subscore (100 x factor score subtotal/maximum score subtotal)				57
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	3	8	24	24
Direct access to ground water	0	8	0	24
		Subtotals	64	114
Subscore (100 x factor score subtotal/maximum score subtotal)				56

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	63
Waste Characteristics	80
Pathways	80
Total 223 divided by 3 =	74
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

74 x 1.0 = 74

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 14--Pesticide Rinse Area

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1950 (Assumed)-Present

OWNER/OPERATOR: Carswell AFB, Texas

COMMENTS/DESCRIPTION: Located at Golf Course; Rinse Area Adjacent to Farmers Branch

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	1	10	10	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	89	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 49

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108
Subscore (100 x factor score subtotal/maximum score subtotal)				50
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
		Subtotals	48	114
Subscore (100 x factor score subtotal/maximum score subtotal)				42

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	45
Waste Characteristics	60
Pathways	50
Total 159 divided by 3 =	53
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

53 x 1.0 = 53

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 15--Entomology Dry Well

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1965-1981

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Pesticide Rinsates Disposed of; Reports of Chlordane Detected

SITE RATED BY: David Moccia, Bob Knight, Gray Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	3	4	12	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	113	160

Receptors subscore (100 x factor score subtotal/maximum subtotal) 63

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore --

B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface-water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	46	108

Subscore (100 x factor score subtotal/maximum score subtotal) 43

2. Flooding

Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	3	8	24	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to ground water	0	8	0	24
		Subtotals	56	114

Subscore (100 x factor score subtotal/maximum score subtotal) 49

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 49

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	63
Waste Characteristics	60
Pathways	49
Total 172 divided by 3 =	57
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

57 x 1.0 = 57

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 16--Unnamed Stream

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1965-Present

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Discharge from Oil/Water Separator; POL Odor, Sheen Noted

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	3	4	12	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	113	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 63

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 0.8 = 32

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

32 x 1.0 = 32

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	80
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	62	108
Subscore (100 x factor score subtotal/maximum score subtotal)				57
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	3	8	24	24
Direct access to ground water	0	8	0	24
		Subtotals	64	114
Subscore (100 x factor score subtotal/maximum score subtotal)				56

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	63
Waste Characteristics	32
Pathways	80
Total 175 divided by 3 =	58
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

58 x 1.0 58

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 17--POL Tank Farm

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1965-Present

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Past History of Fuel in Ground--Suspected Source was the POL Tank Farm

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	3	4	12	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	107	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 59

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L

2. Confidence level (C = confirmed, S = suspected) C

3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.8 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	—
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108
Subscore (100 x factor score subtotal/maximum score subtotal)				50
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
		Subtotals	32	114
Subscore (100 x factor score subtotal/maximum score subtotal)				28
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	59
Waste Characteristics	80
Pathways	50
Total 189 divided by 3 =	63
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

63 x 1.0 = 63

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: WSA--Inspection Shop Site

LOCATION: Carswell AFB, Texas

DATE OF OPERATION OR OCCURRENCE: 1972-1983

OWNER/OPERATOR: Carswell AFB

COMMENTS/DESCRIPTION: Disposal of 5-10 gal/year Waste Cleaners, Solvents onto Ground

SITE RATED BY: David Moccia, Bob Knight, Gary Eichler

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	3	10	30	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	1	10	10	30
F.	Water quality of nearest surface-water body	3	6	18	18
G.	Ground-water use of uppermost aquifer	2	9	18	27
H.	Population served by surface-water supply within 3 miles downstream of site	3	6	18	18
I.	Population served by ground-water supply within 3 miles of site	3	6	18	18
			Subtotals	143	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 79

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	—
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	46	108
Subscore (100 x factor score subtotal/maximum score subtotal)				43
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
		Subtotals	24	114
Subscore (100 x factor score subtotal/maximum score subtotal)				21
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		43

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	79
Waste Characteristics	60
Pathways	43
Total 182 divided by 3 =	61
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

61 x 1.0 = 61

Appendix J

GLOSSARY OF TERMS

Appendix J
GLOSSARY OF TERMS

ALLUVIUM - A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material deposited during comparatively recent geologic time by a stream or other body of running water as a sorted or semisorted sediment in the bed of the stream or on its flood plain or delta, or as a code or fan at the base of a mountain slope; especially such a deposit of fine-grained texture deposited during time of flood.

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct ground water to yield economically significant quantities of ground water to wells and springs.

BOWSER - A small mobile tank used to recover and transport POL products.

CONFINING STRATA - A strata of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

CONTAMINANT - As defined by section 104(a)(2) of CERCLA, shall include, but not be limited to, any element, substance, compound, or mixture, including disease causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformation, in such organisms or their offspring.

DOWNGRADIENT - A direction that is hydraulically down slope. The downgradient direction can be determined through a potentiometric survey or through the evaluation of existing water level elevations referenced to a common datum (mean sea level).

EP TOXICITY - A laboratory test designed to identify if solid waste is hazardous. A liquid extract from the solid waste is analyzed for selected metals and pesticides. If one or more of the parameters tested for is present in concentration greater than a maximum value then the solid waste is considered a hazardous waste in accordance with RCRA definition.

ESKER - A widening ridge of stratified glacial drift, steep-sided, 3 to 15 m in height, and from a fraction of a mile to over 160 km in length.

EVAPOTRANSPIRATION - Evaporation from the ground surface and transpiration through vegetation.

FRACTURES - As a mineral characteristic, the way in which a mineral breaks when it does not have cleavage. May be conchoidal (shell-shaped), fibrous, hackly, or uneven.

GLACIAL TILL - Unsorted and unstratified drift, generally unconsolidated, deposited directly by and underneath a glacier without subsequent reworking by water from the glacier, and consisting of a heterogeneous mixture of clay, sand, gravel, and boulders varying widely in size and shape.

GROUND MORAINE - Till deposited from a glacier as a veneer over the landscape and forming a gently rolling surface.

GROUND WATER - All subsurface water, especially that part that is in the zone of saturation.

HAZARDOUS WASTE (expanded version of the RCRA definition) - A solid waste which because of its quantity, concentration, or physical, chemical or infectious characteristics may -

(A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible, illness; or

(B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed.

ICE-CONTACT DEPOSITS - Stratified drift deposited in contact with melting glacier ice, such as an esker, kame, kame terrace, or a feature marked by numerous kettles.

JOINTS - A break in a rock mass where there has been no relative movement of rock on opposite sides of the break.

LACUSTRINE - Pertaining to, produced by, or formed in a lake or lakes; e.g., "lacustrine sands" deposited on the bottom of a lake or formed along the margin of a lake.

LEACHING - The separation or dissolving out of soluble constituents from a rock or ore body by percolation of water.

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal and moderate proportions of clay, silt, and sand particles, and usually containing organic matter (humus) with a minor amount of gravelly material.

METAMORPHOSED (METAMORPHIC) - Pertaining to the process of mineralogical and structural adjustment of solid rocks to physical and chemical conditions which have been imposed at

depth below the surface zones of weathering and cementation, and which differ from the conditions under which the rocks in question originated.

MIGRATION (Contaminant) - The movement of contaminants through pathways (ground water, surface water, soil, and air).

NET PRECIPITATION - Mean annual precipitation minus mean annual evapotranspiration. Evapotranspiration is sometimes estimated by pan evaporation measurements.

PD-680 (Type I and Type II) - A military specification for petroleum distillate (aliphatic) used as a safety cleaning solvent. The primary difference between PD-680 Type I and Type II is the flash point of the material. The flash points are 100°F and 140°F for PD-680 Types I and II, respectively. Currently, only Type II is authorized for use at Air Force installations.

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

POTENTIOMETRIC SURFACE - An imaginary surface that represents the static head of ground water and is defined by the level to which water will rise in a cased well.

SOIL HORIZONS -

(A) A-Horizon - The uppermost mineral horizon of a soil; zone of leaching.

(B) B-Horizon - Occurs below the A-Horizon; the mineral horizon of a soil or the zone of accumulation.

(C) C-Horizon - Occurs below the B-Horizon; a mineral horizon of a soil consisting of unconsolidated rock material that is transitional in nature between the parent material below and the more developed horizons above.

SOLUM - Upper part of a soil profile, in which soil-forming processes occur; A and B horizons.

SPOTTING CHARGE - A small explosive charge, the size of a shotgun shell, which is contained in training ordnance to score the impact of training ordnance.

STRATA - Plural of stratum.

STRATUM - A single and distinct layer, of homogeneous or gradational sedimentary material (consolidated rock or unconsolidated earth) of any thickness, visually separable from other layers above and below by a discrete change in the character of the material deposited or by a sharp physical break in deposition, or by both.

TRANSMISSIVITY - A measure of the amount of water that can be transmitted horizontally by the full saturated thickness of the aquifer under a hydraulic gradient.

UNSATURATED ZONE (Vadose Zone or Zone of Aeration) - A subsurface zone containing water under pressure less than that of the atmosphere, including water held by capillarity; and containing air or gases generally under atmospheric pressure. This zone is limited above by the land surface and below by the surface of the zone of saturation.

UPGRADIENT - A direction that is hydraulically up slope. The upgradient direction can be determined through a potentiometric survey or through the evaluation of existing water level elevations referenced to a common datum (mean sea level).

WATER TABLE - The upper limit of the portion of the ground completely saturated with water.

Appendix K

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS USED IN THE TEXT

Appendix K
LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS USED IN THE TEXT

A/C	Aircraft
AFB	Air Force Base
AFESC	Air Force Engineering and Services Center
AFRES	Air Force Reserves
AG	Aboveground
AGE	Aerospace Ground Equipment
AVGAS	Aviation Gasoline
Bldg.	Building
bls	Below Land Surface
BOD_5	Biochemical Oxygen Demand (5-day)
°C	Degrees Celsius (Centigrade)
CE	Civil Engineering
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
cm/sec	Centimeters per Second
COD	Chemical Oxygen Demand
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DoD	Department of Defense
DPDO	Defense Property Disposal Office
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
°F	Degrees Fahrenheit
ft/min	Feet per Minute
gal/yr	Gallons per Year
gpd	Gallons per Day
gpm	Gallons per Minute
HARM	Hazard Assessment Rating Methodology
IRP	Installation Restoration Program
JP	Jet Petroleum
lb	Pounds
lb/yr	Pounds per Year
MAJCOM	Major Command
mg/l	Milligrams per Liter

mgd	Million Gallons per Day
mo.	Month
MOGAS	Motor Gasoline
mph	Miles per Hour
msl	Mean Sea Level
NDI	Non-Destructive Inspection
No.	Number
NPDES	National Pollutant Discharge Elimination System
OEHL	Occupational and Environmental Health Laboratory
PCB	Polychlorinated Biphenyls
POL	Petroleum, Oil, and Lubricants
ppm	Parts per Million
RCRA	Resource Conservation and Recovery Act
SAC	Strategic Air Command
SCS	Soil Conservation Service
TOC	Total Organic Carbon
TSS	Total Suspended Solids
UG	Underground
USAF	United States Air Force
USDA	United States Department of Agriculture
VOC	Volatile Organic Compound
µg/l	Micrograms per Liter

Appendix L

REFERENCES

Appendix L
REFERENCES

1. Fenneman, Nevin M. Physical Divisions of the United States. U.S. Department of the Interior Geological Survey Map, Edition of 1946.

2. Geotechnical Investigation Proposed Air Force Housing Development Carswell Air Force Base, Fort Worth, Texas. Rone Engineers, October 1983. Fort Worth, Texas.

3. Leggat, E. R. Geology and Ground-Water Resources of Tarrant County, Texas. U.S. Geological Survey Bulletin 5709, September 1957.

4. Nordstrom, Phillip L. Occurrence, Availability, and Chemical Quality of Ground Water in the Cretaceous Aquifers of North-Central Texas Vol. I. Texas Department of Water Resources Report 269, April 1982.

5. Phase I Investigation of Subsurface Conditions at U.S. Air Force Plant No. 4, Fort Worth, Texas, Vol. I, II, III. Hargis & Montgomery, Inc., Consultants in Hydrogeology, Tucson, Arizona, February 3, 1983.

6. Sellards, E. H., W. S. Adkins, and F. B. Plummer. The Geology of Texas, Vol. I Stratigraphy. The University of Texas Bulletin No. 3232: August 1932, 8th ed. 1981.

7. Soil Survey of Tarrant County, Texas. U.S. Department of Agriculture, June 1981.

8. Taylor, Howard D. Water Level and Water Quality Data from Observation Wells in Northeast Texas. Report 198, Texas Water Development Board, February 1976.

9. Texas Department of Water Resources. Texas Surface-Water Quality Standard, LP-71, 1981.

10. USAF. AWS Climatic Brief, Carswell AFB, Texas. Revised 1981.

11. USAF. Carswell AFB, Fort Worth, Texas--Hazardous Waste Management, Part B--Permit Application to Texas Department of Health. 1983.

12. USAF. Carswell Air Force Base, Texas--Industrial Waste Baseline Survey by Facility (No Date--Assumed pre-1975).

13. USAF. Files from the Office of Bioenvironmental Engineering, Carswell AFB, Texas (No Date).

14. USAF. Hazardous Waste Management Plan, Carswell AFB, Texas, May 1982.

Appendix H

Land Deed For Carswell AFB

DEED

STATE OF TEXAS)
)
COUNTY OF TRAVIS)

1403.075

TO ALL WHOM THESE PRESENTS SHALL COME, GREETINGS:

WHEREAS, The United States of America has acquired title to certain tracts or parcels of land lying and being situated in the County of Tarrant, State of Texas, for use in connection with the Fort Worth Aircraft Assembly Plant, which land is more particularly described as follows, to-wit:

Tract I 967.12 Ac

A tract of land situated about 6 miles N. 80 W. from the Courthouse in Tarrant County, Texas, and embracing portions of the Jos. B. Farmer, D. W. Farmer, Cornelius Connelly, B. L. Samuel, Daniel McVean, J. M. Shreeve, and E. S. Terrell Surveys.

F 3 6 1 - 9
Real Property Record
Form 5-50 (Land)
For "Federal Government"
Cost Code
Date 23 Dec 53
Initials

Beginning at a stake in the most southerly south line of the said E. S. Terrell Survey 103 feet from its south southwest corner, a City monument bears west 128 feet.

Thence north no degrees 07 minutes west 4225-82/100 feet to a stake.

Thence north 31 degrees 15 minutes east 389-1/10 feet to a stake.

Thence north no degrees 5-1/2 minutes east 1807-9/10 feet to a stake in the north line of the said E. S. Terrell Survey; thence north 89 degrees 37 minutes east 4-3/4 feet to a monument.

Thence south 45 degrees 27 minutes east 212-7/10 feet to a Lake Worth monument.

Thence north 89 degrees 43 minutes east 150 feet to a Lake Worth monument.

Thence north 44 degrees 30 minutes east 212-8/10 feet to a Lake Worth monument, in the said north line of said Terrell Survey.

Thence north 89 degrees 36 minutes east along said line, 1449-5/10 feet to a Lake Worth monument at the northeast corner of said Terrell Survey in the west line of the Daniel McVean Survey.

Thence north along said line 834-4/10 feet to a Lake Worth monument.

Thence north 19 degrees 48 minutes east 437-8/10 feet to a Lake Worth monument.

.075 Total
.954 acquired
967.121 carried
C.F. Rose

967.121

This is dated 30 Dec 42
967.121 acres

Deed Recorded 30 Dec 42
establish Federal jurisdiction

2-1 D-6-55

— Thence north 87 degrees 25 minutes east 95-3/10 feet to a Lake Worth monument.

— Thence south 66 degrees 13 minutes east 137-7/10 feet to a Lake Worth monument.

— Thence south 54 degrees 06 minutes east 415-8/10 feet to a Lake Worth monument.

— Thence south 24 degrees 56 minutes east 881-1/10 feet to a Lake Worth monument.

— Thence south 60 degrees east 277-8/10 feet to a Lake Worth monument.

— Thence north 82 degrees 03 minutes east 1387 feet to a Lake Worth monument in the east line of the said McVean Survey, the west line of the said D. V. Farmer Survey.

— Thence north 81 degrees 54 minutes east 1396-8/10 feet to a Lake Worth monument in the north line of the said D. V. Farmer Survey.

— Thence along said line north 89 degrees 35 minutes east 178-9/10 feet to a stake from which a City monument bears south 15 feet, said monument numbered 218.

— Thence south 7601-55/100 feet to a stake from which a City monument number 190 bears north 15 feet.

— Thence south 89 degrees 31 minutes west 9[illegible]-5/10 feet to a white stone marked "T" in top and in the west line of the said Connelly Survey and in the east line of the said B. L. Samuel Survey.

— Thence south 89 degrees 41 minutes west 5[illegible]-6/10 feet to a Bois d'arc post marked "S E McV" on its north side for the southeast corner of said Daniel McVean Survey and the northeast corner of the said J. L. Shreeve Survey.

— Thence south 89 degrees 47 minutes west along the south line of said McVean Survey, the north line of the said Shreeve Survey, 1388 feet to a stake from which a City monument number 216 bears north 89 degrees 47 minutes east 15 feet.

— Thence south no degrees 22 minutes west 752-8/10 feet to a stake from which a City monument number 232 bears south 89 degrees 33 minutes west 15 feet.

— Thence south 89 degrees 33 minutes west 1454-3/10 feet to a stake from which a City monument number 224 bears north 89 degrees 33 minutes east 15 feet.

— Thence north no degrees 22 minutes east 752-8/10 feet to a stone marked "[illegible] A E L" and in the south line of said Terrell Survey and from which a City monument number 214 bears west 15 feet.

— Thence west along said south line 1806-5/10 feet to the place of beginning and containing nine hundred sixty-seven and 121/1000 (967.121) acres, of which 97-7/10 acres are embraced within the

D61-53

D. V. Farmer Survey, 119-738/1000 acres within the Jos. B. Farmer Survey, 9-819/1000 acres within the Cornelius Connelly Survey, 8-560/1000 acres within the B. L. Samuel Survey, 25 acres within the [illegible] Survey, 408 acres within the Daniel McHorse Survey, and 301-227/1000 acres within the E. S. Terrell Survey.

Tract II = 345.92 Ac Net Cont

A tract situated about 6-1/2 miles N. 80 W. from the Courthouse in Tarrant County, Texas, and embracing the John McHorse and Wm. E. Robinson Surveys and parts of the E. S. Terrell, Wm. Ray, J. J. Reese and Garcia Montez & Duran Surveys:

Beginning at a point in the south line of the E. S. Terrell Survey, 103 feet from its most southerly southwest corner and from which point a City monument, number 221, bears west 128 feet.

Thence north no degrees 07 minutes west 4225-82/100 feet to a stake.

Thence north 31 degrees 15 minutes east 389-1/10 feet to a stake.

Thence north no degrees 06-1/2 minutes east 1907-9/10 feet to a stake in the north line of the said Terrell Survey, from which a Lake Worth monument bears north 89 degrees 37 minutes east 4-3/4 feet.

Thence south 89 degrees 37 minutes west along said north line 1705-8/10 feet to the northwest corner of said survey, a stake, whence a City monument bears north 89 degrees 37 minutes east 15 feet, said monument being numbered 235.

Thence south no degrees 28 minutes east along the west line of said survey 942-1/10 feet to a stake, whence a City monument, number 240, bears north no degrees 28 minutes west 16 feet.

Thence south 89 degrees 32 minutes west 594-6/10 feet to a Lake Worth monument in the west line of the said Garcia Montez & Duran Survey.

Thence south, along the west lines of the said Garcia Montez & Duran and John McHorse Surveys, 1492-6/10 feet to a Lake Worth monument, the southwest corner of the said McHorse Survey in the north line of the said J. J. Reese Survey.

Thence south 88 degrees 55 minutes west along said north line 751-9/10 feet to a stake whence a City monument, number 233, bears south 19 feet.

Thence south no degrees and 1[illegible] minutes east 1968-1/10 feet to a post, whence a City monument, number 234, bears north 15 feet.

Thence south 78 degrees 18 minutes west 293 feet to a willow tree north of a spring, whence a City monument, number 236, bears south no degrees [illegible] minutes east [illegible] feet.

Thence south no degrees 36 minutes east 444-2/1[illegible] feet to a stake beside a set stone, whence a

R. F. M.

D-61-53

City monument, number 237, bears north 89 degrees 49 minutes west 15 feet.

Thence north 89 degrees 49 minutes west 1405 feet to a stake beside a set stone, whence a City monument, number 238, bears south no degrees 26 minutes west 15 feet.

Thence south no degrees 26 minutes west 1763-7/10 feet to a stake, whence a City monument, number 227, bears north 89 degrees 41 minutes east 15 feet.

Thence north 89 degrees 41 minutes east 4432-4/10 feet to a point in the east line of said Ray Survey, whence a City monument, number 221, bears west 15 feet.

Thence east 105 feet to the place of beginning, and containing four hundred thirty-five and 954/1000 (435.954) acres, save and except Blocks 20 and 25, Original Campus Addition, and the streets running to the south and to the east of said blocks.

AND WHEREAS, the United States of America desires to acquire constitutional jurisdiction over said tracts or parcels of land above described, and has made application to the Governor of the State of Texas in writing to that effect, through its Secretary of War, accompanied with proper evidence of such acquisition, duly authenticated and recorded, containing or having annexed thereto an accurate description of said tracts or parcels by metes and bounds as hereinbefore set forth,

NOW, THEREFORE, I Coke R. Stevenson, Governor of the State of Texas, in the name and on behalf of the State of Texas, do hereby cede to the United States of America exclusive jurisdiction over the said described tracts or parcels of land, to hold, possess, and exercise said jurisdiction over the same as long as the same remains the property of the United States of America: Provided, however, that this cession of jurisdiction is made and granted upon the express condition that the State of Texas shall retain concurrent jurisdiction with the United States of America in and over every portion of the lands so ceded, so far, that all process, civil and criminal, issuing under the authority of the State of Texas

D 61-53

or any of the courts or judicial officers thereof, may be executed by the proper officers of the State, upon any person amenable to the same within the limits of the lands over which jurisdiction is so ceded, in like manner and like effect as if no such cession had taken place.

This deed of cession is made pursuant to Articles 5242, 5247, and 5248 of the Revised Civil Statutes of Texas, 1925, and in accordance therewith the United States of America shall be secure in its possession and enjoyment of said lands, and said lands and all improvements thereon shall be exempt from any taxation under the authority of the State of Texas so long as the same are held, owned, used and occupied by the United States of America for any of the purposes expressed in the foregoing statutes and not otherwise.

IN TESTIMONY WHEREOF, I have hereunto signed my name as Governor of the State of Texas and have caused the great seal of the State of Texas to be hereunto affixed, at the City of Austin, in said State, on this 30th day of December, 1942.

Governor of Texas

ATTEST:

Secretary of State of Texas

D-61-53

STATE OF TEXAS }
COUNTY OF TRAVIS }

Before me, the undersigned authority, a Notary Public in and for the County of Travis, State of Texas, on this day personally appeared Coke R. Stevenson, Governor of the State of Texas, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed, and in the capacity therein stated.

Given under my hand and seal of office, on this the 30th day of December, A. D. 1942.

Eunice Orsten
Notary Public, Travis County, Texas

My commission expires June 1, 1943

Approved as to Form:

Gerald C. Mann
ATTORNEY GENERAL OF TEXAS

By Chester E. Ollison
Chester E. Ollison
Assistant Attorney General

D61-53.
L-4

SUMMARY
INSTALLATION RESTORATION PROGRAM
CARSWELL AIR FORCE BASE, TEXAS

Carswell Air Force Base (AFB) was established in 1942 and located six miles west of downtown Fort Worth, in Tarrant County, Texas. The base operates the Weapons Storage Area (WSA) located five miles west of the base on White Settlement Road.

Wastes have been generated and disposed of at Carswell AFB since the beginning of industrial operation in 1942. Major industrial operations include maintenance of jet engines, aerospace ground equipment, fuel systems, weapon systems and pneudraulic systems; maintenance of general and special purpose vehicles; aircraft corrosion control; and non-destructive inspection activities. The generated wastes are primarily oils, lubricants, recoverable fuels, spent solvents and cleaners produced from these operations.

The Installation Restoration Program at Carswell AFB has progressed through Phase I and II. Phase I Records Search was completed in February 1984 by CH2M Hill, Inc., Phase II Confirmation/Quantification. Stage 1 was completed in October 1986 by Radian Corporation and Phase II Confirmation/Quantification, Stage 2, Draft was dated in Octoher 1988 by Radian Corporation.

Investigations have focused on twelve sites at Carswell AFB and on one site at the WSA. At Carswell AFB, these sites consist of landfills, fire training areas, industrial areas, spill sites and a gasoline service station that are located in two main areas. One group of sites is near the flightline and another group is concentrated in the east area of the base. The history, investigations, findings and recommendations of each site are described briefly in the following paragraphs. The sites have been assigned to one of the following IRP categories:

Category 1 - Sites where not further action is required

Category 2 - Sites requiring additional IRP effort

Category 3 - Sites requiring detailed evaluation of remedial alternatives.

All sites investigated fall into either Category 1 or Category 2. No sites were eligible for inclusion into Category 3, since only the first phase of the feasibility study process was completed and remedial alternatives were not selected.

<u>IRP Site 1, Landfill No. 1 (SWMU No. 28).</u>

IRP Site 1 was reported to be the original base landfill and was operated during the 1940s. This site is located adjacent to the Trinity River levee at the current location of the Defense Reutilization and Marketing Office storage yard. No information is

available concerning the past waste disposal practices at this site due to the time elapsed since this site was closed.

Six upper zone monitor wells were installed at the site. The subsurface conditions consists of fill, clay, and sandy clay. The large amount of fill material (asphalt, concrete, tar, wood chips) encountered in the clay beneath the DRMO indicates that the area has been extensively modified. The upper zone materials are a result of construction fill or rechannelling of the Trinity River. The surface of the Goodland Limestone dips relatively steeply to the east beneath the site, reflecting channel cutting and erosion of the limestone by the Trinity River. The land surface elevation does not dip eastward as steeply as the limestone; therefore, the lower elevation of the top of the Goodland at the extreme eastern edge of the site accounts for the relatively greater thickness of alluvium. The ground water depth ranges from 5 feet at one well, to a fairly consistent measurement of 20 feet at the other wells.

Soil samples from two wells were collected and analyzed of moisture content, heavy metals, oil and grease, volatile organic compounds, and semivolatile organic compounds. Heavy metals were compared with mean values of metal concentrations in U.S. soils and detected at above normal ranges for arsenic, cadmium and silver. Oil and grease were not detected. Toluene was detected in both wells sampled. Di-n-butylphthalate was confirmed in soil samples at both locations, with a maximum concentration of 380 ug/kg.

Ground water was sampled for chemical analysis twice in 1988. Samples were analyzed for water quality indicators, heavy metals, oil and grease, purgeable halocarbons, purgeable aromatics, and extractable priority pollutants. Total dissolved solids concentrations for most samples were approximately 500 mg/L, with the exception of two wells in Round 1 with values of 1,100 mg/L and 1,300 mg/L. Sulfate concentrations that exceeded recommended standards were detected in one well for both rounds (460 mg?l and 360 mg/L, respectively). Water samples were found to exceed MCLs for arsenic, barium, cadmium, chromium, lead and selenium. Iron and manganese exceeded MCLGs during both sampling rounds for all wells. Other MCLGs that were surpassed are lead (one well) and cadmium (two wells). Oil and grease were found in concentrations less than 1 mg/L in ground water samples in the first round, from four wells, however, no detectable concentrations of oil and grease were detected in the second round. Trichloroethene exceeded the MCLGs in two wells (0.70 ug/L and 0.30 ug/L) and vinyl chloride was detected in one well with a value of 0.40 ug/L which also exceeded the MCLGs. Toluene was detected during both sampling rounds in five wells with a maximum value of 26 ug/L. The only other purgeable aromatic compound detected was chlorobenzene during both sampling rounds at one well. Bis(2-ethylhexyl)phthalate was detected in two wells and di-n-butylphthalate was found in the second round of one well.

The soil investigation of this area did not indicate the presence of contaminants or waste materials.

during the Stage 1 study provided inconclusive evidence of disposal activities at this site. Based on the subsurface investigations and chemical analysis at Stage 2, the site does not appear to be a source of contaminants in the subsurface. Some metals concentrations above MCLs were detected in ground water and should continue to be monitored. Recommended monitoring parameters should include volatile halogenated organic compounds, metals, and general water quality parameters. Results of the Stage 2 investigation indicates that there is no further action necessary at this time for IRP Site 3 and should be classified in Category 1.

Results of Stage 2 investigation show concentrations of metals in several downgradient wells in excess of the federal MCLs. No other contaminants were detected in soil or ground water samples at the site. The baseline assessment concluded that Landfill No. 1 has a low to moderate potential to affect human health, assuming prolonged human contact with the Trinity River adjacent to the landfill. Continuation of collecting and analyzing the ground water from the existing well network is recommended. Samples should be analyzed for volatile organic compounds, metals, and general water quality parameters. IRP Site 1 is classified as Category 2.

IRP Site 3, Landfill No. 3 (SWMU No. N/A).

IRP Site 3 is located under the existing runway, immediately south of the culvert carrying the flow of Farmers Branch. During the period from 1950 to 1952, the site was used for burial of all types of wastes, however primarily construction debris. During that period, the runway ended north of Farmers Branch, and an existing ravine at this location was utilized as a fill area.

Four boreholes were drilled and one upper zone monitor well was installed at the site. The subsurface conditions consists of clayey silt at the surface, grading into silty clay a few feet deep which rests directly on bedrock. Generally the clay and silt deposits are ten to twenty feet thick. The bedrock is shale and limestone of the Goodland Formation. Ground water was only encountered in the upper zone at one location near Farmers Branch.

Spit-spoon samples were collected and visually examined for evidence on contamination and samples were selected for analysis of moisture content, metals, oil and grease, volatile organic compounds, and semivolatile organic compounds. Heavy metals were detected at the normal ranges, with the exception of arsenic in one hole. Oil and grease were detected in two holes with concentrations ranging from 32-48 ug/g. Toluene was detected in one hole at a value of 7.6 ug/Kg. Various phthalate compounds were detected in the soil samples, along with acetone and methylene chloride.

Ground water was sampled for chemical analysis twice in 1988. Samples were analyzed for water quality indicators, metals, oil and grease, petroleum hydrocarbons, phenols, purgeable halocarbons,

purgeable aromatics, organochlorine pesticides, chlorinated phenoxy acid herbicides, and extractable priority pollutants. The water quality indicators remained stable with the only major change being an increase in sulfate concentration from 140 mg/L to 330 mg/L. Water samples were found to exceed MCLs for chromium and arsenic. Iron and manganese exceeded MCLGs during both sampling rounds. Oil and grease was not detected. Petroleum hydrocarbons were detected in the first round, however, no petroleum hydrocarbons were detected in the second round. Phenols and 2-chlorophenol were detected in the second round and confirmed by a second column analysis. Trichloroethene was the only purgeable halocarbon detected and the level was below the MCL for TCE but above the MCLG, which is zero. Toluene was detected in both rounds of sampling but the levels were below the MCLG for toluene. Neither pesticides nor herbicides were detected in the ground water.

The geophysical investigation of this location during the Stage 1 study provided inconclusive evidence of disposal activities at this site. Based on the subsurface investigations and chemical analysis at Stage 2, the site does not appear to be a source of contaminants in the subsurface. Some metals concentrations above MCLs were detected in ground water and should continue to be monitored. Recommended monitoring parameters should include volatile halogenated organic compounds, metals, and general water quality parameters. Results of the Stage 2 investigation indicates that there is no further action necessary at this time for IRP Site 3 and should be classified in Category 1.

IRP Site 4, Landfill 4 (SWMU No. 22).

IRP Site 4 consists of ten acres of land located east of the runway and is currently the location of the radar site. The site was operated as the main landfill from approximately 1956 to 1975. At least six large pits, approximately twelve feet deep were filled with refuse which was burned and buried. Various materials suspected of being hazardous were reportedly disposed at this site, including drums of waste liquids, partially full paint cans and cadmium batteries. Written records indicate that waste paints, thinners, and strippers; oil containing absorbent materials; PD-680 (safety cleaning solvent) and oils may have been routinely disposed of at this site.

Eight monitoring wells were installed at the site. Upper deposits consist of clayey silt with variable amounts of fine sand and gravel underlain by sand and gravel deposits and vary in thickness from 17 feet to 39.5 feet. Bedrock, shale and limestone of the Goodland Formation was encountered at the base of the upper zone deposits at all locations with the exception of one boring. Ground water occurs in the upper zone materials underlying the site at depths ranging from approximately 13 feet to 28 feet.

Spit-spoon samples were collected and visually examined for evidence on contamination and samples were selected for analysis of moisture content, metals, oil and grease, volatile and semivolatile

organic compounds. Heavy metals were detected at the normal ranges, with the exception of silver in two holes. No oil and grease were detected. Toluene was detected in low levels (less than 8.8 ug/kg) in the soil samples in two holes. Several phthalate compounds were detected in the soil samples at the site, however, the occurrences of the compounds were noted to coincide with phthalates in reagent blanks.

Ground water was sampled for chemical analysis twice in 1988. Samples were analyzed for water quality indicators, heavy metals, purgeable halocarbons, purgeable aromatics, and extractable priority pollutants. The total dissolved solids ranged from 430 mg/L to 920 mg/L, with the highest value in the first round of sampling. Sulfate concentrations increased in every well, except one, from the first to the second sampling round. MCLs were exceeded in Round 1 for lead, chromium, barium and cadmium. Round 2 results indicated that arsenic, lead, chromium and barium concentrations surpassed MCLs. Iron and manganese exceeded MCLGs during both sampling rounds. Purgeable halocarbons were detected in every upper zone monitor well at the site. TCE was the principal halocarbon, with values ranging from not detected to 4,200 ug/L. The only other compound surpassing MCLs for purgeable halocarbons was vinyl chloride, detected in both rounds at only one well. Toluene was detected in low levels (majority less than 10 ug/k, but up to 27 ug/L) from five wells. Benzene was found exceeding MCLs in Round 1 at one well, however, it was not detected in the second sampling round.

Results of Stage 2 field laboratory tests indicate that there is a TCE plume in the upper zone ground water in the area of IRP Sites 4, 5 and 10. The results of the risk assessment indicate that there is little to no potential for impacts on human health, since there is no direct pathway for contaminants to reach human receptors. In addition, the current covered and vegetated condition of these disposal sites precludes opportunities for air emissions or spreading of contaminants by dust. Additional upper zone wells are recommended to determine the extent of TCE both upgradient and downgradient of the existing wells. Surface water sampling is recommended to determine the water quality of Farmers Branch and the ponds near Building 233. The preliminary evaluation of possible remedial alternatives indicated that ground water extraction and treatment would be recommended, however, in order to properly evaluate such an option, additional data on the aquifer characteristics are needed. Therefore, one or two aquifer tests, each consisting of a pumping well and three or more observation wells, are recommended to provide the data ultimately needed. IRP Sites 4, 5, and 10 appear to be best treated as combined sites in dealing with the problem of TCE in the ground water and are classified as Category 2 sites.

<u>IRP Site 5, Landfill 5 (SWMU No. 23).</u>

IRP Site 5 is located northwest of Landfill 4 and was constructed adjacent to a small tributary of Farmers Branch. The

landfill was operated between 1963 and 1975 and was constructed by building a clay berm adjacent to the creek and then filling the area behind the berm up to its existing level. This site received all types of flightline wastes and refuse, and was regularly burned prior to covering.

Eight monitoring wells were installed at the site. The thickness of the upper zone ranges from 8 feet to at least 40 feet. The surficial clay and silt deposits are generally 5 to 10 feet thick and the sand and gravel deposits are 10 to 30 feet thick. The grain size of the sand and gravel generally increased with depth. Bedrock, shale and limestone of the Goodland Formation was encountered at the base of the upper zone deposits at all locations with the exception of two borings which were not deep enough to encounter bedrock. Ground water occurs in the upper zone materials underlying the site at depths ranging from less than 2 feet to 27 feet.

Spit-spoon samples were collected in five of the borings and visually examined for evidence on contamination and samples were selected for analysis of moisture content, metals, oil and grease, volatile and semivolatile organic compounds. Heavy metals were detected at the normal ranges, with the exception of silver in two holes and arsenic in one hole. Oil and grease were only detected in one hole with a value of 15.0 ug/g. TCE was only revealed at one boring with a value of 22 ug/Kg. Soil samples contained toluene (up to 31 ug/kg) in five of the seven samples analyzed. Several phthalate compounds and acetone were detected in the soil samples at the site. These compounds varied in concentrations of 100 to 800 ug/kg.

Ground water was sampled for chemical analysis twice in 1988. Samples were analyzed for water quality indicators, heavy metals, purgeable halocarbons, purgeable aromatics, and extractable priority pollutants. The total dissolved solids (TDS) ranged from 380 mg/L to 770 mg/L. Except for two wells, there was a noticeable increase in TDS values between the two sampling events. Nitrate and sulfate concentrations increased in every well also. MCLs were exceeded in Round 1 for arsenic, lead and chromium. Round 2 results indicated that arsenic, lead, chromium and barium concentrations surpassed MCLs. Iron and manganese exceeded MCLGs during both sampling rounds. Purgeable halocarbons were detected in every monitor well at the site. The principal ground water contaminant is trichloroethene (TCE). TCE was detected in every sample from the monitor wells, except one. The TCE concentration ranged from 52 to 3,800 ug/L. 1,1,1-trichloroethane was detected (67 ug/L) in the first round at one well. Other purgeable halocarbons detected above MCL values included vinyl chloride and trans-1,2-dichloroethene. The only detected purgeable aromatic was benzene, which was detected only in the first round and at one well. Water samples were analyzed for extractable priority pollutants and bis(2-ethylhexyl)phthalate was detected in low levels (5.2 ug/L).

IRP Site 5, as discussed previously for IRP Site 4, appears to be best treated as a combined site with IRP Site 4 and 10 in dealing with the problem of TCE in the ground water and is classified as a Category 2 site.

IRP Site 10, Waste Burial Site (SWMU No. 24).

IRP Site 10 is located adjacent to and north of White Settlement Road, where it dead-ends at the taxiway. The site was used for burial of wastes during the 1960s. Various types of hazardous materials, including drums of cleaning solvents, leaded sludge, and possibly ordnance materials were reported disposed of at this site. Fort Worth District, Corps of Engineers is presently preparing the plans and specifications for the removal of drums reportedly containing TCE within the boundaries of this site.

Three boreholes were drilled and two upper zone monitor wells were installed at the site. The upper zone materials consist of surficial deposits of clayey silt with variable amounts of fine sand and gravel, underlain by sand and gravel deposits. The thickness of the upper zone ranges from 31 feet to 39 feet. The surficial clay and silt deposits are 7 to 14 feet thick and the sand and gravel deposits are 19 to greater than 27 feet thick. Shale and limestone of the Goodland Formation underlie the upper zone materials and occurs at a maximum of greater than 39 feet west of the site and at its shallowest depth of 31 feet northwest of the site. Ground water occurs in the upper zone materials at a depth ranging from 20 feet to 30 feet.

Spit-spoon samples were collected and analyzed for heavy metals, oil and grease, petroleum hydrocarbons, volatile organic compounds, semivolatile organic compounds, pesticides, and PCBs. No heavy metals were detected above the normal ranges. There was no detection of oil and grease or petroleum hydrocarbons. TCE was detected in one sample, however, this finding was not confirmed with a duplicate sample. Toluene was estimated in low levels (5.3 ug/Kg and 2.0 ug/Kg) in two samples. Various phthalate compounds were detected in the soil samples ranging up to 390 ug/Kg. Pesticides or PCBs were not detected in any soil samples at this site.

Ground water samples were sampled for chemical analysis in two rounds of sampling. Samples were analyzed for water quality indicators, heavy metals, oil and grease, petroleum hydrocarbons, phenols, purgeable halocarbons, purgeable aromatics, organochlorine pesticides and herbicides. Total dissolved solids concentrations were fairly uniform through the two sampling rounds, ranging from 510 to 670 mg/L. Water samples were found to exceed MCLs for chromium at one well in both rounds of sampling and in the first round for another well and in the second round for the third well. Iron and manganese exceeded MCLGs at the three wells during both sampling rounds. Ground water analyses detected oil and grease in all three monitor wells in Round 1. Values ranged from 0.3 mg/L to 1 mg/L. However in Round 2, oil and grease were not detected at

any of the wells. Petroleum hydrocarbons were detected (0.40 and 0.60 mg/L) in the first round, however, no petroleum hydrocarbons were detected in the second round. Phenols were detected in the first round and confirmed by a second column analysis. Concentrations of 2,4-dinitrophenol, 2-chlorophenol, and 2-methyl,-4,6-dinitrophenol were detected in the first round, but not the second round of sampling. Trichloroethene (TCE) was detected in concentrations greater than the MCL in all ground water sampled at the site. Values ranged from 1,900 ug/L to 11,000 ug/L. Chloroethene was detected at 850 ug/L in one well in the first round, but was not detected in the second round. Purgeable aromatics pesticides nor herbicides were not detected in the ground water at the site.

IRP Site 10, as discussed previously for IRP Site 4, appears to be best treated as a combined site with IRP Site 4 and 5 in dealing with the problem of TCE in the ground water and is classified as a Category 2 site.

IRP Site 11, Fire Department Training Area 1 (SWMU No. 18).

IRP Site 11 is located north of Landfill 5 and was the primary fire pit prior to 1963. The pit was gravel-lined, and had a low concrete curb around its perimeter and reportedly was adjacent to a small tributary of Farmers Branch. Several fire training exercises are reported to have taken place at this site each month, with waste oils and contaminated fuels being the primary flammable liquids used in the exercises. Small quantities of solvents are also reported to have been used in these exercises. The site now consists of a level, gravel-surfaced area on a drainage divide between an unnamed tributary of Farmers Branch and Farmers Branch.

Two upper zone monitor wells were installed at the site. Upper zone materials consist of surficial deposits of clayey silt with variable amounts of fine sand and gravel, underlain by sand and gravel deposits. The thickness of the upper zone is approximately 14 feet at both wells. Generally the surficial clay and silt deposits are five feet thick and the sand and gravel deposits are eight to ten feet thick. The bedrock is shale and limestone of the Goodland Formation. Ground water occurs in the upper zone materials underlying the site at depths ranging from six to nine feet.

Samples of ground water were collected and analyzed from the two wells in two sampling rounds. Parameters analyzed were water quality indicators, heavy metals, petroleum hydrocarbons, purgeable halocarbons, purgeable aromatics, and extractable priority pollutants. Total dissolved solids ranged from 570 mg/L to 820 mg/L during the two sampling rounds. Maximum contaminant levels were exceeded by arsenic in both sampling rounds at only one well. Chromium also surpassed MCLs at the same well in the second round. Iron and manganese exceeded MCLGs during both sampling rounds at both wells. Lead was found in levels above the MCL at one well, but this was not confirmed with the graphite atomic absorption

test. Petroleum hydrocarbons were not detected at the two wells. Purgeable halocarbons were not detected in the ground water at the site. Toluene was found in all ground water samples, ranging from 0.6 ug/L to 19 ug/L. Concentrations increased at both wells from the first to the second rounds, but were under the toluene MCLG of 2.0 mg/L. Several priority pollutants were detected in one well, however, the substances detected were at low levels and occasionally were detected in the reagent blank samples.

The geophysical investigation of this site during the Stage 1 study detected no soil or ground water contamination. Results of the Stage 2 investigations indicated low levels of TCE (range from none detected to 0.249 ug/g) were detected in one well at the site, located just north of IRP Site 5. In addition, TCE (range from none detected to 0.257 ug/g) was also detected in soil from a hand-augured boring at the center of the site and at the upgradient well. It is recommended that the two wells should continue to be monitored, primarily due to their proximity to the TCE plume in the ground water south of the site. Monitoring parameters should include volatile organic compounds, metals, and general water quality parameters. Results of the Stage 2 investigation indicates that there is no further action necessary at this time for IRP Site 11 and should be classified in Category 1.

IRP Site 12, Fire Department Training Area 2 (SWMU No. 19).

Site 12 is located between the north-south taxiway and the radar facility. This site, with only slight modifications, has been used as a fire department training area since 1963. The fire ring is gravel-lined with a low earthen berm around its perimeter. In the past, a pit was present at the site to collect runoff from training exercised, but this pit has been filled. Two tanks located at the site have been used for storage for flammable liquids prior to training exercises. An 8,500 gallon aboveground tank is used to store clean or contaminated fuels, which are delivered to the ring via a pump and various pipes. An underground tank of approximately 9,500 gallons has been used for storage of waste oils and solvents from the flightline shops. Normal disposition of the underground tank contents has been to off-base contractors, however, it is possible that contents of this tank have also been used for training exercises in the past.

Five boreholes were drilled and five upper zone monitor wells were installed at the site. Upper zone materials consist of surficial deposits of clayey silt with variable amounts of fine sand and gravel, underlain by sand and gravel deposits. The thickness of the upper zone ranges from 18 feet to 40 feet. The surficial clay and silt deposits are 10 feet thick and the sand and gravel deposits are 2 to 27 feet thick. The thickness of sand and gravel deposits decrease abruptly toward the south as the bedrock elevation rises. The bedrock, shale and limestone of the Goodland Formation, underlies the upper zone materials at all locations. The top of the Goodland ranges from 18 to 40 feet. Limestone of the Goodland Formations crops out just southeast of the site near

Landfill 4 in a stream that flows to Farmers Branch. Ground water occurs in the upper zone materials underlying the site at depths ranging from 15 feet to 30 feet.

Spit-spoon samples from five soil borings and two monitor wells were collected and visually examined for evidence on contamination and samples were selected for analysis of moisture content, heavy metals, petroleum hydrocarbons, volatile organic compounds, and semivolatile organic compounds. Heavy metals were detected at the normal ranges, with the exception of selenium in three borings and lead was detected above the mean values at one boring. Petroleum hydrocarbons were encountered at five boreholes. Samples analyzed from various depths showed an apparent trend of decreasing petroleum hydrocarbon concentrations with depth until sand was encountered, where the highest values were detected. TCE was not detected in any of the soil samples. 1,1,2,2-tetrachloroethane was estimated at 1,300 ug/Kg in one hole in the sand layer at 19 to 21 feet below the surface. Maximum concentrations for the same hole included 370 ug/Kg for benzene and 37,000 ug/Kg for total xylenes (both in the first two feet of soil) and 5,000 ug/Kg for ethylbenzene (in the sand layer). Semivolatile organic compounds encountered in only two bore holes were as follows: 2-methylnaphthalene (11,000 ug/Kg), 4-methylphenol (4,200 ug/Kg), phenol (500 ug/kg), naphthalene (4,700 ug/Kg). The trend in concentration for napthalene and 2-methylnapthalene was high concentrations at the surface, decreasing concentrations with depth and then maximum concentrations in the sand zone at 19 feet below land surface. Phenol and methylphenol concentrations were highest at the surface, but were not detected at depth.

Samples of ground water were collected and analyzed from the two wells in two sampling rounds. Parameters analyzed were water quality indicators, heavy metals, petroleum hydrocarbons, purgeable halocarbons, purgeable aromatics, and extractable priority pollutants. Total dissolved solids ranged from 380 mg/L to 590 mg/L during the two sampling rounds. Concentrations of several metals were above federal regulatory limits for drinking water. Arsenic (3 wells), lead (4 wells), cadmium (1 well) and chromium (4 wells) exceeded MCLs in the first round. In the second sampling round, arsenic (2 wells), lead (4 wells), cadmium (1 well) and chromium (4 wells) concentrations exceeded MCLs. MCLGs were exceeded by iron and manganese in every ground water sample from the site. The only detection of petroleum hydrocarbons was in one monitor well (0.60 mg/L) in first round. Purgeable halocarbons were detected in all samples except for the first round sample in one well. TCE concentrations in two wells, tetrachloroethene in one well and vinyl chloride in one well were above their respective MCLs. Several purgeable aromatic compounds were detected in low levels in the ground water, however, all values were below MCLs. 1,2-dichlorobenzene was found in low levels in one well in the second sampling round.

The Stage 2 investigations confirmed the findings of Stage 1. Although the site is upgradient of the Flightline Area TCE plume,

ground water at some wells contains metals and volatile aromatic hydrocarbon compounds in concentrations exceeding federal MCLs. Petroleum hydrocarbons occur in the upper zone soil profile, both at and near the surface and at depths coinciding with a laterally continuous sand stratum and represent a potential source of ground water contamination downgradient of the site. Carswell AFB is recommended to continue to proceed with plans to construct a fully contained, concrete-lined pad at the site to replace the current unlined facility. Feasibility study efforts should progress to provide remedial action concepts to the construction of the new facility. Monitoring of the existing wells should include the collection and analysis of ground water samples for volatile organic compounds, petroleum hydrocarbons, metals, and general water quality parameters. IRP Site 12 is classified as Category 2.

IRP Site 13, Flightline Drainage Ditch (SWMU No. 53).

IRP Site 13 is a drainage ditch located east of Haile Drive adjacent to the main aircraft washrack and Hangers 1048 and 1049. The ditch receives run-off from the flightline area via three concrete drainage conduit located under Haile Drive. The ditch is unlined from Haile Drive to its intersection with the POL Tank Farm, at which point it becomes a concrete-lined ditch. The ditch enters a storm sewer at the intersection of Knights Lake Road and Hobby Shop Road. In addition to normal storm drainage, this ditch receives discharges from the aircraft washracks and the Fuel System Shop (Building 1048). Washrack wastes (PD-680, a cleaning solvent, and soap) can be discharged directly to the Facility 1190 oil/water separator, located adjacent to the flightline drainage ditch, or into the drainage ditch via an overflow pipe in the drain line between the washracks and the oil/water separator. Discharge to the oil/water separator or to the drainage ditch is controlled by a valve in the drain line just upstream of the separator.

The investigation of IRP Site 13 consisted of the collection of surface sediment samples at five locations during two sampling rounds. The borings were spaced evenly along the site between where the ditch emerges east of Haile Drive and to where the ditch becomes concrete-lined as it enters the POL Tank Farm. The geologic features were not evaluated from the surface samples collected in Stage 2. During Stage 1, the borings at the site extended to a maximum of ten feet below the surface, so only the most shallow sediments have been examined. In general, the soil is gravelly and hard and a very stiff clay is also present in the area. During Stage 1, it was observed that some gravels along the ditch were stained with a black, oily substance at a level equivalent to the observed stream level in the ditch. Water occurs in the shallow sediments below the ditch at depths between six inches and four feet below the surface. This level is substantially higher than that in nearby monitor wells at IRP Site 17 and probably represents near-surface soil saturation related to the ditch, rather than the local ground water body.

Surface soil samples were collected in two rounds

approximately one month apart. Soils were tested for moisture content, heavy metals, petroleum hydrocarbons, volatile organic compounds and semivolatile organic compounds. Cadium, lead and selenium were above normal ranges in most samples analyzed. Arsenic was detected at elevated levels during the first round of sampling in four of the five locations. However, arsenic was not detected in any samples from the second round of samples. Petroleum hydrocarbons were detected in every soil sample from the site. The highest values detected were 1,320 ug/g in the first round and 3,500 ug/g in the second round. The lowest concentration of petroleum hydrocarbons was in the first round with a value of 34 ug/g near the upstream limit of the ditch. Benzene, ethylbenzene, toluene, and total xylenes were the volatile organic compounds detected in most samples. Benzene concentrations decreased between the first and second rounds and were generally less than 10 ug/Kg. Ethylbenzene was usually estimated at values below detection limits, with the exception of a concentration of 750 ug/Kg in the first round at one location. Toluene was found in all soil samples in concentrations ranging from 8.3 ug/Kg to 3,000 ug/Kg. Total xylenes were detected in every soil sample, with the exception of one location in the second round. There were numerous detections of semivolitile organic compounds at the site. In addition, there was an apparent trend between sampling events of decreasing concentrations at the upgradient location, while all other locations show increasing concentrations of semivolitiles.

Stage 1 and 2 findings confirm the presence of petroleum hydrocarbon compounds and other organic compounds in the sediment of the drainage ditch. Trends of increasing or decreasing concentrations between sampling rounds and at different locations in the ditch may be attributed to conditions of variable stream flow, possible pooling or trapping of contaminants in some segments of the ditch and intermittent discharges of fuels or runoff that would influence the distribution of contaminants.

Prior to formal corrective action, the ditch should be dredged and contaminated soil and sediment removed. This action will remove a possible source of future contamination. The recommended corrective action for IRP Site 13 is to concrete line the ditch, similar to the lined portion of the ditch as it flows through the POL Tank Farm. IRP Site 13 is classified as Category 2.

IRP Site 15, Entomology Dry Well (SWMU No. 63).

IRP Site 15 is located in the vicinity of the new communications building (Building 1337), east of Rogner Drive near the base main gate. Immediately east of the site is the former location of the entomology shed (Building 1338) which was removed in 1981 and the site was regraded. A dry well at the site was used for disposal of insecticide rinsate between 1965 and 1981. Due to the dismantling of Building 1338 and regrading of the site, the location of the former dry well has not been determined. Building 1338 was used for the storage and mixing of insecticides including malathion, diazinon, dursban, and chlordane, and for storage and

cleaning of spray equipment. Chlordane has been reported in samples taken from the well next to Building 1338, although no documented analytical results could be found during the records search to substantiate this report.

Three monitor wells were installed in Stage 1 and samples were obtained by hand augering at seven locations in the vicinity of the Entomology Dry Well during Stage 2. These samples were analyzed for the presence of organic compounds, specifically organochlorine pesticides and PCBs. Organochlorine pesticides were detected in all soil samples except one, the furthest upgradient sample. Chlordane was the most prevalent substance encountered, being detected in four locations. The highest value of 32,000 ug/Kg was in the sample furthest downgradient sampling location and closest to IRP Site 16. Other chlordane findings ranged from 21 to 420 ug/Kg and heptachlor was only detected at one location, in a concentration of 980 ug/Kg. Two sample locations had findings of 4,4'-DDD and 4,4'-DDE with the highest concentrations of 140 ug/Kg and 29 ug/Kg, respectively. There were no other organochlorine pesticides detected in the soil at the site.

The results from the ground water samples obtained in Stage 1 did not indicate that pesticides occurred in the shallow upper zone ground water. The principal effort for the Stage 2 investigations was to determine if pesticide contaminants occur in near surface soils. Based on the samples collected and analyzed from the site, pesticide compounds were detected in an apparent random pattern around the former location of the Entomology Shop in near the surface. Thus the available evidence indicates that pesticides have remained in the shallow soil.

Collection and analysis of ground water samples should be performed at the three existing monitor wells since pesticides and herbicides were detected in shallow soil. Samples should be analyzed for pesticides and herbicides and general water quality parameters. In addition, the samples should be analyzed for petroleum hydrocarbons due to the proximity of this site to the old gasoline station, where petroleum hydrocarbons are suspected to occur in the shallow ground water. IRP Site 15 is classified as Category 2.

<u>IRP Site 16, Unnamed Stream (SWMU No. 64).</u>

IRP Site 16 is divided into two parts located to the south and west of IRP Site 15. The Unnamed Stream, a small tributary of Farmers Branch, located south of the old entomology shed, and near the confluence of Farmers Branch and the Trinity River and a paved lot in the vicinity of an abandoned gasoline service station to the west of IRP Site 15. The small stream is the discharge from an oil/water separator located immediately south of the fenced civil engineering yard, and receives its perennial flow from ground water entering the separator. The separator is connected to a french underdrain system which was installed to aid in the removal of fuels from the ground either at IRP Site 17 or at the abandoned

gasoline service station. This separator has not been routinely cleaned for a number of years and reportedly contains hydrocarbon constituents.

Samples of surface water were collected and analyzed from four locations in two sampling rounds. Samples were analyzed for water quality indicators, heavy metals, oil and grease, purgeable halocarbons, and purgeable aromatics. Total dissolved solids at the four sampling locations were less than 500 mg/L and remained relatively stable between sampling events. Chloride and nitrate concentrations increased between sampling rounds at all locations, with all values below Secondary Drinking Water Regulations, except for a sample from Round 2 in which chloride was detected at 710 mg/L, up from 24 mg/L for Round 1. Surface water samples from the stream had two metals that exceeded MCLs. Arsenic surpassed MCLs in the second sampling round at two locations and chromium matched MCLs in the second round from one location. Iron and manganese exceeded MCLGs in all samples taken from the site. Oil and grease was detected at all four locations and in every sample, except the second round at one location. The highest concentration was 2.4 mg/L, which was detected in the second round. With the exception of this increase, all other oil and grease concentrations decreased between samplings. The only detection of purgeable halocarbons occurred at the most downstream sampling location, with the finding of tetrachloroethene which was below MCLs. Benzene was detected in levels exceeding MCLs at all four locations during the first round. Values ranged from 39 ug/L to 120 ug/L. However, in the second round of samples, benzene was not detected at any of the sample locations.

Results of the Stage 2 investigation indicates that the Unnamed Stream is receiving quantities of petroleum hydrocarbons. The decreasing concentrations of these contaminants with increasing distance downstream can be attributed to volatilization losses of these compounds to the atmosphere. Therefore, all contaminants in the stream can be attributed directly to the oil/water separator.

It is recommended that the stream should continue to be monitored and additional wells be installed in the vicinity of the old gasoline station. These wells should be screened in the upper zone, with water quality samples collected and analyzed for volatile organic compounds, petroleum hydrocarbons, metals, and general water quality parameters. IRP Site 16 is classified as Category 2.

<u>IRP Site 17, POL Tank Farm (SWMU No. 68).</u>

IRP Site 17 is located adjacent to Knight's Lake Road, near the base main gate. The site consists of three aboveground tanks. Three additional aboveground tanks were formerly located at this site, but have been dismantled. During the early 1960s, fuels were discovered in the ground in this area, and also downgradient from the site in the direction of the former base gasoline station. The underground leaking POL pipes were reportedly located and replaced.

No additional loss of POL to the ground is suspected to have occurred in this area since 1965. At the same time, a french drain system was installed downgradient from this area to collect fuels in the ground. The french drain discharged through the oil/water separator at IRP Site 16. The french drain system is still continuing to collect POL as evidenced by the results of the IRP Site 16 investigation.

Five boreholes for upper zone monitor wells were drilled in and around the tank farm area. The upper zone of the POL Tank Farm area typically consists of approximately ten feet of gray to tan clay, followed by another five to ten feet of sand and gravel. The clay frequently emitted a hydrocarbon odor during drilling. The sand is gray, tan to brown, or pink in color, and is generally fine-grained. Gravel ranges from pea size to pebbles over an inch in diameter. The depth of the Goodland Limestone beneath the POL Tank Farm ranges from 16 to over 20 feet below the land surface. The depth of water at the site varies from approximately 9.5 feet to 16 feet. The water surface slopes primarily to the southeast across the site, towards Farmers Branch.

The results of the soil gas survey conducted at the POL Tank Farm and the pipeline/truck loading area east of the tanks indicate that some areas are underlain by hydrocarbon vapor plumes. Using 1,000 ppm organic compound concentration as a criterion for delineating contamination, the results show that two soil vapor plumes exist at the site. The largest plume encompasses an area approximately 100 feet wide and 300 feet long in the vicinity of Tanks 1156 and 1157. The smaller plume envelops a circular area with a diameter of approximately 125 feet located east of the site and adjacent to Building 1213.

Soil samples from the five monitor wells were collected during drilling and analyzed for petroleum hydrocarbons, volatile organic compounds, and lead. The soil at the site was analyzed for lead concentration and all samples were well within normal ranges of heavy metal concentrations. The presence of petroleum hydrocarbons was confirmed at three borings with values ranging from 240 ug/g to 8900 ug/g. Soil analysis found low levels of benzene at two wells and toluene at three wells. Methylene chloride was detected at four wells.

Samples of ground water were collected from the five wells and analyzed for water quality indicators, heavy metals, petroleum hydrocarbons, purgeable halocarbons, purgeable aromatics, and extractable priority pollutants. The total dissolved solids (TDS) at the site ranged form 450 mg/L to 980 mg/L. With the exception of TDS, none of the water quality indicators exceeded recommended limits. Several heavy metals detected in ground water at the site exceeded federal guidelines. Arsenic, lead, barium, cadmium, and chromium exceeded MCLs at all five wells sampled. Concentrations of these metals were 0.13 ug/mL for arsenic, 0.56 ug/mL for lead, 2.2 ug/mL for barium, 0.031 ug/mL for cadmium and 0.56 ug/mL for chromium. MCLGs were exceeded by iron and manganese during both

sampling events at all five wells. Selenium was detected at all five wells during the ICP metal screen but was not verified with additional testing. Sodium was the only metal concentration that increased at each well between sampling events. Petroleum hydrocarbons were encountered in the vicinity of the POL Tank Farm in water samples taken from four wells in Round 1 and three wells in Round 2. Water collected from one well in Round 2 contained 0.20 ug/L of trichloroethene and vinyl chloride was detected in both rounds in another well. Although the values are below MCLs, they are above the MCLGs for these contaminants. MCLs for benzene were exceeded in the first sampling rounds at two wells. Benzene, however, was not detected at either of these locations in the second sampling round. Other detections of purgeable aromatics during the second round included ethylbenzene, toluene and m- and p-xylenes. Analyses of extractable priority pollutants were only performed on water from one well. The compounds found were at low levels and appeared to be decreasing slightly in concentration between sampling rounds.

The soil chemistry data reviewed indicated that petroleum hydrocarbons are the principal contaminant. The pattern of contamination in soil resembles the occurrence of ground water contaminants. Drilling in the unsaturated portion of the upper zone deposits generally did not yield materials with visible contamination, suggesting localized sources of contamination and migration of contamination in the ground water.

Four additional wells are recommended to complete the definition of the extent of contamination at the site and in addition to the new wells, continue to monitor the existing wells. All monitor wells at the site should be samples and the ground water analyzed for purgeable aromatic compounds, petroleum hydrocarbons, metals and general water quality parameters. IRP Site 17 is classified as Category 2.

<u>IRP Site BSS, Base Service Station (SWMU No. N/A).</u>

The BSS is located on the northwest corner of Rogner Drive and Jennings Drive. Gasoline is stored in several underground tanks located north of the pump islands. Drainage from the BSS is to culverts adjacent to Rogner Drive. The BSS has been in operation for less than 20 years, having replaced the gasoline station formerly located near IRP Site 15. BSS was designated as an IRP site after the Phase II Stage investigation was completed.

Three upper zone monitor wells were installed and one soil boring was drilled at the site. There is 3 to 9 feet of clay and silt, underlain by a generally thin stratum of sand with gravel. The three monitor wells encountered limestone of the Goodland Formation between 10 and 12 feet and the soil boring in 6 feet. The depth of water at the site ranges from 5 feet to 11 feet.

The results of the soil gas survey conducted at the service station indicated that two areas are underlain by hydrocarbon vapor

plumes. The soil vapor plumes exist north of the station extending from the underground storage tanks to east of Rogner Drive and also at the southern end of the station.

Soil samples were collected and analyzed from all the wells. The one soil boring was not completed as a well since no ground water was encountered, but soil sampled during drilling was analyzed. Soils were analyzed for petroleum hydrocarbons, volatile organic compounds, and lead. Petroleum hydrocarbons detected in two wells had a concentration of 520 ug/g and 1,800 ug/g. Chemical analysis of the soil at the site did not detect purgeable halocarbons. Benzene, ethylbenzene, toluene and total xylenes were the only aromatic compounds discovered. Analysis of the samples showed lead concentrations with normal ranges.

Ground water samples were collected and analyzed from the monitor wells in two sampling rounds. Water was tested for water quality indicators, heavy metals, petroleum hydrocarbons, purgeable halocarbons, and purgeable aromatics. The total dissolved solids (TDS) concentrations exceeded Secondary Drinking Water Regulations at all three wells during both rounds of sampling. However, the TDS levels at the site decreased uniformly between the first and second rounds. Concentrations of eight metals in the ground water exceeded federal standards for drinking water. All three wells had concentrations of lead and chromium that exceeded MCLs. MCLs were surpassed by arsenic during both rounds at one well. MCLGs for iron and manganese were exceeded at all three wells. One well also had a cadmium concentration that matched MCLGs on the first sampling round. Petroleum hydrocarbons were detected in the first sampling round at all monitor wells. Values ranged from 0.40 mg/L to 30 mg/L. In the second round, petroleum hydrocarbons were detected only at one well. 1,2-dichloroehtane exceeded MCLs at one well only in the first sampling round. TCE, PCE and trans-1,2-dichloroethene were also found at low levels. Purgeable aromatic compounds were detected at all three monitor wells. Benzene concentrations exceeded MCLs and ranged from 20 ug/L to 4,400 ug/L. Ethylbenzene and toluene exceeded MCLGs during both sampling rounds with the maximum values of 1,900 ug/L and 12,000 ug/L, respectively. M-xylene was detected at 5,500 ug/l in the first round at one well.

The extent of contamination is limited to the areas surrounding the contamination source. Therefore, it is recommended that collection and analysis of ground water samples for volatile organic compounds, petroleum hydrocarbons, metals, and general water quality parameters be continued. BSS is classified as Category 2.

IRP Site WSA, Weapons Storage Area (SWMU No. N/A).

The WSA is located about 6 miles west of Carswell AFB, just north of White Settlement Road. The facility is on 247 acres of fee-owned land and is surrounded by an additional 264 acres of easement. The area consists of unimproved pasture heavily grazed

by beef cattle and of natural oak woodlands populated by white-tail deer and coyotes. The site is located between two forks of Live Oak Creek, which flows east to the discharge point of Lake Worth. The facility was constructed in 1956 and includes two munitions inspections shops, sixteen ordnance storage buildings, one entry-control building, an emergency power plant, an explosive ordnance disposal range, a radioactive waste disposal facility, a water storage tank and two water wells. It has been reported that small quantities of waste cleaners and solvents have been disposed of on the ground behind the inspection shop. Quantities were estimated to be five to ten gallons per year.

Eight shallow hand-augered borings were drilled around the inspection shop. A sandy clay with variable amounts of fine to course sand and limestone gravel was encountered. An indurated layer, probably limestone, was encountered at shallow depths. The site is located on the outcrop of the Fredericksburg and Washita Groups. The Paluxy sand is at the surface where the limestone has been eroded. The potable water well at the site is screened in the Paluxy aquifer and the Twin Mountains Formation.

The eight borings were drilled in order to determine the impact of the suspected disposal of waste cleaners and solvents in the shop area. Twelve samples were analyzed for volatile and semi-volatile organic compounds. Benzene was detected in only one sample at the site. The concentration was 1.2 ug/Kg and the potential emissions of benzene from the site can be considered insignificant. Toluene was detected in several soil samples in concentrations ranging from 2.8 ug/Kg to 49 ug/Kg. Toluene is not a potential carcinogen and the potential emissions can be considered insignificant.

Previous studies found that the ground water from the potable supply well contained total radium (8.5 pCi/L) in excess of Federal Standards for drinking water. In addition, analysis of soil west of the Inspection Shop revealed the presence of TCE (range from none detected to 0.0619 ug/g). Field studies at the site should be considered complete and it is recommended that the feasibility study by completed for the occurrence of TCE in the shallow soil. WSA is classified as Category 2.

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

EXISTING BUILDING SCHEDULE

BLDG NR.	GRID NR.	FACILITY NOMENCLATURE				TYPE CONST	DEFINITIVE NUMBER	AREA		STORIES	CAPACITY		COND.	YEAR BUILT	STRUCTURAL DETAILS				
		CAT. CODE	ORIGINAL DESIGN	CAT. CODE	PRESENT USE			QTY.	UN.		QTY.	UN.			FOUND'N	FRAME	EXTERIOR	FLOOR	ROOF
875	G-8	711-121	Fam Hsg Wherry	711-121	Fam Hsg Wherry	S		2099	SF		2	FA	3	1951	P & G	Wood	Asb Sdg	Wood	Asb Shngl
876	G-8	"	"	"	"	S		2099	SF		2	FA	3	1951	"	"	"	"	"
877	G-8	"	"	"	"	S		2148	SF		2	FA	3	1951	"	"	"	"	"
878	G-7	"	"	"	"	S		1070	SF		1	FA	1	1951	"	"	Wood	"	"
879	G-8	"	"	"	"	S		1624	SF		2	FA	3	1951	"	"	Asb Sdg	"	"
880	G-8	"	"	"	"	S		2148	SF		2	FA	3	1951	"	"	"	"	"
881	G-8	"	"	"	"	S		1668	SF		1	FA	1	1951	"	"	"	"	"
882	G-8	"	"	"	"	S		1684	SF		2	FA	3	1951	"	"	"	"	"
883	G-7	"	"	"	"	S		1037	SF		1	FA	1	1951	"	"	Wood	"	"
884	G-7	"	"	"	"	S		1341	SF		1	FA	1	1951	"	"	"	"	"
885	G-8	"	"	"	"	S		1319	SF		1	FA	4	1951	P & G	Wood	Asb Sdg	Wood	Asb Shngl
886	G-8	"	"	"	"	S		1078	SF		1	FA	1	1951	"	"	"	"	"
887	G-8	"	"	"	"	S		1037	SF		1	FA	1	1951	"	"	"	"	"
888	G-8	"	"	"	"	S		1098	SF		1	FA	1	1951	"	"	"	"	"
889	G-7	"	"	"	"	S		1070	SF		1	FA	1	1951	"	"	Wood	"	"
900	E-7	"	"	"	"	S		956	SF		1	FA	1	1951	"	"	"	"	"
901	E-7	"	"	"	"	S		1180	SF		1	FA	1	1951	"	"	"	"	"
902	E-7	"	"	"	"	S		1078	SF		1	FA	1	1951	"	"	"	"	"
903	E-7	"	"	"	"	S		1116	SF		1	FA	1	1951	"	"	"	"	"
904	E-7	"	"	"	"	S		1116	SF		1	FA	1	1951	"	"	Asb Sdg	"	"
905	E-7	711-121	Fam Hsg Wherry	711-121	Fam Hsg Wherry	S		956	SF		1	FA	1	1951	P & G	Wood	Wood	Wood	Asb Shngl
906	E-7	"	"	"	"	S		915	SF		1	FA	1	1951	"	"	Asb Sdg	"	"
907	E-7	"	"	"	"	S		915	SF		1	FA	1	1951	"	"	"	"	"
908	E-7	"	"	"	"	S		1180	SF		1	FA	1	1951	"	"	Wood	"	"
909	E-7	"	"	"	"	S		1078	SF		1	FA	1	1951	"	"	"	"	"
910	E-7	"	"	"	"	S		956	SF		1	FA	1	1951	"	"	Asb Sdg	"	"
912	E-7	"	"	"	"	S		915	SF		1	FA	1	1951	"	"	Asb Sdg	"	"
914	E-7	"	"	"	"	S		1116	SF		1	FA	1	1951	"	"	"	"	"
915	E-7	"	"	"	"	S		956	SF		1	FA	1	1951	"	"	Wood	"	"
917	E-6	"	"	"	"	S		915	SF		1	FA	1	1951	"	"	"	"	"
918	E-7	711-121	Fam Hsg Wherry	711-121	Fam Hsg Wherry	S		1180	SF		1	FA	1	1951	P & G	Wood	Wood	Wood	Asb Shngl
919	E-6	"	"	"	"	S		956	SF		1	FA	1	1951	"	"	Asb Sdg	"	"
920	E-7	"	"	"	"	S		956	SF		1	FA	1	1951	"	"	Wood	"	"
921	E-6	"	"	"	"	S		1191	SF		1	FA	1	1951	"	"	"	"	"
922	E-6	"	"	"	"	S		1191	SF		1	FA	1	1951	"	"	"	"	"
923	E-6	"	"	"	"	S		915	SF		1	FA	1	1951	"	"	"	"	"
924	E-6	"	"	"	"	S		915	SF		1	FA	1	1951	"	"	"	"	"
925	E-6	"	"	"	"	S		1341	SF		1	FA	1	1951	"	"	"	"	"
926	E-6	"	"	"	"	S		956	SF		1	FA	1	1951	"	"	"	"	"
927	E-6	"	"	"	"	S		1180	SF		1	FA	1	1951	"	"	"	"	"
928	E-6	711-121	Fam Hsg Wherry	711-121	Fam Hsg Wherry	S		1116	SF		1	FA	1	1951	P & G	Wood	Wood	Wood	Asb Shngl
929	E-6	"	"	"	"	S		956	SF		1	FA	1	1951	"	"	"	"	"
930	E-6	"	"	"	"	S		1078	SF		1	FA	1	1951	"	"	"	"	"
931	E-6	"	"	"	"	S		1116	SF		1	FA	1	1951	"	"	"	"	"
932	E-6	"	"	"	"	S		915	SF		1	FA	1	1951	"	"	"	"	"
933	E-6	"	"	"	"	S		915	SF		1	FA	1	1951	"	"	"	"	"

REV	DATE	DESCRIPTION	INITIAL
1	1-JAN 71	NO CHANGE	OKVL
2	1-1-72	NO CHANGE	RAS
3	1-1-73	NO CHANGE	EMB
4	1-1-74	NO CHANGE	JWB
5	2-14-74	UPDATED	DB
6	1-JAN 75	NO CHANGE (1 JAN 76)	TE
		NO CHANGE 30 MAY 76	RST

DEPARTMENT OF THE AIR FORCE
DIRECTORATE OF CIVIL ENGINEERING, DCS/P&R — WASHINGTON, D.C.

STRATEGIC AIR COMMAND

MASTER PLAN
EXISTING BUILDING SCHEDULE

CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

SCALE NONE | DATE JUNE 1967 | TAB NO C-1

MASTER PLANNING DIRECTIVE

CARTER & BURGESS — ENGINEERS
FORT WORTH, TEXAS

SHEET 15 OF 24

CONTRACT AF 25 (600)-4683

EXISTING BUILDING SCHEDULE

BLDG NR.	GRID NR.	FACILITY NOMENCLATURE: CAT. CODE	ORIGINAL DESIGN	CAT. CODE	PRESENT USE	TYPE CONST	DEFINITIVE NUMBER	AREA: QTY.	UN.	STORIES	CAPACITY: QTY.	UN.	COND.	YEAR BUILT	STRUCTURAL DETAILS: FOUND'N	FRAME	EXTERIOR	FLOOR	ROOF
934	E-6	711-121	Fam. Hsg. Wherry	711-121	Fam. Hsg. Wherry	S		956	SF		1	FA	1	1951	P & G	Wood	Wood	Wood	Asb Shngl
935	E-7	"	"	"	"	S		1116	SF		1	FA	1	1951	"	"	"	"	"
936	E-7	"	"	"	"	S		956	SF		1	FA	1	1951	"	"	"	"	"
937	E-7	"	"	"	"	S		1176	SF		1	FA	1	1951	"	"	Asb Sdg	"	"
938	E-7	711-121	Fam. Hsg. Wherry	711-121	Fam. Hsg. Wherry	S		915	SF		1	FA	1	1951	P & G	Wood	Wood	Wood	Asb Shngl
939	E-7	"	"	"	"	S		1341	SF		1	FA	1	1951	"	"	"	"	"
941	E-7	"	"	"	"	S		1116	SF		1	FA	1	1951	"	"	"	"	"
942	E-6	"	"	"	"	S		915	SF		1	FA	1	1951	"	"	Asb Sdg	"	"
943	E-7	"	"	"	"	S		1180	SF		1	FA	1	1951	"	"	Wood	"	"
944	E-6	"	"	"	"	S		1180	SF		1	FA	1	1951	"	"	"	"	"
946	E-6	"	"	"	"	S		1116	SF		1	FA	1	1951	"	"	"	"	"
947	E-6	"	"	"	"	S		1116	SF		1	FA	1	1951	"	"	"	"	"
949	E-6	"	"	"	"	S		1180	SF		1	FA	1	1951	"	"	"	"	"
951	E-6	"	"	"	"	S		956	SF		1	FA	1	1951	"	"	Ab Sdg	"	"
953	E-6	711-121	Fam. Hsg. Wherry	711-121	Fam. Hsg. Wherry	S		1078	SF		1	FA	1	1951	P & G	Wood	Wood	Wood	Asb Shngl
955	E-6	"	"	"	"	S		1180	SF		1	FA	1	1951	"	"	Asb Sdg	"	"
957	E-6	"	"	"	"	S		915	SF		1	FA	1	1951	"	"	"	"	"
959	E-6	"	"	"	"	S		1116	SF		1	FA	1	1951	"	"	"	"	"
961	E-6	"	"	"	"	S		956	SF		1	FA	1	1951	"	"	Wood	"	"
1010	D-6	211-193	Jet Test Stand	218-712	Shp Age/Stor Fclty	P		58	SF		1	EA	3	1954	Conc		Conc	Conc	
1015	D-6	211-183	Test Cell	211-183	Test Cell	P		3569	SF				1	1968	Conc	Wood	Conc	Conc	
1020	E-6	730-839	Traffic Check House	730-839	Traffic Check House	T		48	SF				3	1951		Wood	Wood		
1026	D-6	442-258	Stor Liquid Oxygen	442-258	Stor Liquid Oxygen	P		1925	SF				1	1964	Conc	Metal		Conc	Metal
1027	D-6	214-467	Shp Refl Veh	214-467	Shp Refl Veh	P		20077	SF				2	1958	Conc	Steel	Sht Metl	Conc	Sht Metal
1028	D-6	211-154	Shp A/M Org	211-154	Shp A/M Org	T		312	SF				2	1970	Conc	Metal	Sht Metl	Conc	Sht Metal
1039	E-6	841-167	Water Stge Tank	841-427	Water Stor Tank	P					500	KG	1	1955	Conc	Steel	Steel	Conc	Steel
1040	E-6	843-368	Pump House, Water N/P	843-316	Water, Fire Pump Sta	P		1462	SF		1000	GM	1	1955	Conc	Conc Blk	Conc Blk	Conc	Built-Up
1048	E-5			211-179	Maint, Dock Fl Sys	P		24215	SF		1	EA	1	1958	Conc	Steel	Sht Metl	Conc	Sht Metal
1049	E-5			211-173	Maint, Dock Large A/C	P		20540	SF		1	EA	2	1958	Conc	Steel	Sht Metl	Conc	Sht Metal
1050	E-6	211-111	Hanger, F. M.	211-111	Hanger, Maint	P		185493	SF				1	1955	Conc	Conc Blk	Metal	Conc	Built-Up
1055	E-6	217-712	Arm & Elec Shop	217-712	Shop, Avionics	P		21696	SF				1	1956	Conc	Conc Blk	Conc Blk	Conc	Built-Up
1058	E-6	217-712	Shd Avionics	121-111	Petrol Ops Bldg	T		33923	SF				2	1943	Conc	Steel & Wd	Sht Metl	Conc	Asb Shngl
1059	E-6	217-712	Shd Avionics	121-111	Petrol Ops Bldg	T					238	BL	2	1956	Conc		Steel		
1065	E-5	211-111	Hanger, Rem & I	214-425	Veh Maint Shop	S					300	KG	1	1942	Conc	Conc	Conc	Conc	Conc
1066				411-138	Stor, Solvents						250	KG	1	1953	Conc	Steel	Steel	Conc	Conc
1078	E-5	841-164	Water Reservoir	841-427	Water Stor Tank	P		550	SF				3	1970	On Wheels	Metal	Metal	Asp On Metal	Metal
1080	E-5	841-164	Water Reservoir	841-427	Water Stor Tank	P		550	SF				3	1970	On Wheels	Metal	Metal	Asp On Metal	Metal
1082	E-5	842-249	Water Pump Plant	841-169	Building Water Supply	P		1156	SF				1	1942	Conc	GWB	Brick	Conc	Conc
1101	E-6	121-111	Petrol Ops Bldg	121-111	Petrol Ops Bldg	P		1600	SF				1	1971	Conc		Masonry	Conc & Asp	Built-Up
1140	E-6	740-679	Hobby Shop	740-665	H/Shp Auto	S		7050	SF				3	1953	Conc	Steel	Sht Metl	Conc	Sht Metal
1141	E-6			740-665	H/Shp Auto	T		1000	SF				1	1958	"	"	"	"	Built-Up
1142	E-6	740-676	Washrack	740-665	H/Shp Auto	P		2002	SF				1	1959	"	"	"	"	"
1143	E-6	133-314	Dir Finder Shelter	740-665	H/Shp Auto	T		1440	SF				1	1958	Conc	Open	Sht Metl	Conc	Sht Metal

REV	DATE	DESCRIPTION	INITIAL
		NO CHANGE 30 MAY 76	RST

DEPARTMENT OF THE AIR FORCE

STRATEGIC AIR COMMAND

MASTER PLAN

EXISTING BUILDING SCHEDULE

CARSWELL AIR FORCE BASE

FORT WORTH, TEXAS

CARTER & BURGESS – ENGINEERS

C-1

SHEET 16 OF 24

CONTRACT AF 25(600)-4683

EXISTING BUILDING SCHEDULE

BLDG NR.	GRID NR.	FACILITY NOMENCLATURE: CAT. CODE	ORIGINAL DESIGN	CAT. CODE	PRESENT USE	TYPE CONST	DEFINITIVE NUMBER	AREA: QTY.	UN	STORIES	CAPACITY: QTY	UN	COND.	YEAR BUILT	STRUCTURAL DETAILS: FOUND'N	FRAME	EXTERIOR	FLOOR	ROOF
1155	E-6	852-282	Walkway Bridge	852-282	Walkway Bridge	P		20	LF		1	EA	1	1967	Conc	Steel		Steel	N/A
1156	E-6	411-135	Stor Bse Jet Fuel	411-135	Stor, Jet Fuel	P					20000	BL	1	1953	Conc		Steel		Floating Roof
1157	E-6	411-135	Stor Bse Jet Fuel	411-135	Stor, Jet Fuel	P					20000	BL	1	1951	Conc		Steel	Earth	Floating Roof
1158	E-6	411-135	L/F Fill St	125-977	Pump Sta, Liq Fuel	S		494	SF				2	1956					
1159	E-6	411-135	Stor Bse Jet Fuel	411-131	Stor (Av Gas)	P					4500	BL	1	1943	Conc		Steel		Steel
1163		126-926	L/F Stand U/Load	126-926	L/F Stand U/Load JP-4	P		10	OL				1	1967	Conc	N/A	N/A	N/A	N/A
1164		126-926	L/F Stand U/Load	126-926	L/F Stand U/Load Av Gas	P		2	OL				1	1967	Conc	N/A	N/A	N/A	N/A
1165		126-926	L/F Stand U/Load	126-926	L/F Stand U/Load Av Gas	P		2	OL				1	1967	Conc	N/A	N/A	N/A	N/A
1166		126-925	L/F Fill Stand Truck	126-925	L/F Fill Stnd Truck JP-4	P		1	OL				1	1967	Conc	N/A	N/A	N/A	N/A
1167		126-925	L/F Fill Stand Truck	126-925	L/F Fill Stnd Truck Av Gas	P		1	OL				1	1967	Conc	N/A	N/A	N/A	N/A
1168		125-977	Pump Station L/F	125-977	Pump Station L/F (JP-4)	P		312	SF				1	1967	Conc	Steel	Shed	Conc	Steel
1169		125-977	Pump Station L/F	125-977	Pump Station L/F (Av Gas)	P		312	SF				1	1967	Conc	Steel	Shed	Conc	Steel
1170	E-6			121-111	Petrol Ops Bldg	P		346	SF				1	1957	Conc	Conc Blk	Conc Bike	Rust Tile	Built-Up
1174		126-926	L/F Std Unload	126-926	L/F Std Unload	P		6	OL				1	1967	Conc	N/A	N/A	N/A	N/A
1189	E-5	610-125	Administration	610-142	Coml Trnsp Fclty	S		2750	SF				3	1942	Conc	Wood	Asb Sdg	Conc Tile	Asp Shingles
1190	E-5	831-155	Gunk Treatment	831-155	Ind Wast & Disp	P					36	KG	1	1955	Conc		Conc	Conc	Built-Up
1192	E-5	442-242	Metal Prefab Storage	442-758	Whse Sup & Equip - Base	S		4000	SF				3	1953	Conc		Metal	Conc	Metal
1200	F-6	422-243	Oil Storage House	219-946	BE Stor Cv Fclty	T		224	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Built-Up
1201	F-6			219-946	BE Stor Cv Fclty	T		980	SF				3	1951					
1202	F-6	214-424	Washrack, A.I.G.	214-422	Auto Serv Rack	S		3564	SF		1	EA	1	1949	Conc			Conc	
1204	F-6	219-947	Lumber Shed, P Eng	219-947	BE Stor Shed	S		7457	SF				3	1942		Wood	Wood		Asp Shingles
1206	F-6	442-242	Warehouse	219-944	CE Maint Shop	S		1638	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1208	F-6	442-242	Misc Stge Bldg	219-947	BE Stor Shed	T		2013	SF				3	1953	Conc	Wood	Wood	Wood	Sheet Metal
1210	F-6	219-944	Plbg & Htg Shop	219-944	CE Maintenance Shop	S		1500	SF				3	1952	Conc		Metal	Wood	Metal
1212				219-947	BE Stor Shed	T		320	SF				3	1964	Conc		Metal	Wood	Metal
1214	F-5	442-242	Warehouse, QM	219-946	BE Stor Cv Fclty	S		9000	SF				3	1942	Conc	Wood	Asb Sdg	Wood	Asp Shingles
1216	F-5	219-942	Admin Bldg	610-127	Base Engr Admin	S		7903	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1218	F-6	219-944	Utility Shop	219-944	CE Maintenance Shop	S		10498	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1224	F-5	610-127	Supply & Admin	730-717	Clo Store	S		1500	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1225	F-5	740-676	Rctn. Dayroom	610-127	BE Admin	S		1250	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1226	F-5	723-35A	Mess	730-717	Clo Store	S		2773	SF				3	1942	Conc	Wood	Asb Sdg	Wood, Tile	Asp Shingles
1229	F-5	442-242	Warehouse	610-142	Commercial Trans Fac	S		20033	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Built-Up

REV	DATE	DESCRIPTION	INITIAL
		NO CHANGE 30 MAY 76	RST

DEPARTMENT OF THE AIR FORCE
DIRECTORATE OF CIVIL ENGINEERING, HQ USAFRP, WASHINGTON, D.C.

STRATEGIC AIR COMMAND
MASTER PLAN
EXISTING BUILDING SCHEDULE
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

SCALE | DATE
MASTER PLANNING DIRECTOR
CARTER & BURGESS - ENGINEERS
FORT WORTH, TEXAS

C-1
SHEET 17 OF 24

CONTRACT AF 25(600)-4683

EXISTING BUILDING SCHEDULE

BLDG NR.	GRID NR.	FACILITY NOMENCLATURE				TYPE CONST	DEFINITIVE NUMBER	AREA		STORIES	CAPACITY		COND.	YEAR BUILT	STRUCTURAL DETAILS				
		CAT. CODE	ORIGINAL DESIGN	CAT. CODE	PRESENT USE			QTY.	UN.		QTY.	UN.			FOUND'N	FRAME	EXTERIOR	FLOOR	ROOF
1231	F-5	442-242	Warehouse	740-266	Store, Commissary			34524					2	1942	Conc	Wood	Asb Sdg	Conc, Tile	Built-Up
1233	F-3	442-242	Warehouse, QM	442-768	Wh/Forms & Pub			9000					3	1942	Conc	Wood	Asb Sdg	Wood	Asp Shingles
1236	F-3	740-266	Store, Commissary	740-266	Store, Commissary	P		19200	SF				1	1972	Conc	Metal	Metal	Conc	Metal
1237	F-3	442-242	Warehouse, QM	740-266	Store, Commissary, Bse	S		9750	SF				3	1942	Conc	Wood	Asb Sdg	Wood	Asp Shingles
1238	F-3	442-242	Warehouse, QM	442-758	Whse Sup & Equip Bse	S		9000	SF				3	1942	Conc	Wood	Wood	Wood	Asp Shingles
1239	F-3	890-158	Loading Ramp	890-158	L/Un, Platform	S		678	SF				1	1950	Conc			Conc	
1241	F-3	442-243	Paint & Dope	740-253	Fam Svc	S		1372	SF				2	1945	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1247	F-3	740-676	Recreation Bldg	740-269	Bse Pkg Stor	S		1750	SF				3	1942	Conc	Wood	Asb Sdg	Wood, Conc	Asp Shingles
1248	F-3	141-457	Opns Sq	740-269	Bse Pkg Stor	S		1750	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1251	F-3	442-242	Gen Stge Whse	442-758	Whse, Sup & Equip, Bse	P		76556	SF				1	1953	Conc	Conc Blk	Conc Blk	Conc	Built-Up
1255	E-5	123-335	Gasoline Pump Sta	123-335	Vehicle Fueling Sta			297	SF		7	OL	3	1942	Conc	Wood	Asb Sdg	Conc	Built-Up
1256	E-5	411-134	Operating Diesel Fuel	411-137	Stor, MoGas	S					129	BL	3	1955	Conc		Steel		
1259	E-5	411-137	Stor Bse MoGas	411-137	Stor, MoGas	S					274	BL	3	1942			Steel		
1261	E-5	411-137	Stor Bse MoGas	411-137	Stor, MoGas	S					274	BL	3	1942			Steel		
1263	E-5	411-137	Stor Bse MoGas	411-134	Stor, Diesel	S					274	BL	3	1950					
1265	E-5	411-137	Stor Bse MoGas	411-137	Stor, MoGas	S					274	BL	3	1942			Steel		
1268	E-5	610-125	Administration	740-266	Store, Commissary	S		1500	SF				3	1951	Conc	Wood	Asb Sdg	Conc, Tile	Asp Shingles
1270	E-5	442-243	Butane Gas Storage	442-257	Hazard Stor BSE	P		1132	SF				1	1955	Conc		Conc Blk	Conc	Built-Up
1275		740-382	Exchange Branch	730-839	Traffic Check House	P		34	SF				2	1955	Conc	Conc Blk	Conc Blk	Conc	Built-Up
1300	F-6	730-839	Traffic Check House	730-832	A/Police Control & ID	P		1200	SF				1	1955	Conc	Conc Blk	Conc Blk	Conc	Built-Up
1302	F-6	730-832	Contr & Ident Bldg																
1310	F-6	442-247	Storage Shed	219-943	BE Pav Grnd Fclty	S		624	SF				3	1947	Conc	Wood	Wood	Conc	Wood Shingles
1312	F-6			813-228	ELE Switch Station	P		750	SF				2	1942					
1313	F-6	442-247	Barn	219-946	BE Stor Cv Fclty	T		6072	SF				3	1953	Conc	Wood	Wood	Conc	Sheet Metal
1315	F-6			411-128	Stor Bse Spec Liq	T					238	BL	2	1951					
1320	F-6	442-252	Whse, Gen Stor	219-944	BE Maint Shp	P		3838	SF				1	1953	Conc	Wood	Asb Sdg	Conc	Built-Up
1324	F-5	723-351	Mess & Admin	721-312	Amn E1/E4 - Dormitory	P		25460	SF		138	MN	2	1954	Conc	Conc Blk	Conc Blk	Conc	Built-Up
1326	F-5	723-351	Mess & Admin	721-312	Amn E1/E4 - Dormitory	P		25460	SF		130	MN	2	1954	Conc	Conc Blk	Conc Blk	Conc	Built-Up
1330	F-5	723-351	Mess Hall	740-381	Exch, Cafe Snck Bar	P		5176	SF				1	1954	Conc	Conc Blk	Conc & Pan	Conc	Built-Up
1332	F-5	730-839	Traffic Check Hse	730-839	Traffic Check House	P		34	SF				1	1955	Conc	Conc Blk	Conc Blk	Conc	Built-Up
1338	F-6			219-947	CE, Storage Shed	T		1600	SF				3	1965	Conc	Steel	Sht Metl	Conc	Sht Metal
1340	G-6			179-475	Sm Arms Sys	P					25	FP	2	1963		Wood	Open	Dirt	Asp Shingles
1346	G-6	179-478	Range, Small Arms	171-475	Range, Sm/Arms I/D	P		3825	SF		6	FP	1	1956	Conc	Conc Blk	Conc Blk	Conc	
1347	F-6	442-242	Quonset Hut Stor	171-476	Small Arms Tng	T		576	SF				3	1949	Conc		Sht Metl	Wood	Sheet Metal
1360	F-5			442-758	Whse, Bse	T		4800	SF				1	1963	Conc	Steel	Sht Metl	Conc	Sheet Metal
1365	F-5	890-197	Weighing House	890-197	Weighing Scale	P		32	SF		1	EA	2	1955					
1370	F-5			442-758	Whse, Bse	T		4000	SF				1	1962	Conc	Steel	Sht Metl	Conc	Sheet Metal
1372	F-5			442-758	Whse, Bse	T		4000	SF				1	1973	Conc	Steel	Sht Metl	Conc	Sheet Metal
1401	D-4			211-177	Maint Dog S/ACFT	P		20077	SF		3	EA	2	1958	Conc	Steel	Sht Metl	Conc	Sheet Metal
1402	D-4			211-177	Maint Dog S/ACFT	P		23752	SF		3	EA	2	1958	Conc	Steel	Sht Metl	Conc	Sheet Metal
1403	D-4			211-173	Maint, Dock Large A/C	P		20077	SF		1	EA	2	1958	Conc	Steel	Sht Metl	Conc	Sheet Metal
1404	D-4			211-173	Maint, Dock Large A/C	P		23752	SF		1	EA	2	1958	Conc	Steel	Sht Metl	Conc	Sheet Metal

REV	DATE	DESCRIPTION	INITIAL
		NO CHANGE 30 MAY 76	RST

DEPARTMENT OF THE AIR FORCE

STRATEGIC AIR COMMAND

MASTER PLAN

EXISTING BUILDING SCHEDULE

CARSWELL AIR FORCE BASE

FORT WORTH, TEXAS

CARTER & BURGESS - ENGINEERS

C-1

CONTRACT AF 25(600)-4683

EXISTING BUILDING SCHEDULE

BLDG NR.	GRID NR.	FACILITY NOMENCLATURE: CAT. CODE	ORIGINAL DESIGN	CAT. CODE	PRESENT USE	TYPE CONST.	DEFINITIVE NUMBER	AREA: QTY.	UN.	STORIES	CAPACITY: QTY.	UN.	COND.	YEAR BUILT	STRUCTURAL DETAILS: FOUND'N	FRAME	EXTERIOR	FLOOR	ROOF
1405	D-4			211-159	ACFT Cor Con	P		20077	SF				2	1958	Conc	Steel	Sht Metl	Conc	Sheet Metal
1410	E-4	211-111	Hangar	211-157	Shop, A/C Eng T & Repr	S		68875	SF				2	1946	Conc	Wood	Conc Blk	Conc	Gypsum
1411	E-4	811-142	Comm Power	123-335	Vehicle, Fueling Sta	P		50	SF		6	OL	1	1963					
1412	D-4			211-152	Shp Acft Gen Purp	T		550	SF				3	1970	Pier	Metal	Metal	Asp on Metal	Metal
1413	D-4	211-152	Shp Acft Gen Purp	211-152	Shp Acft Gen Purp	T		550	SF				3	1970	Pier	Metal	Metal	Asp on Metal	Metal
1414	D-4	211-111	Hangar	218-712	Shop, AGE	S		41562	SF				2	1942	Conc	Steel	Wood	Conc Tile	Asphalt
1415	D-4	211-154	Shop A/M Orgl	211-154	Shop A/M Orgl	T		550	SF				3	1970	Pier	Metal	Metal	Asp on Metal	Metal
1416	D-4	218-852	Parachute	218-852	Shop, Para & Dingy	S		7923	SF				1	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1417	D-4	211-154	Shp A/M Orgl	211-154	Shp A/M Orgl	T		550	SF				3	1970	Pier	Metal	Metal	Asp on Metal	Metal
1418	D-4	211-111	Hangar	218-712	Shp Age/Stor Fclty	S		11062	SF				3	1942	Conc	Steel	Sht Metl	Conc	Sheet Metal
1423	D-4	211-111	Hangar	215-552	Shp Wpn & Ride Sys	S		14940	SF				3	1942	Conc	Steel	Sht Metal	Conc	Sheet Metal
1425	D-4	141-144	Fire Station	730-142	Fire Station	P		22807	SF		7	ST	2	1955					
1427	D-4	134-452	ILAS Bldg.	131-134	Aircom Rel Con	P		2511	SF				1	1952	Conc	Conc Blk	Conc Blk	Conc, Tile	Gypsum
1428	D-3	610-124	Sq Arms	730-833	Secur Control Cntl	S		2858	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1430	E-4	211-111	Hangar	141-753	Sq Ops	S		24888	SF				1	1946	Conc	Conc Blk	Conc Blk	Conc	Gypsum
1432	E-4	821-116	Boiler Rm & Pipe Tun	821-156	Steam Facility, Bldg	S		840	SF				3	1944	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1434				211-152	Shop, A/C Gen Purp	S		20299	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Built-Up
1438	D-4	442-243	Hydrogen Storage	219-946	CE, Storage Covered	P		64	SF				1	1953	Conc	Wood	Asb Sdg	Conc	Built-Up
1440	D-4	141-451	Crew Chief Bldg	730-142	Fire Sta t	S		1526	SF		1	ST	3	1943	Conc	Wood	Wood	Conc	Asp Shingles
1445	E-4			171-412	Oper Mission Tng	P		36383	SF				1	1959	Conc Pier	Conc Blk	Conc Blk	Conc	Built-Up
1500	E-5	740-388	Exchange	740-675	Retn, Library	S		7528	SF				3	1943	Conc	Wood	Asb Sdg	Wood, Conc	Asp Shingles
1502	E-4	740-676	Rec Bldg	730-835	Air Police Ops	S		3500	SF				3	1942	Conc	Wood	Asb Sdg	Conc, Wood	Asp Shingles
1504	E-4	723-351	Dining Hall, Am	730-835	Sp Operations	P		14136	SF				1	1953	Conc Blk	Conc Blk	Conc Blk	Conc Tile	Built-Up
1509	E-4		Oprn Sq	740-633	Post Office Central	S		4740	SF				3	1942	P & G	Wood	Asb Sdg	Wood Tile	Asp Shingles
1510	E-4			610-249	Hq Wing	P		25102	SF				2	1959	Conc Pier	Conc	Conc Blk	Conc Tile	Built-Up
1515	E-4	131-113	Tele & Tele Off	610-249	Hq Wing	S		6100	SF				3	1942	Conc	Wood	Asb Sdg	Conc Tile	Asp Shingles
1518	E-4	740-383	Exch, Svc Stn	740-383	Exch, Svc Stn	P		2925	SF				1	1972	Conc		Conc&Brick	Conc	Built-Up
1520	E-5			721-312	Dormitory, Airmen E1/E4	P		26145	SF		140	MN	2	1959		Conc Blk	Conc Blk		
1521	E-5	722-211	Dorm Am Std	721-312	Dormitory, Airmen E1/E4	P		25138	SF		140	MN	2	1953	Conc Pier	Conc Blk	Conc Blk	Conc	Built-Up
1522	E-4	722-211	Dorm Am Std	721-312	Dormitory, Airmen E1/E4	P		25138	SF		140	MN	2	1953	Conc Pier	Conc Blk	Conc Blk	Conc	Built-Up
1523	E-4	722-211	Dorm Am Std	721-312	Dormitory, Airmen E1/E4	P		25138	SF		142	MN	2	1953	Conc Pier	Conc Blk	Conc Blk	Conc	Built-Up
1524	E-4	722-211	Dorm Am Std	721-312	Dormitory, Airmen E1/E4	P		25138	SF		142	MN	2	1953	Conc Pier	Conc Blk	Conc Blk	Conc	Built-Up
1525	E-4	722-211	Dorm Am Std	610-128	Consol Bse Pers Off	P		25138	SF				2	1953	Conc Pier	Conc Blk	Conc Blk	Conc	Built-Up
1550	E-4	442-243	Shop Base Engineering	722-351	Dining Hall, Amn Det	P		14508	SF		750	MN	1	1953	Conc Pier	Conc Blk	Conc Blk	Conc	Asp Shingles
1560	E-4	722-211	Dorm, Type 1	610-243	Hq Gp Air Base	P		13320	SF				1	1951	Conc Pier	Wood	Asb Sdg	Wood	Built-Up
1561	E-4	722-211	Dorm, Type 1	610-128	Con Bse Per Off	P		12999	SF				1	1951	Conc Pier	Wood	Asb Sdg	Wood	Built-Up
1562	E-4	722-211	Dorm, Type 1	610-249	Hq Wing	P		13913	SF				1	1951	Conc Pier	Wood	Asb Sdg	Wood	Built-Up
1563	E-4	722-211	Dorm, Type 1	721-312	Dormitory, Airmen E1/E4	P		12853	SF		56	MN	2	1951	Conc Pier	Wood	Asb Sdg	Wood	Built-Up
1564	E-4			721-312	Dormitory, Airmen E1/E4	P		12853	SF		54	MN	2	1951	P & G	Wood	Asb Sdg	Wood	Built-Up
1565	E-4	722-211	Dormitory, Airmen	721-312	Dormitory, Airmen E1/E4	P		25259	SF		96	MN	2	1957	Conc Pier	Conc Blk	Conc Blk	Wood	Asp Shingles
1566	E-4	722-211	Dormitory, Airmen	721-312	Dormitory, Airmen E1/E4	P		25259	SF		136	MN	2	1957	Conc Pier	Conc Blk	Conc Blk	Wood	Asp Shingles
1602	D-3	211-112	Hangar	211-152	Shop, A/C Genrl Purps	S		11062	SF				3	1942	Conc	Steel	Sht Metl	Conc	Sheet Metal
1604	D-3	216-64A	Sq Arms Repair	171-873	A/Port Tng Fclty	S		4043	SF				3	1962	Conc	Wood	Asb Sdg	Conc Tile	Asp Shingles
1615	D-3	217-712	Arm & Instr Bldg	171-613	Tng Special Weapon	S		12330	SF				2	1963	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1617	D-3	610-124	Prefab Metal Bldg	171-617	Training Aids, Shops	T		2400	SF				3	1953	Conc	Steel	Sht Metl	Conc	Sheet Metal
1619	D-3	171-153	Bomb Trainer Bldg	171-617	Training Aids, Shops	S		9958	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles

REV DATE	DESCRIPTION	INITIAL
	NO CHANGE 30MAY76	RST

DEPARTMENT OF THE AIR FORCE
DIRECTORATE OF CIVIL ENGINEERING, DCS/P&R WASHINGTON, D.C.

STRATEGIC AIR COMMAND

MASTER PLAN

EXISTING BUILDING SCHEDULE

CARSWELL AIR FORCE BASE
FORT WORTH TEXAS

CARTER & BURGESS - ENGINEERS

C-1

CONTRACT AF 25(600)-4683

EXISTING BUILDING SCHEDULE

BLDG NR.	GRID NR.	FACILITY NOMENCLATURE: CAT. CODE	ORIGINAL DESIGN	CAT. CODE	PRESENT USE	TYPE CONST	DEFINITIVE NUMBER	AREA: QTY.	UN.	STORIES	CAPACITY: QTY.	UN.	COND	YEAR BUILT	STRUCTURAL DETAILS: FOUND'N	FRAME	EXTERIOR	FLOOR	ROOF
1639	D-3	171-153	School Bldg	211-152	Shp Acft Gen Purp	S		5923	SF				3	1945	Conc	Wood	Asb Sdg	Conc Tile	Asp Shingles
1640	D-3	442-242	Whse Metal Prefab	218-712	Shop AGE	S		7200	SF				2	1953	Conc	Steel	Metal	Conc	Metal
1642	D-3		Prefab	211-152	Shp Acft Gen Purp	S		1200	SF				3	1953	Conc	Metal	Metal	Conc	Metal
1645	D-3	610-12A	Metal Prefab Bldg	211-152	Shop, A/C Genrl Purps	S		3200	SF				3	1953	Conc	Metal	Metal	Conc	Metal
1646	D-2	610-12A	Metal Prefab Bldg	218-712	Shop, AGE	S		3200	SF				1	1953	Conc	Metal	Metal	Conc	Metal
1647	D-2	610-12A	Metal Prefab Bldg	442-758	Whse, Sup & Equip, Bse	S		3200	SF				1	1953	Conc	Metal	Metal	Conc	Metal
1650	E-3			217-712	Shop, Avionics	P		21713	SF				1	1963	Conc Pier	Conc Blk	Conc Blk	Conc/Tile	Built-Up
1654	D-2			171-445	Res Forces Op Tng	P		29587	SF				1	1963	Conc Pier	Conc Blk	Conc Blk	Conc/Tile	Built-Up
1658	E-2	141-622	Weather Modulator	141-622	Rdr, Met Set Band	S		203	SF				1	1955	Conc	Wood	Wood	Wood	Built-Up
1710	D-4	722-211	Barracks, Am	171-214	High Altitude Tng	P		8365	SF				1	1958	Conc Pier	Conc Blk	Conc Blk	Wood	Built-Up
1720	D-4	211-112	Hangar	610-249	Hq Wing	P		10016	SF				1	1953	Conc Pier	Conc	Conc	Conc	Built-Up
1730	E-3	131-112	Comm Bldg	131-111	Tele Com Cen	P		7288	SF				2	1951	Conc Pier	Conc Blk	Conc Blk	Conc	Built-Up
1740	D-3	540-243	Dental Clinic	540-243	Dental Clinic	P		5292	SF		11	OU	2	1957	Conc Pier	Conc Blk	Conc Blk	Conc	Built-Up
1750	E-3	131-122	Globe Comm Relay Center	131-134	Aircom Rel Cent	P		14988	SF				2	1957	Conc Pier	Conc Blk	Conc Blk	Conc	Built-Up
1751	E-3			811-149	Elepwr Station Bldg	S		392	SF				1	1963	Conc	Steel	Sht Metl	Wood	Sheet Metal
1772	E-3	141-743	Photo Lab	141-743	Photo Lab, Base	S		5768	SF				3	1942	Conc	Wood	Asb Sdg	Wood Conc	Asb Shingles
1775	E-3	610-125	Admin Bldg	217-722	Shp, ICBM/TAC	S		4814	SF				3	1942	Conc	Wood	Asb Sdg	Conc/Tile	Asp Shingles
1776	E-3	610-127	Sup & Admin	610-249	Hq Wing	S		3363	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1777	E-3	740-676	Rctn, Bldg	171-212	Flight Simulator Tng	S		3600	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles
1778	E-3	722-351	Mess, Bldg	740-883	Youth Center	S		4320	SF				3	1942	Conc	Wood	Asb Sdg	Wood Conc	Asp Shingles
1780	D-3	171-618	Field Training Facility	171-412	Opl Mgt Tng	P		24640	SF				1	1969	Conc	Metal	Brick	Conc	Built-Up
1790	E-3	141-753	Sq Ops	141-753	Sq Ops	P		9140	SF				1	1970	Conc	Metal	Brick	Conc	Built-Up
1805	E-4	750-811	Bath House	750-811	Swim Pool Bath House	P		3550	SF				1	1949	Conc	Conc Blk	Conc Blk	Conc	Conc
1806	E-4	750-813	Swimming Pool	750-813	Swimming Pool, Airmen	P		7012	SF				1	1949	Conc		Conc	Conc	
1807	E-4	750-819	Filter Room	750-819	Swim Pool Wtr Treat	P		680	SF				1	1949	Conc		Conc	Conc	Conc
1808	E-4			750-813	Swim Pool, Airmen	P		800	SF				1	1960			Conc		
1809	E-4	841-167	Tower, Water	841-427	Water Stor Tank	P					200	TG	1	1942	Conc	Steel	Steel	Steel	Steel
1810	E-4			740-674	Rctn, Gymnasium	P		19834	SF				1	1965	Conc Pier	Conc Blk	Conc Blk	Wood/Conc	Built-Up
1812	E-4			750-347	Court, Tennis	P					3	EA	2	1948					
1815	E-3			740-671	Rctn, Bowling Alley	P		8520	SF		10	LA	1	1962		Met & Conc	Metal		
1820	E-4	740-316	Club, Airmen	740-316	Club, Service	P		18921	SF				2	1953	Conc	Conc Blk	Conc & GWB	Conc Wood	Built-Up
1835	E-3	610-124	Sup & Admin	740-387	Exch, Retail Whse	S		4035	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Asp Shingles

REV	DATE	DESCRIPTION	INITIAL
		NO CHANGE 30MAY76	KST

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS STRATEGIC AIR COMMAND, OFFUTT AIR FORCE BASE, NEBRASKA 68113

STRATEGIC AIR COMMAND
MASTER PLAN
EXISTING BUILDING SCHEDULE
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

CARTER & BURGESS - ENGINEERS

C-1

CONTRACT AF 25(600)-4683

EXISTING BUILDING SCHEDULE

BLDG NR.	GRID NR.	FACILITY NOMENCLATURE: CAT. CODE	ORIGINAL DESIGN	CAT. CODE	PRESENT USE	TYPE CONST.	DEFINITIVE NUMBER	AREA: QTY.	UN.	STORIES	CAPACITY: QTY	UN.	COND.	YEAR BUILT	STRUCTURAL DETAILS: FOUND'N	FRAME	EXTERIOR	FLOOR	ROOF
1837	E-3	723-351	Mess	740-386	Exch Admin	S		2650	SF				3	1942	Conc	Wood	Asb Sdg.	Wood Conc	Asp Shingles
1838	E-3	740-233	Chapel	740-236	Chapel, Center	P		8790	SF		204	SE	1	1942	Conc	Wood	Brick	Wood	Asp Shingles
1845	E-3	740-873	Theater	740-873	Theater, Base	P		9967	SF		500	SE	1	1970	Conc	Steel	Brick	Conc	Built-Up
1880	E-3			740-388	Exch, Sales Store	P		39975	SF				1	1972	Conc	Steel	Brick	Conc	
2570	F-3	740-617	Open Mess, NCO	740-617	Open Mess, NCO	P		15452	SF				2	1957	Conc Pier	Conc Blk	Conc Blk	Wood	Built-Up
2571	F-3			750-815	Swim Pool, NCO	P		275	SF				1	1962			Conc		
2572	F-3			750-815	Swim Pool, NCO	P		4043	SF				1	1962			Conc		
2573	F-3			750-811	Swim Pool Bath Hse	P		1800	SF				1	1962	Wood	Conc Blk	Conc Blk	Conc	Built-Up
2574	F-3			750-819	Swim Pool Wtr Trmt	P		82	SF				1	1962					
2585	F-3	832-267	Sewage Disposal	832-267	San Sewage Pump Sta	P		49	SF				1	1951					
3000	F-2	611-001	Hospital	510-001	Composite Med	P		188168	SF		215	BD	1	1958	Conc	Conc	Conc	Conc Tile	Built-Up
3001	G-2	821-156	Steam Facility Bldg	821-156	Steam Facility, Bldg	P		7602	SF				1	1958	Conc	Conc	Asb Sdg	Wood	Asp Shingles
3100	F-1	530-142	Food Inspection Bldg	530-634	Med Food Inspection	P		1046	SF				1	1956	Conc	Conc Blk	Conc Blk	Conc	Built-Up
3101	F-1			730-839	Traffic Check House	T		144	SF				2	1951		Wood	Wood		Asp Shingles
3102	F-1	723-356	Officers, Mess	740-618	Open Mess, Officer	S		19818	SF				3	1942	Conc	Wood	Asb Sdg	Conc	Built-Up
3103	F-1	442-242	Warehouse	740-618	Open Mess, Officer	S		1500	SF				3	1951	Conc	Wood	Asb Sdg	Conc	Asp Shingles
3104	F-2	841-167	Water Supply Storage	841-427	Water Stor Tank	P					250	KG	1	1957		Steel	Steel		
3105	F-1	833-356	Garbage Rack	833-356	S/Waste Repository	T		90	SF				4	1951	Conc			Conc	
3106	F-1	750-811	Bath House	750-811	Swim Pool Bath Hse	S		1532	SF				2	1952	Conc	Wood	Asb Sdg	Conc	Asp Shingles
3107	F-1	750-817	Off Club Swim Pool	750-817	Swim Pool, Off	P		3000	SF				2	1952	Conc		Conc	Conc	
3108	F-1	750-818	Wading Pool	750-817	Swim Pool, Off	P		849	SF				2	1952	Conc		Conc	Conc	
3110	F-2	724-414	BOQ	724-417	VOQ (01/05)	P		16057	SF		40	MN	1	1969	Conc	Conc	Brick	Conc	Built-Up
3115	F-2	724-414	BOQ	724-417	VOQ (01/05)	P		15552	SF		40	MN	1	1969	Conc	Conc	Brick	Conc	Built-Up
3120	F-1			750-347	Court Tennis	P					2	FA	2	1943					
3160	F-1			724-417	VOQ (01/05)	P		16766	SF		34	MN	1	1959	Conc Pier	Plas	Brick	Conc Tile	Built-Up
3153				510-263	Med & Den Spt Space	T		550	SF				3	1970		Metal	Metal	Metal	Metal & Asp
3175	E-3	740-884	Child Care Center	740-884	Child Care Center	P		4602	SF				1	1971	Conc	Steel	Brick	Conc	Built-Up
3179		141-459	Readiness Crew	215-552	Hp, Wpn/Rlse	T		550	SF				3	1970		Metal	Metal	Metal	Metal & Asp
3180				215-552	Hp, Wpn/Rlse	T		550	SF				3	1970		Metal	Metal	Metal	Metal & Asp
3181				215-552	Hp, Wpn/Rlse	T		550	SF				3	1970		Metal	Metal	Metal	Metal & Asp
3201	E-2	711-145	Off Qtrs Duplex	711-144	Fam. Hsg. (FFY 50)	P		2450	SF		1	FA		1948	Conc	Wood	Con Stco	Wood	Built-Up
3202	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3203	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3204	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3205	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3206	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3207	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3208	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3209	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3210	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3211	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3212	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3213	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3214	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3215	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"
3216	E-2	"	"	"	"	P		"	"		"	"		"	"	"	"	"	"

REV. DATE	DESCRIPTION	INITIAL
	NO CHANGE 30 MAY 76	RST

DEPARTMENT OF THE AIR FORCE
DIRECTORATE OF CIVIL ENGINEERING, DCS/P&R, WASHINGTON, D.C.
STRATEGIC AIR COMMAND
MASTER PLAN
EXISTING BUILDING SCHEDULE
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS
SCALE | DATE | DRAWN BY | APPR. | MASTER PLANNING DIRECTOR
CARTER & BURGESS - ENGINEERS
FORT WORTH, TEXAS
AF NO. C-1
SHEET 21 OF 24

CONTRACT AF 25(600)-4683

EXISTING BUILDING SCHEDULE

BLDG NR.	GRID NR.	FACILITY NOMENCLATURE				TYPE CONST	DEFINITIVE NUMBER	AREA		STORIES	CAPACITY		COND.	YEAR BUILT	STRUCTURAL DETAILS				
		CAT. CODE	ORIGINAL DESIGN	CAT. CODE	PRESENT USE			QTY.	UN.		QTY.	UN.			FOUND'N	FRAME	EXTERIOR	FLOOR	ROOF
3217	E-2	711-145	Off Qtrs Duplex	711-144	Fam Hsg Appr. PFY 50	P		2450	SF		1	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3218	E-2	"	"	"	"	P		2450	SF		1	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3219	E-2	"	"	"	"	P		2450	SF		1	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3220	E-3	"	"	"	"	P		2450	SF		1	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3221	E-3	"	"	"	"	P		2450	SF		1	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3222	E-3	"	"	"	"	P		2450	SF		1	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3223	E-3	"	"	"	"	P		2450	SF		1	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3224	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3225	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3226	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3227	F-2	711-145	Off Qtrs Duplex	711-144	Fam Hsg Appr. PFY 50	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3228	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3229	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3230	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3231	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3232	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3233	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3234	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3235	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3236	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3237	F-2	711-145	Off Qtrs Duplex	711-144	Fam Hsg Appr. PFY 50	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3238	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3239	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3240	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3241	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3242	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3243	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3244	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3245	F-2	"	"	"	"	P		2450	SF		2	FA	1	1948	Conc	Wood	Con Stco	Wood	Built-Up
3246	F-2	711-143	NCO Fam Qtrs	711-143	Fam Hsg Appr. (50/69)	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3247	F-2	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3248	F-2	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3249	F-2	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3250	F-3	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3251	F-2	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3252	F-2	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3253	F-3	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3254	E-3	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3255	E-3	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3256	E-3	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3257	E-3	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3258	F-2	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3259	E-2	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3260	E-2	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3261	F-2	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos
3262	F-2	"	"	"	"	P		11202	SF		8	FA	1	1950	Conc	Wood	Con Stco	Wood	Asp Compos

REV	DATE	DESCRIPTION	INITIAL
1	1-1-70	NO CHANGE	DWC
2	1-1-71	NO CHANGE	RRS
3	1-1-72	NO CHANGE	KMN
4	1-1-73	NO CHANGE	GWB
5	2-14-74	UPDATED	DB
6	1 JAN 75	NO CHANGE/1 JAN 76 NO CHANGE SO MAY 76	RST

DEPARTMENT OF THE AIR FORCE

STRATEGIC AIR COMMAND

MASTER PLAN

EXISTING BUILDING SCHEDULE

CARSWELL AIR FORCE BASE

FORT WORTH, TEXAS

SCALE NONE DATE JUNE 1967

C-1

CARTER & BURGESS, ENGINEERS

CONTRACT AF 25(600)-4683

EXISTING BUILDING SCHEDULE

BLDG NR.	GRID NR.	FACILITY NOMENCLATURE: CAT. CODE	ORIGINAL DESIGN	CAT. CODE	PRESENT USE	TYPE CONST	DEFINITIVE NUMBER	AREA: QTY.	UN.	STORIES	CAPACITY: QTY.	UN.	COND.	YEAR BUILT	STRUCTURAL DETAILS: FOUND'N	FRAME	EXTERIOR	FLOOR	ROOF
3263	E-2	711-143	Hsg Off Appr Funds	711-143	Fam Hsg Appropriat (50/69)	P		2402	SF		1	EA	1	1959	Conc	Wood	Stucco	Wood	Asp Compos
3264	E-2	711-145	Hsg Off Appr Funds	711-143	Fam Hsg Appropriat (50/69)	P		2626	SF		1	EA	1	1953	Conc	Wood	Stucco	Wood	Asp Shingles
3265	E-2	711-145	Hsg Off Appr Funds	711-143	Fam Hsg Appropriat (50/69)	P		2650	SF		1	EA	1	1953	Conc	Wood	Stucco	Wood	Asp Shingles
3266	E-2	711-145	Hsg Off Appr Funds	711-143	Fam Hsg Appropriat (50/69)	P		2511	SF		1	EA	1	1953	Conc	Wood	Stucco	Wood	Asp Shingles
3268	D-2	711-14A	Garage & Ser Qtrs	714-431	Grge F/Hsg Detchd	S		774	SF		2	VE	1	1953	Conc		Wood	Conc, Wood	Clay Tile
3269	E-2	711-14A	Garage & Ser Qtrs	714-431	Grge F/Hsg Detchd	S		934	SF		2	VE	1	1953	Conc		Wood	Conc	Wood Shingles
3270	E-2	711-14B	Garage	714-431	Grge F/Hsg Detchd	S		366	SF		2	VE	1	1957	Conc		Wood	Conc	Wood Shingles
3271	E-2	711-14A	Gar Serv Qtrs	714-431	Grge F/Hsg Detchd	S		1026	SF		2	VE	1	1953	Conc		Wood	Conc, Wood	Asp Compos
3335	E-1			750-581	Misc Rec Fac	T					1	EA	1	1961					
3336	E-1			750-581	Misc Rec Fac	T					1	EA	1	1952					
3340	D-2			740-883	Youth Center	T		1083	SF		2		2	1959					
3351	D-2			422-253	Stor, Mv-Cub Mag	P		5952	SF				1	1963					
3352	D-2			422-253	Stor, Mv-Cub Mag	P		5952	SF				1	1963			Conc Blk		
3355	C-2	141-157	Ops Bldg	141-455	Ops, Ord, Control Pt	S		4633	SF				3	1951	Conc	Steel	Metal	Conc Tile	Sheet Metal
3356	D-2			730-837	Security, Sentry Hse	S		149	SF				3	1963		Wood	Asb Sdg	Wood	Asp Shingles
3358	D-2			214-442	Auto Svc Rack	S		800	SF		1	EA	1	1960			"		
3370	C-2	452-252	Prefab Metal Bldg	422-258	Stor Mag Ag	T		960	SF		1	EA	2	1953			Metal		
3371	C-2	442-264	Igloo No. 1	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3372	C-2	422-264	Igloo No. 2	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3373	C-2	422-264	Igloo No. 3	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3374	C-2	422-264	Igloo No. 4	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3375	C-2	422-264	Igloo No. 5	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3376	C-1	422-264	Igloo No. 6	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3377	C-1	422-264	Igloo No. 7	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3378	C-1	422-264	Igloo No. 8	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3379	C-1	422-264	Igloo No. 9	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3380	C-1	422-264	Igloo No. 10	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3381	C-1	422-264	Igloo No. 11	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
3382	B-1	422-264	Igloo No. 12	422-264	Stor, Igloo	P		318	SF		1	EA	1	1951	Conc		Conc	Conc	Conc
4112	D-10			141-621	Weather, Ceilometer	P					1	EA	1	1965					
4113	D-10			141-621	Weather, Ceilometer	P					1	EA	1	1965					
4114	B-9			116-922	Barrier, A/C Arrest	T					1	EA	1	1964					
4115	C-10	134-465	TACAN Sta Fixed	134-465	TACAN, Station, Fixed	S		344	SF		1	EA	1	1958	Conc	Wood	Asb Sdg	Conc	Built-Up
4116				141-621	Weather, Ceilometer	P					1	EA	1	1965					
4119	B-2	134-352	ILS Transmitter Bldg	134-338	GCA Vault	P		96	SF		1	EA	1	1949	Conc		Conc	Conc	Conc
4120	B-1			116-922	Barrier, A/C Arrest	T					1	EA	1	1964					
4121	B-4	134-338	GCA Trans Vault	134-338	GCA Vault	P		96	SF		1	EA	1	1949	Conc		Conc	Conc	Conc
4122	B-8			134-351	ILS, Glide Slope	P		235	SF		1	EA	2	1959					
4124	C-9			141-628	Wea Transmissometer	P					1	EA	1	1963					
4125	C-8			141-628	Wea Transmissometer	P					1	EA	1	1963					

REV	DATE	DESCRIPTION	INITIAL
		NO CHANGE 30 MAY 76	RST

DEPARTMENT OF THE AIR FORCE
DIRECTORATE OF CIVIL ENGINEERING, DCS/P&O, WASHINGTON, D.C.

STRATEGIC AIR COMMAND
MASTER PLAN
EXISTING BUILDING SCHEDULE
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

SCALE | DATE
MASTER PLANNING DIRECTOR
CARTER & BURGESS – ENGINEERS
FORT WORTH, TEXAS

AFB NO. C-1
SHEET 23 OF 24

CONTRACT AF 25 (600)-4683

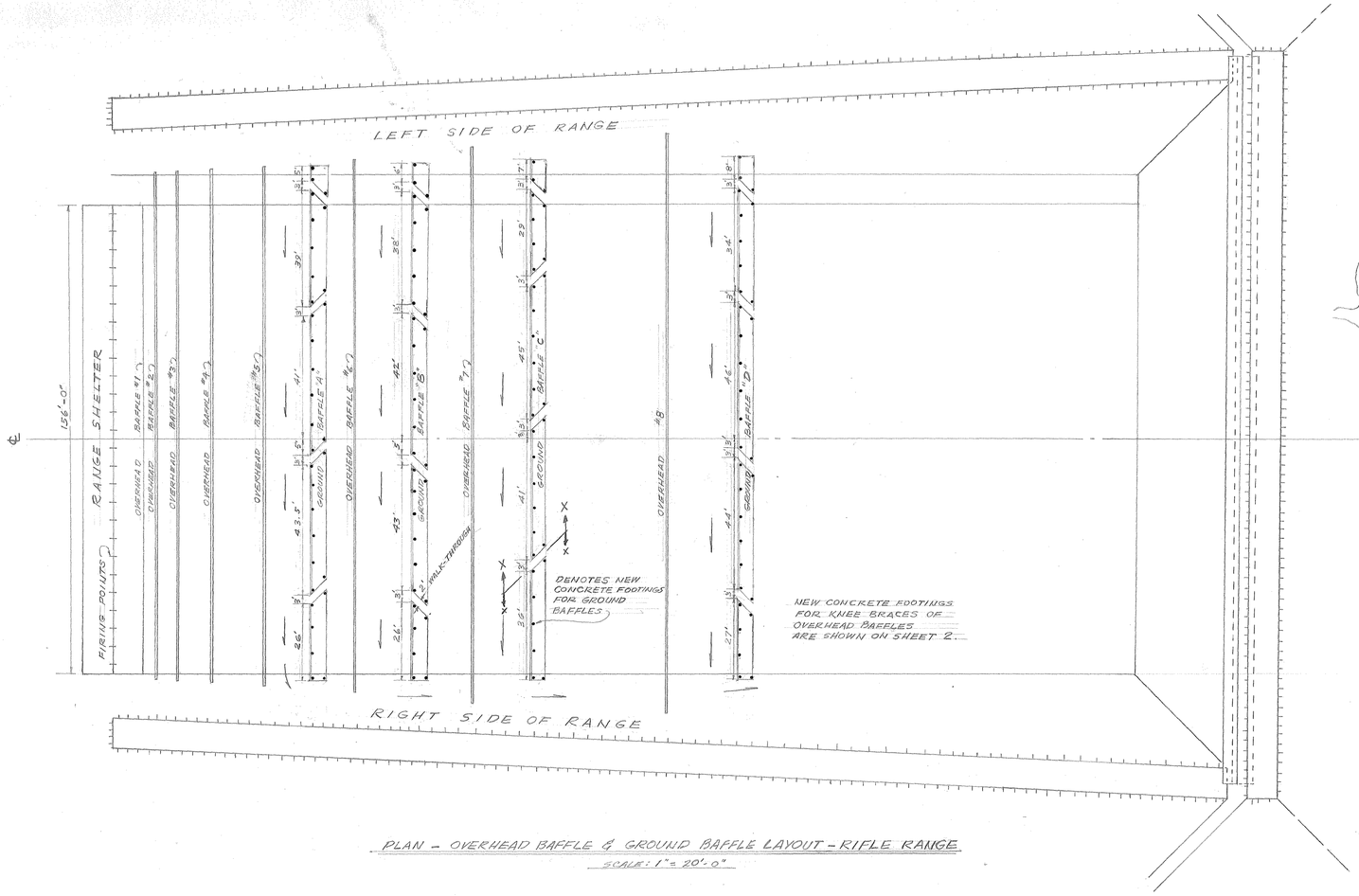
EXISTING BUILDING SCHEDULE

BLDG NR.	GRID NR.	FACILITY NOMENCLATURE: CAT. CODE	ORIGINAL DESIGN	CAT. CODE	PRESENT USE	TYPE CONST	DEFINITIVE NUMBER	AREA: QTY.	UN.	STORIES	CAPACITY: QTY.	UN.	COND.	YEAR BUILT	STRUCTURAL DETAILS: FOUND'N	FRAME	EXTERIOR	FLOOR	ROOF
4126				179-511	Fireman Tng Fclty	P					1	EA	2	1971					
4127	C-7			811-149	Ele Emerg Stn Bldg	P					186	SF	1	1959					
4130				811-147	Ele Emerg Power Plant	P					25	KW	1	1963					
4132	C-2			141-628	Wea Transmissometer	P					1	EA	1	1965					
4133	C-2			141-628	Wea Transmissometer	P					1	EA	1	1965					
4134	B-2			141-633	Wind, Meas Set	P					1	EA	1	1965					
4135	B-5	723-392	Sanitary Latrine	134-341	GCA/RAPCON Spt	T					550	SF	3	1970		Metal	Metal	Asp on Metal	Metal
4137	E-8			141-633	Wind, Meas Set	P					1	EA	1	1956					
4138				134-373	Turntable, Rdr	P					1	EA	1	1969					
4139	C-5			217-762	Shop Navaid			302	SF				1	1960					
4141	C-3			811-149	Ele Emerg Stn Bldg			186	SF		15	KW	1	1959					
4142	B-3			134-353	ILS, Localizer			1629	SF		1	EA	2	1959					
4143	C-6			131-117	Comm, Tmtr	P		1520	SF		1	EA	1	1964					
4150	D-5	125-977	Operating Pump House	121-124	Hydra Fuel Bldg	P		1508	SF				2	1954	Conc	Conc Blk	Brick	Conc	Conc
4151	D-5			841-169	Bldg Wtr Sup	S		1200	SF				1	1959	Conc		Brick	Conc	Conc
4152	D-4	125-977	Operating Pump House	121-124	Hydra Fuel Bldg	P		1508	SF				2	1954	Conc	Conc Blk	Brick	Conc	Conc
4153	D-4	125-977	Operating Pump House	121-124	Hydra Fuel Bldg	P		1507	SF				2	1954	Conc	Conc Blk	Brick	Conc	Conc
4154	D-4	125-977	Operating Pump House	121-124	Hydra Fuel Bldg	P		1508	SF				2	1954	Conc	Conc Blk	Brick	Conc	Conc
4155	D-4	131-66A	Power Vault, Hight Lighting	890-187	Utility Vault	P		1841	SF				1	1955					
4156	D-4	131-177	Radio Trans Station	219-944	CE Maintenance Shop			923	SF				3	1962	Conc	Wood	Wood	Wood	Asp Shingles
4158	D-5			411-123	Stor Bse Dem/Water	P					595	BL	1	1959	Conc		Brick	Conc	Conc
4170	C-3	125-977	Operating Pump House	121-124	Hydra Fuel Bldg	P		1507	SF				2	1954	Conc Pier	Conc Blk	Brick	Conc	Conc
4175	D-2			141-459	Readiness, Crew	P		18196	SF		70	MN	1	1961	Conc Pier	Conc Blk	Conc Blk		
4176	D-2			730-839	Traffic Check House			48	SF				3	1961		Conc Blk	Conc Blk		
4177	C-2			750-817	Swimming Pool Off	P		800	SF				1	1966					

REV	DATE	DESCRIPTION	INITIAL
		NO CHANGE 30 MAY 76	

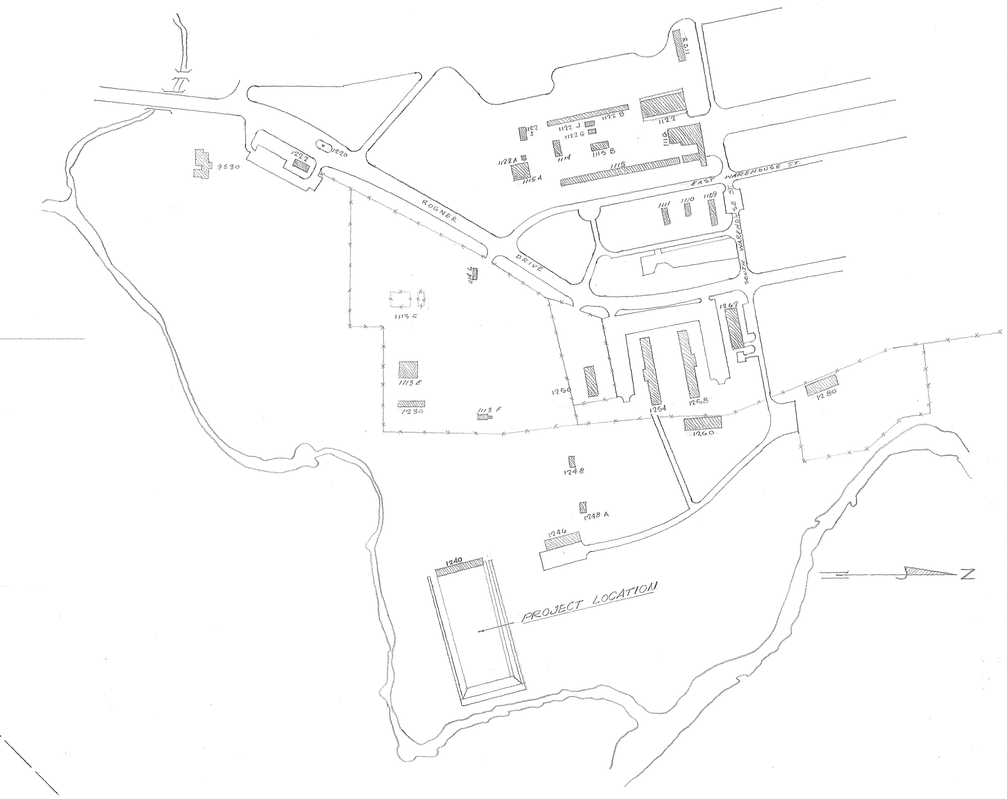
DEPARTMENT OF THE AIR FORCE
DIRECTORATE OF CIVIL ENGINEERING DCS/P&S WASHINGTON, D.C.
STRATEGIC AIR COMMAND
MASTER PLAN
EXISTING BUILDING SCHEDULE
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS
SCALE | DATE
MASTER PLANNER DIRECTOR
CARTER & BURGESS - ENGINEERS
FORT WORTH TEXAS
TAB NO C-1
SHEET 26 OF 34

CONTRACT AF 25(600)-4693



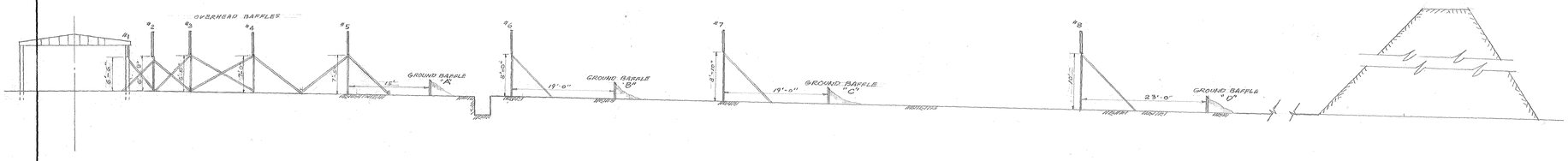
PLAN - OVERHEAD BAFFLE & GROUND BAFFLE LAYOUT - RIFLE RANGE

SCALE: 1" = 20'-0"



LOCATION PLAN

SCALE: 1" = 200'



TYPICAL SECTION - RIFLE RANGE

SCALE: 1" = 10'-0"

OVERHEAD BAFFLES		
BAFFLE NO.	TOTAL LENGTH	STEEL SHEET HGT.
1	136'-0"	2'-0"
2	169'-6"	4'-0"
3	170'-6"	4'-0"
4	172'-0"	4'-0"
5	174'-0"	4'-0"
6	178'-0"	4'-4"
7	184'-0"	4'-0"
8	192'-0"	4'-0"

GROUND BAFFLES	
BAFFLE	TOTAL LENGTH
A	171'-6"
B	172'-0"
C	173'-0"
D	174'-0"

ALL DIMENSIONS WILL BE VERIFIED BY CONTRACTOR IN FIELD

REV.	DATE	DESCRIPTION	SUBT	RECD.	APPD.

STRATEGIC AIR COMMAND

CARSWELL AIR FORCE BASE

ALTER RGE, SM BOR RIFL/CARB

PLAN AND SECTION

APPROVED: FIRE CHIEF

APPROVED: SANITARY ENGINEER

APPROVED: SAFETY OFFICER

APPROVED: USING AGENCY

SCALE: AS SHOWN | PROJECT NO. CRS 20-6

DRAWN: | SUBMITTED: CHIEF ENGINEER | RECOMMENDED: BASE CIVIL ENG.

DESIGNED: FRIAS

CHECKED: FRIAS

DATE 23 AUG 65

APPROVED: BASE COMMANDER

DRAWING NO. CRS-2638

SHEET 1 OF 2

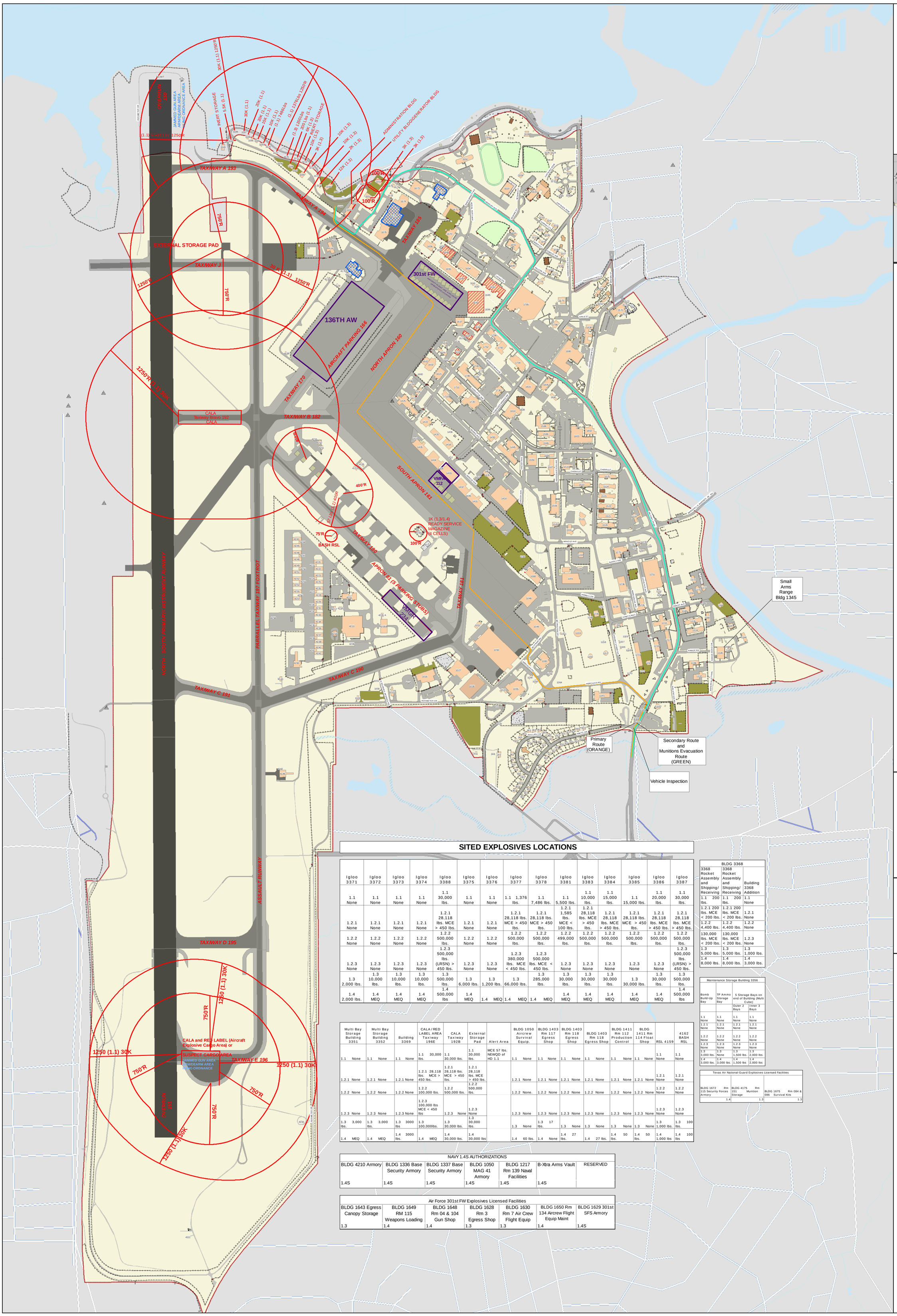
1340-14

Appendix C
Installation Maps

- 1951 Base Layout Map (SAC 1951)
- 1958 Additional Runway Grading & R.R. Spur Relocation Map (USACE 1958)
- 1969 Master Plan Gas System (USAF 1969)
- 1991 Base Map (DON 1991)
- 2004 Facility Map, Explosive Safety Arcs (DON 2004)
- 2011 Facility Map, Explosive Safety Arcs (NAVFAC 2011)
- 2012 Facility Map, Explosive Safety Arcs (NAVFAC 2012)
- 2012 Installation Layout Map (NAVFAC 2012)
- 2013 Facility Map, Explosive Safety Arcs (NAVFAC 2013)

NAS FORT WORTH JRB FACILITY MAP EXPLOSIVE SAFETY ARCS

INSTALLATION LAYOUT



Legend

Explosive Safety
- ESQD Arc
- Aircraft Parking Areas
- Air Force 301st Explosive Licensed Facilities
- TANG Explosive Licensed Facilites

Explosive Transporation Route
- PRIMARY
- SECONDARY

Improvement General
- Control Point
- Gate Point
- Gate Line
- Wall Line
- Fence Line
- Installation Area

Railroad Centerline
- Abandoned
- Active

Transportation Vehicle
- Paved Parking/Driveway/Road
- Unpaved Parking/Driving/Road

Hydrography
- Water Centerline
- Intermittent Water
- Permanent Water

Recreation Features
- Playground
- Athletic Field
- Athletic Court
- Sidewalk Area

Structure Existing Area
- Existing
- Portable
- Unknown
- Slab Area
- Open Store Area
- Canopy Pavillion Area

Airfield Surface Area
- Parking Area
- Shoulder
- Apron
- Helipad
- Taxiway
- Hardstand
- Runway
- Runway End
- Overrun

N

Coordinate System: UTM 14N
Projection: Transverse Mercator
Datum : NAD83
Sheet Size: 44" W x 34" H

Scale: 1:4,800

0 600 1,200 Feet

0 150 300 Meters

SITED EXPLOSIVES LOCATIONS

Igloo 3371	Igloo 3372	Igloo 3373	Igloo 3374	Igloo 3388	Igloo 3375	Igloo 3376	Igloo 3377	Igloo 3378	Igloo 3381	Igloo 3383	Igloo 3384	Igloo 3385	Igloo 3386	Igloo 3387
1.1 None	1.1 None	1.1 None	1.1 None	1.1 30,000 lbs.	1.1 None	1.1 None	1.1 1,376 lbs.	1.1 7,486 lbs.	1.1 5,500 lbs.	1.1 10,000 lbs.	1.1 15,000 lbs.	1.1 15,000 lbs.	1.1 20,000 lbs.	1.1 30,000 lbs.
1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 None	1.2.1 None	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 1,585 lbs. MCE < 100 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.
1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 500,000 lbs.	1.2.2 None	1.2.2 None	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.	1.2.2 499,000 lbs.	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.
1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 500,000 lbs. (LRSN) > 450 lbs.	1.2.3 None	1.2.3 None	1.2.3 380,000 lbs. MCE < 450 lbs.	1.2.3 500,000 lbs. MCE < 450 lbs.	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 500,000 lbs. (LRSN) > 450 lbs.
1.3 2,000 lbs.	1.3 10,000 lbs.	1.3 10,000 lbs.	1.3 10,000 lbs.	1.3 500,000 lbs.	1.3 6,000 lbs.	1.3 1,200 lbs.	1.3 66,000 lbs.	1.3 285,000 lbs.	1.3 30,000 lbs.	1.3 30,000 lbs.	1.3 30,000 lbs.	1.3 30,000 lbs.	1.3 30,000 lbs.	1.3 500,000 lbs.
1.4 2,000 lbs.	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 500,000 lbs	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 500,000 lbs

Multi Bay Storage Building 3351	Multi Bay Storage Building 3352	Building 3369	CALA/RED LABEL AREA Taxiway 196E	CALA Taxiway 192B	External Storage Pad	Alert Area	BLDG 1050 Aircrew Survival Equip.	BLDG 1403 Rm 117 Egress Shop	BLDG 1403 Rm 118 Egress Shop	BLDG 1403 Rm 118 Egress Shop	BLDG 1411 Rm 112 Production Control	BLDG 1411 Rm 114 Float Shop	RSL 4159	4162 BASH RSL
1.1 None	1.1 None	1.1 None	1.1 30,000 lbs.	1.1 30,000 lbs.	1.1 30,000 lbs.	MCE 57 lbs. NEWQD of HD 1.1	1.1 None	1.1 None	1.1 None	1.1 None	1.1 None	1.1 None	1.1 None	1.1 None
1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.		1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None
1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 100,000 lbs.	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.		1.2.2 None.	1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None
1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 100,000 lbs MCE < 450 lbs	1.2.3 None	1.2.3 None		1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None
1.3 3,000 lbs.	1.3 3,000 lbs.	1.3 3000 lbs	1.3 100,000lbs.	1.3 30,000 lbs.	1.3 30,000 lbs.		1.3 None	1.3 17 lbs.	1.3 None	1.3 None	1.3 None	1.3 None	1.3 1,000 lbs.	1.3 100 lbs.
1.4 MEQ	1.4 MEQ	1.4 3000 lbs.	1.4 MEQ	1.4 30,000 lbs.	1.4 30,000 lbs		1.4 60 lbs.	1.4 None	1.4 27 lbs.	1.4 27 lbs.	1.4 50 lbs.	1.4 50 lbs.	1.4 1,000 lbs	1.4 100 lbs

BLDG 3368		
3368 Rocket Assembly and Shipping/ Receiving	3368 Rocket Assembly and Shipping/ Receiving	Building 3368 Addition
1.1 200 lbs.	1.1 200 lbs.	1.1 None
1.2.1 200 lbs. MCE < 200 lbs.	1.2.1 200 lbs. MCE < 200 lbs.	1.2.1 None
1.2.2 4,400 lbs.	1.2.2 4,400 lbs.	1.2.2 None
130,000 lbs. MCE < 200 lbs.	130,000 lbs. MCE < 200 lbs.	1.2.3 None
1.3 5,000 lbs.	1.3 5,000 lbs.	1.3 1,000 lbs.
1.4 8,000 lbs.	1.4 8,000 lbs.	1.4 3,000 lbs.

Maintenance Storage Building 3356			
Bomb Build-Up Bay	TP Ammo Storage Bay	5 Storage Bays on end of Building (Multi Cube)	
		Outer 2 Bays	Inner 3 Bays
1.1 None	1.1 None	1.1 None	1.1 None
1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None
1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None
1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None
1.3 3,000 lbs.	1.3 None	1.3 1,500 lbs.	1.3 2,000 lbs.
1.4 3,000 lbs.	1.4 3,000 lbs.	1.4 1,500 lbs	1.4 2,000 lbs

Texas Air National Guard Explosives Licensed Facilities		
BLDG 1672 Rm 115 Security Forces Armory	BLDG 4175 Rm 151 Munition Storage	BLDG 1675 Rm 084 & 086 Survival Kits
1.4	1.3	1.3

NAVY 1.4S AUTHORIZATIONS						
BLDG 4210 Armory	BLDG 1336 Base Security Armory	BLDG 1337 Base Security Armory	BLDG 1050 MAG 41 Armory	BLDG 1217 Rm 139 Naval Facilities	B-Xtra Arms Vault	RESERVED
1.4S	1.4S	1.4S	1.4S	1.4S	1.4S	

Air Force 301st FW Explosives Licensed Facilities						
BLDG 1643 Egress Canopy Storage	BLDG 1649 RM 115 Weapons Loading	BLDG 1648 Rm 04 & 104 Gun Shop	BLDG 1628 Rm 3 Egress Shop	BLDG 1630 Rm 7 Air Crew Flight Equip	BLDG 1650 Rm 134 Aircrew Flight Equip Maint	BLDG 1629 301st SFS Armory
1.3	1.4	1.4	1.3	1.3	1.4	1.4S

NAVFAC GeoReadiness

PREPARED BY:

NAVFAC Naval Facilities Engineering Command Southeast

Date: 03/22/2013
Naval Facilities Engineering Command Southeast
Asset Utilization Branch, AM4
Contact: Samantha Gorham
(817) 782-7283

Gregory Eckelbecker,
NAS Fort Worth JRB
Explosives Safety Officer
817-782-5334

SMSgt Donald Seymore,
136th Airlift Wing Ground Weapons Safety Manager
817-852-3209

CMSgt Terry Goines
301st Fighter Wing
Weapons Safety Manager
(817) 782-6885

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Commander Navy Region Southeast GeoReadiness Center. CNRSE GeoReadiness Center does not attest to or guarantee the currency and/or validity of the data contained in this map, nor does it attest to any spatial accuracy. This map is for

NAS FORT WORTH JRB

INSTALLATION LAYOUT

LEGEND

Improvement General

- Control Point
- Gate Point
- Gate Line
- Wall Line
- Fence Line
- Installation Area

Railroad Centerline

- Abandoned
- Active

Transportation Vehicle

- Paved Parking/Driveway/Road
- Unpaved Parking/Driving/Road

Hydrography

- Water Centerline
- Shoreline
- Intermittent Water
- Permanent Water

Recreation Features

- Playground
- Athletic Field
- Athletic Court
- Sidewalk Area

Military Operations

- Ammunition Storage Area

Structure Existing Area

- Existing
- Portable
- Unknown
- Slab Area
- Open Store Area
- Canopy Pavillion Area

Airfield Surface Area

- Parking Area
- Shoulder
- Apron
- Helipad
- Taxiway
- Hardstand
- Runway
- Runway End
- Overrun

Coordinate System: UTM 14N
Projection: Transverse Mercator
Datum : NAD83
Sheet Size: 44" W x 34" H

N

Scale: 1:4,800

0 630 1,260 Feet

0 150 300 Meters

NAVFAC GeoReadiness

PREPARED BY:

NAVFAC Naval Facilities Engineering Command NAVFAC SOUTHEAST

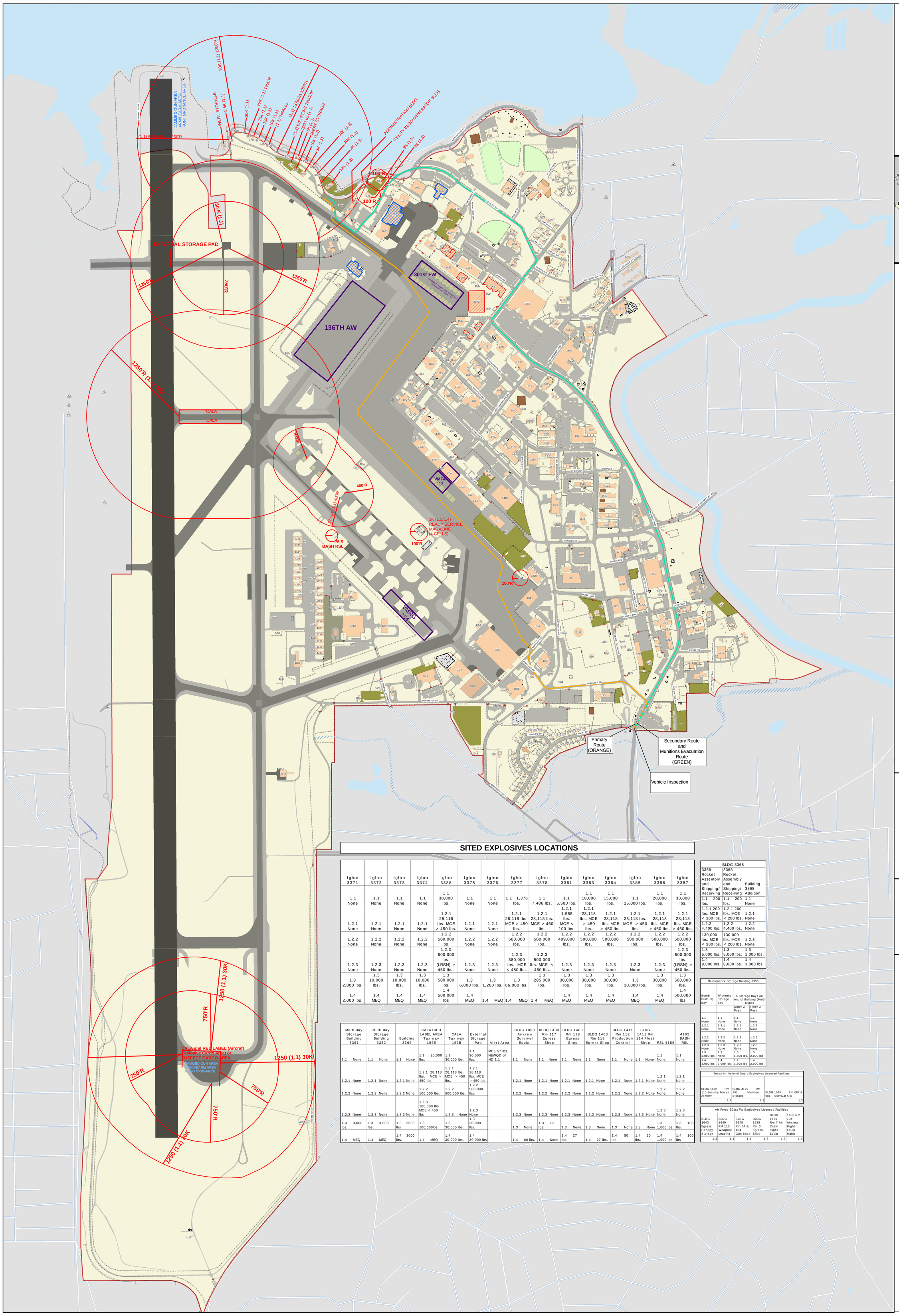
Date: 8/03/2012
Naval Facilities Engineering Command Southeast
Asset Utilization Branch, AM4
Contact: Samantha Gorham
(817) 782-7283

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Commander Navy Region Southeast GeoReadiness Center. CNRSE GeoReadiness Center does not attest to or guarantee the currency and/or validity of the data contained in this map, nor does it attest to any spatial accuracy. This map is for planning purposes only.

NAS FORT WORTH JRB FACILITY MAP EXPLOSIVE SAFETY ARCS

INSTALLATION LAYOUT



Legend

Explosive Safety
- ESQD Arc
- Aircraft Parking Areas
- Air Force 301st Explosive Licensed Facilities
- TANG Explosive Licensed Facilites

Explosive Transporation Route
- Primary Route
- Secondary Route

Improvement General
- Control Point
- Gate Point
- Gate Line
- Wall Line
- Fence Line
- Installation Area

Railroad Centerline
- Abandoned
- Active

Transportation Vehicle
- Paved Parking/Driveway/Road
- Unpaved Parking/Driving/Road

Hydrography
- Water Centerline
- Intermittent Water
- Permanent Water

Recreation Features
- Playground
- Athletic Field
- Athletic Court
- Sidewalk Area

Structure Existing Area
- Existing
- Portable
- Unknown
- Slab Area
- Open Store Area
- Canopy Pavillion Area

Airfield Surface Area
- Parking Area
- Shoulder
- Apron
- Helipad
- Taxiway
- Hardstand
- Runway
- Runway End
- Overrun

N

Coordinate System: UTM 14N
Projection: Transverse Mercator
Datum : NAD83
Sheet Size: 44" W x 34" H

Scale: 1:4,800

0 600 1,200 Feet

0 150 300 Meters

SITED EXPLOSIVES LOCATIONS

Igloo 3371	Igloo 3372	Igloo 3373	Igloo 3374	Igloo 3388	Igloo 3375	Igloo 3376	Igloo 3377	Igloo 3378	Igloo 3381	Igloo 3383	Igloo 3384	Igloo 3385	Igloo 3386	Igloo 3387
1.1 None	1.1 None	1.1 None	1.1 None	1.1 30,000 lbs.	1.1 None	1.1 None	1.1 1,376 lbs.	1.1 7,486 lbs.	1.1 5,500 lbs.	1.1 10,000 lbs.	1.1 15,000 lbs.	1.1 15,000 lbs.	1.1 20,000 lbs.	1.1 30,000 lbs.
1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 None	1.2.1 None	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 1,585 lbs. MCE < 100 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.
1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 500,000 lbs.	1.2.2 None	1.2.2 None	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.	1.2.2 499,000 lbs.	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.
1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 500,000 lbs. (LRSN) > 450 lbs.	1.2.3 None	1.2.3 None	1.2.3 380,000 lbs. MCE < 450 lbs.	1.2.3 500,000 lbs. MCE < 450 lbs.	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 500,000 lbs. (LRSN) > 450 lbs.
1.3 2,000 lbs.	1.3 10,000 lbs.	1.3 10,000 lbs.	1.3 10,000 lbs.	1.3 500,000 lbs.	1.3 6,000 lbs.	1.3 1,200 lbs.	1.3 66,000 lbs.	1.3 285,000 lbs.	1.3 30,000 lbs.	1.3 30,000 lbs.	1.3 30,000 lbs.	1.3 30,000 lbs.	1.3 30,000 lbs.	1.3 500,000 lbs.
1.4 2,000 lbs.	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 500,000 lbs	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 MEQ	1.4 500,000 lbs

Multi Bay Storage Building 3351	Multi Bay Storage Building 3352	Building 3369	CALA / RED LABEL AREA Taxiway 196E	CALA Taxiway 192B	External Storage Pad	Alert Area	BLDG 1050 Aircrew Survival Equip.	BLDG 1403 Rm 117 Egress Shop	BLDG 1403 Rm 118 Egress Shop	BLDG 1403 Rm 118 Egress Shop	BLDG 1411 Rm 112 Production Control	BLDG 1411 Rm 114 Float Shop	RSL 4159	4162 BASH RSL
1.1 None	1.1 None	1.1 None	1.1 30,000 lbs.	1.1 30,000 lbs.	1.1 30,000 lbs.	MCE 57 lbs. NEWQD of HD 1.1	1.1 None	1.1 None	1.1 None	1.1 None	1.1 None	1.1 None	1.1 None	1.1 None
1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.	1.2.1 28,118 lbs. MCE > 450 lbs.		1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None
1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 100,000 lbs.	1.2.2 500,000 lbs.	1.2.2 500,000 lbs.		1.2.2 None.	1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None
1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 100,000 lbs MCE < 450 lbs	1.2.3 None	1.2.3 None		1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None
1.3 3,000 lbs.	1.3 3,000 lbs.	1.3 3000 lbs	1.3 100,000lbs.	1.3 30,000 lbs.	1.3 30,000 lbs.		1.3 None	1.3 17 lbs.	1.3 None	1.3 None	1.3 None	1.3 None	1.3 1,000 lbs.	1.3 100 lbs.
1.4 MEQ	1.4 MEQ	1.4 3000 lbs.	1.4 MEQ	1.4 30,000 lbs.	1.4 30,000 lbs		1.4 60 lbs.	1.4 None	1.4 27 lbs.	1.4 27 lbs.	1.4 50 lbs.	1.4 50 lbs.	1.4 1,000 lbs	1.4 100 lbs

BLDG 3368		
3368 Rocket Assembly and Shipping/ Receiving	3368 Rocket Assembly and Shipping/ Receiving	Building 3368 Addition
1.1 200 lbs.	1.1 200 lbs.	1.1 None
1.2.1 200 lbs. MCE < 200 lbs.	1.2.1 200 lbs. MCE < 200 lbs.	1.2.1 None
1.2.2 4,400 lbs.	1.2.2 4,400 lbs.	1.2.2 None
130,000 lbs. MCE < 200 lbs.	130,000 lbs. MCE < 200 lbs.	1.2.3 None
1.3 5,000 lbs.	1.3 5,000 lbs.	1.3 1,000 lbs.
1.4 8,000 lbs.	1.4 8,000 lbs.	1.4 3,000 lbs.

Maintenance Storage Building 3356			
Bomb Build-Up Bay	TP Ammo Storage Bay	5 Storage Bays on end of Building (Multi Cube)	
		Outer 2 Bays	Inner 3 Bays
1.1 None	1.1 None	1.1 None	1.1 None
1.2.1 None	1.2.1 None	1.2.1 None	1.2.1 None
1.2.2 None	1.2.2 None	1.2.2 None	1.2.2 None
1.2.3 None	1.2.3 None	1.2.3 None	1.2.3 None
1.3 3,000 lbs.	1.3 None	1.3 1,500 lbs.	1.3 2,000 lbs.
1.4 3,000 lbs.	1.4 3,000 lbs.	1.4 1,500 lbs	1.4 2,000 lbs

Texas Air National Guard Explosives Licensed Facilities		
BLDG 1672 Rm 115 Security Forces Armory	BLDG 4175 Rm 151 Munition Storage	BLDG 1675 Rm 084 & 086 Survival Kits
1.4	1.3	1.3

Air Force 301st FW Explosives Licensed Facilities					
BLDG 1643 Egress Canopy Storage	BLDG 1649 RM 115 Weapons Loading	BLDG 1648 Rm 04 & 104 Gun Shop	BLDG 1628 Rm 3 Egress Shop	BLDG 1630 Rm 7 Air Crew Flight Equip	1650 Rm 134 Aircrew Flight Equip Maint
1.3	1.4	1.4	1.3	1.3	1.4

PREPARED BY:

Date: 10/18/2012
Naval Facilities Engineering Command Southeast
Asset Utilization Branch, AM4
Contact: Samantha Gorham
Center (817) 782-7283

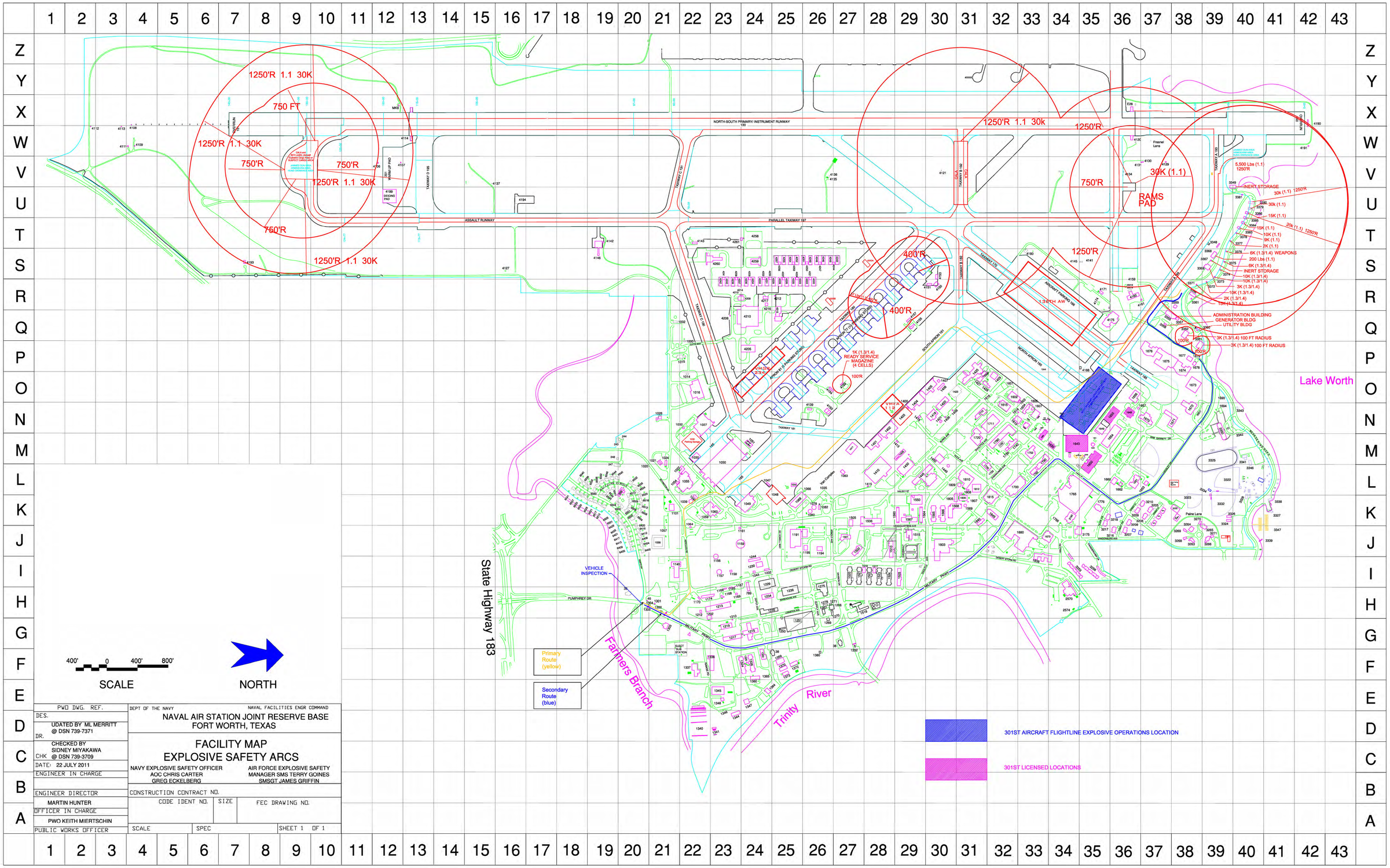
Gregory Eckelbecker,
NAS Fort Worth JRB
Explosives Safety Officer
817-782-5334

SMSgt Donald Seymore,
136th Airlift Wing Ground Weapons Safety Manager
817-852-3209

CMSgt Terry Goines
301st Fighter Wing
Weapons Safety Manager
(817) 782-6885

FOR OFFICIAL USE ONLY

This map and data contained herein is For Official Use Only. All data shown is considered Unclassified Sensitive upon Aggregation. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the Commander Navy Region Southeast GeoReadiness Center. CNRSE GeoReadiness Center does not attest to or guarantee the currency and/or validity of the data contained in this map, nor does it attest to any spatial accuracy. This map is for planning purposes only.



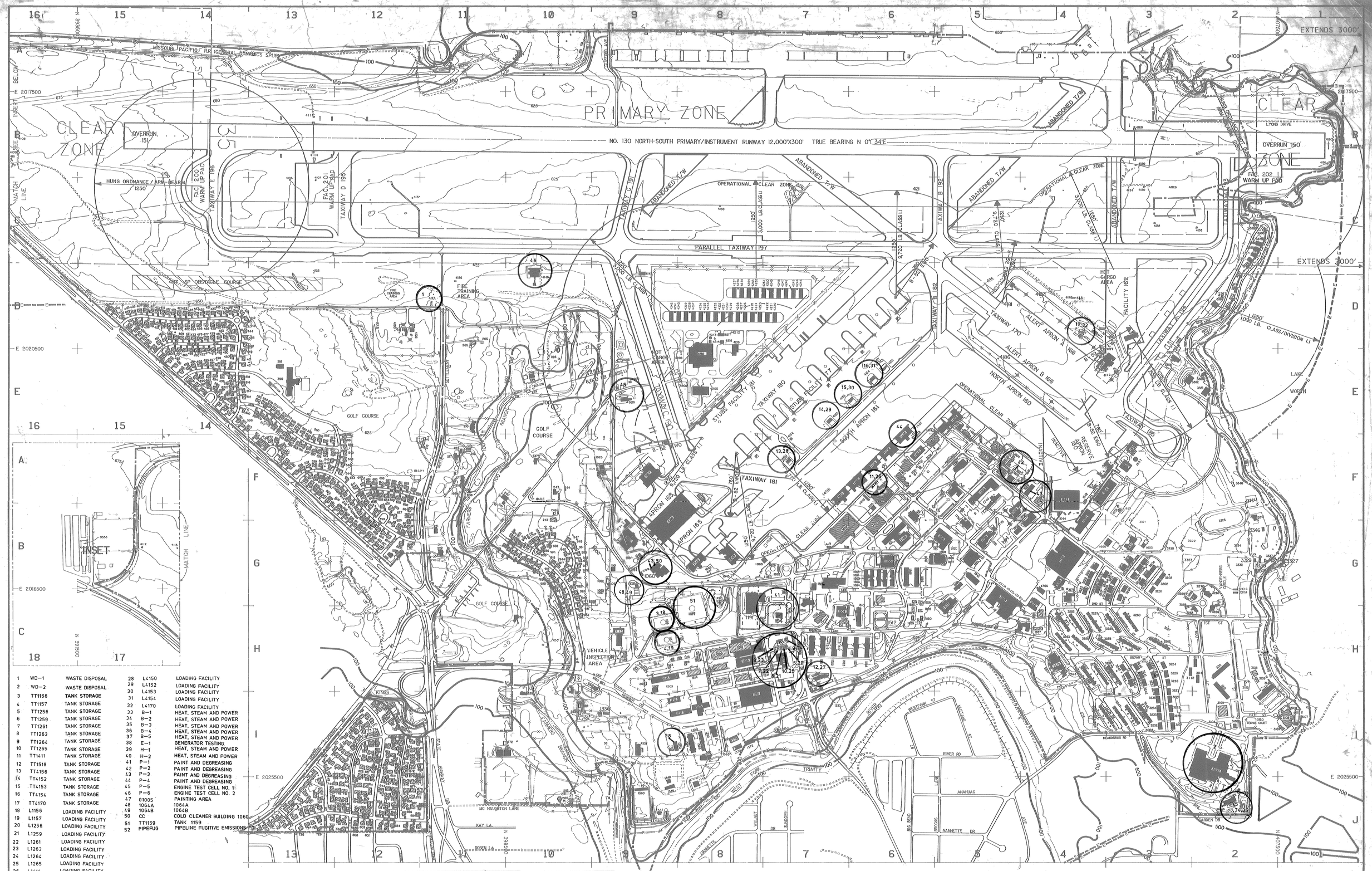
400' 0 400' 800'

SCALE

NORTH

PWO DWG. REF.	DEPT OF THE NAVY — NAVAL FACILITIES ENGR COMMAND
DES.	NAVAL AIR STATION JOINT RESERVE BASE FORT WORTH, TEXAS
UDATED BY ML MERRITT @ DSN 739-7371	
DR.	FACILITY MAP EXPLOSIVE SAFETY ARCS
CHECKED BY SIDNEY MIYAKAWA	
CHK @ DSN 739-3709	NAVY EXPLOSIVE SAFETY OFFICER AOC CHRIS CARTER GREG ECKELBERG — AIR FORCE EXPLOSIVE SAFETY MANAGER SMS TERRY GOINES SMSGT JAMES GRIFFIN
DATE: 22 JULY 2011	
ENGINEER IN CHARGE	
ENGINEER DIRECTOR	CONSTRUCTION CONTRACT NO.
MARTIN HUNTER	CODE IDENT NO. — SIZE — FEC DRAWING NO.
OFFICER IN CHARGE	
PWO KEITH MIERTSCHIN	
PUBLIC WORKS OFFICER	SCALE — SPEC — SHEET 1 OF 1

BUILDING COLOR CODES
NAVY
MARINE
AIR FORCE
TANG
AAFES
RECREATION
JOINT
MISC.
SCALE
NORTH
KEY
State Highway 183
Farmers Branch
Trinity River
Lake Worth
NORTH-SOUTH PRIMARY/ INSTRUMENT RUNWAY 130
ASSAULT RUNWAY
PARALLEL TAXIWAY 197
JAMMED GUN AREA
ARM / DEARM AREA
HUNG ORDINANCE AREA
TAXIWAY E 196
TAXIWAY D 195
TAXIWAY C 191
TAXIWAY C 190
TAXIWAY B 182
TAXIWAY B 192
TAXIWAY A 193
TAXIWAY A 194
201 WARM UP PAD
SOUTH APRON 161
NORTH APRON 160
AIRCRAFT PARKING 166
VEHICLE INSPECTION
PUMPHREY DR
MILITARY PKWY
PWD DWG. REF.
DES.
DR. UDATED BY PHILLIP COUCH @ EXT 6253
CHK CHECKED BY JON HALL @ EXT 6299
DATE: 10 NOV 2004
ENGINEER IN CHARGE
ENGINEER DIRECTOR FRED HANCHER
OFFICER IN CHARGE LCDR RAY PYLE, USN
PUBLIC WORKS OFFICER
DEPT OF THE NAVY
NAVAL FACILITIES ENGR COMMAND
NAVAL AIR STATION JOINT RESERVE BASE
FORT WORTH, TEXAS
FACILITY MAP
EXPLOSIVE SAFETY ARCS
NAVY EXPLOSIVE SAFETY OFFICER A01 BRAD GUYMON
AIR FORCE EXPLOSIVE SAFETY MANGER MIKE SHERMAN
CONSTRUCTION CONTRACT NO.
CODE IDENT NO.
SIZE
FEC DRAWING NO.
SCALE
SPEC
SHEET 1 OF 1



1	WD-1	WASTE DISPOSAL
2	WD-2	WASTE DISPOSAL
3	TT1156	TANK STORAGE
4	TT1157	TANK STORAGE
5	TT1256	TANK STORAGE
6	TT1259	TANK STORAGE
7	TT1261	TANK STORAGE
8	TT1263	TANK STORAGE
9	TT1264	TANK STORAGE
10	TT1265	TANK STORAGE
11	TT1411	TANK STORAGE
12	TT1518	TANK STORAGE
13	TT4156	TANK STORAGE
14	TT4152	TANK STORAGE
15	TT4153	TANK STORAGE
16	TT4154	TANK STORAGE
17	TT4170	TANK STORAGE
18	L1156	LOADING FACILITY
19	L1157	LOADING FACILITY
20	L1256	LOADING FACILITY
21	L1259	LOADING FACILITY
22	L1261	LOADING FACILITY
23	L1263	LOADING FACILITY
24	L1264	LOADING FACILITY
25	L1265	LOADING FACILITY
26	L1411	LOADING FACILITY
27	L1518	LOADING FACILITY
28	L4150	LOADING FACILITY
29	L4152	LOADING FACILITY
30	L4153	LOADING FACILITY
31	L4154	LOADING FACILITY
32	L4170	LOADING FACILITY
33	B-1	HEAT, STEAM AND POWER
34	B-2	HEAT, STEAM AND POWER
35	B-3	HEAT, STEAM AND POWER
36	B-4	HEAT, STEAM AND POWER
37	B-5	HEAT, STEAM AND POWER
38	E-1	GENERATOR TESTING
39	H-1	HEAT, STEAM AND POWER
40	H-2	HEAT, STEAM AND POWER
41	P-1	PAINT AND DEGREASING
42	P-2	PAINT AND DEGREASING
43	P-3	PAINT AND DEGREASING
44	P-4	PAINT AND DEGREASING
45	P-5	ENGINE TEST CELL NO. 1
46	P-6	ENGINE TEST CELL NO. 2
47	01005	PAINTING AREA
48	1064A	1064A
49	1064B	1064B
50	CC	COLD CLEANER BUILDING 1060
51	TT1159	TANK 1159
52	PIPEFUG	PIPELINE FUGITIVE EMISSIONS-FD

NOTES:

36 BASE HEATING
37 HOUSING HEATING
39 HOUSING HEATING
40 HOUSING HEATING
52 BASE WIDE

BASE LAYOUT LEGEND

BOUNDARY LINES
- EXISTING PROPERTY LINE (IN FEE)
- EXISTING PROPERTY LINE (LEASED)
- EXISTING PROPERTY LINE (EASEMENT OR PERMIT)
- EXISTING FENCE
- APPROACH ZONE - R/W CLEARANCE
- 1250D ARC - INHABITED BLDG. DIST.
- 100 YEAR FLOOD PLAIN

BOUNDARY ANNOTATION
- 100 YEAR — 100 YEAR FLOOD PLAIN

PLANIMETRIC ANNOTATION
- TOWER — MISC. CULTURAL ANNOTATION

ROADWAYS
- PAVED ROAD
- UNPAVED ROAD

ROADWAYS ANNOTATION
- ROSNER DRIVE — STREET NAME

RAILROAD
- EXISTING RAILROAD

RAILROAD ANNOTATION
- MISSOURI PACIFIC RAILROAD NAME

DRAINAGE
- DITCH
- CROSSHATCH FOR OPEN WATER

DRAINAGE ANNOTAION
- LAKE CEDAR CREEK — MAJOR ANNOTATION
- MINOR ANNOTATION

SIDEWALK
- EDGE OF SIDEWALK

STRUCTURES
- BUILDING (EXISTING PERMANENT) WITH SHADING
- BUILDING (EXISTING TEMPORARY)
- BUILDING (EXISTING SEMI-PERMANENT) WITH SHADING
- EXISTING STRUCTURES-BELOW GRADE SLAB ONLY, NO BUILDING
- PB — PORTABLE BUILDING

STRUCTURE ANNOTATION
- FOUNDATION — UNDER CONSTRUCTION, FOUNDATION
- 1750 — BUILDING NUMBER
- ELEM. SCHOOL — MINOR ANNOTATION

PARKINGS
- PARKINGS

AIRFIELD PAVEMENTS
- EXISTING

CULTURAL LINES
- CULTURAL ITEMS (SOLID)
- POOLS
- STORAGE TANK
- TOWER
- BILLBOARDS
- GUARDRAIL
- DAM
- LEVEE
- RETAINING WALL
- QUARRY PIT

- AREA OUTLINE
- STEPS

CONTOURS
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- INDEX DEPRESSION
- DEPRESSION

CONTOUR ANNOTATION
- 1720 — CONTOUR ANNOTATION

SPOT ELEVATION
- SPOT ELEVATION

FACILITY FEATURE SYMBOL
- HEADWALL, CULVERT
- ARRESTING BARRIERS
- ANTENNAS
- HYDRANT, LATERAL CONTROL PIT, FUEL & DEFUEL POINTS
- 80' STEEL POLE W/2-1500 WATT FLOODLIGHTS.

NORTH

MAG. DEC. 7° 50' 57.8" E
YEAR 30 OCT 91
ANNUAL CHANGE - 5.8' W

400 0 400 800 1200
AIRFIELD ELEVATION 650 FEET

LEGEND

- GAS MAIN CARSWELL A.F.B.
- LONE STAR GAS MAINS & SERVICE LINES
- VALVE
- (2) PIPE SIZE

NOTE: ALL PIPE MATERIAL IS STEEL

- METER

NORTH-SOUTH PRIMARY/INSTRUMENT RUNWAY 12,000'X 300' N 0° 34'E

NO. 151 · NO. 130 · NO. 150 · NO. 202

35 · 17

NORTH-SOUTH · T/W 197 · TAXIWAY

LONE STAR GAS TRANSMISSION LINE 20-25 LBS. PSI

AIRCRAFT ASSEMBLY PLANT

APRON

LAKE WORTH

HEATING PLANT BLDG. 1432
2 BOILERS 7,700 EACH
4,869,954 BTU PER HOUR
1 STANDBY GEN.

NOTE: SEPARATE METER CONNECTIONS TO EACH WHERRY HOUSE BY LONE STAR GAS CO. MAXIMUM PRESSURE 8 OZ. P.S.I. MINIMUM PRESSURE 4 OZ. P.S.I.

MAG. DEC. 7°51.50'E
YEAR 1 MARCH 1977
ANNUAL CHANGE - 5.8'W

NORTH

AIRFIELD ELEVATION 650 FEET

REV	DATE	DESCRIPTION	INITIAL
	30SEP84	ANNUAL REVISION - UPDATE	MAM
	30SEP83	ANNUAL REVISION - NO CHANGE	D.A.S.
	30SEP82	ANNUAL REVISION - NO CHANGE	V.R.K.
	30SEP81	ANNUAL REVISION - NO CHANGE	L.A.S.

PLAN REVISIONS

DEPARTMENT OF THE AIR FORCE
DIRECTORATE OF CIVIL ENGINEERING DCS/P&R - WASHINGTON, D.C.

STRATEGIC AIR COMMAND

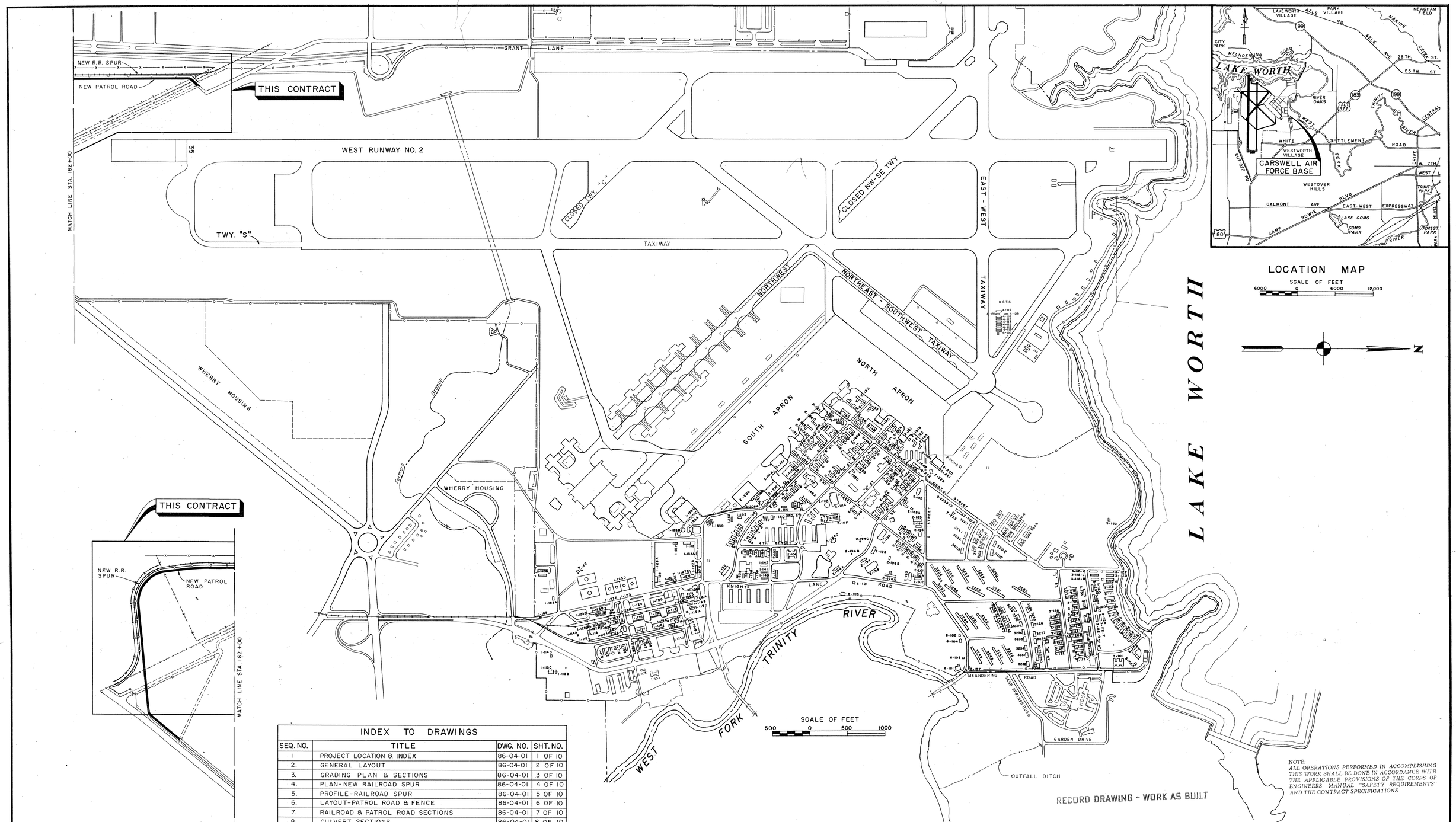
MASTER PLAN
GAS SYSTEM
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS.

SCALE 1" = 400' | DATE: JAN. 1969 | TAB NO. G | SHEET 5 OF

MASTER PLANNING DIRECTIVE

CARTER & BURGESS - ENGINEERS
FORT WORTH, TEXAS

CONTRACT



INDEX TO DRAWINGS			
SEQ. NO.	TITLE	DWG. NO.	SHT. NO.
1	PROJECT LOCATION & INDEX	86-04-01	1 OF 10
2.	GENERAL LAYOUT	86-04-01	2 OF 10
3.	GRADING PLAN & SECTIONS	86-04-01	3 OF 10
4.	PLAN-NEW RAILROAD SPUR	86-04-01	4 OF 10
5.	PROFILE-RAILROAD SPUR	86-04-01	5 OF 10
6.	LAYOUT-PATROL ROAD & FENCE	86-04-01	6 OF 10
7.	RAILROAD & PATROL ROAD SECTIONS	86-04-01	7 OF 10
8.	CULVERT SECTIONS	86-04-01	8 OF 10
9.	FENCE DETAILS	86-04-01	9 OF 10
10.	PLAN - LOG OF BORINGS	86-04-01	10 OF 10

NOTE:
ALL OPERATIONS PERFORMED IN ACCOMPLISHING THIS WORK SHALL BE DONE IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE CORPS OF ENGINEERS MANUAL "SAFETY REQUIREMENTS" AND THE CONTRACT SPECIFICATIONS

RECORD DRAWING - WORK AS BUILT

CONTR. NO. DA-41-443-ENG- 5379

JOB NO. CARSWELL-ACRP-AF, ITEM 6012

REVISION	DATE	DESCRIPTION	BY

CORPS OF ENGINEERS
U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER
FORT WORTH, TEXAS

DRAWN BY: B. J. M.
TRACED BY: B. W. H.
CHECKED BY: B. J. M.
SUBMITTED BY: [illegible]
ENGINEER

CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS
ADDITIONAL RUNWAY GRADING & R.R. SPUR RELOCATION
PROJECT LOCATION & INDEX

RECOMMENDED: [illegible] CHIEF, DESIGN BRANCH
RECOMMENDED: [illegible] CH. E.I. MILITARY BRANCH
APPROVAL RECOMMENDED: [illegible] CHIEF, ENGINEERING DIVISION
APPROVED: [illegible] COL., C.E., DISTRICT ENGINEER

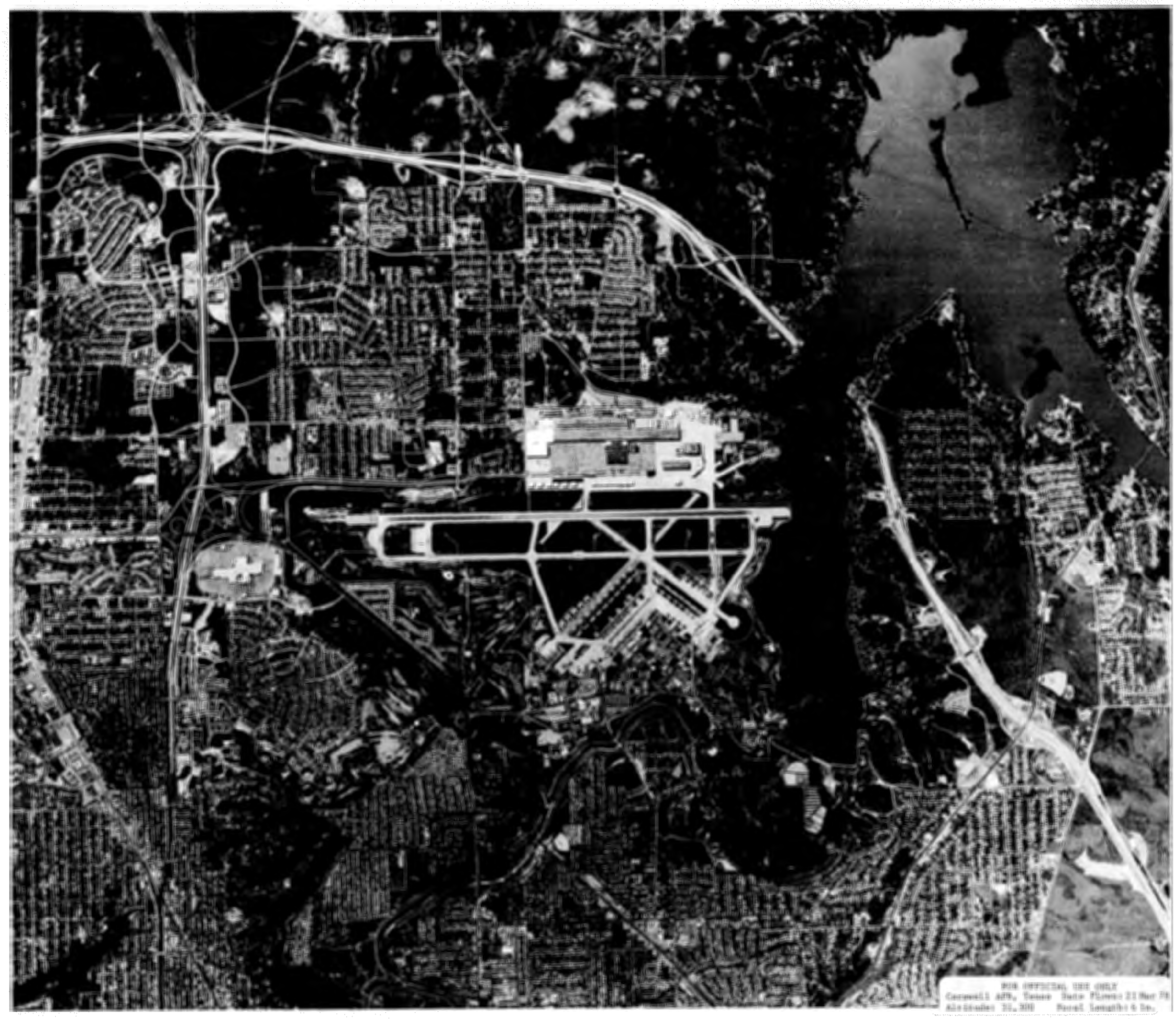
SCALE: AS SHOWN
SPEC. DATE: OCT. 1958
INVITATION No. ENG-41-443-59-15
DWG. NO. 86-04-01
SHEET 1 OF 10
FILE No. TRIN. 285-81

000585-A-7-43 (1)

LAKE WORTH
SCALE: 1" = 200'
CALIBRATION YARD
WEATHER SURVEILLANCE TOWER
MAN HOLE
2-4" FIBER DUCT
SKEET RANGE
RADIO H.F. RECEIVER
OFFICERS CLUB
OFFICERS MESS
TENNIS COURTS
CRASH BOAT
J STREET
I STREET
H STREET
G STREET
C STREET
A STREET
6TH STREET
MC ROBERTS STREETS
WARD STREET
BOYDSTON STREET
1ST STREET
2ND STREET
3RD STREET
4TH STREET
5TH STREET
BROWN STREET
MEANDERING ROAD
KNIGHTS LAKE ROAD
N.C.O. MESS
THEATER
SWIMMING POOL
WATER TANK
DORM.
VAULT
DWELLING
RED CROSS
LARGE HANG-R-A (MODIFIED) 2-205
SMALL HANG. (MODIFIED)
12,000 GAL SOLVENT TANK
MOTOR POOL
A.C. STORAGE
Q.M. GASOLINE
CONCRETE DRAIN
NORTH WAREHOUSE STREET
SOUTH WAREHOUSE STREET
WEST WAREHOUSE STREET
EAST WAREHOUSE STREET
A.C. FUELING SYSTEM NO. 1
A.C. FUELING SYSTEM NO. 2
PUMPS
LUMBER SHED
RACK UTILITY SHOP
WASH
ELECTRIC SWITCHING
ELECTRIC SUB-STATION
GAS CHAMBER
PISTOL RANGE
FIRING TUNNEL
GAS REGULATOR HOUSE
OPERATIONS SHELTER
POWER SHELTER
MH#0 (Modified B) 0+00
P.B.#1 2+95
P.B.#2 6+25 6+53
Trestle #1 7+08
MH#1 9+55
Trestle #2 11+40 11+92
P.B.#3 12+04
P.B.#3A 12+55
Trestle #3 13+50 14+02
MH#2 15+86
MH#2A 19+16
P.B.#4 22+46
Trestle #4 23+37 24+18
P.B.#4A 24+69
MH#3 25+77
MH#4 28+88
MH#5 32+35
MH#6 33+40
MH#7 38+70
MH#8 42+00
MH#9 45+30
MH#12 52+30
MH A 55+55
P.B.#5 53+97
TRINITY RIVER
WEST FORK OF TRINITY RIVER
G.T. 6
G.T. 14
G.T. 15
1-165 GEN. BLDG.
1-164 V.H.F. D.F.
S 80+00
S 70+00
S 60+00
S 50+00
S 40+00
S 30+00
S 20+00
R-30+00
R-40+00
R-50+00
R-60+00
R-70+00
R-80+00
STRATEGIC AIR COMMAND
FORT WORTH, TEXAS
CARSWELL AIR FORCE BASE
BASE LAYOUT
G.C.A. SYSTEM
REV | DATE | DESCRIPTION | SUBT'D | REC'D | APP'D
DESIGNED | DRAWN | TRACED | CHECKED
DATE 7/13/51
SUBMITTED
BASE ENGINEER
APPROVED
COMMANDING OFFICER
RECOMMENDED
AIR INSTALLATIONS OFFICER
DRAWING NUMBER
CR 400/212

Appendix D
Historical Aerial Photographs

021
1-111
1011-001


NOT OFFICIAL USE ONLY

OCTOBER 6, 1992
(M-1-487) I-5
(12-9000-MB) TARRANT CO
WORTH TEX., N39°
755.