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SITE INVESTIGATION SITE CHARACTERIZATION FOR AEROSPACE MUSEUM SITE AND  
GROUNDS MAINTENANCE YARD SAMPLING AND ANALYSIS PLAN WITH TRANSMITTAL  
LETTER NAS FORT WORTH TX  
9/1/1995  
LAW ENGINEERING AND ENVIRONMENTAL



**NAVAL AIR STATION  
FORT WORTH JRB  
CARSWELL FIELD  
TEXAS**

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**ADMINISTRATIVE RECORD  
COVER SHEET**

AR File Number 363

11-3517-3209

INSTALLATION RESTORATION PROGRAM (IRP)  
SITE INVESTIGATION/SITE CHARACTERIZATION  
FOR AEROSPACE MUSEUM SITE  
AND GROUNDS MAINTENANCE YARD

**SAMPLING & ANALYSIS PLAN**

Naval Air Station Fort Worth Joint Reserve Base, Carswell Field  
Fort Worth, Texas

September 1995

Final



PREPARED FOR

AIR FORCE BASE CONVERSION AGENCY (AFBCA/OL-H)  
NAVAL AIR STATION FORT WORTH JOINT RESERVE BASE, CARSWELL FIELD  
FORT WORTH, TEXAS 76127-5000

UNITED STATES AIR FORCE  
AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE (AFCEE/ERB)  
BROOKS AIR FORCE BASE, TEXAS 78235-5328

CONTRACT NO.: F41624-94-D-8050  
DELIVERY ORDER 3209



**LAW**

ENGINEERING AND ENVIRONMENTAL SERVICES

September 11, 1995

Air Force Center for Environmental Excellence  
HQ AFCEE/ESB  
8001 Inner Circle Drive  
Suite 2  
Brooks Air Force Base, TX 78235-5328

Attention: Mr. Charles Rice (Team Chief)

**Subject: Final Sampling and Analysis Plan  
Site Investigation/Site Characterization  
Aerospace Museum Site and Grounds Maintenance Yard  
Naval Air Station Fort Worth Joint Reserve Base, Carswell Field  
Contract No. F41624-94-D-8050, Delivery Order No. 0009  
Law Project No. 11-3517-3209**

Dear Mr. Rice:

Law Environmental, Inc., is pleased to submit the enclosed four copies of the Site Investigation/Site Characterization Final Sampling and Analysis Plan to the Air Force Center for Environmental Excellence (AFCEE). Scoping documents for the Fire Training Area No. 2 (FTA-2) investigation, included as part of this delivery order, will be submitted under separate cover as an addendum to these scoping documents.

If you have questions or comments, please contact us at (404) 499-6800.

Sincerely,

**LAW ENVIRONMENTAL, INC.**

  
James R. Forbes, P.E.  
Project Manager

  
E. Fred Sharpe, Jr., P.E.  
Principal

**LAW ENVIRONMENTAL, INC.  
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INSTALLATION RESTORATION PROGRAM (IRP)

SITE INVESTIGATION/SITE CHARACTERIZATION

FOR

AEROSPACE MUSEUM SITE AND GROUNDS MAINTENANCE YARD

FINAL SAMPLING AND ANALYSIS PLAN

FOR

NAVAL AIR STATION FORT WORTH JOINT RESERVE BASE, CARSWELL FIELD

FORT WORTH, TEXAS 76127-5000

SEPTEMBER 1995

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United States Air Force  
Air Force Center For Environmental Excellence (AFCEE/ERB)  
Brooks Air Force Base, Texas 78235-5328

Contract F41624-94-D-8050

Delivery Order 0009

**DISCLAIMER NOTICE**

This document has been prepared for the United States Air Force by Law Environmental, Inc. for the purpose of initiating a base-wide monitoring program at the Naval Air Station Fort Worth Joint Reserve Base, Carswell Field under the Air Force Installation Restoration Program (IRP). Subsequent information may become known which may make this plan premature or inaccurate. Acceptance of this document does not mean that the Air Force adopts the conclusions, recommendations or other views expressed herein, which are those of the contractor only and do not necessarily reflect the official position of the United States Air Force.

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**SAMPLING AND ANALYSIS PLAN  
PREFACE**

Law Environmental, Inc., (LAW) was contracted by the U.S. Air Force Center for Environmental Excellence (AFCEE) to perform a Site Investigation/Site Characterization at two sites at the Naval Air Station Fort Worth Joint Reserve Base, Carswell Field. The two sites to be investigated are the Aerospace Museum Site and the Grounds Maintenance Yard. The primary objective of this field investigation is to further characterize the condition of site soils. Project objectives will be achieved by collecting soil samples for laboratory analysis.

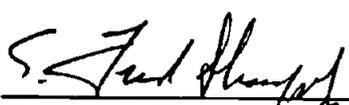
The Sampling and Analysis Plan (SAP) outlines the site objectives, the data quality objectives, the field activities, sample collection, and laboratory analytical procedures required for the project.

The SAP is composed of two documents - the Quality Assurance Project Plan (QAPP) and the Field Sampling Plan (FSP).

The QAPP consists of detailed information on defining and assuring that the Data Quality Objectives (DQOs) are achieved. DQOs are considered through various project tasks, including writing of plans, field work, and laboratory analysis. The QAPP delineates the procedures necessary to achieve DQO goals.

The FSP describes field tasks necessary for implementing the project objectives. Field tasks are described in detail to ensure that the DQOs are achieved during field activities.

  
\_\_\_\_\_  
James R. Forbes  
Project Manager

  
\_\_\_\_\_  
E. Fred Sharpe, Jr., P.E.  
Principal

**PURPOSE OF DOCUMENT**

This Sampling and Analysis Plan (SAP) has been developed for the Naval Air Station Fort Worth Joint Reserve Base, Carswell Field. Procedures outlined in this plan are designed to describe the collection of soil samples, laboratory analysis of those samples, evaluation of the analytical results and field measurements with respect to quality control data, and the interpretation and analysis of all data collected. The plan will be effective after final approval.

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## LIST OF ACRONYMS AND ABBREVIATIONS

AB	ambient conditions blank
ABB-ENV	ABB Environmental Services, Inc.
AFBCA	Air Force Base Conversion Agency
AFCEE	Air Force Center for Environmental Excellence
ARAR	applicable or relevant and appropriate requirements
ASTM	American Society for Testing and Materials
BFB	4-bromo-fluorobenzene
CA	corrective action
CCB	continuing calibration blank
CCC	continuing calibration check
CCV	continuing calibration verification
CE	civil engineering
CEO	chief executive officer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (PL-96-510) - Superfund
CES	Civil Engineering Squadron
CF	calibration factor
CFR	Code of Federal Regulations
CLP	contract laboratory program
CV	coefficient of variation
CVAA	cold vapor atomic absorption
DFTPP	decafluorotriphenylphosphine
DOT	Department of Transportation
DQO	data quality objectives
EB	equipment blank (rinsate)
EICP	extracted ion current profile
EMSL	USEPA Environmental Monitoring Systems Laboratory
FS	feasibility study
FSP	field sampling plan
GC/MS	gas chromatography/mass spectrometry
GFAA	graphite furnace atomic absorption

3 5 3 . 2 7

**LIST OF ACRONYMS AND ABBREVIATIONS**  
**(Continued)**

ICB	initial calibration blank
ICP	inductively coupled plasma
ICV	initial calibration verification
ID	sample identification
IDL	instrument detection limit
IRP	Installation Restoration Program
IRPIMS	Installation Restoration Program Information Management System
ITIR	Informal Technical Information Report
LAW	Law Environmental, Inc.
LCS	laboratory control standards
LENL-P	Law Environmental National Laboratories - Pensacola, Florida
MCL	maximum contaminant level
MDL	method detection limit
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
MW	monitoring well
NAS Fort Worth	Naval Air Station Fort Worth Joint Reserve Base, Carswell Field
NCP	National Contingency Plan
NTU	nephelometric turbidity unit
OSWER	Office of Solid Waste and Emergency Response
PARCC	precision, accuracy, representativeness, completeness, comparability
PCB	polychlorinated biphenyls
PE	professional engineer
PID	photoionization detector
POC	point of contact
ppb	parts per billion
ppm	parts per million
PQL	practical quantitation limit

LIST OF ACRONYMS AND ABBREVIATIONS  
(Continued)

QA	quality assurance
QA/QC	quality assurance/quality control
QAMS	quality assurance management staff
QAPP	Quality Assurance Project Plan
QC	quality control
QCCS	quality control check samples
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RF	response factor
RLS	registered land surveyors
RPD	relative percent difference
RRF	relative response factor
RRT	relative retention time
RSD	relative standard deviation
RT	retention time
S	standard deviation
SAP	Sampling and Analysis Plan
SB	soil boring
SC	specific conductance
SD	surface sediment
SI	site investigation
SOP	standard operating procedures
SOW	Statement of Work
SPCC	system performance check compound
SPT	standard penetration test
SW	surface water
SWMU	solid waste management unit
TB	trip blank
TC	team chief
TNRCC	Texas Natural Resource Conservation Commission
TPM	technical project manager

**LIST OF ACRONYMS AND ABBREVIATIONS**  
**(Continued)**

TWC	Texas Water Commission
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
$\mu\text{g/L}$	micrograms per liter

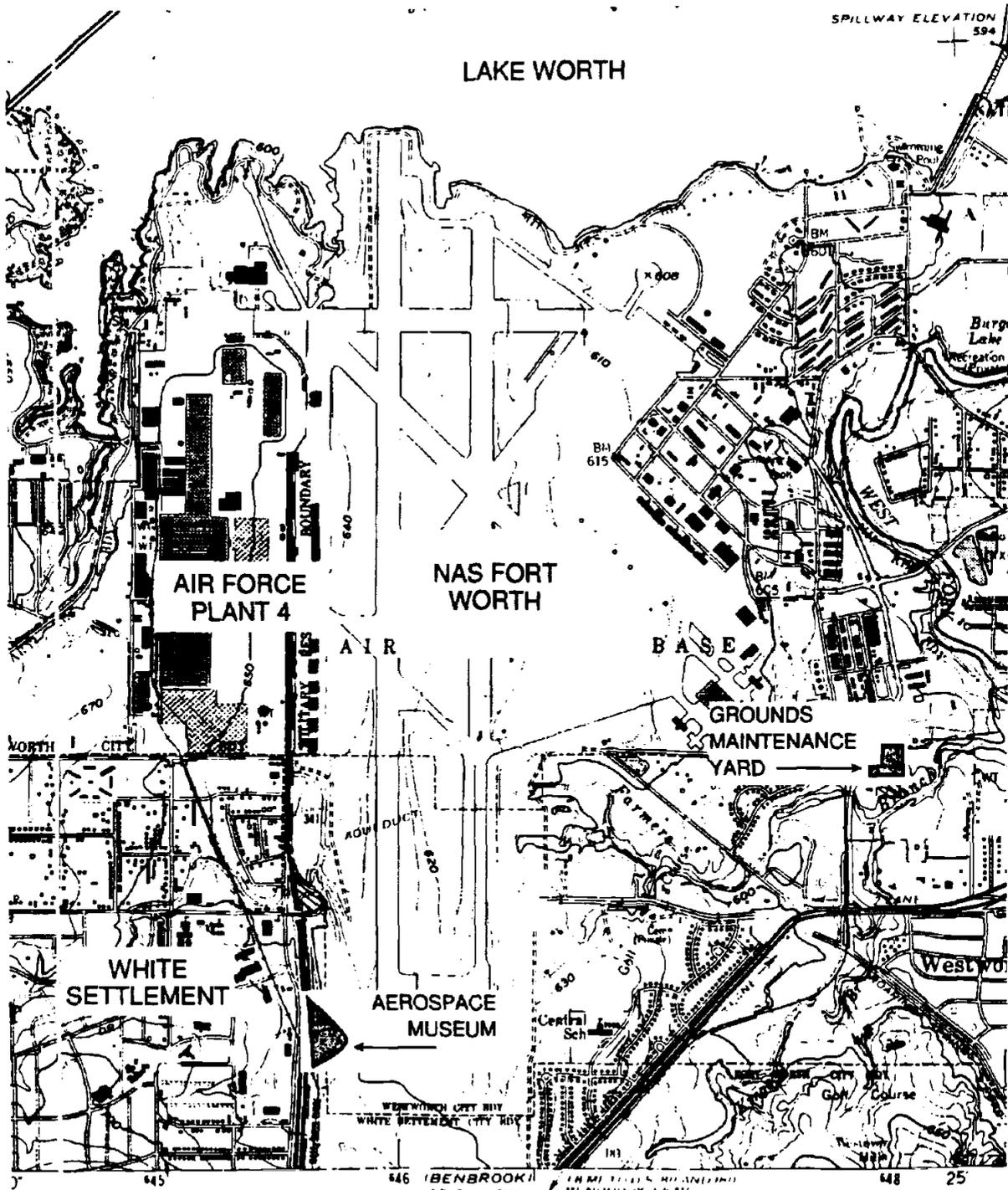
## 1.0 QUALITY ASSURANCE PROJECT PLAN

### 1.1 INTRODUCTION

This quality assurance project plan (QAPP) is provided in support of the United States Air Force Installation Restoration Program (IRP) for the Site Investigation/Site Characterization of the Aerospace Museum Site and Grounds Maintenance Yard at the Naval Air Station Fort Worth Joint Reserve Base, Carswell Field (Figure 1-1). Solid waste management unit (SWMU) numbers have not been assigned to either the Aerospace Museum Site or the Grounds Maintenance Yard; however, both sites have been listed as Areas of Concern by the Texas Natural Resource Conservation Commission (TNRCC). This investigation will be conducted in accordance with the Air Force Center for Environmental Excellence (AFCEE) Statement of Work (SOW) for Delivery Order 0009, dated August 19, 1994, and in accordance with the Law Environmental, Inc., (LAW) SOW interpretation letter, dated January 27, 1995 (LAW, 1995b). The AFCEE Handbook (AFCEE, 1993) will be used as a source of supplemental guidance in developing the approach to the project.

#### 1.1.1 The U.S. Air Force Installation Restoration Program

The objective of the U.S. Air Force's IRP is to assess past hazardous waste disposal and spill sites at Air Force installations and to develop remedial actions consistent with the National Contingency Plan (NCP) for those sites which present a threat to human health and welfare or the environment. Additional information regarding the IRP is discussed in Section 1.1 of the work plan.



UNITED STATES AIR FORCE  
 NAVAL AIR STATION FORT WORTH, JOINT RESERVE BASE  
 FORT WORTH, TEXAS

SITE INVESTIGATION/SITE CHARACTERIZATION

SITE  
 VICINITY MAP

Source: USGS Lake Worth, Texas Topographic Quadrangle, 1982  
 USGA Benbrook, Texas Topographic Quadrangle, 1981

PREPARED/DATE:	JRF / 03 AUG 95	FIGURE NUMBER:	1-1	FILE DATE:	02 AUG 95
CHECKED BY/DATE:	EFS / 04 AUG 95			PLOT DATE:	04 AUG 95
PROJECT No.:	11-3517-3200			FILE NAME:	3517-3200.01

### 1.1.2 Purpose and Scope

The sampling and analysis plan (SAP) describes those procedures necessary to perform the sampling and analytical activities during the execution of the project's scope of work. The elements addressed in the SAP include:

- Acquisition of soil samples
- Decontamination of equipment
- Calibration of field instruments
- Maintenance of laboratory and field quality assurance/quality control (QA/QC)
- Chemical analysis
- Preventative maintenance
- Data quality assessment
- Corrective action
- Quality control checks
- Quality assurance audits and reports

Specific quality control requirements are listed in Appendix A.

### 1.2 PROJECT DESCRIPTION

An initial site characterization of the Aerospace Museum Site and Grounds Maintenance Yard will be conducted under this delivery order.

The following sections present the project background, scope and objectives.

### 1.2.1 Project Background

The following subsections describe the site background and previous work performed at the sites as it pertains to this SAP.

1.2.1.1 Aerospace Museum Site - The Aerospace Museum Site is located along Spur 341, the western portion of NAS Fort Worth, south of Air Force Plant No. 4 (AFP-4) (Figure 1-2). The property was acquired in 1947 as part of the expansion of the Fort Worth Army Airfield, later renamed as Carswell Air Force Base. This 12.5-acre museum site has been used for display of various aircraft, vehicles, and storage equipment since 1977. A records search indicated that an asphalt batching plant was previously located at the site in the early 1960s. Also, a B-52 bomber was previously stored and dismantled at the site, resulting in small chips of aircraft skin being buried in the surface soil of the site. NAS Fort Worth personnel conducted a site survey on April 9, 1993, (NAS Fort Worth, 1993) and reported the following:

- Several spots of stressed vegetation and dark oily spots near aircraft and ground vehicle displays
- Stressed vegetation along the west fence line and randomly throughout the aircraft display area
- A 55-gallon drum of material assumed to be waste grease
- Discarded paint cans
- A 55-gallon drum of cleaning compound
- Several rusted and unidentifiable cans and drums.

In October 1994, LAW and AFCEE representatives met at NAS Fort Worth to visit the Aerospace Museum Site and found that the site debris listed above had been removed and neither surface staining nor stressed vegetation were evident.



**LEGEND:**



AREA OF AEROSPACE MUSEUM SITE

(INDUSTRIAL AREA)

AUTOMOBILE BODY SHOP/JUNK YARD

SPUR 341

AEROSPACE MUSEUM SITE

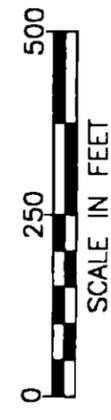
FARMERS BRANCH

BEGINNING OF  
AQUEDUCT

WHITE SETTLEMENT ROAD

NO. 130 NORTH-SOUTH PRIMARY/INSTRUMENT RUNWAY

191



UNITED STATES AIR FORCE  
NAVAL AIR STATION FORT WORTH, JOINT RESERVE BASE  
FORT WORTH, TEXAS

SITE INVESTIGATION/SITE CHARACTERIZATION  
SAMPLING AND ANALYSIS PLAN

**AEROSPACE MUSEUM SITE MAP**

PREPARED BY:	FIGURE NUMBER:	FILE DATE:
CHECKED BY:	1-2	02 MAY. 95
PROJECT NO. 11-3517-3209		PLOT DATE: 02 AUG. 95
		FILE NAME: arm-site1.dwg

1.2.1.2 Grounds Maintenance Yard - The Grounds Maintenance Yard is located east of the main gate, between Rogner Drive and Farmers Branch (Figure 1-3). The Grounds Maintenance Yard is a graveled yard with two small maintenance buildings, a pesticide storage shed, and two 500 gallon aboveground gasoline storage tanks contained within a concrete berm. A site walk-through survey conducted by LAW and AFCEE personnel found some soil staining and the location of areas suspected to have contained chemical storage sheds and/or petroleum storage tanks.

### 1.2.2 Project Scope and Objectives

The site-specific project objectives are described in the following subsections. Project objectives will be accomplished through the collection of environmental samples, the laboratory analysis of these samples, the evaluation of the analytical results and field measurements with respect to quality control data, and the interpretation and evaluation of all data collected.

1.2.2.1 Project Objective for Aerospace Museum Site - The project objective is to conduct an initial site characterization to determine the presence or absence of contamination in surface soils resulting from previous site activities, which included the storage and restoration of surplus aircraft to use as museum pieces. Potential contaminants include lubricants, solvents, and aircraft paint. The site is not included in the RCRA Part B permit dated February 1991.

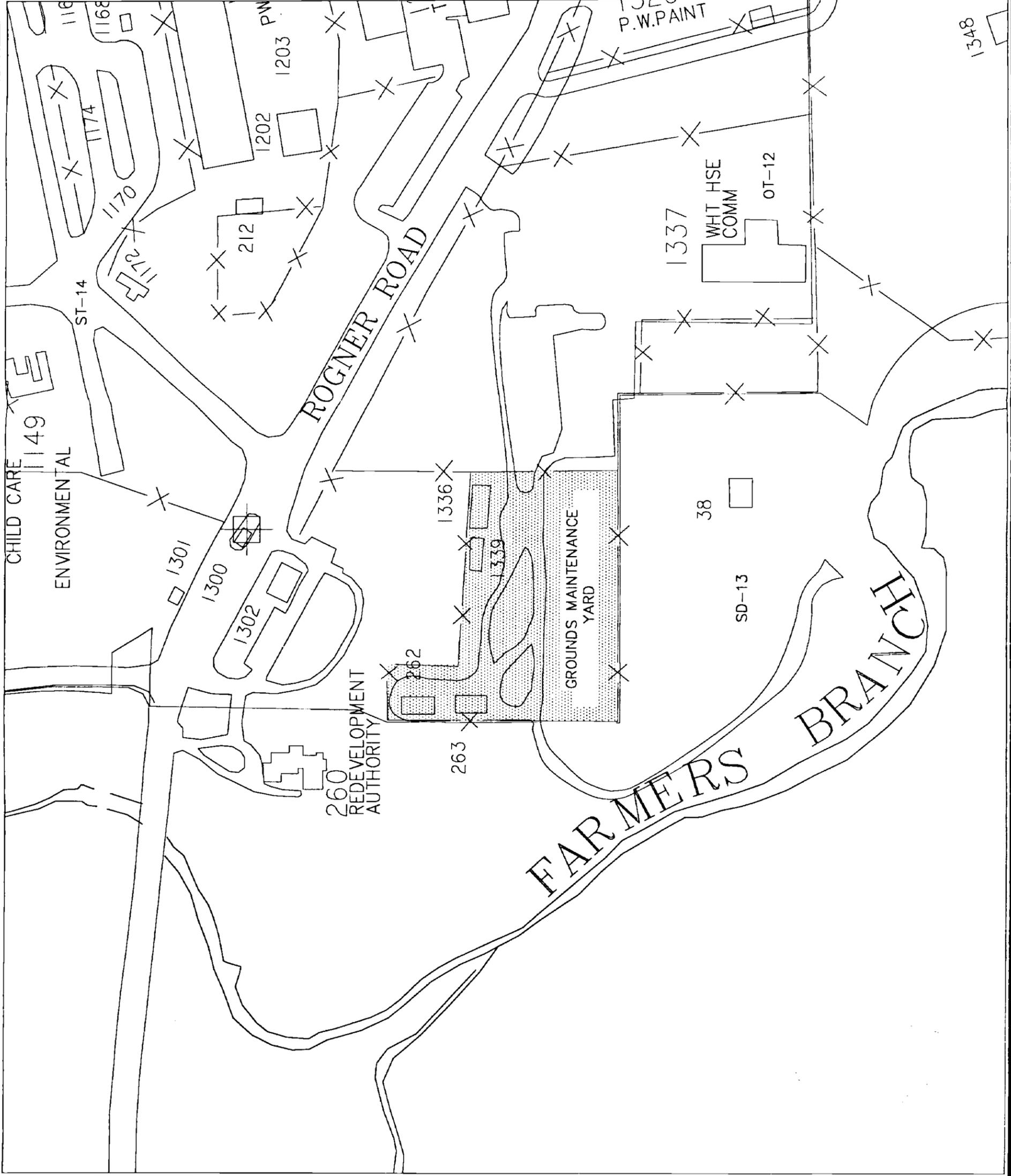
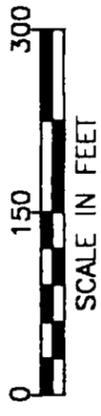
Samples of the surface soil will be collected from 0 to 2 feet and analyzed for volatile organics, semi-volatile organics, and metals. Approximately 49 samples will be collected from locations selected from a grid layout of the site. Sampling locations occur at 100-foot intervals, but locations may be offset approximately where obvious soil staining is observed, at source areas identified during the field effort, or at locations with accumulations of aircraft debris.



**LEGEND:**



AREA OF GROUNDS MAINTENANCE YARD



UNITED STATES AIR FORCE  
NAVAL AIR STATION FORT WORTH, JOINT RESERVE BASE  
FORT WORTH, TEXAS

SITE INVESTIGATION/SITE CHARACTERIZATION  
SAMPLING AND ANALYSIS PLAN

**GROUNDS MAINTENANCE YARD  
SITE MAP**

PREPARED BY: *Sept 1995*  
CHECKED BY: *CSH 7 Sep 95*  
PROJECT NO.: 11-3517-3209

FIGURE NUMBER: 1-3  
FILE DATE: 03.MAY.95  
PLOT DATE: 05.SEP.T.95  
FILE NAME: gmy-map1.dwg

The data quality objective for the analytical results is selected to achieve definitive chemical data. Analyses will be performed using SW-846 methods. Full IRP Handbook compliance is not a requirement for the chemical data for this project because the data are intended to be used only for the determination of the presence or absence of contamination. All laboratory quality control protocols will be followed and the quality control results will be reported. The laboratory results will be verified and data evaluation will be performed by LAW. Results of the sampling effort will be compared to site-specific background concentrations.

1.2.2.2 Project Objective for Grounds Maintenance Yard - The project objective is to conduct an initial site characterization to determine the presence or absence of contamination in surface soils resulting from past operations, which included storage and maintenance of groundskeeping equipment, and storage of pesticides, solvents, and fuels. Potential contaminants include lubricants, fuels, solvents, and pesticides. The site is not included in the RCRA Part B permit dated February 1991.

Samples of the surface soil will be collected from 0 to 2 feet and analyzed for volatile organics, semi-volatile organics, metals, pesticides/PCBs, and herbicides. Approximately 30 samples will be collected from locations selected from a grid layout of the site. Sampling locations occur at approximately 60-foot intervals, but locations may be offset where stained areas occur near the two maintenance buildings and former pesticide storage building, in the area of the former petroleum storage tanks, and locations where obvious soil staining is observed.

The data quality objective for the analytical results is selected to achieve definitive chemical data. Analyses will be performed using SW-846 methods. Full IRP Handbook compliance is not a requirement for the chemical data for this project because the data are intended to be used only for the determination of the presence

or absence of contamination. All laboratory quality control protocols will be followed and the quality control results will be reported. The laboratory results will be verified and data evaluation will be performed by LAW.

Results of the sampling effort will be compared to site-specific background concentrations.

### 1.2.3 Subcontractors

The subcontractors to be utilized for this investigation along with the services to be performed are identified in Section 1.3.

## 1.3 PROJECT ORGANIZATION AND RESPONSIBILITIES

Project organization and responsibilities for this project are discussed in the following sections.

### 1.3.1 Project Organization

LAW will manage the project and provide services related to field sampling, data analysis, site characterization, and reporting.

The project organization is shown on Figure 1-4.

1.3.1.1 Law Environmental, Inc. - LAW will provide the project management, engineering and analysis, and sampling through its in-house resources. Law Environmental, Inc., is a wholly-owned subsidiary of Law Companies Group, Inc. Law Companies Group, Inc., is an employee-owned company.

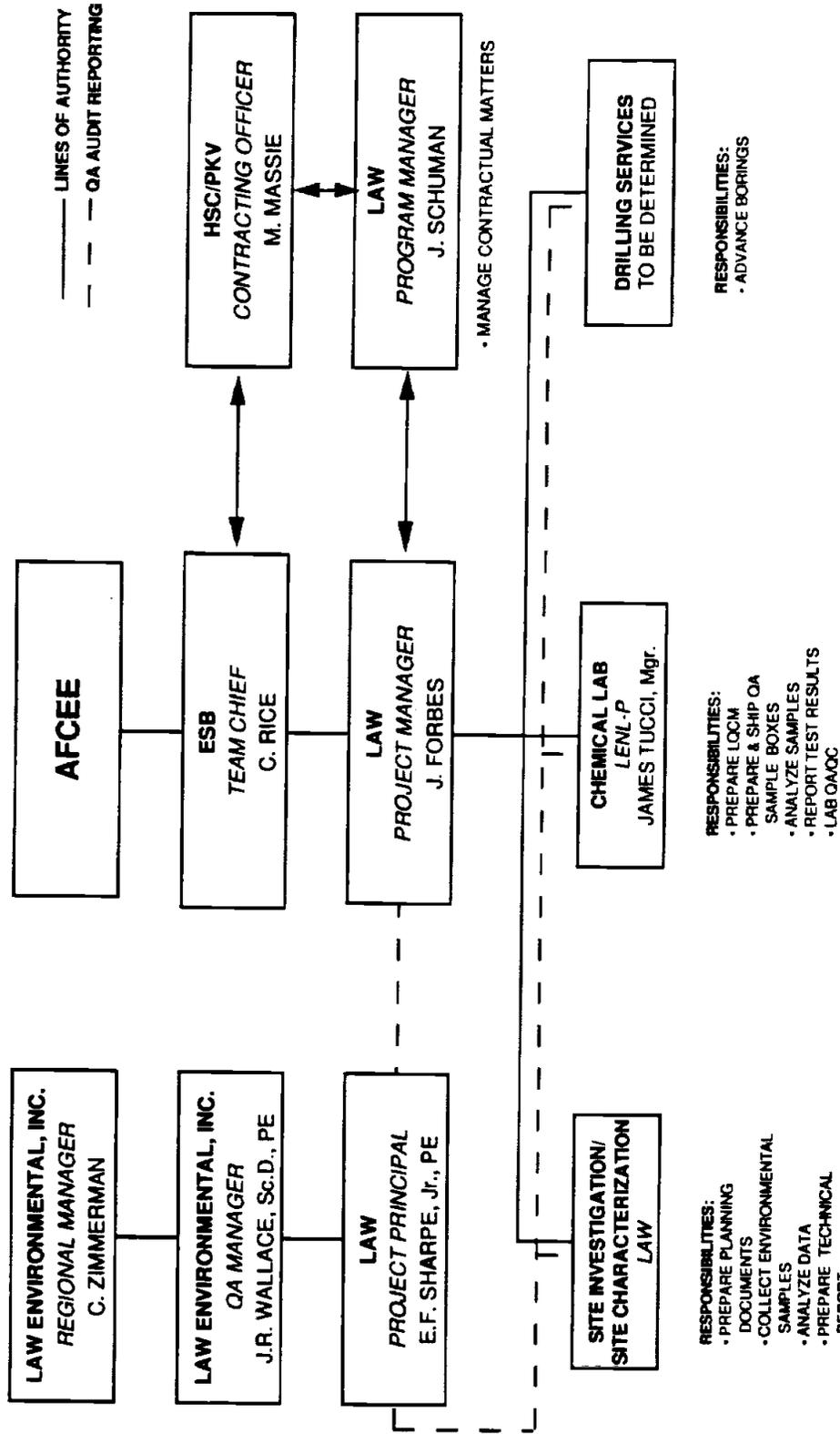
1.3.1.2 Chemical Analysis Laboratory - The Law Environmental, Inc., National Laboratories facility in Pensacola, Florida (LENL-P), is a LAW chemical testing laboratory which was established in 1989. LENL-P will be the laboratory responsible for providing

# PROJECT ORGANIZATION AND QUALITY MANAGEMENT RESPONSIBILITIES

## SITE INVESTIGATION/SITE CHARACTERIZATION

### NAVAL AIR STATION FORT WORTH, JOINT RESERVE BASE FORT WORTH, TEXAS

FIGURE 1-4



sample shipping containers, chain-of-custody documents, chemical analysis, reporting, and laboratory quality assurance/quality control (QA/QC). LENL-P will report directly to the LAW project manager during the project. LENL-P has integrated QA/QC procedures into their laboratory design and standard operating procedures. LENL-P is certified in several states. In order to perform analyses for AFCEE projects, LENL-P has undergone and complied fully with audits conducted under the auspices of the Air Force. LENL-P's key personnel and their positions and responsibilities are outlined in Appendix B.

### 1.3.2 Key Project Individuals

Key participants for this project include the project principal, project manager, site manager, project chemist, laboratory project manager, field team, and project safety officer. The following paragraphs provide a description of the proposed project assignments and responsibilities, a list of individuals expected to serve in each capacity, and a brief synopsis of the participants' related experience.

1.3.2.1 Project Principal - The project principal, Mr. E. Fred Sharpe, Jr., P.E., will provide technical quality control, oversight and direction for all aspects of the site investigation and data evaluation. Mr. Sharpe has over 25 years of experience with Law Companies.

1.3.2.2 Project Manager - The project manager, Mr. James Forbes, will be responsible for the overall management of the project. He will coordinate office and field activities, provide administrative requirements, and supervise schedules, technical approach, implementation, and report preparation. Mr. Forbes has 18 years of professional experience in technical and project management with LAW.

1.3.2.3 Site Manager - The site manager will coordinate and supervise the field investigation activities. Mr. William Craig will serve as the site manager for this project. Mr. Craig has over five years of experience in site investigations and assessments.

1.3.2.4 Project Chemist - The project chemist will be responsible for preparing and implementing the field sampling, sample preservation, chain-of-custody documentation, and shipping activities. The project chemist will also perform data evaluation on the chemical data. Ms. Susan Max will serve as the project chemist for this investigation. Ms. Max is a Senior Chemist with over eight years of experience in environmental chemistry, QA/QC, and data evaluation.

1.3.2.5 Laboratory Project Manager - The laboratory project manager will be responsible for the handling and analysis of environmental samples received by the laboratory. This person will oversee sample distribution through the lab, analytical procedures, quality control, reporting, and sample disposal. Mr. James Tucci is LENL's chemical laboratory manager. His areas of expertise include environmental field studies, laboratory analyses and personnel management.

1.3.2.6 Field Team - The field team will perform on-site tasks contained in this plan, including analytical sampling under the direction of the site manager.

1.3.2.7 Project Safety Officer - The project safety officer, Mr. William Craig, will be responsible for the project site safety and health plan requirements. While conducting field activities, if a health and safety issue arises that is not covered by the health and safety plan, the project safety officer will contact LAW's health and safety coordinator, Mr. Jack Peng (404) 449-6752, who

will provide advice and assist in resolving any health and safety issues.

### 1.3.3 Project QA Responsibilities

LAW has established a strong internal quality assurance (QA) program with an associated QA Manual, Engineering Procedures Manual, Equipment Calibration Procedures Manual, and specialty manuals for hazardous waste site investigations and software documentation. LAW employees use these manuals as the basis for conducting company work within the QA program.

LAW's principal review system is an integral part of the QA Program. Each project is assigned to a principal reviewer who is responsible for maintaining the required professional quality from beginning to completion of the project. Every proposal and report must be reviewed and signed by a LAW principal with experience relevant to the area of work.

LAW will control the quality of subcontractor furnished data and services by source evaluation and selection, evaluation of objective evidence of quality compliance to procurement documents furnished to the subcontractor, site and/or source inspections, audits, and/or examination of items or services upon delivery or completion. Prior to the award of a subcontract, potential suppliers of quality affecting items or services will be evaluated by LAW personnel. The evaluation may be performed by any appropriate means, including, but not limited to surveys, inspections, audits, or surveillance, depending upon the complexity of the item or service being supplied. When the project principal deems it necessary, on-site audits of subcontractor facilities may be conducted under the quality assurance program. While the responsibility for quality remains with the subcontractor under his quality control program, LAW will conduct appropriate quality

assurance activities to determine compliance with the quality program.

#### 1.4 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

QA objectives for measurement data are expressed in terms of precision, accuracy, representativeness, completeness, and comparability (PARCC). QA objectives provide the mechanism for ongoing control and evaluation of measurement data quality throughout the project and will ultimately be used to define data quality for the various measurement parameters. These QA/QC objectives will be accomplished through the collection of field duplicates, rinsates, trip blanks, and field blanks. The analytical QA/QC will be assessed by the internal QC such as method blanks, laboratory control sample data, surrogate recoveries, adherence to holding times and matrix spike/matrix spike duplicate data. Quality control requirements and reporting limits are included in Appendix A.

##### 1.4.1 QA Criteria

The following sections list and define the QA criteria applicable to this project.

1.4.1.1 Accuracy - Accuracy refers to the degree of difference between measured or calculated values and the true value. The closer the numerical value of the measurement comes to the true value, or actual concentration, the more accurate the measurement. Analytical accuracy may be expressed as the percent recovery of an analyte which has been added to the environmental sample at a known concentration before analysis. For example, accuracy can be determined from the results of matrix spike analyses performed at the rate of one set every 20 samples or one per batch. The equation used to calculate percent recovery can be found in Section 1.13.1.

Sampling accuracy can be maximized by the adoption and adherence to a strict QA program. Specifically, all procedures will be documented and all equipment and instrumentation will be properly calibrated and well maintained. Trip blanks and equipment rinsates will be included in all sample batches to assess the potential for cross-contamination. The trip blank shall accompany each shipment of samples to be analyzed for volatile organic compounds. This blank will be analyzed for volatile compounds only. Equipment blanks shall be collected by each sampling team on each day of sampling. This blank will be analyzed for all laboratory analyses requested for the environmental samples. In addition to equipment operation and standard operating procedures, a high level of accuracy will be maintained by continuous monitoring and review of field procedures by site personnel. In this manner, any deficiencies will be quickly documented and corrected.

1.4.1.2 Precision - Precision refers to the reproducibility or degree of agreement among duplicate measurements of a single analyte. This allows for comparison of the results of duplicate samples analyzed by the same method. Analytical precision for a single analyte is expressed as a percentage of the difference between results of duplicate samples or matrix spike duplicates (MS/MSD) for a given analyte. Relative percent difference is calculated as shown in Section 1.13.1.

Precision will be determined through the collection of field duplicates and the analysis of matrix spikes and matrix spike duplicates. The chemist will select 1 sample in 20 (or 1 per batch, whichever is fewer) for that matrix and split the sample into three aliquots. The first aliquot will be analyzed routinely for the parameters of interest, while the other two aliquots will be spiked with known quantities of the parameters of interest prior to analysis. The relative percent difference (RPD) will be calculated and used as an indication of the precision for the analyses performed.

During the collection of data using field methods or field instrumentation, precision is checked by reporting several duplicate measurements taken at one location and comparing the results. Precision will be reported as the RPD for two results. Sample collection precision will be measured in the laboratory with the analysis of field replicates. Laboratory precision will be measured in the laboratory with the analysis of matrix spike duplicates.

1.4.1.3 Completeness - Completeness is expressed as the percentage of valid data obtained from a measurement system. The formula used to calculate completeness is found in Section 1.13.1.

Field sampling conditions are often unpredictable and nonuniform. However, the objective of the field sampling program is to obtain samples for all analyses required at each individual site, provide sufficient sample material to complete those analyses, and to collect QC samples to monitor all possible contamination potential; i.e., contamination during sample collection, transportation, and storage. If, for any reason, all of the samples are not sampled, or if they are sampled but not analyzed due to breakage or holding time exceedances, the amount of valid results is diminished by the appropriate number for all of the methods affected.

For analytical data to be considered valid, it must meet all acceptance criteria including accuracy, precision, and any other criteria specified for the analytical method used. Completeness is calculated after the data has been evaluated and qualified. All results not qualified with an "R" flag are considered valid and are included in the numerator of the equation. Estimated ("J" flagged) data are included as valid results because the objective of this project is to determine only the presence or absence of contamination. The completeness goal is evaluated for each analyte by method and takes into account both field sampling completeness

and analytical completeness. The overall data quality objective for completeness during this investigation is 90 percent.

Methods for which more than 10 percent of the samples fail the sampling, accuracy, or precision data quality objectives may be reanalyzed (providing adequate sample volume and holding times are met) or resampled (with approval of the project manager) to meet data quality objectives.

Critical data points are those samples necessary in order to achieve the project objectives (i.e., background-samples). In the event a critical data point is not available, resampling may be required.

1.4.1.4 Representativeness - Representativeness is defined by the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. If the results are reproducible, the data can be said to represent the environmental condition. Representativeness is ensured by collecting sufficient samples of an environmental medium, properly chosen with respect to place and time. The precision of a representative set of samples reflects the degree of variability of the sampled medium, as well as the effectiveness of the sampling techniques and laboratory analysis.

For this project, the sampling locations have been chosen from a grid layout in order to collect representative samples from each site. Sampling locations may be offset to coincide with observations of soil staining or stressed vegetation. All laboratory methods have been chosen from SW-846 analytical protocols which are the preferred methodologies for IRP environmental activities.

1.4.1.5 Comparability - Comparability is defined by the confidence with which one data set can be compared to another. Field and laboratory procedures affect comparability. To optimize comparability, only the EPA established methods and protocols that have been specified as appropriate for this investigation will be used to collect and analyze samples.

1.4.1.6 Analytical Levels - Data generated by the soil sampling activities are categorized into two groups: field screening data and laboratory generated data.

Field screening data (field measurements) are collected to conduct health and safety monitoring described in the health and safety plan. For this project, breathing zone readings will be taken using a PID detector. The instrument used to gather the data will be calibrated and maintained as described in the Field Sampling Plan and real-time results will be recorded in the field log books.

The definitive data for this project is produced using SW-846 methods as described in Table 1-1. The laboratory will perform the requested methods, meet specified limits (method detection limits and surrogate recoveries), and implement any corrective actions needed as listed in Appendix A.

The laboratory generated data will be adequately documented and of sufficient quality to provide legally defensible data. Laboratory requirements include complete data documentation and archival. Laboratory reports will include all soil results corrected for dry weight; surrogate, matrix spike, and method blank results; and method calibration and continuing calibration verifications.

#### 1.4.2 Goals

Method-specific goals for precision and accuracy are presented in Appendix A-2. Comparability goals will be met by adhering to the

TABLE 1-1

**ANALYTICAL TEST METHODS  
Naval Air Station Fort Worth Joint Reserve Base  
Fort Worth, Texas**

MATRIX: SOIL	METHOD* (soil/water)	HOLDING TIMES	
		Soils	Waters
Volatile Organics	SW 8240	A: 14 d	A: 14 d
Semi-Volatile Organics	SW 8270	P: 14 d A: 40 d	P: 7 d A: 40 d
Herbicides <sup>b</sup>	SW 8150	P: 14 d A: 40 d	P: 7 d A: 40 d
Pesticides/PCBs <sup>c</sup>	SW 8080	P: 14 d A: 40 d	P: 7 d A: 40 d
Total Metals Screen	SW 6010	180 d	180 d
Arsenic	SW 7060	180 d	180 d
Lead	SW 7421	180 d	180 d
Selenium	SW 7740	180 d	180 d
Mercury	SW 7471/7470	28 d	28 d

A = Analyzed      P = Prepped      d = days

\* Test Methods for Evaluation of Solid Waste, SW-846 (Third Edition)

<sup>b</sup> Herbicides collected at Grounds Maintenance Yard only.

<sup>c</sup> Pesticides collected at Grounds Maintenance Yard only.

Note: (1) If the lead concentration detected on the inductively coupled plasma (ICP) is >5 x the instrument detection limit (IDL) on the ICP, the ICP value can be used. If the lead concentration detected on the ICP is <5 x the IDL on the ICP, then the Graphite Furnace Atomic Absorption(GFAA) analysis is required.

(2) Preparation methods for soil samples are SW 3550 for semi-volatiles and pesticides/PCBs, and SW 3050 for metals (except for arsenic). Preparation methods for water samples are SW 3520 for semi-volatiles and pesticides/PCBs, SW 3005 for metals by SW 6010, and SW 3020 for lead.

PREPARED/DATE: DRJ 2-10-95

CHECKED/DATE: SM 2-13-95

use of standard sampling and analytical methods, and through the use of quality control samples. The overall completeness goal (valid data) for this project will be 90 percent for each analyte by method. Valid data is defined as all data which has not been qualified as rejected. Failure to meet the completeness goal may result in the resampling and reanalysis of samples.

### 1.5 SAMPLING PROCEDURES

Sampling procedures consist of sample collection, transport, and storage protocols. The protocols which pertain to the field activities are presented in detail in the Field Sampling Plan (FSP) and are only referenced here. Sample collection, transport, and storage guidance documents to be adhered to are listed below:

- Test Methods for Evaluating Solid Wastes, Third Edition, EPA SW-846, November 1986 (USEPA, 1986)
- Handbook to Support the Installation Restoration Program (IRP) Statements of Work, September 1993 (AFCEE, 1993)

Detailed sampling protocols are presented in Section 2.2.

### 1.6 SAMPLE CUSTODY

Sample custody procedures during the collection of samples in the field and sample receipt in the laboratory are discussed in the following subsections.

#### 1.6.1 Field Operations

Maintenance of sample custody in the field starts with the collection, preservation, and labeling of the sample. Documentation of field sampling activities will be performed and a chain-of-custody form will be initiated. Specific procedures for

the maintenance and documentation of the custody of the samples in the field is discussed in detail in the Field Sampling Plan.

#### 1.6.2 Laboratory Operations

Sample custody and documentation procedures in the laboratory are outlined in Figure 1-5. Upon receipt of the samples at the laboratory the chain-of-custody documentation is reviewed and completed. The laboratory documents the condition, temperature, and appropriate preservation the samples. The laboratory then assigns a laboratory identification number and initiates internal chain-of-custody procedures. These procedures include limited access to sample storage areas within the laboratory; documentation of samples checked out by technicians and analysts; standard labeling practices for sample aliquots, extracts and digestates; and documented sample disposal practices. If discrepancies in any of these procedures occur, the laboratory will notify Law and institute the appropriate corrective actions.

#### 1.7 FIELD EQUIPMENT CALIBRATION PROCEDURES

Several instruments will be used in the field investigation. These instruments consist of a photoionization detector, oxygen monitor, and combustible gas indicator. Each field instrument will be calibrated a minimum of twice a day. Calibration data will be documented in the field book. Details of calibration and maintenance are presented in Section 2.3 of the FSP.

#### 1.8 ANALYTICAL PROCEDURES

The following sections identify the analytical methods to be used, sample holding times, detection limits, and calibration requirements.

FIGURE 1-5

LENL SAMPLE FLOW AND DOCUMENTATION CHART

Sample Flow		Documentation	
A.	Incoming Samples	-	Chain of Custody
		-	Request for Analysis
		-	Work Authorization
B.	Log-In and Assignment	-	Master Logbook
		-	Test Entry Form
C.	Sample Handling and QC	-	Extraction Record
	(1) Organics Prep Lab	-	Percent Moisture
		-	Standards Prep Logs
		-	QC Sample Logs
	(2) GC Lab	-	Chromatograms
		-	Bench Sheets
		-	Condition Reports
		-	Linearity Checks
		-	Surrogate Recovery Logs
		-	Blank, Standard and Spike Results
		-	Standards Logbook
	(3) GC/MS Lab	-	Instrument Maintenance Logs
		-	Sample Logbook
		-	Quantitation Reports
		-	Chromatograms
		-	Initial Calibration Forms
		-	Continuing Calibration Checks
		-	Surrogate Recovery Logs
		-	Blank, Standard and Spike Results
		-	Computer Streamer Tapes
		-	Instrument Maintenance Logs
	(4) Metals Lab	-	Digestion Log
		-	Bench sheets
		-	Blank, Standard and Spike Results
		-	Percent Moisture
		-	Standards Prep Logs
		-	QC Sample Logs
D.	Reporting	-	Transmittal Letters
		-	Test Data Reports
		-	GC/MS Data Reports
E.	Sample Disposal	-	Internal Sample Disposal Forms

1.8.1 Analytical Methods and Holding Times

Samples will be transported to the laboratory for analysis as expeditiously as possible. Upon receipt of the samples, the laboratory will evaluate whether holding times have been exceeded. If at any time the laboratory is aware of a holding time exceedance, the laboratory representative will contact LAW in order to determine a course of corrective action. If completeness goals are not met as a result of holding time exceedances, resampling will be performed at no additional cost to the Air Force. The analytical methods and associated holding times are presented in Table 1-1.

1.8.2 Detection Limits and Quantitation Criteria

1.8.2.1 Terminology - Each analytical result will be reported as a detected concentration or as less than the instrument detection limit (IDL) for inorganic methods. For organic methods, results will be reported as a detected concentration or as less than the practical quantitation limit (PQL). Soil results will be reported corrected for moisture in parts per million (mg/kg) for organics and inorganics. Method detection limits (MDLs), IDLs, and PQLs are defined below.

1.8.2.2 Procedures - The following procedures are used to establish limits of detection and quantification.

Method detection limits (MDL) are established using the required USEPA procedure specified in 40 CFR Part 136 Appendix B. The MDL is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the value is above zero. A data pool of at least seven standards analyzed at a concentration approximately three times the anticipated MDL is generated. The MDL is estimated by employing the "t" distribution with a 99 percent confidence interval by the following equation:

$$MDL = (t)(S)$$

where:

- t = is a factor for n-1 degrees of freedom  
at the 99 percent confidence factor
- S = is the standard deviation of the data  
pool

Instrument detection limits (IDL) are established by the USEPA Contract Laboratory Program (CLP) protocol, which allows for generating a data pool by analyzing a minimum of seven standards at three times the anticipated IDL on three nonconsecutive days. The standard deviation (S) of the seven data for each of the three days is calculated and the IDL established by the following equation:

$$IDL = \frac{S1 + S2 + S3}{3} * 3$$

The PQL is the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. PQLs are often derived from the calculated MDL or IDL. Soil PQLs for this project are derived from MDLs resulting from detection limit studies performed on laboratory water. The values obtained from the water studies are adjusted for the conversion to soil units and then factored by a method-specific multiplier. For this project, the laboratory PQL is defined as the reporting limit. In cases where AFCEE PQLs cannot routinely be achieved, a request for variance will be issued to the team chief.

1.8.2.3 Values - The laboratory established detection and quantitation limits are listed in Appendix A-1.

### 1.8.3 Method Calibration

The calibration procedures, preparation of calibration standards, and frequency of initial and continuing calibration checks are described for each analytical method in the following subsections.

At a minimum, all instruments and other equipment used by LAW will be calibrated and maintained at the recommended intervals prescribed by the analytical method employed. In those cases where it has been demonstrated that more frequent calibration or maintenance is required, the base method will be enhanced as necessary. Calibration checks and preventive maintenance procedures are permanently recorded in a log book for future reference. Whenever possible, calibration checks on instruments and support equipment are performed using reference materials (e.g., weights) which are traceable to the USEPA Environmental Monitoring Systems Laboratory (EMSL) or bear certificates of standardization from the National Institute of Standards and Technology.

All chemical standards used by LAW are certified to have the highest reasonable purity with assays or certificates of analysis provided with material. All materials are purchased from established and reputable chemical suppliers. All standard materials are dated and stored under appropriate conditions in order to maintain chemical stability. Each time a specific standard is prepared, the material mass and dilution information is recorded in the standards record book. All prepared standards (stock and working) are labeled in reference to the book number, page number, and entry number of the Analytical Standards Preparations Record Book. Additionally, the description, date, and preparation technician's name are recorded on the standard label.

1.8.3.1 Organics by Gas Chromatography (GC) with Second Column Confirmation - Pesticide/PCB analyses performed by gas chromatography will follow EPA Method 8080 and herbicide analyses will follow EPA Method 8150. Second column confirmation is required for samples which exhibit a positive result at or above the PQL. The primary column to be used is DB-5 and the secondary column is DB-608. The confirmation system must be calibrated and subject to the same QC as the primary GC system. Data from both

analyses will be reported and the laboratory will identify the most reliable of the two results. Prior to calibration, retention time windows for each standard on each GC column are determined whenever a new GC column is installed as follows.

Three injections of each standard are made over a 72-hour period at approximately equal intervals. A standard deviation is calculated from the three absolute retention times. For multi-response analytes, one major peak is chosen from the envelope for the retention time study. Retention time windows for each analyte are updated daily at a minimum and are equal to the continuing calibration analyte retention time plus or minus three times the standard deviation determined in the study. If the retention time window for an analyte is zero, a standard deviation of a similar compound is used.

Tentative identification of an analyte occurs when a peak from a sample falls within the daily retention time window. Multi-response analytes are identified primarily by pattern recognition.

Calibration procedures for both systems are presented below.

1. GC system is checked daily prior to analysis of samples by reviewing temperatures of injector parts, detectors and columns, verifying that the system is set up according to the method specifications to ensure reliability and reproducibility of analytical results.
2. The gas chromatograph is calibrated with five standards and a calibration blank using external standard technique.
3. If the percent relative standard deviation (RSD) of the calibration factor (CF) for the five standards is less than or equal to 20 percent, then the average CF is used for quantitation. If the CF is greater than 20 percent, a calibration curve is established by plotting response versus amount.

4. After development of each new five-point gas calibration and at the start of every analytical sequence, a mid-point initial calibration verification (ICV) containing all single peak analytes of interest is run. Pesticide/PCB standards also include Toxaphene, Chlordane, and Aroclors 1016/1260. The standard's CF must agree with the initial calibration average CF within plus or minus 15 percent difference (D). For a calibration curve, the CF of the mid-point initial calibration standard is compared to the ICV CF.
5. After every ten samples within the sequence and at the end of the sequence, a mid-level continuing calibration verification (CCV) is analyzed which must be within plus or minus 15 percent difference (D) of the ICV. For a calibration curve, the CF of the mid-point initial calibration standard is compared to the CF of the CCV.
6. The retention time (RT) for all identified analytes in an analytical sequence must match the RT windows calculated for the analytical standards.
7. Second column analysis is also subject to the preceding acceptance criteria.

1.8.3.2 Volatile and Semi-Volatile Organics by Gas Chromatography/Mass Spectrometry (GC/MS) - Analyses performed by GC/MS will follow EPA Method 8240 (Volatile) and EPA Method 8270 (Semi-Volatile). This includes the following calibration procedure:

1. Instrument calibration will be performed every 12-hour time period. The GC/MS will be tuned to meet ion abundance criteria given in Tables 1-2 and 1-3 for decafluorotriphenylphosphine (DFTPP) or 4-bromofluorobenzene (BFB).
2. Initial calibration will be performed on calibration standards at five concentration levels containing all analytes of interest and each surrogate standard.

The relative retention time (RRT) of each compound in each calibration run should agree within 0.06 RRT units. The average relative response factor (RRF) and percent RSD is calculated for each compound. The RRF for the System Performance Check

TABLE 1-2

**DFTPP KEY IONS AND ABUNDANCE CRITERIA\***  
**Naval Air Station Fort Worth Joint Reserve Base**  
**Fort Worth, Texas**

Mass	Ion Abundance Criteria
51	30-60% of mass 198
68	< 2% of mass 69
70	< 2% of mass 69
127	40-60% of mass 198
197	< 1% of mass 198
198	Base peak, 100% relative abundance
199	5-9% of mass 198
275	10-30% of mass 198
365	> 1% of mass 198
441	Present but less than mass 443
442	> 40% of mass 198
443	17-23% of mass 442

\*J.W. Eichelberger, L.E. Harris, and W.L. Budde. "Reference Compound to Calibrate Ion Abundance Measurement in Gas Chromatography-Mass Spectrometry," *Analytical Chemistry*, 47, 995 (1975).

TABLE 1-3

**BFB KEY IONS AND ABUNDANCE CRITERIA\***  
**Naval Air Station Fort Worth Joint Reserve Base**  
**Fort Worth, Texas**

MASS	ION ABUNDANCE CRITERIA
50	15-40% of mass 95
75	30-60% of mass 95
95	base peak, 100% relative abundance
96	5-9% of mass 95
173	less than 2% of mass 174
174	greater than 50% of mass 95
175	5-9% of mass 174
176	greater than 95% but less than 101% of mass 174
177	5-9% of mass 176

\* EPA Method 8240, SW-846, 3rd Edition, November 1986.

Compounds (SPCC) must be greater than or equal to 0.300 (0.250 for Bromoform) for volatiles and must be greater than or equal to 0.050 for semi-volatiles. The percent RSD for the Calibration Check compounds (CCC) must not exceed 30 percent. The percent RSD for the other compounds should be less than 30 percent. If not, a notation is made in the sample documentation. The following SPCC and CCC compounds will be monitored:

#### SPCC

Volatiles: Chloromethane, 1,1-Dichloroethane, Bromoform, 1,1,2,2-Tetrachloroethane, Chlorobenzene

Semi-volatiles: N-nitroso-di-n-propylamine, Hexachlorocyclopentadiene, 2,4-Dinitrophenol, 4-Nitrophenol)

#### CCC

Volatiles: Vinyl chloride, 1,1-Dichloroethene, Chloroform, 1,2-Dichloropropane, Toluene, Ethylbenzene

Semi-volatiles: Base/Neutrals - Acenaphthene, 1,4-Dichlorobenzene, Hexachlorobutadiene, N-Nitroso-di-n-phenylamine, Di-n-octylphthalate, Fluoranthene, Benzo(a)pyrene; Acids - 4-Chloro-3-methylphenol, 2,4-Dichlorophenol, 2-Nitrophenol, Phenol, Pentachlorophenol, 2,4,6-Trichlorophenol

3. After the preparation of each new initial five-point calibration curve and after tune criteria are met for each 12-hour time period, the initial calibration is verified (using a midpoint calibration standard containing all analytes) prior to running any samples. This initial calibration verification (ICV) must satisfy the above SPCC criteria. In addition, the percent difference (%D) for the CCC must be less than or equal to 25 percent for the volatiles and less than or equal to 30 percent for the semi-volatiles. If these criteria are not met for any single CCC, corrective action must be taken or a new five point calibration must be performed.
4. Internal standards for GC/MS volatiles will be added to each sample, standard and reagent blank. The final concentration of each internal standard will be 10 µg/L. The internal standards are as follows:

- Bromochloromethane
- 1,4-Difluorobenzene
- Chlorobenzene-d<sub>3</sub>

Table 1-4 presents the volatile analytes quantitated by each internal standard.

Internal standards for GC/MS semi-volatiles will be added to each sample, standard, and reagent blank. The final concentration of each internal standard will be 40 nanograms per microliter (ng/ $\mu$ L). The internal standards are as follows:

- 1,4-Dichlorobenzene-d<sub>4</sub>
- Naphthalene-d<sub>8</sub>
- Acenaphthene-d<sub>10</sub>
- Phenanthrene-d<sub>10</sub>
- Chrysene-d<sub>12</sub>
- Perylene-d<sub>12</sub>

Table 1-5 presents the semi-volatile analytes quantitated by each internal standard.

1.8.3.3 Metals by Inductively Coupled Plasma (ICP) - Metal analyses by the ICP method will follow current EPA SW846 method procedures. The instrument must be calibrated daily or once every 24 hours and each time the instrument is set up. This includes the following calibration procedure:

1. Verify instrument is operating satisfactorily by checking automatic gain setting and optical alignment.
2. Calibrate instrument with matrix matched mixed standards at four concentration levels and a blank. The correlation coefficient must be greater than or equal to 0.995.
3. Verify the calibration with a 2nd source Initial Calibration Verification (ICV) standard. The observed result must be plus or minus 10 percent of the expected value.
4. Verify the calibration blank. The observed result must be less than three times the detection limit.
5. Verify high-level standard calibration. The observed result must be plus or minus 5 percent of expected value.

TABLE 1-4

**VOLATILE INTERNAL STANDARDS WITH CORRESPONDING ANALYTES  
ASSIGNED FOR QUANTITATION  
Naval Air Station Fort Worth Joint Reserve Base  
Fort Worth, Texas**

BROMOCHLOROMETHANE	1,4-DIFLUOROBENZENE	CHLOROBENZENE-d5
Chloromethane	Trichloroethene	Chlorobenzene
Vinyl chloride	1,2-Dichloropropane	Ethylbenzene
Bromomethane	Bromodichloromethane	Styrene
Chloroethane	2-Chloroethyl vinyl ether	Bromoform
Acetone	cis-1,3-Dichloropropene	1,1,2,2-Tetrachloroethane
Carbon disulfide	trans-1,3-Dichloropropene	Xylenes(total)
1,1-Dichloroethene	Dibromochloromethane	Bromofluorobenzene(surr)
Methylene chloride	1,1,2-Trichloroethane	
trans-1,2-Dichloroethene	Tetrachloroethene	
1,1-Dichloroethane	Toluene	
Vinyl acetate	4-Methyl-2-pentanone	
cis-1,2-Dichloroethene	2-Hexanone	
2-Butanone	Toluene-d8(surr)	
Chloroform		
1,1,1-Trichloroethane		
Carbon tetrachloride		
Benzene		
1,2-Dichloroethane		
1,2-Dichloroethane-d4(surr)		

TABLE 1-5

**SEMI-VOLATILE INTERNAL STANDARDS WITH CORRESPONDING ANALYTES  
ASSIGNED FOR QUANTITATION  
Naval Air Station Fort Worth Joint Reserve Base  
Fort Worth, Texas**

1,4-DICHLOROBENZENE-d4	NAPHTHALENE-d8	ACENAPHTHENE-d10
Phenol	Nitrobenzene	Hexachlorocyclopentadiene
bis(2-Chlorethyl)ether	Isophorone	2,4,6-Trichlorophenol
2-Chlorophenol	2-Nitrophenol	2,4,5-Trichlorophenol
1,3-Dichlorobenzene	2,4-Dimethylphenol	2-Chloronaphthalene
1,4-Dichlorobenzene	Benzoic acid	2-Nitroaniline
Benzyl alcohol	bis(2-Chloroethoxy)methane	Dimethylphthalate
1,2-Dichlorobenzene	2,4-Dichlorophenol	Acenaphthylene
2-Methylphenol	1,2,4-Trichlorobenzene	2,4-Dinitrophenol
bis(2-Chloroisopropyl)ether	Naphthalene	3-Nitroaniline
4-Methylphenol	4-Chloroaniline	Acenaphthene
N-nitrosodi-n-propylamine	Hexachlorobutadiene	4-Nitrophenol
Hexachloroethane	4-Chloro-3-methylphenol	Dibenzofuran
2-Fluorophenol(surr)	2-Methylnaphthalene	2,4-Dinitrotoluene
Phenol-d6(surr)	Nitrobenzene-d5(surr)	2,6-Dinitrotoluene
		Diethylphthalate
		4-Chlorophenyl phenyl ether
		Fluorene
		4-Nitroaniline
		2-Fluorobiphenyl(surr)

TABLE 1-5

SEMI-VOLATILE INTERNAL STANDARDS WITH CORRESPONDING ANALYTES  
 ASSIGNED FOR QUANTITATION  
 Naval Air Station Fort Worth Joint Reserve Base  
 Fort Worth, Texas

PHENANTHRENE-d10	CHRYSENE-d12	PERYLENE-d12
4-6-Dinitro-2-methylphenol	Pyrene	Di-n-octyl-phthalate
N-nitrosodi-phenylamine	Butyl benzyl phthalate	Benzo(b)fluoranthene
4-Bromophenyl phenyl ether	3,3'-Dichlorobenzidine	Benzo(k)fluoranthene
Hexachlorobenzene	Benz(a)anthracene	Benzo(a)pyrene
Pentachlorophenol	Chrysene	Indeno(1,2,3-cd)pyrene
Phenanthrene	bis(2-Ethylhexyl)phthalate	Dibenz(a,h)anthracene
Anthracene	Terphenyl-d14(surr)	Benzo(g,h,i)perylene
Di-n-butyl-phthalate		
Fluoranthene		
2,4,6-Tribromophenol(surr)		

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6. Every ten samples, a Continuing Calibration Verification (CCV)/Continuing Calibration Blank (CCB) pair is run which must be plus or minus 10 percent of expected value and less than three times detection limit, respectively.
7. Check for interferences. An interference check solution must be analyzed at the beginning and at the end of the run (or at least every 8 hours); refer to EPA Methods for acceptable limits which are plus or minus 20 percent. The interference check solution contains aluminum, calcium, iron, and magnesium.

1.8.3.4 Cold-Vapor Atomic Absorption - Mercury is analyzed using cold-vapor atomic absorption (CVAA). An aliquot of sample is acidified and then undergoes a heated, oxidation digestion with potassium permanganate and potassium persulfate. After digestion, a solution of sodium chloride-hydroxylamine sulfate is added to the sample digestate to reduce excess permanganate and remove free chlorine. A reducing agent (stannous chloride) is then added to the solution, resulting in a reduction of the mercury to an elemental state. The elemental mercury is aerated from the solution in a closed system and the mercury vapor content is measured as it passes through a cell positioned in the light path of an atomic absorption spectrophotometer. The calibration procedure is as follows:

1. Optimize instrument setting and alignment by maximizing the energy setting.
2. Align cell minimizing absorbance reading.
3. Calibrate instrument with standards at five concentration levels and a blank. The correlation coefficient must be greater than or equal to 0.995.
4. Verify calibration by running an initial calibration verification standard (ICV) and a calibration blank (ICB). The observed result of the ICV must be within plus or minus 10 percent of the expected value and the observed result of the calibration blank must be less than the detection limit.

5. Analyze a CCV/CCB pair every ten samples. The response must be within 20 percent of the initial response and less than three times the detection limit, respectively.

1.8.3.5 Metals by Graphite Furnace Atomic Absorption (GFAA) - Metal analyses performed by the GFAA method will follow current EPA SW 846 Methods. Instrument must be calibrated daily or once every 24 hours and each time the instrument is set up. This includes the following calibration procedures:

1. The lamp must be peaked for position and for wavelength (the temperature of the furnace is automatically calibrated at 2,600 degrees Centigrade).
2. After the proper conditions for each element are programmed for furnace operation, distilled water is injected and run as a sample. This is done several times until the instrument response produces a steady base line absorbance.
3. Verify instrument is operating satisfactorily by checking the energy output of the lamp and by checking the characteristic mass on the midpoint standard, which must be plus or minus 10 percent of the true value for that standard.
4. Calibrate instrument with four standards and a calibration blank. The calibration curve must have a correlation coefficient of greater than or equal to 0.995.
5. Verify the calibration with a second source Initial Calibration Verification (ICV) standard. The observed result must be within plus or minus 10 percent of the expected result.
6. Verify the calibration blank. The blank must be less than three times detection limit.
7. Verify low level standard calibration.
8. Every ten samples, a continuing calibration verification (CCV) and continuing calibration blank (CCB) pair is run and must be plus or minus 10 percent of expected value and less than the detection limit, respectively.

1.9 DATA REDUCTION, VALIDATION, AND REPORTING

The following sections describe the reduction, validation, and reporting of data after samples are analyzed.

1.9.1 Data Management

Analytical data are collected and processed in the laboratory in accordance with the requirements of the laboratory's protocols. These requirements include data entry and review, report assembly, and document review.

1.9.2 Data Reduction

Computerized data systems are present for all analytical equipment. The majority of data reduction is performed on the data station associated with that particular piece of equipment.

The analyst performs the analysis and enters the data on the parameter bench sheet and corresponding data station(s). Bench sheets contain all necessary information to establish sample identity, integrity, calibration evaluation, and analytical observation/results to process/validate the sample test data. A bench sheet key is provided to the analyst which specifies the way in which bench sheets are to be filled out (i.e., notation, significant figures, etc.), the data reduction formula and the QC samples required and their control criteria. QC samples include duplicates, matrix spikes, or matrix spike duplicates, CCV samples, etc. Calculations are performed on the data station or on specialized software utilized by the MIS Department. Raw data are to be reduced as specified by each analytical method and reported in the following units:

	<u>SOLID</u>
Organic parameters	mg/kg
Inorganic parameters	mg/kg

Note that for the organic and inorganic parameters, solid results will be corrected for the percentage of solids in the sample ("dry weight"). Each analytical result will be reported as a detected concentration or as less than the IDL or PQL (see Section 1.8.2).

### 1.9.3 Data Quality Assessment

The parameters of precision, accuracy, representativeness, completeness, and comparability are indicators of data quality (USEPA, 1987a). Establishing goals for these parameters serves to guide the choice of the analytical methodology. It also establishes a strategy for the evaluation of the data once it has been acquired to determine whether the goals of the project have been met. Upon receipt from the laboratory, the chemical analysis data will be evaluated by the LAW project chemist against predetermined criteria to determine whether data quality meets the requirements of the project. The laboratory quality control (QC) data and the field QC data will be evaluated to objectively ascertain the quality of the data. The data quality will then be compared to the project requirements found in Appendix A. If quality control problems are found, qualification of the affected data points will be recommended. Upon determination of the level of quality for each data point, the data interpretation can be performed. The following sections describe the data quality evaluation and data qualification process.

1.9.3.1 Data Quality Evaluation - The objective of the evaluation of the quality of the chemical data is to determine if qualifications of the data are necessary. This evaluation will be made by the LAW project chemist who has over five years of environmental chemistry experience. The evaluation includes reviews of the laboratory QC data, the field QC data, and the project DQOs presented in Section 1.4. The first step will be to perform an evaluation of the laboratory QC data. This will provide a rating of the quality of each data point produced by the laboratory. The second part will provide an overall rating of each

data point based upon the field QC data. The final step in the evaluation will compare the quality of the data acquired to the project's DQOs to determine whether the data are useful. These three steps are described in the following subsections. Each step will be completely documented. The overall goal of the data quality evaluation is to determine whether the data can be used to satisfy the objectives of the project.

Evaluation of Laboratory QC Data - Analytical data will be reviewed by the project chemist following LAW's Standard Operating Procedures for Chemical Data Quality Evaluation (LAW, 1995a). These procedures are based on the USEPA's data validation guidelines for qualification of chemical data. The data evaluation process is documented on method-specific evaluation forms provided in the LAW standard operating procedures. All data evaluation documentation is reviewed by a LAW senior chemist.

Laboratory QC data for an analytical parameter fall within one of eight categories for evaluation purposes. These categories are listed in Table 1-6 in the order in which they will be considered. All QC data provided will be evaluated against the criteria established by each method as presented in this document to achieve the objectives of this project. Each review will be completely documented to indicate the criteria used and the results and recommendations of the evaluation. For this investigation, the evaluation of calibration data will be performed.

Evaluation of Field QC Data - Field QC data for an analytical parameter fall within one of eight categories for evaluation purposes. These categories are also listed in Table 1-6 in the order in which they will be considered. Field QC data reported will be evaluated to assure the objectives of this project are achieved. Each review will be completely documented to indicate the criteria used and the results and recommendations of the evaluation.

TABLE 1-6

**DATA EVALUATION CATEGORIES**  
**Naval Air Station Fort Worth Joint Reserve Base**  
**Fort Worth, Texas**

CATEGORY	QC DATA EVALUATED
<b><u>LABORATORY QC:</u></b>	
1. Sample Integrity	Sample container condition; preservation performance and applicability; condition upon receipt at laboratory
2. Instrument Set-up/Method Applicability	Correct method; detection/quantitation limits achieved; method applicability for analytes and matrix, instrument set-up
3. Calibration Accuracy and Precision	Standard preparation; accuracy verification, precision achieved
4. Calibration Stability	Stability verification; frequency of performance
5. Laboratory Contamination	Laboratory blanks
6. Method Accuracy and Precision	Method accuracy and precision data
7. Sample Preparation	Procedures; holding times
8. Sample Analysis	Procedures and sequences; holding times; sample-specific accuracy and precision; interferences; dilutions
<b><u>FIELD QC:</u></b>	
1. Sample Integrity	Sample container condition; preservation performance and applicability; condition prior to shipment; custody
2. Location Installation	Sampling location installation
3. Sampling Procedures	Sampling protocols
4. Contamination From Sampling	Rinsates
5. Contamination From Site	Field blanks (volatile organics only)
6. Contamination From Shipping	Trip blanks (volatile organics only)
7. Sampling Precision	Field duplicates
8. Miscellaneous *	Blind QC samples; performance evaluation data; split sample data

\* No blind data for QC samples, blind performance evaluation samples, or split samples will be collected.

Usability Determination - Once the laboratory and field QC data have been evaluated, the uncertainty associated with each data point can be estimated. The estimated accuracy and precision of each data point can then be compared to the data quality objectives of the project to determine its usefulness for evaluating the site. Recommendations for the qualification of a data point can also be made when necessary.

Precision will be determined by evaluation of the RPDs for the laboratory and field duplicates. The laboratory and field blank data, MS/MSD and surrogate (if applicable) recoveries, and other applicable QC data will be used to determine the accuracy of the data. The evaluator will use their judgement based upon established principles and the guidelines described in this document in the assignment of qualifications to the data.

The completeness parameter will be evaluated after the determination of the usability of each data point. All usable data will be included in the numerator of the completeness calculation; all rejected data will be excluded. Completeness will be expressed in quantitative terms using the formula in Section 1.13.1 and the results will be compared to the project objectives to determine whether enough data were collected to achieve the project goals.

Representativeness will be determined through an evaluation of sampling procedures and sampling locations chosen, and will be expressed in qualitative terms. Comparability will be determined by the evaluation of analytical methodologies, reporting units, and the traceability of standards and will also be expressed in qualitative terms.

1.9.3.2 Data Qualification - Data qualification is performed following the USEPA chemical data validation guidelines. Each data point will be graded using one of the following categories:

- Usable as reported (no qualifier)
- Usable with qualifications ("J", estimated value)
- Unusable ("R", rejected result)

Data for which the laboratory and field QC data are all within the acceptance limits, as defined in Appendix A, will be assigned the grade "usable as reported" and will not be qualified. Data for which QC criteria are not met, but which are considered usable data, will be assigned the grade "usable with qualifications" and may be flagged with a "J" flag indicating an estimated value. These data are usable, although the qualifier indicates a bias in the reported value. Data for which the corresponding QC results are deemed gross QC failure will be qualified with an "R", assigned the grade "unusable", and will not be used for site characterization. Examples of gross QC failure include: calibration failures, internal standard recoveries less than 10 percent, and surrogate spike recoveries less than 10 percent. The flags to be used to qualify the data are presented in Table 1-7.

#### 1.9.4 Data Reporting

Data reports will be included in the technical report. The data will be presented in tables in the text or in the appendices of the report. Tables will include the following information:

- Sampling dates
- Extraction and analysis dates
- Surrogate recovery (if applicable)
- MS/MSD results
- Duplicate/replicate results
- Rinsate results
- Positive results
- Field characterization data (pH, SC, temp)
- Control limits (surrogates, MS/MSD, duplicates)

A data quality evaluation summary is included in the technical report. It includes a discussion of the QC results from the laboratory report and any data qualifiers applied to the sample data as a result of the QC review.

TABLE 1-7

**DATA QUALIFICATION FLAGS**  
**Naval Air Station Fort Worth Joint Reserve Base**  
**Fort Worth, Texas**

FLAG	POSITIVE RESULTS	NEGATIVE RESULTS
<b>FLAGS FOR DATA WITHIN ACCEPTANCE LIMITS (Usable as Reported)</b>		
(no flag)	{Use datum without qualification}	{Use datum without qualification}
<b>FLAGS FOR DATA WITHIN ACTION LIMITS (Usable With Qualification)</b>		
J	Estimated quantitation based upon QC data	Estimated quantitation based upon QC data
JB	Estimated quantitation: possible biased high or false positive based upon blank data	(Not applicable)
JH	Estimated quantitation - possibly biased high based upon QC data	(Not applicable)
JL	Estimated quantitation - possibly biased low based upon QC data	Possible false negative based upon QC data
Jd	Estimated result due to dilution	Reporting limit raised due to dilution
JQ	Estimated quantitation; result below the PQL	(Not applicable)
<b>FLAGS FOR DATA OUTSIDE OF ACTION LIMITS (Unusable)</b>		
R	Datum rejected based upon QC data: do not use	Datum rejected based upon QC data: do not use
<b>MISCELLANEOUS FLAGS</b>		
t	Tentatively identified compound; identity not confirmed with standard and quantitation estimated (applicable to GC/MS data only)	(Not applicable)

Note that if the QC results suggest contradictory flags, the following hierarchy should be used to select the appropriate flag to assign:

- R > J, JH, JL, JB, Jd
- JH + JL = J
- Jd > JH, JL
- Jd > JB (where JB is due to laboratory method blank or field blanks)
- JB > Jd (where JB is due to laboratory system blank)
- JB > J
- JH or JL > J

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## 1.10 INTERNAL QUALITY CONTROL CHECKS

The following sections describe the quality control checks employed in the field and laboratory.

### 1.10.1 Field Quality Control

Quality control of field measurements will be implemented through the calibration of instruments. The control parameters, control limits, and corrective actions are outlined in Section 2.4.

### 1.10.2 Laboratory Quality Control

The minimum requirements of laboratory quality control consist of an initial demonstration of laboratory capability and an ongoing analysis of quality control samples to evaluate and document data quality. The laboratory must maintain records to document the quality of the data generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method. Calibration stability will be assessed and documented as specified in each method.

Before processing samples, the analyst shall demonstrate, through the analysis of a reagent water blank, that interferences from the analytical system, glassware, and reagents are under control. A reagent water blank shall be processed with each preparation batch consisting of no more than 20 samples that are of a similar matrix. Within the preparation batch, all reagents and procedures are kept constant. The blank samples should be carried through all the stages of the sample preparation and measurement steps.

If any spiked analyte in a laboratory control sample fails the acceptance criteria for recovery, a QC check standard for each analyte that failed must be prepared and analyzed. As part of the

QC program for the laboratory, method accuracy for each matrix studied must be assessed and records must be maintained.

The types and frequency of laboratory quality control samples to be used are presented in Appendix A-3. They are defined as follows:

Method blanks. Method blanks consist of organic-free or deionized water that is carried through the analytical scheme like a sample. They measure contamination associated with laboratory storage, preparation, and instrumentation. For most analyses, a method blank is analyzed for each sample preparation batch (or analysis batch if no preparation is required) and at a frequency of one method blank for no more than 20 samples analyzed at the same time. Within a preparation batch, all reagents and procedures are kept constant. If an analyte of interest is detected above the reporting limit in a method blank, corrective action must be taken as described in Appendix A-3.

Calibration blanks. Calibration blanks are prepared with standards to create a calibration curve. They differ from the other standards only by the absence of analyte and provide the "zero-point" for the curve.

Internal standards. Internal standards are measured amounts of certain compounds added after preparation or extraction of a sample. They are used in an internal standard calibration method to correct sample results for capillary column injection losses, purging losses, or viscosity effects. Internal standards will be used for volatile compound and semi-volatile compound analyses. Recovery of internal standards is considered acceptable if the criteria for EICP area (minus 50 percent to plus 100 percent of the last calibration verification standard) is met.

Surrogates. Surrogates are measured amounts of certain compounds added before preparation or extraction of a sample. The recovery

of a surrogate may be used to determine extraction recovery. Surrogates are added to all samples analyzed for chlorinated pesticides, herbicides, semi-volatiles, and volatiles. The criteria for surrogate recoveries for each applicable analytical method are presented in Appendix A-2.

Spiked Samples. Spiked samples are aliquots of samples to which known amounts of analyte have been added. They are subjected to the sample preparation or extraction procedure and analyzed as samples. The stock solutions used for spiking are purchased or prepared independently of calibration standards.

The spike recovery measures the effects of in the sample matrix, on the reported results, and reflects the accuracy of sample determinations. Spike recoveries are calculated as follows:

$$\text{Matrix Spike Percent Recovery} = \frac{\text{SSR} - \text{SR}}{\text{SA}} \times 100$$

where:

SSR = spike sample result  
SR = sample result  
SA = spike added from spiking mix

Spiked samples are prepared and analyzed for representative method analytes with each batch and at a frequency of at least 1 matrix spike per 20 samples or as required by the specific analytical method. The QC criteria for spike recoveries for each analytical method are presented in Appendix A-2.

The matrix spiking compounds for SW-8240, SW-8270, SW-8080 and SW-8150 have been chosen as representative spiking compounds based on their prevalence at many installations studied under the IRP. These compounds are generally accepted as representative of the various compound classes analyzed by the methods and are commonly

used for this purpose. The following compounds will be used as MS/MSD spiking compounds:

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Method SW-8240

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1,1-Dichloroethene	Dibromochloromethane
Trichloroethene	Chloroform
Benzene	Ethylbenzene
Toluene	Tetrachloroethene
Chlorobenzene	1,1,1-Trichloroethane

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Method SW-8270

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Phenol	Pentachlorophenol
2-Chlorophenol	Pyrene
1,4-Dichlorobenzene	bis(2-Chloroethoxy)methane
N-Nitroso-di-n-propylamine	Butyl benzyl phthalate
1,2,4-Trichlorobenzene	Hexachlorobenzene
4-Chloro-3-methylphenol	Benzo(a)pyrene
Acenaphthene	Benzo(a)anthracene
4-Nitrophenol	Naphthalene
2,4-Dinitrotoluene	

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Method SW-8080

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gamma-BHC (Lindane)	Endrin
Heptachlor	4,4'-DDT
Aldrin	PCB 1016/1260
Dieldrin	

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Method SW-8150

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2,4-D	2,4,5-TP
2,4,5-T	

Duplicate Samples or Duplicate Spikes. The relative percent difference (RPD) between duplicates or duplicate spikes measures the precision of a given analysis. RPDs are calculated as according to the equation presented in Section 1.13.1.

Duplicates or duplicate spikes are prepared and analyzed for each method analyte with each batch, or at a frequency of at least 1 per 20 samples.

Laboratory Control Standards. Laboratory control standards (LCSs) and quality control check samples (QCCSs) are aliquots of organic-free or deionized water to which known amounts of all analytes of interest have been added. LCSs are analyzed with every analytical batch, and they are subjected to the sample preparation or extraction procedure and analyzed as samples. The stock solutions used for LCSs are purchased or prepared independently of calibration standards. The LCS recovery checks the performance of analytical methods and equipment. For inorganic and metals analyses, the percent recovery for LCSs is compared to method-specific QC criteria. When the results of an organic method aqueous matrix spike indicate recovery failures, an LCS will be analyzed to evaluate the performance of the measurement system.

LCSs are prepared and analyzed for all method analytes with each batch or at a frequency of 1 per 20 samples. Laboratory control limits are updated annually by the laboratory. The current QC criteria for LCS recoveries are presented in Appendix A-2.

The LCS is used to monitor overall performance of all steps in analysis, including sample preparation. If 80 percent of the compounds included in the LCS spike fall within the laboratory established range, acceptable instrument performance is verified. The laboratory will reanalyze any batch in which the LCS fails for over 20 percent of the analytes. In addition, data qualifications will be applied to individual compound results for all samples analyzed in a batch with out-of-limits LCS results.

### 1.10.3 Control Limits

Control limits for this project are laboratory established on an annual basis. Control limits for the recoveries of spikes for each analytical method will be experimentally established based on historical data. Control limits for precision are based on historical data but are adjusted to accommodate the wide variation seen in project-specific matrices. If historical data are not

complete then control limits are set based on the method performance data. Appendix A-2 presents the current control limits for QC samples for each analytical method. Appendix A-3 presents a summary of calibration and internal quality control procedures, acceptance criteria, and corrective actions.

### 1.11 PERFORMANCE AND SYSTEM AUDITS

Quality assurance is the monitoring of the quality of the various day-to-day operations carried out under the QA/QC program. The goals associated with the QA/QC program are listed below:

- QA reviews determine compliance with mandated QC procedures.
- QA reviews provide a structured means of communicating problems between the technical and administrative portions of the company.
- QA audits provide a mechanism by which QC procedures are constantly being reviewed and reported so that corrective actions can accurately be implemented.

#### 1.11.1 Systems Audits

Systems audits are qualitative evaluations of each component of field and laboratory QC measurement systems. An internal systems audit will be performed quarterly by the QA manager and will consist of inspecting the following procedures:

- Sampling
- Sample custody
- Sample storage and preservation
- Standard preparation
- Sample preparation
- Analytical methodology

- Data management
- Preventative maintenance
- Personnel qualifications
- Corrective actions, reporting and documentation of out-of-control events
- Recordkeeping

#### 1.11.2 Performance Audits

A performance audit is a quantitative evaluation of a measurement system. Law Environmental National Laboratories, Pensacola participates in the following performance evaluation programs:

- EPA, Environmental Monitoring Support Laboratory - Cincinnati
- Florida Department of Environmental Regulation (DER)
- EPA Inorganic and Organic CLP
- U.S. Army Corps of Engineers, Missouri River Division
- Florida Department of Health and Rehabilitative Services (FDHRS)
- U.S. Air Force Performance Audit conducted by MITRE, in support of AFCEE

#### 1.11.3 Certifications

Law Environmental National Laboratories, Pensacola currently holds certifications with several states for the various matrices and parameters. They have also been approved by AFCEE and the U.S. Army Corps of Engineers.

1.12 PREVENTIVE MAINTENANCE

Equipment maintenance is the responsibility of the analyst and the department manager. All repairs and/or modifications are recorded in bound maintenance logbooks. Daily equipment checks include visual and/or manual inspections of cooling fans, pumps, indicator readings, detectors, gas supplies, and other method-specific inspections. Service schedules are established for performing routine preventive maintenance on all major equipment. Tables 1-8 through 1-11 list the maintenance required for each instrument.

1.13 FIELD AND LABORATORY PROCEDURES USED TO ASSESS DATA QUALITY INDICATORS

1.13.1 Formulas

Accuracy - Accuracy is a measure of the bias in a system. Accuracy is defined as the degree of agreement of a measurement with an accepted reference or true value. To determine the accuracy of an analytical method, a sample spiking program will be conducted. The results of sample spiking will be used to calculate the percent recovery (%R). The percent recovery is defined as follows:

$$\%R = \frac{X - T}{K} \times 100$$

where: X = analytical result from the spiked sample  
T = analytical result from the unspiked sample  
K = value of the spike added

To determine accuracy, surrogate, matrix spike and matrix spike duplicates (MS/MSD), and internal standards will be analyze. The accuracy for these results will be calculated, reported, and compared to the control limits established by the laboratory.

TABLE 1-8

**ROUTINE MAINTENANCE SCHEDULE FOR GC**  
**Naval Air Station Fort Worth Joint Reserve Base**  
**Fort Worth, Texas**

	<b>Maintenance</b>	<b>Frequency</b>
1.	Check carrier gas supply	Daily
2.	Check head pressure	Daily
3.	Change septums	As needed
4.	Change carrier gas filters	As needed
5.	Check baseline and detector response	Daily
6.	Air dust electronics and main frame	Annually

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TABLE 1-9

**ROUTINE MAINTENANCE SCHEDULE FOR GC/MS  
Naval Air Station Fort Worth Joint Reserve Base  
Fort Worth, Texas**

Maintenance	Frequency
<b>1. <u>System Diagnostics</u></b>	
a. Scan box I/O test	Daily
b. Scan box DMA test	Daily
c. MS I/O test	Daily
d. Filament test	Daily
e. RF power test	Daily
f. Electromultiplier test	Daily
g. Background signal noise test	Daily
<b>2. <u>Vacuum/Carrier Flow Check</u></b>	
a. Column headpressure check	Daily
b. Vacuum check	Daily
c. Replace septum	As needed
d. Leak check and tighten fittings	As needed
<b>3. <u>Instrument Tune Check</u></b>	
a. BFB/DFTPP tune check	Daily
b. PFTBA tuning	As needed
<b>4. <u>Calibration Check</u></b>	
a. VOA standards check	Daily
b. BNA standards check	Daily
Replace inlet liner	As needed
<b>5. Clean source</b>	As needed
<b>6. Clean quadrupole rods</b>	As needed
<b>7. Replace column (or remove front end)</b>	As needed

BFB = 4-Bromofluorobenzene  
DFTPP = Decafluorotriphenylphosphine  
DMA = Disk Maintenance Acquisition  
GC/MS = Gas Chromatograph/Mass Spectrometer

I/O = Input/Output  
PFTBA = Perfluorotributylamine  
RF = Radio Frequency

TABLE 1-10

**ROUTINE MAINTENANCE SCHEDULE FOR ICP**  
**Naval Air Station Fort Worth Joint Reserve Base**  
**Fort Worth, Texas**

MAINTENANCE	FREQUENCY
1. Check Argon pressure at tank and at nebulizer.	Daily
2. Inspect cooling water supply.	Daily
3. Inspect vacuum pump.	Daily
a. Oil level	
b. Vacuum monochromator gauge	
4. Inspect peristaltic pump windings and capillary tubing.	Daily
5. Check ICP ignition sequence.	Daily
a. Argon to torch	
b. Preignition discharge	
c. Ignition	
6. Disassemble and clean ICP nebulizer, spray chamber and torch assembly.	Weekly
7. Check peak resolution and monochromator stability using profile routines and internal Hg lamp.	Weekly
8. Change pump windings and all capillary tubing to nebulizer.	Monthly
9. Change vacuum pump oil.	Monthly

TABLE 1-11

**ROUTINE MAINTENANCE SCHEDULE FOR AA SPECTROPHOTOMETER**  
**Naval Air Station Fort Worth Joint Reserve Base**  
**Fort Worth, Texas**

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Maintenance

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1. Contact cylinders, tube, and platform should be cleaned and checked each day before running samples. Use cotton swab and methanol for cleaning.
  2. Contact cylinders should be checked for cracks and pitting. Tubes should be checked for pitting, peeling pyrolytic coating and burn marks around sample port hole. Any of the above indicate a worn tube or cylinder.
  3. Furnace/spectrometer windows should be checked and cleaned daily.
  4. Check coolant level in recirculator and temperature setting daily.
  5. Spectroscopy lab should be wet mopped, counters dusted, and exterior of instruments cleaned on a weekly basis to ensure a dust-free environment.
  6. Consult instrument operations manual for further maintenance instructions.
  7. All maintenance is to be recorded in the Maintenance Log Book.
  8. Argon gas pressure to furnace should be 60 psi. Check regulator to ensure proper pressure.
-

Precision - Precision is the measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best expressed in terms of standard deviation or relative percent difference (RPD) Precision is assessed through the use of duplicate samples. An RPD for each component is calculated using the following equation:

$$RPD = \frac{A - B}{(A + B)/2} \times 100$$

where:

- A = replicate value 1
- B = replicate value 2
- RPD = relative percent difference

To determine precision, matrix spikes and matrix spike duplicates will be analyzed. The precision will be calculated, reported and compared to the laboratory established control limits. In addition, field duplicate precision will be calculated. Field precision will be rated based on the following:

RPD CATEGORY		
<u>Good</u>	<u>Fair</u>	<u>Poor</u>
less than 20%	20-50%	greater than 50%

Samples demonstrating field precision in the "poor" category will be qualified as estimated.

Completeness - Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Field sampling completeness is defined as the number of samples successfully sampled and analyzed compared to the number of samples planned for analysis. Valid laboratory results are defined as all results not qualified with an "R" flag. The result is expressed as a percentage for each analyte measured.

$$\text{Percent completeness} = \frac{\text{Number of valid measurements}}{\text{Total number of measurements}} \times 100$$

The overall percent completeness goal for this project is 90 percent.

#### 1.13.2 Documentation

Complete documentation of all procedures used to generate laboratory data is required. Laboratory log books on data sheets must contain all data and calculations associated with each independent determination. These include such things as operating parameters, sample weight(s), dilution factor(s), applicable determinative measurements (titration values, spectrometer readings, injection quantities, and standard(s) identity and concentrations), as well as all calculations related to each final value reported.

Each laboratory report sheet will be reviewed and initialed by a second analyst for completeness of data and correctness of all calculations in the report. All work sheets and raw data including chromatograms, spectra, etc., associated with every analysis will be archived at the laboratory for a minimum of five years. This documentation will be available to LAW on its client upon request.

#### 1.14 CORRECTIVE ACTION

An effective QC program requires rapid and thorough correction of the QC problems.

Depending on the nature of the corrective action (CA), it is classified as one of two types, immediate and long-term. Immediate corrective actions are activities resulting in reversal of an out-of-control situation such as the repair of instrumentation that is

working improperly. Long-term corrective actions are the correction of systematic errors, which may require a series of events to occur before the system regains compliance. In this case, analyses are suspended until system compliance is achieved.

1.14.1 Response

Many times the source of a nonsystematic problem is obvious to the analyst and can be corrected immediately. Immediate corrective action routinely made by field technicians or laboratory analysts should be documented as normal operating procedures in instrument log books or personal notebooks. The supervisor and analyst should compile a list of commonly encountered problems and the appropriate routine corrective actions (in addition to manufacturer's troubleshooting guides). The operations manager and QA/QC coordinator are responsible for approving all corrective actions.

1.14.2 Reestablishment of Control

Corrective action is not complete until the system is returned to compliance. Continuing monitoring of the system is an important step in the corrective action procedure. Routine corrective actions, such as recalibrating the instrument, are incorporated into the standard operating procedures (SOPs). Major corrective actions, such as a systems failure, are handled in the following manner: Once a problem has been defined, the operations manager and the QA/QC coordinator discuss the problem and jointly take the following steps:

1. Determine what specific corrective action is needed to eliminate the problem and assign responsibility for investigating, implementing, and documenting the situation.
2. Set a time schedule for determining the required action.

3. Assign responsibility and time schedule to implement the desired action.
4. Establish desired effectiveness of the corrective action and implement the correction.
5. Verify that the corrective action has corrected the problem and document all actions taken.
6. Continue to monitor the system for compliance.

#### 1.14.3 Documentation

All QC activities, including QC problems and corrective actions implemented, must be documented. Historical records assist laboratory management in identifying long-term corrective actions, such as personnel training, replacement of instrumentation, improvement of sampling procedures, etc. Corrective action documentation associated with field activities are recorded in field logbooks.

#### 1.15 QUALITY ASSURANCE REPORTS

Laboratory management is informed of QA activities in three ways: (1) by immediate verbal notification of QA problems, (2) by interim QA reports, and (3) QA audit reports. The following subsections discuss the reporting procedures to be followed and report contents.

##### 1.15.1 Reporting Procedure

A final report containing sample results and QA information is prepared by the laboratory QA coordinator and submitted to LAW. The QA results are presented according to the following procedures:

- An assessment of QC (accuracy, precision, and completeness)

- Significant QA problems encountered and results of corrective action taken
- Name and position of the individual preparing the reports.

#### 1.15.2 Laboratory Report Content

The laboratory has developed reporting procedures and forms in order to document the sample analysis and QA procedures, including case narratives, QC tables, and Deficient Incident Reports (DIRs). Case narratives are included at the beginning of a data report to give the reviewer an overview of the samples and parameters analyzed, and identifying flags which are applied to the data to indicate quality control discrepancies. QC tables and laboratory limits are included to list the criteria and reporting requirements which apply to the data. DIRs are also included as part of the report format as documentation of the corrective actions implemented by the laboratory.

#### 1.16 VARIATION

AFCEE approval will be obtained in order to implement field tasks that vary in approach as compared to the statement of work written for this delivery order.

## 2.0 FIELD SAMPLING PLAN

Field tasks to be conducted at the Carswell AFB RFI sites are explained in detail in the following text.

### 2.1 FIELD OPERATIONS

#### Aerospace Museum Site and Grounds Maintenance Yard

- Lay out surface soil sampling grid (Figures 2-1 and 2-2).
- Determine location for two background samples.
- Collect surface soil samples for off-site chemical analysis.

#### 2.1.1 Site Reconnaissance, Preparation, and Restoration

Prior to commencement of field operations, all sites will be visually inspected and cleared for utilities, and sample locations will be staked. The sites will also be inspected for access routes. Specific information concerning field office spaces, decontamination area, and drum staging areas will be coordinated with base personnel.

Upon completion of field activities, each site will be restored to a condition that as closely as possible approximates the condition of the site prior to field activities.

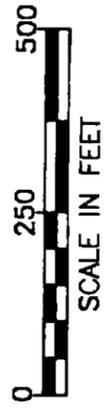
#### 2.1.2 Surface Geophysical Surveys

Surface geophysical surveys are not required for this preliminary soil investigation.



**LEGEND:**

- ⊙ PROPOSED SURFACE SOIL LOCATION (SAMPLE LOCATION BASED ON 100 FT. GRID)

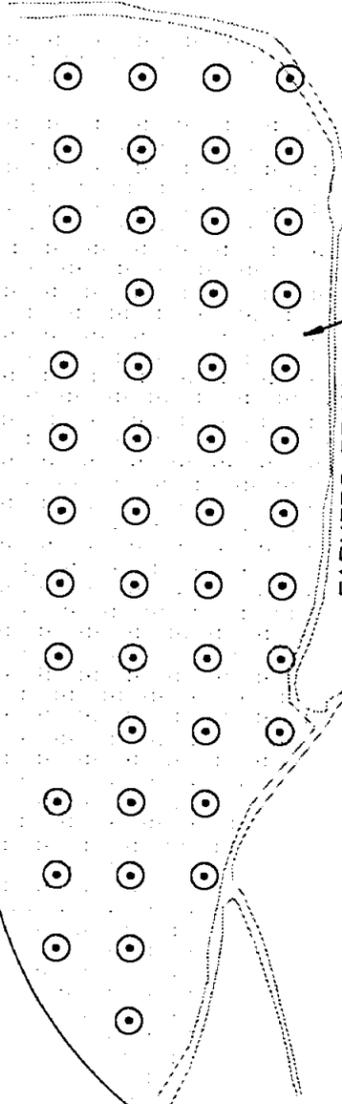


(INDUSTRIAL AREA)

AUTOMOBILE BODY SHOP/JUNK YARD

SPUR 341

WHITE SETTLEMENT ROAD



FARMERS BRANCH

BEGINNING OF AQUEDUCT

AEROSPACE MUSEUM SITE

NO. 130 NORTH-SOUTH PRIMARY/INSTRUMENT RUNWAY

191

UNITED STATES AIR FORCE  
NAVAL AIR STATION FORT WORTH, JOINT RESERVE BASE  
FORT WORTH, TEXAS

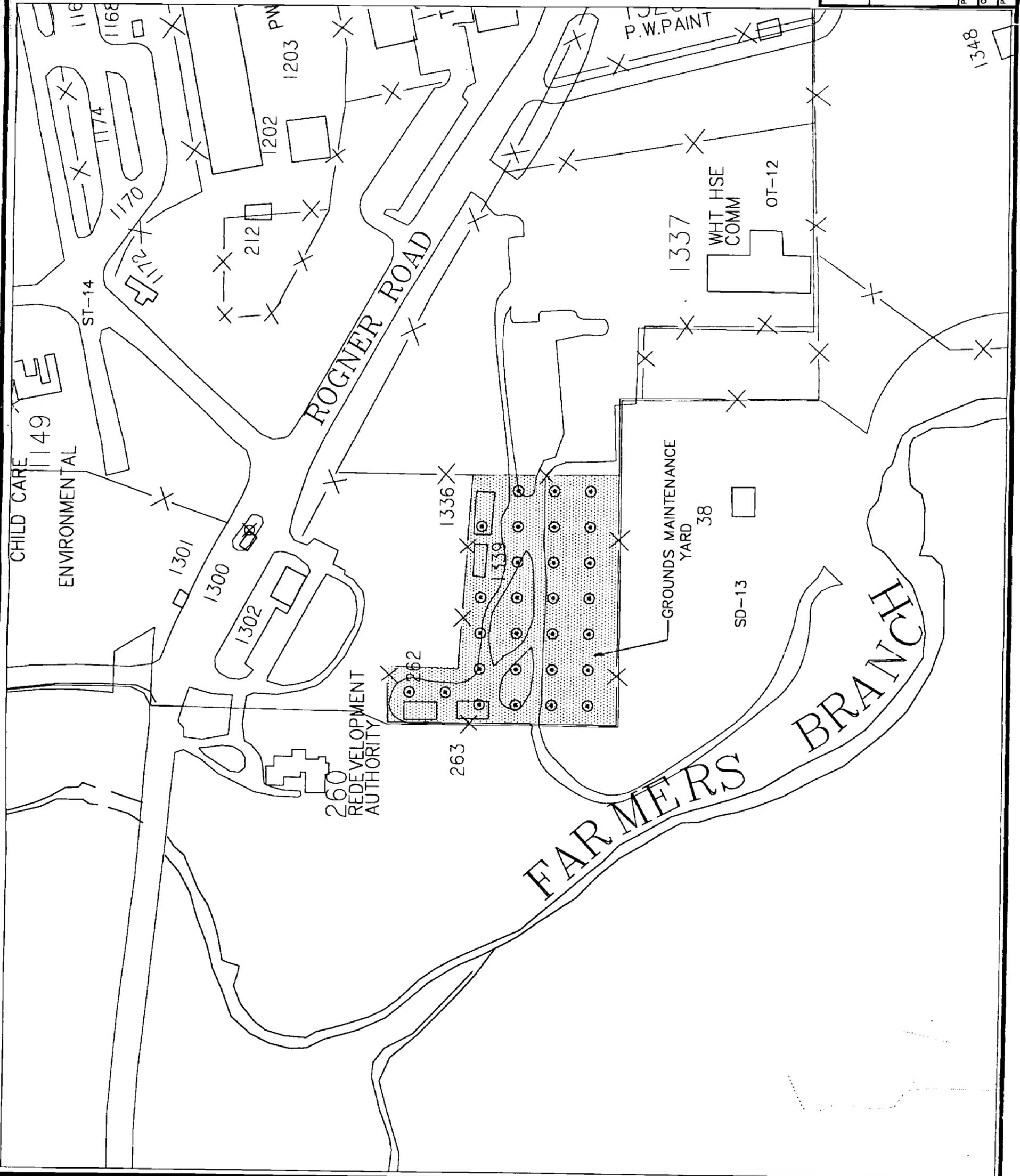
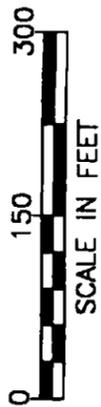
SITE INVESTIGATION/SITE CHARACTERIZATION  
SAMPLING AND ANALYSIS PLAN  
**AEROSPACE MUSEUM SITE  
PROPOSED SAMPLE LOCATIONS**

PREPARED BY: <i>JAC 7 Sep 95</i>	FIGURE NUMBER: 2-1	FILE DATE: 03.MAY.95
CHECKED BY: <i>SK 7 Sep 95</i>		PLOT DATE: 05.SEPT.95
PROJECT NO. 11-3517-3209		FILE NAME: om-samp2.dwg



**LEGEND:**

- ⊙ PROPOSED SURFACE SOIL LOCATION (SAMPLE LOCATION BASED ON 60 FT. GRID)



UNITED STATES AIR FORCE  
NAVAL AIR STATION FORT WORTH, JOINT RESERVE BASE  
FORT WORTH, TEXAS

SITE INVESTIGATION/SITE CHARACTERIZATION  
SAMPLING AND ANALYSIS PLAN

**GROUND'S MAINTENANCE YARD  
PROPOSED SAMPLE LOCATIONS**

PREPARED BY: *YLA 7 Sep 95*  
CHECKED BY: *CA 7 Sep 95*  
PROJECT NO. 11-3517-3209

FIGURE NUMBER:  
**2-2**

FILE DATE: 03.MAY.95  
PLOT DATE: 05,SEPT.95  
FILE NAME: gmy-psi2.dwg

### 2.1.3 Soil Gas Surveys

Soil gas surveys are not required for this preliminary soil investigation.

### 2.1.4 Borehole Construction, Lithologic Sampling, and Logging

Borehole construction, lithologic sampling, and logging are not required for this preliminary soil investigation.

### 2.1.5 Monitor Well Construction and Development

Monitor well construction and development are not required for this preliminary soil investigation.

### 2.1.6 Aquifer Tests

Aquifer tests are not required for this preliminary soil investigation.

### 2.1.7 Test Pit Excavation

Test pit excavation is not included as a part of this delivery order.

### 2.1.8 Surveying

Surveying is not included as a part of this delivery order.

### 2.1.9 Equipment Decontamination

The following decontamination procedures will apply to all sampling equipment. The decontamination steps are as follows:

1. Hand wash with a solution of laboratory grade detergent.
2. Rinse with copious quantities of potable water.
3. Rinse with deionized (Reagent Grade II) water.
4. Spray-rinse with pesticide grade methanol.
5. Spray-rinse with pesticide grade hexane (Grounds Maintenance Yard only).
6. Air dry.

#### 2.1.10 Waste Handling

The field effort is limited to the collection of shallow soil samples using stainless steel hand augers. Decontamination water from the washing of hand augers between sample locations is the only investigation derived waste (IDW) expected to be generated. This wash water will be discharged to the local wastewater treatment plant for disposal. In the event that hazardous waste drums are generated, they will be promptly sampled and transported from the site within 90 days after receipt of analytical data.

#### 2.1.11 Field Activities

Surface soil samples will be collected at the Aerospace Museum Site and the Grounds Maintenance Yard using stainless steel hand augers. Soil sample collection for chemical analysis is described in Section 2.2.

Additional wastes, such as gloves, tyvek suits, etc., generated in sampling operations, will be double bagged and disposed of in a proper manner.

## 2.2 ENVIRONMENTAL SAMPLING

Field sampling activities include the collection of soil samples. The collection methods, including sample handling, sample custody, QC samples, and sample analysis are presented in the following subsections.

### 2.2.1 Procedure for Collection of Samples

This section presents the procedure for collection of samples for chemical analysis. The parameters to be analyzed at each site are presented in the sampling plan details and presented in Appendix A. The following sections present the site-specific sampling requirements, the sample collection procedures, and the procedures to be used to maintain sample integrity.

Field instruments will be calibrated as described in Section 2.3.2, Site conditions and sampling information will be recorded in the field log books. The site manager will brief the sampling team on safety, decontamination, and any other sampling protocols necessary. Each sampling team member will wear the appropriate level of PPE and safety gear as specified in the health and safety plan.

2.2.1.1 Surface Soil Sampling at Aerospace Museum Site and Grounds Maintenance Yard - Surface soil samples will be collected from 0 to 2 feet using a stainless steel hand auger. Care has been taken to determine the best practical sampling procedure that will result in obtaining representative samples. The samples must maintain the integrity of the original medium through collection, transportation, and delivery to the analyst. The soil samples will be collected and containerized as described below.

The sampling protocol will be as follows:

1. Position the hand auger bucket over the desired sampling location.

2. Advance the auger bucket directly into the soil. Rotate the auger as necessary to reach the required sampling depth, avoiding excess disturbance of surface particles.
3. Retrieve the auger by lifting upward.
4. Place auger into a stainless-steel mixing bowl and empty contents of the bucket into the bowl using a stainless-steel spoon if necessary.
5. Immediately sample for volatiles by filling vials completely full, avoiding headspace.
6. Once the volatile organic samples have been collected, mix the remaining soil thoroughly.
7. Place the well-mixed soil into the appropriate pre-labeled sample containers.

All sampling equipment will be decontaminated before use as presented in Section 2.1.8.

#### 2.2.2 Sample Handling

The following sections describe the proper way to containerize, label, identify, ship, and preserve samples.

2.2.2.1 Sample Containers, Amounts and Preservation - Samples will be placed in appropriate containers as required by AFCEE (AFCEE, 1993). The amount of sample to be collected and preservation procedures specified by AFCEE will be followed. These requirements are specified in Table 2-1.

2.2.2.2 Sample Labels - Field sampling personnel must properly identify all samples taken in the field with an adhesive sample label attached to the sample container. The sample label must contain the site name, field identification number; the date, time, and location of sample collection; designation of the sample as a grab or composite; notation of the type of sample (e.g., ground water, soil boring, etc.); identification of preservatives used;

TABLE 2-1a

**SAMPLE CONTAINERS, AMOUNTS, AND PRESERVATION  
SOIL SAMPLES  
Naval Air Station Fort Worth Joint Reserve Base  
Fort Worth, Texas**

PARAMETER	SAMPLE CONTAINER (b)	AMOUNT	TEMP	HOLDTIM ES (days)
Volatile Organics (SW 8240)	Two 2 oz. G	Full; no headspace	Cool to 4°C	A: 14
Semi-Volatile Organics (SW 8270)	One 8 oz. G (c)	Full	Cool to 4°C	P: 14 A: 40
Metals, total (SW 6010/7000) (a)	One 8 oz. G	Full	Cool to 4°C	180
Mercury (SW 7471)				28
Herbicides (SW 8150)	One 8 oz. G (c)	Full	Cool to 4°C	P: 14 A: 40
Pesticides/PCBs (SW 8080)	One 8 oz. G (c)	Full	Cool to 4°C	P: 14 A: 40

A = Analysis

P = Preparation

## NOTES:

- (a) Metals analysis includes: Arsenic (SW 7060), Lead (SW 7421), and Selenium (SW 7740)  
 (b) All containers to have Teflon®-lined lids except for vials for volatile organics which will have Teflon®-lined septa. Container codes: G = glass  
 (c) Samples chosen for MS/MSD and/or Laboratory Duplicate require double the number of containers indicated.

TABLE 2-1b

**SAMPLE CONTAINERS, AMOUNTS, AND PRESERVATION  
WATER SAMPLES  
Naval Air Station Fort Worth Joint Reserve Base  
Fort Worth, Texas**

PARAMETER	SAMPLE CONTAINER (b)	PRESERVATIVE	AMOUNT	TEMP	HOLD TIMES (days)
Volatile Organics (SW 8240)	Three 40 mL G	HCl to pH < 2	Full; no headspace	Cool to 4°C	A: 14
Semi-Volatile Organics (SW 8270)	Two 1 L G (c)	-	Full	Cool to 4°C	P: 7 A: 40
Metals, total (SW 6010/7000) (a)	One 500 mL P	HNO <sub>3</sub> to pH < 2	Full	Cool to 4°C	180
Mercury (SW 7470)		HNO <sub>3</sub> to pH < 2			28
Herbicides (SW 8150)	One 1 L G (c)	-	Full	Cool to 4°C	P: 7 A: 40
Pesticides/PCBs (SW 8080)	One 1 L G (c)	-	Full	Cool to 4°C	P: 7 A: 40

A = Analysis                      P = Preparation

NOTES:

- (a) Metals analysis includes: Arsenic (SW 7060), Lead (SW 7421), and Selenium (SW 7740)
- (b) All containers to have Teflon®-lined lids except for vials for volatile organics which will have Teflon®-lined septa. Container codes: G = glass                      P = polyethylene
- (c) Samples chosen for MS/MSD and/or Laboratory Duplicate require double the number of containers indicated.

any remarks; and the initials of the sampler. The sample labels will be placed on the bottles so as not to obscure any QA/QC data, and sample information will be legibly printed with waterproof ink. Field identification must be sufficient to allow easy cross-reference with the site logbook. Clear tape will be placed over the label to prevent removal or damage.

2.2.2.3 Sample Identification - The following section describes how each sample will be identified and what this identification signifies. Note that all sample IDs shall be no more than 10 characters long to facilitate input into the IRPIMS data base.

For field samples, the following sample ID scheme shall be followed:

Site ID	Location ID	Sample Type	Sample Depth
---------	-------------	-------------	--------------

1. The first three or four digits will indicate the site ID.
2. The following digits will identify the location ID.
3. The digits located after the location ID will identify the sample type. The following extenders will be used:  
  
S - Surface soil (0 to 2 feet)
4. The next digit will designate the depth of the sample collection, if applicable. Alphabetical codes will be used to indicate the depth.

<u>Depth Interval</u>	<u>Code</u>
First interval (0 to 2 feet)	A

For example, sample 4701SOB indicates the following information:

- "47" = site ID (SWMU 47)
- "01" = sample location No. 01
- "SO" = sample type (subsurface soil)
- "B" = sample depth (0 to 2 feet)

Field Duplicate Identification - The identity of field duplicate samples will be concealed from the laboratory by adding "FDUP" to the sample type code only. The true identity of duplicates will be recorded on the sampling data sheet and field notebook. The data sheets will be maintained in the project file and copies will be kept at the on-site field office. Copies of these forms will be provided to the QA Coordinator and the data validation team as needed for their reviews.

2.2.2.4 Handling and Shipping - The properly labeled and sealed sample containers will be placed in plastic "Ziploc" type bags and sealed. Bagged sample containers will be placed in the bottom of the cooler. Bagged sample containers will be arranged in such a manner as to minimize breakage, and will be packed in double-bagged ice and additional packing material to prevent breakage. Samples should be packed so as to maintain a temperature of 2 to 8 degrees Celsius during shipment.

Site-specific analytical request forms for this project and chain-of-custody documents (see Section 2.2.3) will be sealed in airtight plastic bags and taped to the inside of the cooler lid. The lid of the container will be taped shut and sealed with custody seals (see Section 2.2.3). Analytical request forms are shown in Figures 2-3 and 2-4. Samples will be shipped directly to the laboratory by overnight courier on the day they are collected. No samples will be held more than 24 hours on site, unless special arrangements are made with the laboratory. The laboratory will be notified by phone of the sample shipment schedule.

### 2.2.3 Sample Custody

Documentation of sample custody from the time of collection will be maintained. Chain-of-custody records will be prepared for each shipping container. The custody record will be completed, in triplicate, by the field technician designated as responsible for

FIGURE 2-3

REQUEST FOR ANALYSIS FORM

LENL-P

Project #: 11-3571-3209  
 Project: NAS Carswell  
 Project Manager: Mr. James Forbes  
 Project Chemist: Ms. Susan Max  
 Matrix: Soil  
 Site: Aerospace Museum Site

\_\_\_\_\_  
 (Sample I.D.)

ANALYTICAL REQUEST

CONTAINER	NO.	PRESERVATION	PARAMETER	METHOD
2 oz. glass jar	1	Cool to 4°C	Volatile Organics	SW 8240
8 oz. glass jar	1	Cool to 4°C	Semi-Volatile Organics	SW 3550/8270
8 oz. glass jar	1	Cool to 4°C	ICP Screen Arsenic Lead Selenium Mercury	SW 3050/6010 SW 3050/7060 SW 3050/7421** SW 3050/7740 SW 7471

Remarks: \*\*SW 7421 will be used if lead concentrations are less than 5 times the detection limit on the ICP.

Turn-around Time: 30 days

[Please return a copy of this form with the data package.]

## FIGURE 2-4

## REQUEST FOR ANALYSIS FORM

LENL-I

Project #: 11-3571-3209  
 Project: NAS Carswell  
 Project Manager: Mr. James Forbes  
 Project Chemist: Ms. Susan Max  
 Matrix: Soil  
 Site: Grounds Maintenance Yard

(Sample I.D.)

## ANALYTICAL REQUEST

CONTAINER	NO.	PRESERVATION	PARAMETER	METHOD
2 oz. glass jar	1	Cool to 4°C	Volatile Organics	SW 8240
8 oz. glass jar	1	Cool to 4°C	Semi-Volatile Organics	SW 3550/8270
8 oz. glass jar	1	Cool to 4°C	Herbicides	SW 8150
8 oz. glass jar	1	Cool to 4°C	Pesticides/PCBs	SW 3550/8080
8 oz. glass jar	1	Cool to 4°C	ICP Screen Arsenic Lead Selenium Mercury	SW 3050/6010 SW 3050/7060 SW 3050/7421** SW 3050/7740 SW 7471

Remarks: \*\*SW 7421 will be used if lead concentrations are less than 5 times the detection limit on the ICP.

Turn-around Time: 30 days

[Please return a copy of this form with the data package.]

sample shipment to the laboratory. The custody record will include the following information: name of person(s) collecting the samples, date samples were collected, the sample identification code (ID), type of sampling conducted (composite/grab), and number and type of containers used. Figure 2-5 presents an example of a chain-of-custody record.

Transfer of sample custody shall be indicated by the signatures of the sampler(s) and the person receiving the samples on the chain-of-custody record, with date and time noted. Prior to sealing the shipping container, the original and first copy of the chain-of-custody record shall be placed in a plastic bag that will be attached to the inside of the shipping container lid. The second copy remains with the sampler(s). If a courier service is to be used, the signature of the receiving person will be replaced by the shipper's airbill number. Receipt at the laboratory shall be indicated by signature of the laboratory's sample custodian, with the date and time recorded.

Custody seals will be placed on the shipping containers. Custody seals will be preprinted, adhesive-backed seals with security slots designed to break if disturbed. Sample shipping containers will be sealed in as many places as necessary to ensure security. Seals will be signed and dated before use. Upon receipt by the laboratory, the sample custodian will check and document whether the custody seals are intact and will also record the cooler temperature. Additional sample receipt information (i.e., condition of samples, temperature, preservatives, broken bottles, etc.) will be recorded on the chain of custody and cooler receipt forms as required.

#### 2.2.4 QC Samples

Quality control (QC) samples are collected and analyzed for the purpose of assessing the quality of the sampling effort and the

Figure 2-5

analytical data. QC samples include MS/MSD samples, duplicates of field samples, equipment rinsates, trip blanks, and ambient condition blanks. The type, description, preparation, collection, and frequency of field QC samples are discussed in the following section.

- Field Sample - The total sample collected at a specific site location. The field sample may be divided to provide material for analysis for QC samples.
- Laboratory QC Samples (MS/MSDs) - Samples analyzed by the laboratory to assess the quality of the analytical procedures. QC samples may be designated in the field so that adequate sample can be collected. QC samples represent approximately 10 percent of the field samples.
- Field Duplicate Samples
  - Water - Field duplicates are two samples collected independently at a sampling location during a single sampling event.
  - Soil - A field duplicate is a single sample divided into two equal parts for analysis.

One duplicate sample is required for every 10 field samples of the same matrix. The duplicate samples are analyzed for all of the parameters requested on the field samples.
- Equipment Rinsate - Samples consisting of reagent water collected from a final rinse of sampling equipment after the decontamination procedure has been performed. The purpose of equipment rinsates is to determine whether the sampling equipment is causing cross contamination of samples. One equipment blank is required by each sampling team per day (per equipment type). When possible, the equipment rinsate should be collected at the start or finish of sampling at a given location. The rinsate shall be analyzed for all of the analyses requested on samples from the site.
- Trip Blank - Containers of the organic-free reagent water that are kept with the field sample containers from the time they leave the laboratory until the time they are returned to the laboratory. The

purpose of the trip blank is to determine whether samples are being contaminated during transit. Trip blanks pertain only to volatile organic analyses. One trip blank is required for every shipment or cooler, whichever is more frequent, for all water and soil samples for volatile samples.

Ambient Conditions Blank - Containers of organic-free reagent water opened during sampling at the site. The purpose of the ambient condition blank is to determine whether site activities are contributing to sample contamination. Ambient condition blanks are required when samples for volatiles analyses are being collected downwind of possible VOC sources such as active runways. An ambient conditions blank shall be collected during each VOC sampling round.

#### 2.2.5 Sample Analysis Summary

Sample analysis summary information is presented in the Sample Plan Detail Tables for the Aerospace Museum and Ground Maintenance Yard (Appendix C).

### 2.3 FIELD MEASUREMENTS

Field measurements will be performed using a photoionization detector (PID) for the purpose of monitoring site health and safety conditions for the protection of workers. A detailed description of the health and safety program is presented in the "Draft Site Health & Safety Plan Addendum," Law Environmental, Inc., August 1995.

#### 2.3.1 Equipment Calibration

All equipment will be calibrated according to manufacturers instructions or a generally accepted practice. Calibration of all instruments will be recorded in the field log book. The following subsections describe calibration procedures.

- The handheld portable PID is used to monitor health and safety action levels. It will be calibrated daily with a 100 ppm level of isobutylene. The battery power supply will be recharged each evening prior to the next day field activities.

### 2.3.2 Equipment Maintenance

Field equipment will be located in a controlled storage room, and must be returned decontaminated, with any malfunctions reported to the site manager. The site manager will initiate any actions necessary for the repair or replacement of the equipment. Equipment maintenance logs are kept updated and on file. Battery powered instruments will have their power supplies checked daily. Rechargeable instruments will be recharged daily.

### 2.3.3 Decontamination of Field Instruments

No decontamination is required for the OVA.

## 2.4 FIELD QA/QC PROGRAM

The field quality assurance and quality control program is a team effort and will be monitored by the site manager. The following text describes the factors that govern field QA/QC procedures.

### 2.4.1 Control Parameters

Control parameters for field procedures are similar to those parameters applied to analytical data. These parameters are monitored through the assessment of data collected for the evaluation of precision, accuracy, representativeness, and completeness. Control parameters consist of the following:

- Collection of field QC samples
- Calibration of field equipment

- Decontamination of field equipment
- Collection of field measurements
- Record keeping

#### 2.4.2 Control Limits and Corrective Actions

Appendix C presents a summary of quality control samples to be collected. Laboratory corrective action requirements are presented in the Quality Assurance Project Plan. Corrective action will be implemented in the field under the guidance of the LAW Project Manager and Site Manager. Any corrective action taken will be documented in a hardbound field notebook.

#### 2.5 RECORDKEEPING

Pertinent information concerning all aspects of sampling and field measurements will be recorded in hardbound field notebooks. The bound field notebook will have prenumbered pages, and entries will be made in indelible ink. Environmental conditions will also be characterized. Each sampling site will be characterized by the following criteria:

1. Location of work
2. Weather
3. Ongoing activities that may influence or disrupt sampling efforts
4. Accessibility to the sampling locations, e.g., rough terrain, fallen trees, flooding, etc.

#### 2.6 SITE MANAGEMENT

The AFCEE Team Chief for this project is Mr. Charles Rice. The team chief's address and phone number are:

Mr. Charles Rice  
Team Chief  
HQ AFCEE/ERB  
8001 Inner Circle Drive  
Brooks AFB, Texas 78235-5328  
Phone: (210) 536-6452

The NAS Fort Worth Point of Contact (POC) is Mr. Olen Long.  
Mr. Long's address and phone number are:

Air Force Base Conversion Agency  
Site Manager  
AFBCA/OL-H  
Building 1215  
Depot Avenue  
NAS Fort Worth JRB, Carswell Field  
Fort Worth, TX 76127  
Phone: (817) 782-6311

NAS Fort Worth personnel will assist in base cooperation for the following:

- Personnel identification and vehicle passes
- Utility clearances and permits
- Temporary field office
- A water supply for large quantities of potable water to be used in equipment cleaning, etc.
- Rights of easement and access to all Air Force and private property to perform all required field investigations

All field personnel will adhere to the procedures as described in the work plans. The site manager will supervise all field activities and continually update the AFCEE Team Chief and LAW's Project Manager of the daily activities. Problems occurring during field activities requiring deviation from the SAP will be brought to the attention of the Team Chief for his input into the resolution of the problem.

2.7 VARIANCES

AFCEE approval will be obtained in order to implement field tasks that vary in approach as compared to the statement of work written for this delivery order.

## REFERENCES

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**APPENDIX A**

- A-1 LABORATORY-ESTABLISHED DETECTION AND QUANTITATION LIMITS**
- A-2 CONTROL LIMITS FOR MATRIX SPIKE/MATRIX SPIKE DUPLICATES, LABORATORY CONTROL SAMPLES AND SURROGATE SPIKES**
- A-3 SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES**

**APPENDIX A-1**

**LABORATORY-ESTABLISHED DETECTION  
AND QUANTITATION LIMITS**

**LABORATORY--ESTABLISHED DETECTION AND QUANTITATION LIMITS  
VOLATILE ORGANIC COMPOUNDS  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas**

PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	#	AFCEE PQL 9/93
Acetone	8240	µg/L	Water	3.8	10		100
	8240	mg/Kg	Soil	-	0.01		0.1
Benzene	8240	µg/L	Water	0.27	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Bromodichloromethane	8240	µg/L	Water	0.54	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Bromoform	8240	µg/L	Water	0.54	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Bromomethane	8240	µg/L	Water	1.9	10		10
	8240	mg/Kg	Soil	-	0.01		0.01
2-Butanone	8240	µg/L	Water	3.7	10		100
	8240	mg/Kg	Soil	-	0.01		0.1
Carbon disulfide	8240	µg/L	Water	0.22	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Carbon tetrachloride	8240	µg/L	Water	0.2	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Chlorobenzene	8240	µg/L	Water	0.31	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Dibromochloromethane	8240	µg/L	Water	0.65	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Chloroethane	8240	µg/L	Water	1.3	10		10
	8240	mg/Kg	Soil	-	0.01		0.01
2-Chloroethyl vinyl ether	8240	µg/L	Water	8.0	10		10
	8240	mg/Kg	Soil	-	0.01		0.01
Chloroform	8240	µg/L	Water	0.98	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Chloromethane	8240	µg/L	Water	1.8	10		10
	8240	mg/Kg	Soil	-	0.01		0.01
1,1-Dichloroethane	8240	µg/L	Water	1.5	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
1,2-Dichloroethane	8240	µg/L	Water	0.24	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005

**LABORATORY-ESTABLISHED DETECTION AND QUANTITATION LIMITS**  
**VOLATILE ORGANIC COMPOUNDS**  
**Sampling and Analysis Plan**  
**Naval Air Station Fort Worth, Joint Reserve Base**  
**Fort Worth, Texas**

LENL-Pensacola							DV012495
PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	#	AFCEE PQL 9/93
1,1-Dichloroethene	8240	µg/L	Water	0.24	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
cis-1,2-Dichloroethene	8240	µg/L	Water	0.27	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
trans-1,2-Dichloroethene	8240	µg/L	Water	0.58	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
1,2-Dichloropropane	8240	µg/L	Water	0.52	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
cis-1,3-Dichloropropene	8240	µg/L	Water	0.44	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
trans-1,3-Dichloropropene	8240	µg/L	Water	0.52	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Ethylbenzene	8240	µg/L	Water	0.35	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
2-Hexanone	8240	µg/L	Water	0.86	10		50
	8240	mg/Kg	Soil	-	0.01		0.05
Methylene chloride	8240	µg/L	Water	2.3	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
4-Methyl-2-pentanone	8240	µg/L	Water	1.4	10		50
	8240	mg/Kg	Soil	-	0.01		0.05
Styrene	8240	µg/L	Water	0.26	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
1,1,2,2-Tetrachloroethane	8240	µg/L	Water	0.71	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Tetrachloroethene	8240	µg/L	Water	0.19	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Toluene	8240	µg/L	Water	0.33	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
1,1,1-Trichloroethane	8240	µg/L	Water	0.17	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
1,1,2-Trichloroethane	8240	µg/L	Water	0.7	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005

**LABORATORY--ESTABLISHED DETECTION AND QUANTITATION LIMITS**  
**VOLATILE ORGANIC COMPOUNDS**  
**Sampling and Analysis Plan**  
**Naval Air Station Fort Worth, Joint Reserve Base**  
**Fort Worth, Texas**

LENL--Pensacola PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	#	DV012495 AFCEE PQL 9/93
Trichloroethene	8240	$\mu\text{g/L}$	Water	0.36	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005
Vinyl acetate	8240	$\mu\text{g/L}$	Water	6	10		50
	8240	mg/Kg	Soil	-	0.01		0.05
Vinyl chloride	8240	$\mu\text{g/L}$	Water	1.7	10		10
	8240	mg/Kg	Soil	-	0.01		0.01
Xylenes (total)	8240	$\mu\text{g/L}$	Water	1	5.0		5.0
	8240	mg/Kg	Soil	-	0.005		0.005

#: This column flags laboratory PQLs that exceed AFCEE PQLs (IRP Handbook, September 1993).  
 MDL: Method Detection Limit.  
 PQL: Practical Quantitation Limit.

PREPARED/DATE: DRJ 2-10-95  
 CHECKED/DATE: SM 2-13-95

**LABORATORY—ESTABLISHED DETECTION AND QUANTITATION LIMITS  
SEMI-VOLATILE ORGANIC COMPOUNDS  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas**

LENL—Pensacola PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	# AFCEE PQL 9/93	DV012495
Base/Neutral Extractables:							
Acenaphthene	8270	µg/L	Water	0.4	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Acenaphthylene	8270	µg/L	Water	0.31	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Anthracene	8270	µg/L	Water	0.95	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Benz(a)anthracene	8270	µg/L	Water	1.1	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Benzo(b)fluoranthene	8270	µg/L	Water	0.72	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Benzo(ghi)perylene	8270	µg/L	Water	3.0	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Benzo(a)pyrene	8270	µg/L	Water	0.7	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Benzyl alcohol	8270	µg/L	Water	6	20		20
	8270	mg/Kg	Soil	—	0.66		1.3
bis(2—Chloroethoxy)methane	8270	µg/L	Water	1	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
bis(2—Chloroethyl)ether	8270	µg/L	Water	2.1	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
bis(2—Chloroisopropyl)ether	8270	µg/L	Water	2.2	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
bis(2—ethylhexyl)phthalate	8270	µg/L	Water	3.4	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
4—Bromophenyl phenyl ether	8270	µg/L	Water	1.1	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Butyl benzyl phthalate	8270	µg/L	Water	0.82	10		10
	8270	mg/Kg	Soil	—	0.33		0.7

**LABORATORY-ESTABLISHED DETECTION AND QUANTITATION LIMITS  
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Fort Worth, Texas**

LENL-Pensacola PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	# AFCEE PQL 9/93	DV012495
4-Chloroaniline	8270	µg/L	Water	6.8	20		20
	8270	mg/Kg	Soil	-	0.66		1.3
2-Chloronaphthalene	8270	µg/L	Water	1.4	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
4-Chlorophenyl phenyl ether	8270	µg/L	Water	1.4	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Chrysene	8270	µg/L	Water	0.34	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Dibenz(a,h)anthracene	8270	µg/L	Water	0.88	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Dibenzofuran	8270	µg/L	Water	0.82	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Di-n-butylphthalate	8270	µg/L	Water	0.52	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
1,2-Dichlorobenzene	8270	µg/L	Water	1	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
1,3-Dichlorobenzene	8270	µg/L	Water	2.2	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
1,4-Dichlorobenzene	8270	µg/L	Water	1.6	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
3,3'-Dichlorobenzidine	8270	µg/L	Water	7.3	20		20
	8270	mg/Kg	Soil	-	0.66		1.3
Diethyl phthalate	8270	µg/L	Water	1.2	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Dimethyl phthalate	8270	µg/L	Water	0.95	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
2,4-Dinitrotoluene	8270	µg/L	Water	1.9	10		10
	8270	mg/Kg	Soil	-	0.33		0.7

**LABORATORY--ESTABLISHED DETECTION AND QUANTITATION LIMITS  
SEMI-VOLATILE ORGANIC COMPOUNDS  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas**

LENL--Pensacola PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	# AFCEE PQL 9/93	DV012495
2,6-Dinitrotoluene	8270	µg/L	Water	1.9	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Di-n-octyl phthalate	8270	µg/L	Water	0.69	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Fluoranthene	8270	µg/L	Water	0.25	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Fluorene	8270	µg/L	Water	0.21	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Hexachlorobenzene	8270	µg/L	Water	2.1	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Hexachlorobutadiene	8270	µg/L	Water	3	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Hexachlorocyclopentadiene	8270	µg/L	Water	10	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Hexachloroethane	8270	µg/L	Water	2.3	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Indeno(1,2,3-cd)pyrene	8270	µg/L	Water	1.3	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Isophorone	8270	µg/L	Water	1.2	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
2-Methylnaphthalene	8270	µg/L	Water	1.2	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
Naphthalene	8270	µg/L	Water	0.37	10		10
	8270	mg/Kg	Soil	-	0.33		0.7
2-Nitroaniline	8270	µg/L	Water	1.9	50		50
	8270	mg/Kg	Soil	-	1.65		3.3
3-Nitroaniline	8270	µg/L	Water	1.9	50		50
	8270	mg/Kg	Soil	-	1.65		3.3

**LABORATORY—ESTABLISHED DETECTION AND QUANTITATION LIMITS**  
**SEMI—VOLATILE ORGANIC COMPOUNDS**  
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**Naval Air Station Fort Worth, Joint Reserve Base**  
**Fort Worth, Texas**

LENL—Pensacola							DV012495
PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	#	AFCEE PQL 9/93
4—Nitroaniline	8270	µg/L	Water	1.8	50		50
	8270	mg/Kg	Soil	—	1.65		3.3
Nitrobenzene	8270	µg/L	Water	1.6	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
n—Nitrosodiphenylamine	8270	µg/L	Water	2.8	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
n—Nitrosodinpropylamine	8270	µg/L	Water	2.7	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Phenanthrene	8270	µg/L	Water	0.59	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Pyrene	8270	µg/L	Water	0.53	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
1,2,4—Trichlorobenzene	8270	µg/L	Water	1.9	10		10
	8270	mg/Kg	Soil	—	0.33		0.7
Acid:							
Benzoic acid	8270	µg/L	Water	33	50		50
	8270	mg/Kg	Soil	—	1.6		1.6
4—Chloro—3—methylphenol	8270	µg/L	Water	1.4	10		20
	8270	mg/Kg	Soil	—	0.33		1.3
2—Chlorophenol	8270	µg/L	Water	1.8	10		10
	8270	mg/Kg	Soil	—	0.33		0.3
2,4—Dichlorophenol	8270	µg/L	Water	3	10		10
	8270	mg/Kg	Soil	—	0.33		0.3
2,4—Dimethylphenol	8270	µg/L	Water	1.7	10		10
	8270	mg/Kg	Soil	—	0.33		0.3
4,6—Dinitro—2—methylphenol	8270	µg/L	Water	2.0	50		50
	8270	mg/Kg	Soil	—	1.65		3.3
2,4—Dinitrophenol	8270	µg/L	Water	20	50		50
	8270	mg/Kg	Soil	—	1.65		3.3

**LABORATORY-ESTABLISHED DETECTION AND QUANTITATION LIMITS**  
**SEMI-VOLATILE ORGANIC COMPOUNDS**  
**Sampling and Analysis Plan**  
**Naval Air Station Fort Worth, Joint Reserve Base**  
**Fort Worth, Texas**

PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	#	DV012495 AFCEE PQL 9/93
2-Methylphenol	8270	µg/L	Water	2	10		10
	8270	mg/Kg	Soil	-	0.33		0.3
4-Methylphenol	8270	µg/L	Water	2.1	10		10
	8270	mg/Kg	Soil	-	0.33		0.3
2-Nitrophenol	8270	µg/L	Water	1.9	10		10
	8270	mg/Kg	Soil	-	0.33		0.3
4-Nitrophenol	8270	µg/L	Water	20	50		50
	8270	mg/Kg	Soil	-	1.6		1.6
Pentachlorophenol	8270	µg/L	Water	2.9	30		50
	8270	mg/Kg	Soil	-	1.0		3.3
Phenol	8270	µg/L	Water	2.4	10		10
	8270	mg/Kg	Soil	-	0.33		0.3
2,4,5-Trichlorophenol	8270	µg/L	Water	1.7	20		50
	8270	mg/Kg	Soil	-	0.66		3.3
2,4,6-Trichlorophenol	8270	µg/L	Water	1.5	10		10
	8270	mg/Kg	Soil	-	0.33		0.3

#: This column flags laboratory PQLs that exceed AFCEE PQLs (IRP Handbook, September 1993).  
MDL: Method Detection Limit.  
PQL: Practical Quantitation Limit.

PREPARED/DATE: DRJ 2-10-95  
CHECKED/DATE: SM 2-13-95

**LABORATORY-ESTABLISHED DETECTION AND QUANTITATION LIMITS  
ORGANOCHLORINE PESTICIDES & PCBs  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas**

LENL-Pensacola							DV012495
PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	#	AFCEE PQL 9/93
Aldrin	8080	$\mu\text{g/L}$	Water	0.009	0.04		0.04
	8080	mg/Kg	Soil	-	0.001		0.003
alpha-BHC	8080	$\mu\text{g/L}$	Water	0.004	0.03		0.03
	8080	mg/Kg	Soil	-	0.001		0.002
beta-BHC	8080	$\mu\text{g/L}$	Water	0.011	0.05		0.06
	8080	mg/Kg	Soil	-	0.002		0.004
delta-BHC	8080	$\mu\text{g/L}$	Water	0.002	0.05		0.09
	8080	mg/Kg	Soil	-	0.002		0.006
gamma-BHC (Lindane)	8080	$\mu\text{g/L}$	Water	0.004	0.04		0.04
	8080	mg/Kg	Soil	-	0.001		0.003
Chlordane(technical)	8080	$\mu\text{g/L}$	Water	0.078	0.5	#	0.14
	8080	mg/Kg	Soil	-	0.017	#	0.009
alpha-Chlordane	8080	$\mu\text{g/L}$	Water	0.013	0.05		NE
	8080	mg/Kg	Soil	-	0.002		NE
gamma-Chlordane	8080	$\mu\text{g/L}$	Water	0.006	0.05		NE
	8080	mg/Kg	Soil	-	0.002		NE
4,4'-DDD	8080	$\mu\text{g/L}$	Water	0.006	0.1		0.11
	8080	mg/Kg	Soil	-	0.003		0.007
4,4'-DDE	8080	$\mu\text{g/L}$	Water	0.011	0.04		0.04
	8080	mg/Kg	Soil	-	0.001		0.003
4,4'-DDT	8080	$\mu\text{g/L}$	Water	0.041	0.1		0.12
	8080	mg/Kg	Soil	-	0.003		0.008
Dieldrin	8080	$\mu\text{g/L}$	Water	0.01	0.02		0.02
	8080	mg/Kg	Soil	-	0.0007		0.01
Endosulfan I	8080	$\mu\text{g/L}$	Water	0.009	0.05		0.14
	8080	mg/Kg	Soil	-	0.002		0.009
Endosulfan II	8080	$\mu\text{g/L}$	Water	0.018	0.04		0.04
	8080	mg/Kg	Soil	-	0.001		0.003
Endosulfan sulfate	8080	$\mu\text{g/L}$	Water	0.015	0.1		0.66
	8080	mg/Kg	Soil	-	0.003		0.04

**LABORATORY--ESTABLISHED DETECTION AND QUANTITATION LIMITS**  
**ORGANOCHLORINE PESTICIDES & PCBs**  
**Sampling and Analysis Plan**  
**Naval Air Station Fort Worth, Joint Reserve Base**  
**Fort Worth, Texas**

LENL - Pensacola							DV012495
PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	#	AFCEE PQL 9/93
Endrin	8080	µg/L	Water	0.015	0.06		0.06
	8080	mg/Kg	Soil	-	0.002		0.004
Endrin Aldehyde	8080	µg/L	Water	0.047	0.1		0.23
	8080	mg/Kg	Soil	-	0.003		0.02
Heptachlor	8080	µg/L	Water	0.006	0.03		0.03
	8080	mg/Kg	Soil	-	0.001		0.002
Heptachlor epoxide	8080	µg/L	Water	0.008	0.05		0.83
	8080	mg/Kg	Soil	-	0.002		0.06
Methoxychlor	8080	µg/L	Water	0.03	0.5		1.76
	8080	mg/Kg	Soil	-	0.017		0.10
Toxaphene	8080	µg/L	Water	0.988	2.0		2.4
	8080	mg/Kg	Soil	-	0.066		0.20
PCB-1016	8080	µg/L	Water	0.178	1.0		1.0
	8080	mg/Kg	Soil	-	0.033		1.0
PCB-1221	8080	µg/L	Water	0.257	1.0		1.0
	8080	mg/Kg	Soil	-	0.033		1.0
PCB-1232	8080	µg/L	Water	0.168	1.0		1.0
	8080	mg/Kg	Soil	-	0.033		1.0
PCB-1242	8080	µg/L	Water	0.385	1.0		1.0
	8080	mg/Kg	Soil	-	0.033		1.0
PCB-1248	8080	µg/L	Water	0.224	1.0		1.0
	8080	mg/Kg	Soil	-	0.033		1.0
PCB-1254	8080	µg/L	Water	0.384	1.0		1.0
	8080	mg/Kg	Soil	-	0.033		1.0
PCB-1260	8080	µg/L	Water	0.222	1.0		1.0
	8080	mg/Kg	Soil	-	0.033		1.0

#: This column flags laboratory PQLs that exceed AFCEE PQLs (IRP Handbook, September 1993).  
 MDL: Method Detection Limit.  
 PQL: Practical Quantitation Limit.  
 NE: Not Established.

PREPARED/DATE: DRJ 2-10-95  
 CHECKED/DATE: SM 2-13-95

**LABORATORY – ESTABLISHED DETECTION AND QUANTITATION LIMITS  
CHLORINATED PHENOXY ACID HERBICIDES  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas**

LENL – Pensacola PARAMETER	EPA METHOD	UNITS	MATRIX	MDL	PQL REPORTING LIMIT	#	DV012495 AFCEE PQL 9/93
2,4-D	8150	µg/L	Water	0.16	2.0		12
	8150	mg/Kg	Soil	–	0.1		0.8
2,4-DB	8150	µg/L	Water	0.26	1.0		9.0
	8150	mg/Kg	Soil	–	0.2		0.6
2,4,5-T	8150	µg/L	Water	0.19	1.0		2.0
	8150	mg/Kg	Soil	–	0.01		0.1
2,4,5-TP (Silvex)	8150	µg/L	Water	0.19	1.0		1.7
	8150	mg/Kg	Soil	–	0.01		0.1
Dalapon	8150	µg/L	Water	5.6	1.0		60
	8150	mg/Kg	Soil	–	0.4		4.0
Dicamba	8150	µg/L	Water	0.14	1.0		2.7
	8150	mg/Kg	Soil	–	0.01		0.2
Dichloroprop	8150	µg/L	Water	1	1.0		6.5
	8150	mg/Kg	Soil	–	0.1		0.5
Dinoseb	8150	µg/L	Water	0.25	1.0		0.7
	8150	mg/Kg	Soil	–	0.04		0.05
MCPA	8150	µg/L	Water	54	0.13		2500
	8150	mg/Kg	Soil	–	8		170
MCPP	8150	µg/L	Water	23	1.0		1900
	8150	mg/Kg	Soil	–	8		130

#: This column flags laboratory PQLs that exceed AFCEE PQLs (IRP Handbook, September 1993).

MDL: Method Detection Limit.

PQL: Practical Quantitation Limit.

PREPARED/DATE: DRJ 2-10-95  
CHECKED/DATE: SM 2-13-95

**LABORATORY – ESTABLISHED DETECTION AND QUANTITATION LIMIT**  
**INORGANIC ANALYTES**  
**Sampling and Analysis Plan**  
**Naval Air Station Fort Worth, Joint Reserve Base**  
**Fort Worth, Texas**

PARAMETER	EPA METHOD	UNITS	MATRIX	PQL REPORTING LIMIT	#	AFCEE PQL 9/93
Aluminum	6010	mg/L	Water	0.1		0.5
	6010	mg/kg	Soil	10		50
Antimony	6010	mg/L	Water	0.024		0.4
	6010	mg/kg	Soil	2.4		40
Arsenic	6010	mg/L	Water	0.037		0.6
	6010	mg/kg	Soil	3.7		60
Barium	6010	mg/L	Water	0.02		0.02
	6010	mg/kg	Soil	2		2.0
Beryllium	6010	mg/L	Water	0.003		0.003
	6010	mg/kg	Soil	0.3		0.3
Cadmium	6010	mg/L	Water	0.005		0.04
	6010	mg/kg	Soil	0.5		4.0
Calcium	6010	mg/L	Water	0.1		0.1
	6010	mg/kg	Soil	10		10
Chromium	6010	mg/L	Water	0.01		0.07
	6010	mg/kg	Soil	1.0		7.0
Cobalt	6010	mg/L	Water	0.011		0.07
	6010	mg/kg	Soil	1.1		7.0
Copper	6010	mg/L	Water	0.004		0.06
	6010	mg/kg	Soil	0.4		6.0
Iron	6010	mg/L	Water	0.05		0.07
	6010	mg/kg	Soil	5.0		7.0
Lead	6010	mg/L	Water	0.025		0.5
	6010	mg/kg	Soil	2.5		50
Magnesium	6010	mg/L	Water	0.2		0.3
	6010	mg/kg	Soil	20		30
Manganese	6010	mg/L	Water	0.005		0.02
	6010	mg/kg	Soil	0.5		2.0
Molybdenum	6010	mg/L	Water	0.01		0.08
	6010	mg/kg	Soil	1.0		8.0
Nickel	6010	mg/L	Water	0.023		0.15
	6010	mg/kg	Soil	2.3		15
Potassium	6010	mg/L	Water	0.2		5.0
	6010	mg/kg	Soil	20		500
Selenium	6010	mg/L	Water	0.064		0.8
	6010	mg/kg	Soil	6.4		80

**LABORATORY - ESTABLISHED DETECTION AND QUANTITATION LIMIT  
INORGANIC ANALYTES  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas**

PARAMETER	EPA METHOD	UNITS	MATRIX	PQL REPORTING LIMIT	#	AFCEE PQL 9/93
Silver	6010	mg/L	Water	0.005		0.07
	6010	mg/kg	Soil	0.5		7.0
Sodium	6010	mg/L	Water	0.2		0.3
	6010	mg/kg	Soil	20		30
Thallium	6010	mg/L	Water	0.042		0.4
	6010	mg/kg	Soil	4.2		40
Vanadium	6010	mg/L	Water	0.007		0.08
	6010	mg/kg	Soil	0.7		8.0
Zinc	6010	mg/L	Water	0.014		0.02
	6010	mg/kg	Soil	1.4		2.0
Arsenic	7060	mg/L	Water	0.005		0.005
	7060	mg/kg	Soil	0.5		0.5
Cadmium	7131	mg/L	Water	0.0005		0.001
	7131	mg/kg	Soil	0.05		0.1
Lead	7421	mg/L	Water	0.005		0.005
	7421	mg/kg	Soil	0.5		0.5
Mercury	7470	mg/L	Water	0.0002		0.001
	7471	mg/kg	Soil	0.02		0.1
Selenium	7740	mg/L	Water	0.005		0.005
	7740	mg/kg	Soil	0.5		0.5

GFAA analytes may be analyzed by SW6010 (ICP) if the concentration is greater than 5 times the ICP PQL.

#: This column flags IDLs that exceed AFCEE PQLs (IRP Handbook, September 1993).

\*: IDL exceeds AFCEE MQL.

IDL: Instrument Detection Limit

PREPARED/DATE: \_\_\_\_\_  
CHECKED/DATE: \_\_\_\_\_

**APPENDIX A-2**

**CONTROL LIMITS FOR MATRIX SPIKES/  
MATRIX SPIKE DUPLICATES, LABORATORY CONTROL SAMPLES  
AND SURROGATE SPIKES**

CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, LABORATORY  
CONTROL SAMPLES, AND SURROGATE SPIKES  
VOLATILE ORGANIC COMPOUNDS  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas

LENL - Pensacola								DV012495	
PARAMETER	EPA # METHOD	MATRIX	UNITS	MS/MSD SPIKE CONC. LOW	MS/MSD ACCURACY % REC	MS/MSD PRECISION MAX. RPD	LCS SPIKE CONC. LOW	LCS ACCURACY % REC	
Acetone	8240	Water	µg/L	NS	NA	NA	50	34-221	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	34-221	
Benzene	8240	Water	µg/L	50	68-124	40	50	68-124	
	8240	Soil	mg/Kg	0.05	68-124	40	0.05	68-124	
Bromodichloromethane	8240	Water	µg/L	NS	NA	NA	50	68-124	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	68-124	
Bromoform	8240	Water	µg/L	NS	NA	NA	50	71-131	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	71-131	
Bromomethane	8240	Water	µg/L	NS	NA	NA	50	67-124	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	67-124	
2-Butanone	8240	Water	µg/L	NS	NA	NA	50	35-207	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	35-207	
Carbon disulfide	8240	Water	µg/L	NS	NA	NA	50	63-133	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	63-133	
Carbon tetrachloride	8240	Water	µg/L	NS	NA	NA	50	62-109	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	62-109	
Chlorobenzene	8240	Water	µg/L	50	73-127	40	50	73-127	
	8240	Soil	mg/Kg	0.05	73-127	40	0.05	73-127	
Dibromochloromethane	8240	Water	µg/L	50	64-120	40	50	64-120	
	8240	Soil	mg/Kg	0.05	64-120	40	0.05	64-120	
Chloroethane	8240	Water	µg/L	NS	NA	NA	50	71-116	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	71-116	
2-Chloroethyl vinyl ether	8240	Water	µg/L	NS	NA	NA	50	D-182	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	D-182	
Chloroform	8240	Water	µg/L	50	63-117	40	50	63-117	
	8240	Soil	mg/Kg	0.05	63-117	40	0.05	63-117	
Chloromethane	8240	Water	µg/L	NS	NA	NA	50	65-121	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	65-121	
1,1-Dichloroethane	8240	Water	µg/L	NS	NA	NA	50	74-125	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	74-125	
1,2-Dichloroethane	8240	Water	µg/L	NS	NA	NA	50	71-124	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	71-124	
1,1-Dichloroethane	8240	Water	µg/L	50	69-122	40	50	69-122	
	8240	Soil	mg/Kg	0.05	69-122	40	0.05	69-122	
cis-1,2-Dichloroethene	8240	Water	µg/L	NS	NA	NA	50	71-131	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	71-131	
trans-1,2-Dichloroethene	8240	Water	µg/L	NS	NA	NA	50	69-120	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	69-120	
1,2-Dichloropropane	8240	Water	µg/L	NS	NA	NA	50	70-126	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	70-126	
cis-1,3-Dichloropropene	8240	Water	µg/L	NS	NA	NA	50	53-149	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	53-149	

3517-3200-27 (A-Z) (240)

**CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, LABORATORY  
CONTROL SAMPLES, AND SURROGATE SPIKES  
VOLATILE ORGANIC COMPOUNDS**  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas

LENL - Pensacola									DV012495
PARAMETER	EPA # METHOD	MATRIX	UNITS	MS/MSD SPIKE CONC. LOW	MS/MSD ACCURACY % REC	MS/MSD PRECISION MAX. RPD	LCS SPIKE CONC. LOW	LCS ACCURACY % REC	
trans-1,3-Dichloropropene	8240	Water	µg/L	NS	NA	NA	50	48-158	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	48-158	
Ethylbenzene	8240	Water	µg/L	50	72-125	40	50	72-125	
	8240	Soil	mg/Kg	0.05	72-125	40	0.05	72-125	
2-Hexanone	8240	Water	µg/L	NS	NA	NA	50	57-158	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	57-158	
Methylene chloride	8240	Water	µg/L	NS	NA	NA	50	67-124	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	67-124	
4-Methyl-2-pentanone	8240	Water	µg/L	NS	NA	NA	50	67-148	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	67-148	
Styrene	8240	Water	µg/L	NS	NA	NA	50	72-123	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	72-123	
1,1,2,2-Tetrachloroethane	8240	Water	µg/L	NS	NA	NA	50	73-118	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	73-118	
Tetrachloroethane	8240	Water	µg/L	50	66-116	40	50	66-116	
	8240	Soil	mg/Kg	0.05	66-116	40	0.05	66-116	
Toluene	8240	Water	µg/L	50	73-122	40	50	73-122	
	8240	Soil	mg/Kg	0.05	73-122	40	0.05	73-122	
1,1,1-Trichloroethane	8240	Water	µg/L	50	69-127	40	50	69-127	
	8240	Soil	mg/Kg	0.05	69-127	40	0.05	69-127	
1,1,2-Trichloroethane	8240	Water	µg/L	NS	NA	NA	50	78-135	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	78-135	
Trichloroethane	8240	Water	µg/L	50	76-117	40	50	76-117	
	8240	Soil	mg/Kg	0.05	76-117	40	0.05	76-117	
Vinyl acetate	8240	Water	µg/L	NS	NA	NA	50	3-175	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	3-175	
Vinyl chloride	8240	Water	µg/L	NS	NA	NA	50	69-127	
	8240	Soil	mg/Kg	NS	NA	NA	0.05	69-127	
Xylenes (total)	8240	Water	µg/L	NS	NA	NA	150	71-123	
	8240	Soil	mg/Kg	NS	NA	NA	0.15	71-123	
<b>SURROGATES</b>									
1,2-Dichloroethane - d4	8240	Water	µg/L	50	76-114				
	8240	Soil	mg/Kg	0.05	70-121				
Toluene - d8	8240	Water	µg/L	50	88-110				
	8240	Soil	mg/Kg	0.05	81-117				
Bromofluorobenzene	8240	Water	µg/L	50	86-115				
	8240	Soil	mg/Kg	0.05	74-121				

NA: Not applicable.  
 NE: Not established.  
 NS: Not spiked.  
 #: Column to be used to flag analytes not in 5/91 and 9/93 AFCEE handbooks.  
 a: Analyte not in 5/91 AFCEE handbook.  
 b: Analyte not in 9/93 AFCEE handbook.

PREPARED/DATE: DRJ 2-10-95  
 CHECKED/DATE: SM 2-13-95

**CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, LABORATORY  
CONTROL SAMPLES, AND SURROGATE SPIKES  
SEMI-VOLATILE ORGANIC COMPOUNDS  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas**

LENL - Pensacola

DV010595

PARAMETER	EPA # METHOD	MATRIX	UNITS	MS/MSD SPIKE CONC. LOW	MS/MSD ACCURACY % REC	MS/MSD PRECISION MAX. RPD	LCS SPIKE CONC. LOW	LCS ACCURACY % REC
<b>Base/Neutral Extractables:</b>								
Acenaphthene	8270	Water	µg/L	100	47-136	40	50	47-136
	8270	Soil	mg/Kg	3.3	47-135	40	1.65	47-135
Acenaphthylene	8270	Water	µg/L	NS	NA	NA	50	39-135
	8270	Soil	mg/Kg	NS	NA	NA	1.65	33-144
Anthracene	8270	Water	µg/L	NS	NA	NA	50	43-133
	8270	Soil	mg/Kg	NS	NA	NA	1.65	40-127
Benz(a)anthracene	8270	Water	µg/L	100	48-139	40	50	48-139
	8270	Soil	mg/Kg	3.3	43-138	40	1.65	43-136
Benzo(b)fluoranthene	8270	Water	µg/L	NS	NA	NA	50	24-159
	8270	Soil	mg/Kg	NS	NA	NA	1.65	24-153
Benzo(k)fluoranthene	8270	Water	µg/L	NS	NA	NA	50	11-162
	8270	Soil	mg/Kg	NS	NA	NA	1.65	11-162
Benzo(ghi)perylene	8270	Water	µg/L	NS	NA	NA	50	2-158
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-154
Benzo(a)pyrene	8270	Water	µg/L	100	17-156	40	50	17-156
	8270	Soil	mg/Kg	3.3	17-152	40	1.65	17-152
Benzyl alcohol	8270	Water	µg/L	NS	NA	NA	50	D-229
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-118
bis(2-Chloroethoxy)methane	8270	Water	µg/L	100	33-154	40	50	33-154
	8270	Soil	mg/Kg	3.3	33-154	40	1.65	33-154
bis(2-Chloroethyl)ether	8270	Water	µg/L	NS	NA	NA	50	12-140
	8270	Soil	mg/Kg	NS	NA	NA	1.65	12-145
bis(2-Chloroisopropyl)ether	8270	Water	µg/L	NS	NA	NA	50	36-168
	8270	Soil	mg/Kg	NS	NA	NA	1.65	36-160
bis(2-ethylhexyl)phthalate	8270	Water	µg/L	NS	NA	NA	50	29-158
	8270	Soil	mg/Kg	NS	NA	NA	1.65	49-158
4-Bromophenyl phenyl ether	8270	Water	µg/L	NS	NA	NA	50	53-127
	8270	Soil	mg/Kg	NS	NA	NA	1.65	60-127
Butyl benzyl phthalate	8270	Water	µg/L	100	36-152	40	50	36-152
	8270	Soil	mg/Kg	3.3	54-143	40	1.65	54-143
4-Chloroaniline	8270	Water	µg/L	NS	NA	NA	50	D-189
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-134
2-Chloronaphthalene	8270	Water	µg/L	NS	NA	NA	50	60-118
	8270	Soil	mg/Kg	NS	NA	NA	1.65	60-115
4-Chlorophenyl phenyl ether	8270	Water	µg/L	NS	NA	NA	50	49-134
	8270	Soil	mg/Kg	NS	NA	NA	1.65	48-133
Chrysene	8270	Water	µg/L	NS	NA	NA	50	52-138
	8270	Soil	mg/Kg	NS	NA	NA	1.65	38-146
Dibenz(a,h)anthracene	8270	Water	µg/L	NS	NA	NA	50	D-164
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-166

**CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, LABORATORY  
 CONTROL SAMPLES, AND SURROGATE SPIKES  
 SEMI-VOLATILE ORGANIC COMPOUNDS**  
 Sampling and Analysis Plan  
 Naval Air Station Fort Worth, Joint Reserve Base  
 Fort Worth, Texas

LENL - Pensacola								DV010595	
PARAMETER	EPA # METHOD	MATRIX	UNITS	MS/MSD SPIKE CONC. LOW	MS/MSD ACCURACY % REC	MS/MSD PRECISION MAX. RPD	LCS SPIKE CONC. LOW	LCS ACCURACY % REC	
Dibenzofuran	8270	Water	µg/L	NS	NA	NA	50	27-127	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-142	
Di-n-butylphthalate	8270	Water	µg/L	NS	NA	NA	50	37-118	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	43-118	
1,2-Dichlorobenzene	8270	Water	µg/L	NS	NA	NA	50	32-124	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	32-126	
1,3-Dichlorobenzene	8270	Water	µg/L	NS	NA	NA	50	10-138	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-132	
1,4-Dichlorobenzene	8270	Water	µg/L	100	20-124	40	50	20-124	
	8270	Soil	mg/Kg	3.3	20-124	40	1.65	20-124	
3,3'-Dichlorobenzidine	8270	Water	µg/L	NS	NA	NA	50	D-262	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-262	
Diethyl phthalate	8270	Water	µg/L	NS	NA	NA	50	41-114	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	36-114	
Dimethyl phthalate	8270	Water	µg/L	NS	NA	NA	50	48-112	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	33-112	
2,4-Dinitrotoluene	8270	Water	µg/L	100	44-135	40	50	44-135	
	8270	Soil	mg/Kg	3.3	47-129	40	1.65	47-129	
2,6-Dinitrotoluene	8270	Water	µg/L	NS	NA	NA	50	50-135	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	51-132	
Di-n-octyl phthalate	8270	Water	µg/L	NS	NA	NA	50	4-146	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	4-146	
Fluoranthene	8270	Water	µg/L	NS	NA	NA	50	49-137	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	41-136	
Fluorene	8270	Water	µg/L	NS	NA	NA	50	64-121	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	59-121	
Hexachlorobenzene	8270	Water	µg/L	100	34-152	40	50	34-152	
	8270	Soil	mg/Kg	3.3	42-144	40	1.65	42-144	
Hexachlorobutadiene	8270	Water	µg/L	NS	NA	NA	50	33-116	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	24-116	
Hexachlorocyclopentadiene	8270	Water	µg/L	NS	NA	NA	50	D-136	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-121	
Hexachloroethane	8270	Water	µg/L	NS	NA	NA	50	40-113	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	40-113	
Indeno(1,2,3-cd)pyrene	8270	Water	µg/L	NS	NA	NA	50	D-171	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	3-153	
Isophorone	8270	Water	µg/L	NS	NA	NA	50	36-132	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	21-134	
2-Methylnaphthalene	8270	Water	µg/L	NS	NA	NA	50	D-163	
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-146	
Naphthalene	8270	Water	µg/L	100	42-126	40	50	42-126	
	8270	Soil	mg/Kg	3.3	33-127	40	1.65	33-127	

**CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, LABORATORY  
CONTROL SAMPLES, AND SURROGATE SPIKES  
SEMI-VOLATILE ORGANIC COMPOUNDS  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas**

LENL - Pensacola

DV010595

PARAMETER	EPA # METHOD	MATRIX	UNITS	MS/MSD SPIKE CONC. LOW	MS/MSD ACCURACY % REC	MS/MSD PRECISION MAX. RPD	LCS SPIKE CONC. LOW	LCS ACCURACY % REC
2-Nitroaniline	8270	Water	µg/L	NS	NA	NA	100	D-194
	8270	Soil	mg/Kg	NS	NA	NA	3.3	D-130
3-Nitroaniline	8270	Water	µg/L	NS	NA	NA	100	D-194
	8270	Soil	mg/Kg	NS	NA	NA	3.3	D-130
4-Nitroaniline	8270	Water	µg/L	NS	NA	NA	50	D-250
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-250
Nitrobenzene	8270	Water	µg/L	NS	NA	NA	50	35-140
	8270	Soil	mg/Kg	NS	NA	NA	1.65	35-142
n-Nitrosodiphenylamine	8270	Water	µg/L	NS	NA	NA	50	D-245
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-250
n-Nitrosodipropylamine	8270	Water	µg/L	100	30-144	40	50	30-144
	8270	Soil	mg/Kg	3.3	D-139	40	1.65	D-139
Phenanthrene	8270	Water	µg/L	NS	NA	NA	50	60-120
	8270	Soil	mg/Kg	NS	NA	NA	1.65	60-120
Pyrene	8270	Water	µg/L	100	52-115	40	50	52-115
	8270	Soil	mg/Kg	3.3	60-115	40	1.65	60-115
1,2,4-Trichlorobenzene	8270	Water	µg/L	100	44-124	40	50	44-124
	8270	Soil	mg/Kg	3.3	44-142	40	1.65	44-142
Acid: Benzoic acid	8270	Water	µg/L	NS	NA	NA	50	D-250
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-250
4-Chloro-3-methylphenol	8270	Water	µg/L	150	44-136	40	50	44-136
	8270	Soil	mg/Kg	4.95	39-131	40	1.65	39-131
2-Chlorophenol	8270	Water	µg/L	150	28-134	40	50	28-134
	8270	Soil	mg/Kg	4.95	23-127	40	1.65	23-127
2,4-Dichlorophenol	8270	Water	µg/L	NS	NA	NA	50	39-135
	8270	Soil	mg/Kg	NS	NA	NA	1.65	39-135
2,4-Dimethylphenol	8270	Water	µg/L	NS	NA	NA	50	32-113
	8270	Soil	mg/Kg	NS	NA	NA	1.65	32-119
4,6-Dinitro-2-methylphenol	8270	Water	µg/L	NS	NA	NA	50	D-153
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-140
2,4-Dinitrophenol	8270	Water	µg/L	NS	NA	NA	50	D-147
	8270	Soil	mg/Kg	NS	NA	NA	1.65	D-134
2-Methylphenol	8270	Water	µg/L	NS	NA	NA	50	D-169
	8270	Soil	mg/Kg	NS	NA	NA	1.65	13-141
4-Methylphenol	8270	Water	µg/L	NS	NA	NA	50	24-142
	8270	Soil	mg/Kg	NS	NA	NA	1.65	23-132
2-Nitrophenol	8270	Water	µg/L	NS	NA	NA	50	31-139
	8270	Soil	mg/Kg	NS	NA	NA	1.65	29-137
4-Nitrophenol	8270	Water	µg/L	150	D-132	40	50	D-132
	8270	Soil	mg/Kg	4.95	D-132	40	1.65	D-132

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**CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, LABORATORY  
CONTROL SAMPLES, AND SURROGATE SPIKES  
SEMI-VOLATILE ORGANIC COMPOUNDS**  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas

LENL - Pensacola

DV010595

PARAMETER	EPA # METHOD	MATRIX	UNITS	MS/MSD SPIKE CONC. LOW	MS/MSD ACCURACY % REC	MS/MSD PRECISION MAX. RPD	LCS SPIKE CONC. LOW	LCS ACCURACY % REC
Pentachlorophenol	8270	Water	µg/L	150	14-176	40	50	14-176
	8270	Soil	mg/Kg	4.95	14-155	40	1.65	14-155
Phenol	8270	Water	µg/L	150	19-112	40	50	19-112
	8270	Soil	mg/Kg	4.95	29-112	40	1.65	29-112
2,4,5-Trichlorophenol	8270	Water	µg/L	NS	NA	NA	50	38-142
	8270	Soil	mg/Kg	NS	NA	NA	1.65	35-141
2,4,6-Trichlorophenol	8270	Water	µg/L	NS	NA	NA	50	42-144
	8270	Soil	mg/Kg	NS	NA	NA	1.65	45-144
<b>SURROGATES</b>								
Nitrobenzene-d5	8270	Water	µg/L	100	35-114			
	8270	Soil	mg/Kg	3.3	23-120			
2-Fluorobiphenyl	8270	Water	µg/L	100	43-116			
	8270	Soil	mg/Kg	3.3	30-115			
Terphenyl-d14	8270	Water	µg/L	100	38-141			
	8270	Soil	mg/Kg	3.3	18-137			
2-Fluorophenol	8270	Water	µg/L	150	21-100			
	8270	Soil	mg/Kg	4.95	25-121			
Phenol-d6	8270	Water	µg/L	150	10-94			
	8270	Soil	mg/Kg	4.95	24-113			
2,4,6-Tribromophenol	8270	Water	µg/L	150	10-123			
	8270	Soil	mg/Kg	4.95	19-122			

NA: Not applicable.

NS: Not spiked.

NE: Not established.

#: Column to be used to flag analytes not in 5/91 and 9/93 AFCEE handbook.

a: Analyte not in 5/91 AFCEE handbook.

b: Analyte not in 9/93 AFCEE handbook.

PREPARED/DATE: DRJ 2-10-95  
CHECKED/DATE: SM 2-13-95

CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, LABORATORY  
CONTROL SAMPLES, AND SURROGATE SPIKES  
PESTICIDES & PCBs  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas

LENL - Pensacola								DV012485
PARAMETER	EPA METHOD	MATRIX	UNITS	MS/MSD SPIKE CONC. LOW	MS/MSD ACCURACY % REC	MS/MSD PRECISION MAX. RPD	LCS SPIKE CONC. LOW	LCS ACCURACY % REC
Aldrin	8080	Water	µg/L	0.4	42-122	40	0.2	42-122
	8080	Soil	mg/Kg	0.013	42-122	40	0.0067	42-122
alpha-BHC	8080	Water	µg/L	NS	NA	NA	0.2	49-134
	8080	Soil	mg/Kg	NS	NA	NA	0.0067	37-134
beta-BHC	8080	Water	µg/L	NS	NA	NA	0.2	25-147
	8080	Soil	mg/Kg	NS	NA	NA	0.0067	26-147
delta-BHC	8080	Water	µg/L	NS	NA	NA	0.2	19-139
	8080	Soil	mg/Kg	NS	NA	NA	0.0067	20-140
gamma-BHC (Lindane)	8080	Water	µg/L	0.4	55-127	40	0.2	55-127
	8080	Soil	mg/Kg	0.013	32-127	40	0.0067	32-127
Chlordane	8080	Water	µg/L	NS	NA	NA	NS	NA
	8080	Soil	mg/Kg	NS	NA	NA	NS	NA
alpha-Chlordane	8080	Water	µg/L	NS	NA	NA	0.2	38-161
	8080	Soil	mg/Kg	NS	NA	NA	0.0067	24-168
gamma-Chlordane	8080	Water	µg/L	NS	NA	NA	0.2	42-155
	8080	Soil	mg/Kg	NS	NA	NA	0.0067	30-164
4,4'-DDD	8080	Water	µg/L	NS	NA	NA	0.4	36-141
	8080	Soil	mg/Kg	NS	NA	NA	0.013	36-141
4,4'-DDE	8080	Water	µg/L	NS	NA	NA	0.4	40-145
	8080	Soil	mg/Kg	NS	NA	NA	0.013	30-145
4,4'-DDT	8080	Water	µg/L	1.0	59-148	40	0.4	59-148
	8080	Soil	mg/Kg	0.033	32-160	40	0.013	32-160
Dieldrin	8080	Water	µg/L	1.0	40-146	40	0.4	40-146
	8080	Soil	mg/Kg	0.033	40-146	40	0.013	40-146
Endosulfan I	8080	Water	µg/L	NS	NA	NA	0.2	45-149
	8080	Soil	mg/Kg	NS	NA	NA	0.0067	45-153
Endosulfan II	8080	Water	µg/L	NS	NA	NA	0.4	24-159
	8080	Soil	mg/Kg	NS	NA	NA	0.013	32-161
Endosulfan sulfate	8080	Water	µg/L	NS	NA	NA	0.4	36-144
	8080	Soil	mg/Kg	NS	NA	NA	0.013	26-144
Endrin	8080	Water	µg/L	1.0	42-147	40	0.4	42-147
	8080	Soil	mg/Kg	0.033	33-147	40	0.013	33-147
Endrin Aldehyde	8080	Water	µg/L	NS	NA	NA	0.4	39-159
	8080	Soil	mg/Kg	NS	NA	NA	0.013	28-172
Heptachlor	8080	Water	µg/L	0.4	43-111	40	0.2	43-111
	8080	Soil	mg/Kg	0.013	34-111	40	0.0067	34-111
Heptachlor epoxide	8080	Water	µg/L	NS	NA	NA	0.2	42-142
	8080	Soil	mg/Kg	NS	NA	NA	0.0067	37-142
Methoxychlor	8080	Water	µg/L	NS	NA	NA	2.0	62-161
	8080	Soil	mg/Kg	NS	NA	NA	0.067	31-190
Toxaphene	8080	Water	µg/L	NS	NA	NA	NS	NA
	8080	Soil	mg/Kg	NS	NA	NA	NS	NA

**CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, LABORATORY  
 CONTROL SAMPLES, AND SURROGATE SPIKES  
 PESTICIDES & PCBs  
 Sampling and Analysis Plan  
 Naval Air Station Fort Worth, Joint Reserve Base  
 Fort Worth, Texas**

LENL - Pensacola

DV012495

PARAMETER	EPA METHOD	MATRIX	UNITS	MS/MSD	MS/MSD	MS/MSD	LCS	LCS
				SPIKE CONC. LOW	ACCURACY % REC	PRECISION MAX. RPD	SPIKE CONC. LOW	ACCURACY % REC
PCB - 1016	8080	Water	µg/L	10	50-114	40	10	50-114
	8080	Soil	mg/Kg	0.33	50-114	40	0.33	50-114
PCB - 1221	8080	Water	µg/L	NS	NA	NA	NS	NA
	8080	Soil	mg/Kg	NS	NA	NA	NS	NA
PCB - 1232	8080	Water	µg/L	NS	NA	NA	NS	NA
	8080	Soil	mg/Kg	NS	NA	NA	NS	NA
PCB - 1242	8080	Water	µg/L	NS	NA	NA	NS	NA
	8080	Soil	mg/Kg	NS	NA	NA	NS	NA
PCB - 1248	8080	Water	µg/L	NS	NA	NA	NS	NA
	8080	Soil	mg/Kg	NS	NA	NA	NS	NA
PCB - 1254	8080	Water	µg/L	NS	NA	NA	NS	NA
	8080	Soil	mg/Kg	NS	NA	NA	NS	NA
PCB - 1260	8080	Water	µg/L	10	8-127	40	10	8-127
	8080	Soil	mg/Kg	0.33	8-127	40	0.33	8-127
<b>SURROGATES</b>								
Dibutylchloride	8080	Water	µg/L	1.0	33-186			
	8080	Soil	mg/Kg	0.067	10-181			
2,4,5,6-tetrachloro-meta-xylene	8080	Water	µg/L	0.2	24-151			
	8080	Soil	mg/Kg	0.013	18-145			

NA: Not applicable.  
 NE: Not established.  
 NS: Not spiked.

PREPARED/DATE: DRJ 2-10-95  
 CHECKED/DATE: SM 2-13-95

CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES,  
LABORATORY CONTROL SAMPLES, AND SURROGATE SPIKES  
Inorganic Analyses  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas

PARAMETER	EPA METHOD	MATRIX	UNITS	MS/MSD		MS/MSD PRECISION MAX. RPD	LCS	
				SPIKE CONC. LOW	ACCURACY % REC		SPIKE CONC. LOW	ACCURACY % REC
Aluminum	6010	Water	mg/L	2.0	75-125	20	5	80-120
	6010	Soil	mg/Kg	NS	NS	NS	500	80-120
Antimony	6010	Water	mg/L	0.5	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	50	75-125	20	100	80-120
Arsenic	6010	Water	mg/L	2.0	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	200	75-125	20	100	80-120
Barium	6010	Water	mg/L	2.0	75-125	20	5	80-120
	6010	Soil	mg/Kg	200	75-125	20	500	80-120
Beryllium	6010	Water	mg/L	0.05	75-125	20	0.2	80-120
	6010	Soil	mg/Kg	5.0	75-125	20	20	80-120
Cadmium	6010	Water	mg/L	0.05	75-125	20	0.2	80-120
	6010	Soil	mg/Kg	5.0	75-125	20	20	80-120
Calcium	6010	Water	mg/L	NS	NS	NS	12.5	80-120
	6010	Soil	mg/Kg	NS	NS	NS	1250	80-120
Chromium	6010	Water	mg/L	0.2	75-125	20	0.2	80-120
	6010	Soil	mg/Kg	20	75-125	20	20	80-120
Cobalt	6010	Water	mg/L	0.5	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	50	75-125	20	100	80-120
Copper	6010	Water	mg/L	0.25	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	25	75-125	20	100	80-120
Iron	6010	Water	mg/L	1.0	75-125	20	5	80-120
	6010	Soil	mg/Kg	NS	NS	NS	500	80-120
Lead	6010	Water	mg/L	0.5	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	50	75-125	20	100	80-120
Magnesium	6010	Water	mg/L	NS	NS	NS	12.5	80-120
	6010	Soil	mg/Kg	NS	NS	NS	1250	80-120
Manganese	6010	Water	mg/L	0.5	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	50	75-125	20	100	80-120
Molybdenum	6010	Water	mg/L	0.5	75-125	20	0.2	80-120
	6010	Soil	mg/Kg	50	75-125	20	20	80-120
Nickel	6010	Water	mg/L	0.5	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	50	75-125	20	100	80-120
Potassium	6010	Water	mg/L	NS	NS	NS	12.5	80-120
	6010	Soil	mg/Kg	NS	NS	NS	1250	80-120
Selenium	6010	Water	mg/L	2.0	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	200	75-125	20	100	80-120
Silver	6010	Water	mg/L	0.1	75-125	20	0.2	80-120
	6010	Soil	mg/Kg	10.0	75-125	20	20	80-120
Sodium	6010	Water	mg/L	NS	NS	NS	12.5	80-120
	6010	Soil	mg/Kg	NS	NS	NS	1250	80-120
Thallium	6010	Water	mg/L	2.0	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	200	75-125	20	100	80-120
Vanadium	6010	Water	mg/L	0.5	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	50	75-125	20	100	80-120
Zinc	6010	Water	mg/L	0.5	75-125	20	1.0	80-120
	6010	Soil	mg/Kg	50	75-125	20	100	80-120

CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES,  
 LABORATORY CONTROL SAMPLES, AND SURROGATE SPIKES  
 Inorganic Analytes  
 Sampling and Analysis Plan  
 Naval Air Station Fort Worth, Joint Reserve Base  
 Fort Worth, Texas

PARAMETER	EPA METHOD	MATRIX	UNITS	MS/MSD	MS/MSD	MS/MSD	LCS	DV012495
				SPIKE CONC. LOW	ACCURACY % REC	PRECISION MAX. RPD	SPIKE CONC. LOW	LCS ACCURACY % REC
Arsenic	7060	Water	mg/L	0.05	75-125	20	0.05	80-120
	7060	Soil	mg/Kg	5.0	75-125	20	5.0	80-120
Lead	7421	Water	mg/L	0.05	75-125	20	0.05	80-120
	7421	Soil	mg/Kg	5.0	75-125	20	5.0	80-120
Mercury	7470	Water	mg/L	0.001	75-125	20	0.001	80-120
	7471	Soil	mg/Kg	0.1	75-125	20	0.1	80-120
Selenium	7740	Water	mg/L	0.05	75-125	20	0.05	80-120
	7740	Soil	mg/Kg	5.0	75-125	20	5.0	80-120

NA: Not applicable.  
 NE: Not established.  
 NS: Not spiked.

PREPARED/DATE: DRJ 2-10-95  
 CHECKED/DATE: SM 2-13-95

**CONTROL LIMITS FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, LABORATORY  
CONTROL SAMPLES, AND SURROGATE SPIKES  
CHLORINATED PHENOXY ACID HERBICIDES  
Sampling and Analysis Plan  
Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas**

LENL - Pensacola								DV012495
EPA METHOD	PARAMETER	MATRIX	UNITS	MS/MSD SPIKE CONC. LOW	MS/MSD ACCURACY % REC	MS/MSD PRECISION MAX. RPD	LCS SPIKE CONC. LOW	LCS ACCURACY % REC
8150	2,4-D	Water	ug/L	10	4-143	40	10	4-143
8150		Soil	mg/Kg	0.2	4-143	40	0.2	4-143
8150	2,4-DB	Water	ug/L	NS	NA	NA	10	9-122
8150		Soil	mg/Kg	NS	NA	NA	0.2	9-122
8150	2,4,5-T	Water	ug/L	1.0	24-144	40	1.0	24-144
8150		Soil	mg/Kg	0.02	24-144	40	0.02	24-144
8150	2,4,5-TP (Silvex)	Water	ug/L	1.0	25-122	40	1.0	25-122
8150		Soil	mg/Kg	0.02	25-122	40	0.02	25-122
8150	Dalapon	Water	ug/L	NS	NA	NA	25	D-112
8150		Soil	mg/Kg	NS	NA	NA	0.5	D-112
8150	Dicamba	Water	ug/L	NS	NA	NA	1.0	35-136
8150		Soil	mg/Kg	NS	NA	NA	0.02	35-136
8150	Dichloroprop	Water	ug/L	NS	NA	NA	10	35-131
8150		Soil	mg/Kg	NS	NA	NA	0.2	35-131
8150	Dinoseb	Water	ug/L	NS	NA	NA	5.0	D-143
8150		Soil	mg/Kg	NS	NA	NA	0.1	D-143
8150	MCPA	Water	ug/L	NS	NA	NA	NS	12-146
8150		Soil	mg/Kg	NS	NA	NA	NS	12-146
8150	MCPP	Water	ug/L	NS	NA	NA	NS	14-138
8150		Soil	mg/Kg	NS	NA	NA	NS	14-138
SURROGATE								
8150	2,4-Dichlorophenyl acetic acid	Water	ug/L	10	28-124			
8150		Soil	mg/Kg	0.2	D-191			

NA: Not applicable.  
NE: Not established.  
NS: Not spiked.  
D: Detected

PREPARED/DATE: DRJ 2-10-95  
CHECKED/DATE: SM 2-13-95

**APPENDIX A-3**

**SUMMARY OF CALIBRATION  
AND INTERNAL QUALITY CONTROL PROCEDURES**

**SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES**  
**Sampling and Analysis Plan**  
**Naval Air Station Fort Worth, Joint Reserve Base**  
**Fort Worth, Texas**

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8240	Volatile Organics	<u>FIELD QC:</u> Trip Blank	1 for each batch of samples shipped to laboratory	No analytes detected at > reporting limit with the exception of methylene chloride, 2-butanone, acetone, and toluene should not exceed > 3x reporting limit.	Review lab QC data to determine if there is a laboratory problem. If not, and same compounds are found in field samples at similar concentrations, consult with TPM to determine need to resample entire batch.
	Refer to: SW846-8240 IRP Handbook, 9/93	Ambient Blank	Collected when samples are collected downwind of possible volatile sources.	No analytes detected at > reporting limit with the exception of methylene chloride, 2-butanone, acetone, and toluene should not exceed > 3x reporting limit.	Review lab QC data to determine if there is a laboratory problem. If not, and same compounds are found in field samples at similar concentrations, consult with TPM to determine need to resample entire batch.
		Duplicate	1 for every 10 field samples collected	Above 10x detection limit, % RPD must be less than current control limits: Aqueous samples - RPD < 50% Non-aqueous samples - RPD < 50%	Review lab QC data to determine if they are in control. If not in control, flag data. Use data to evaluate whether proper collection procedures were followed. If not, determine further corrective action.
		Rinseate	1 per day	Less than reported detection limits	Qualify data.
		<u>LABORATORY QC:</u> Check of mass spectral ion intensities using BFB	Initially, prior to calibration, once per every 12-hour shift	Established criteria in Table 3 of SW846-8240	1) Repeat BFB analysis
		Five-point calibration	Initial calibration prior to sample analysis	1) SPCCs average RF $\geq 0.30$ (Bromoform $\geq 0.25$ ) 2) RSD $\leq 30\%$ for CCC RFs	1) Repeat calibration
		Demonstrate ability to generate acceptable accuracy and precision using four replicate analyses of a QC check sample	Once per analyst	Analyte-specific limits as per SW846	1) Recalculate results 2) Locate and fix the source of the problem 3) Rerun demonstration for those analytes that did not meet criteria
		MDL Study	Once per year	Detection limits established shall not exceed those in Table 2-3 of IRP Handbook 9/93	Detection limits that exceed established criteria shall be submitted to the Air Force for approval prior to the analysis of any project samples

# SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES

## Sampling and Analysis Plan

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

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8240 (Continued)		Daily calibration check	Once per each 12 hours, prior to sample analysis (criteria for these checks must be met prior to sample analysis)	<ol style="list-style-type: none"> <li>1) SPCCs <math>RF \geq 0.30</math> (Bromoform <math>\geq 0.25</math>)</li> <li>2) CCC percent difference <math>\leq 25\%</math> from average response factors calculated following initial calibration</li> </ol>	<ol style="list-style-type: none"> <li>1) Evaluate system and take corrective action</li> <li>2) Run cal. check; if still out, prepare new calibration curve for any analyte not meeting criteria</li> <li>3) Reinject any samples analyzed after criteria were exceeded</li> </ol>
		Internal Standards (IS) - Retention Time (RT) and area responses checked from daily calibration check	Immediately after or during data acquisition of sample, spike, standard, and reagent blank	$RT \pm 30$ seconds and EICP within $-50\%$ to $+100\%$ of last daily calibration check (12 hrs) for each IS compound	<ol style="list-style-type: none"> <li>1) Inspect MS or GC for malfunctions</li> <li>2) Take appropriate corrective actions</li> <li>3) Mandatory reanalysis of samples analyzed while system was malfunctioning</li> <li>4) If sample exceeds criteria                         <ol style="list-style-type: none"> <li>a) Reanalyze sample; if still out,</li> <li>b) Report both analyses and document corrective action</li> </ol> </li> </ol>
		Matrix spike (MS) and matrix spike duplicate (MSD)	1 MS and 1 MSD per analytical batch if sufficient aliquot is received (minimum 1 pair per every 20 Air Force project samples)	Laboratory-established control limits (see Appendix A-2)	<p><b>Accuracy</b> If any matrix spike target compound (MSTC) is out of control in the MS or MSD, the LCS is evaluated for that compound. If that compound fails to meet LCS criterion as well, the analytical batch must be reprocessed.</p> <p><b>Precision</b> Department supervisor will evaluate failure with respect to an extraction problem, which will initiate analytical MS/MSD reprocessing. If failure is determined to be matrix related, no further action will be taken.</p>
		Laboratory Control Sample (LCS)	One per day/instrument	Laboratory-established control limits (see Appendix A-2)	LCS is evaluated independent of MS/MSD. If more than 20% of all analytes are not within criteria, the analytical batch must be reprocessed.
		Record of assessed accuracy for each matrix studied should be maintained and updated on a regular basis as per SW846-8000 and the IRP Handbook 9/93	After analysis of initial five spiked samples	NA	NA

**SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES**  
**Sampling and Analysis Plan**  
**Naval Air Station Fort Worth, Joint Reserve Base**  
**Fort Worth, Texas**

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8240 (Continued)		Surrogate standards spiked	Every sample, spike, standard, and reagent blank	Limits determined as per SW846-8000 (limits are to be updated annually on a matrix-by-matrix basis) (see Appendix A-2)	1) Recalculate result, if still out 2) Reanalyze sample, if still out 3) Report both analyses and document in report that steps 1 and 2 were performed
		Reagent blank	One per day/instrument	No analytes detected at > reporting limit with the exception of Methylene Chloride, 2-Butanone, Acetone, and Toluene, which should not exceed > 3X reporting limit	1) Source of contamination investigated 2) Appropriate corrective action taken and documented 3) All samples processed with a contaminated blank are to be reanalyzed

NA = Not applicable  
 SPCC = System Performance Check Compounds  
 CCC = Calibration Check Compounds  
 EICP = Extracted Ion Current Profile

# SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES

## Sampling and Analysis Plan

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

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8270	Semi-Volatile Organics	FIELD QC: Duplicate	1 for every 10 field samples collected	Above 10x detection limit, %RPD must be less than current control limits: Aqueous samples - RPD < 50% Non-aqueous samples - RPD < 50%  Less than reporting limit	Review lab QC data to determine if they are in control. If not in control, flag data. Use data to evaluate whether proper collection procedures were followed. If not, determine further corrective action.  Qualify data.
	Refer to: SW846-3500 SW846-3500 SW846-8270 IRP Handbook, 9/93	Rinse  <u>LABORATORY QC:</u>	1 per day		
		Check of mass spectral ion intensities using DFTPP	Initially, prior to calibration, once per every 12-hour shift	Established criteria in Table 3 of SW846-8270	1) Repeat DFTPP analysis
		Five-point calibration	Initial calibration prior to sample analysis	1) SPCCs average RF $\geq 0.05$ 2) RSD $\leq 30\%$ for CCC RFs	1) Repeat calibration
		Demonstrate ability to generate acceptable accuracy and precision using four replicate analyses of a QC check sample	Once per analyst	Analyte-specific limits as per SW846	1) Recalculate results 2) Locate and fix the source of the problem 3) Rerun demonstration for those analytes that did not meet criteria
		MDL Study	Once per year	Detection limits established shall not exceed those in Table 2-3 of IRP Handbook 9/93	Detection limits that exceed established criteria shall be submitted to the Air Force for approval prior to the analysis of any project samples
		Daily calibration check	Once per each 12 hours, prior to sample analysis (criteria for these checks must be met prior to sample analysis)	1) SPCCs RF $\geq 0.05$ 2) CCC percent difference $\leq 30\%$ from average response factors calculated following initial calibration	1) Evaluate system and take corrective action 2) Rerun cal. check; if still out, 3) Prepare new calibration curve for any analyte not meeting criteria 4) Reinject any samples analyzed after criteria were exceeded

# SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES

## Sampling and Analysis Plan

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

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8270 (Continued)		Internal Standards (IS) - Retention Time (RT) and area response checked from daily calibration check	Immediately after or during data acquisition of sample, spike, standard, and reagent blank	RT $\pm$ 30 seconds and EICP within -50% to + 100% of last daily calibration check (12 hrs) for each IS compound	<ol style="list-style-type: none"> <li>1) Inspect MS or GC for malfunctions</li> <li>2) Take appropriate corrective actions</li> <li>3) Mandatory reanalysis of samples analyzed while system was malfunctioning</li> <li>4) If sample exceeds criteria                             <ol style="list-style-type: none"> <li>a) Reanalyze sample; if still out,</li> <li>b) Report both analyses and document corrective action</li> </ol> </li> </ol>
	Matrix spike (MS) and matrix spike duplicate (MSD)		1 MS and 1 MSD per analytical batch if sufficient aliquot is received (minimum 1 pair per every 20 Air Force project samples)	Laboratory-established control limits (see Appendix A-2)	<p><b>Accuracy</b> If any matrix spike target compound (MSTC) is out of control in the MS or MSD, the LCS is evaluated for that compound. If that compound fails to meet LCS criterion as well, the analytical batch must be reprocessed.</p> <p><b>Precision</b> Department supervisor will evaluate failure with respect to an extraction problem, which will initiate analytical MS/MSD reprocessing. If failure is determined to be matrix related, no further action will be taken.</p>
	Laboratory Control Sample (LCS)		1 per analytical/extraction batch, minimum 1 per 20 samples	Laboratory-established control limits (see Appendix A-2)	<p>LCS is evaluated independent of MS/MSD. If more than 20% of all analytes are not within criteria, the analytical batch must be reprocessed.</p> <p>NA</p>
	Record of assessed accuracy for each matrix studied should be maintained and updated on a regular basis as per SW846-8000 and the IRP Handbook 9/93		After analysis of initial five spiked samples	NA	NA

# SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES

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

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8270 (Continued)		Surrogate standards spiked	Every sample, spike, standard, and reagent blank	Limits determined as per SW846-8000 (limits are to be updated annually on a matrix-by-matrix basis) (see Appendix A-2)	<ol style="list-style-type: none"> <li>1) Reanalyze sample; if still out</li> <li>2) Re-extract and reanalyze sample; if still out</li> <li>3) Report two analyses and document in report that steps 1 and 2 were performed</li> </ol>
	Reagent blank		One per analytical/extraction batch, minimum 1 per 20 samples	No analytes detected at > reporting limit with the exception of bis(2-ethylhexyl)phthalate, Di-n-butyl-phthalate, and Di-n-octyl-phthalate, which should not exceed > 3X reporting limit	<ol style="list-style-type: none"> <li>1) Source of contamination investigated</li> <li>2) Appropriate corrective action taken and documented</li> <li>3) All samples processed with a contaminated blank are to be re-extracted and reanalyzed</li> </ol>

NA = Not Applicable

SPCC = System Performance Check Compounds

CCC = Calibration Check Compounds

EICP = Extracted Ion Current Profile

# SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES

## Sampling and Analysis Plan

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

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW7060 SW7421 SW7740 SW7470/7471	Metals-AA As Pb Se Hg	<u>FIELD QC:</u> Duplicate  Rinseate	1 for every 10 field samples collected  1 per day	Above 10x detection limit, %RPD must be less than current control limits: Aqueous samples - RPD < 50% Non-aqueous samples - RPD < 50%  Less than reported detection limits	Review lab QC data to determine if they are in control. If not in control, flag data. Use data to evaluate whether proper collection procedures were followed. If not, determine further corrective action.  Qualify data if sample result is < 5x inseat result.
		<u>LABORATORY QC:</u> Four point calibration (for Hg - five point calibration)  Initial (ICV) and Continuing (CCV) Calibration Verification	Daily, prior to sample analysis (prepare fresh standards daily)  ICV-Prior to sample analysis CCV-After every 10 samples and at end of analytical run	Correlation coefficient $\geq 0.995$  Within $\pm 10\%$ of expected value Within $\pm 20\%$ of expected value for Hg	1) Repeat calibration  1) Terminate analysis 2) Locate and correct problem 3) Recalibrate 4) Reanalyze samples analyzed since last good CCV
		Calibration blank: Initial (ICB) and Continuing (CCB) Calibration Blank	ICB-Prior to sample analysis CCB-After every 10 samples and end of analytical run	No analytes detected at > reporting limit	1) Terminate analysis 2) Locate and correct problem 3) Recalibrate 4) Reanalyze samples since good CCB
		Digested, liquid, second source Laboratory Control Sample (LCS)	1 per digestion batch, minimum 1 per 20 samples	Laboratory-established control limits (see Appendix A-2)	1) Reanalyze LCS, if still out 2) Correct problem 3) Redigest and reanalyze associated samples

# SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES

## Sampling and Analysis Plan

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

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
	Metals-AA (Continued)	Matrix spike (MS)/matrix spike duplicate (MSD) (portion of sample is spiked prior to digestion)	1 MS and MSD per analytical batch if sufficient aliquot received (minimum 1 pair per every 20 Air Force project samples)	Laboratory-established control limits (see Appendix A-2)	<b>Accuracy</b> Analyze post digestion spike  <b>Precision</b> Department supervisor will evaluate failure with respect to an extraction problem, which will initiate analytical MS/MSD reprocessing. If failure is determined to be matrix related, no further action will be taken.
		Record of assessed accuracy for each matrix studied should be maintained and updated on a regular basis as per the IRP Handbook 9/93	NA	NA	NA
		Reagent blank	1 per batch of samples, minimum 1 per 20 samples	No analytes detected at > reporting limit	1) Source of contamination investigated 2) Appropriate corrective action taken and documented 3) All samples processed with a contaminated blank are to be redigested and reanalyzed
		IDL Study	Semi-annually	Detection limits established shall not exceed those in Table 2-2 of IRP Handbook	Detection limits which exceed established criteria shall be submitted to the Air Force for approval prior analysis of any project samples
		Analytical Spike - As, Pb, and Se only	Every sample and reagent blank	85-115% recovery	1) Dilute and reanalyze if recovery is <40%. If analytical spike recovery is still <40%, report data. 2) If recovery >40% and sample concentration <50% of spike concentration, report data. 3) If recovery >40% and sample >50% of spike concentration, rerun by Method of Standard Addition.

NA = Not Applicable

# SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES

## Sampling and Analysis Plan

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

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8010	Trace Metals - ICPEs	<u>FIELD QC:</u> Duplicate	1 for every 10 field samples collected	Above 10x detection limit, % RPD must be less than current control limits: Aqueous samples - RPD < 50% Non-aqueous samples - RPD < 50%	Review lab QC data to determine if they are in control. If not in control, flag data. Use data to evaluate whether proper collection procedures were followed. If not, determine further corrective action.
	Refer to: SW846-3005 SW846-3050 SW846-6010				
	Rinse		1 per day	No more than 4 target compounds, each with a concentration exceeding 3 times the method detection limit can be present.	Qualify data if sample result is < 5x rinse result.
	<u>LABORATORY QC:</u> Four point calibration		Daily, prior to sample analysis	Correlation coefficient $\geq 0.995$ Top standard $\pm 5\%$ of expected value	1) Repeat calibration
	Initial (ICV) and Continuing (CCV) Calibration Verification		ICV-Prior to sample analysis CCV-After every 10 samples and at end of analytical run	Within $\pm 10\%$ of expected value	1) Terminate analysis 2) Locate and correct problem 3) Recalibrate 4) Reanalyze samples analyzed since last good CCV
	Calibration blank: Initial (ICB) and Continuing (CCB) Calibration Blank		ICB-Prior to sample analysis CCB-After every 10 samples and end of analytical run	No analytes detected at > reporting limit with the exception of Al, Ca, Fe, Mg, Na, and K, which should not exceed > 3X reporting limit	1) Terminate analysis 2) Locate and correct problem 3) Recalibrate 4) Reanalyze samples since good CCB
	Digested, liquid, second source Laboratory Control Sample (LCS)		1 per digestion batch, minimum 1 per 20 samples	Laboratory-established control limits (see Appendix A-2)	1) Reanalyze LCS, if still out 2) Correct problem 3) Redigest and reanalyze associated samples

**SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES**

**Sampling and Analysis Plan**

**Naval Air Station Fort Worth, Joint Reserve Base  
Fort Worth, Texas**

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW6010 (Continued)		Interference check sample	Run at the more frequent of the following: 1) Beginning and end of analytical run; or 2) Twice during every 8-hour work shift	Within $\pm$ 20% of expected value for instrument check standard elements	1) Terminate analysis 2) Locate and correct problem 3) Recalibrate 4) Reanalyze samples since last compliant ICS
		Matrix spike (MS)/matrix spike duplicate (MSD) (portion of sample is spiked prior to digestion)	1 MS and MSD per analytical batch if sufficient aliquot received (minimum 1 pair per every 20 Air Force project samples)	Laboratory-established control limits (see Appendix A-2)	<u>Accuracy</u> Analyze post digestion spike  <u>Precision</u> Department supervisor will evaluate failure with respect to an extraction problem, which will initiate analytical MS/MSD reprocessing. If failure is determined to be matrix related, no further action will be taken.
		Record of assessed accuracy for each matrix studied should be maintained and updated on a regular basis as per the IRP Handbook 9/93	NA	NA	NA
		Reagent blank	1 per batch of samples, minimum 1 per 20 samples	No analytes detected at > reporting limit with the exception of Al, Ca, Fe, Mg, Na, and K, which should not exceed > 3X reporting limit	1) Investigate sources of contamination 2) Appropriate corrective action taken and document 3) All samples processed with a contaminated blank are to be redigested and reanalyzed
		IDL Study	Semi-annually	Detection limits established shall not exceed those in Table 2-2 of IRP Handbook 9/93	Detection limits which exceed established criteria shall be submitted to the Air Force for approval prior to analysis of any project samples
		Linear Range Study	Once per year	NA	NA

# SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES

Sampling and Analysis Plan  
 Naval Air Station Fort Worth, Joint Reserve Base  
 Fort Worth, Texas

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8150	Herbicides	<u>FIELD QC:</u> Duplicate	1 for every 10 field samples	Above 10x detection limit, % RPD must be < current control limits: Aqueous samples - RPD < 50% Non-aqueous samples - RPD < 50%	Review lab QC data to determine if they are in control. If not in control, flag data. Use data to evaluate whether proper collection procedures were followed. If not, determine further corrective action.
		Rinseate	1 per day	Less than reported detection limit	Qualify data if sample result is < Ex rinseate result. Non-detect field sample data need not be qualified.
	Refer to: SW846-3500	<u>LABORATORY QC:</u> Five point calibration	Initial calibration prior to sample analysis	a) RSD ≤ 20% for RFs or Correlation coefficient of ≥ 0.995 b) Quantitation by average RF if RSD ≤ 20% or use calibration curve	1) Repeat calibration
		Demonstrate ability to generate acceptable accuracy and precision using four replicate analyses of a QC check sample	Once per analyst	Analyte-specific limits as per SW846	1) Recalculate results 2) Locate and fix problem with system 3) Rerun demonstration for those analytes which did not meet criteria
		MDL Study	Once per year	Detection limits established shall not exceed those in Table 2-3 of IRP Handbook 9/93	Detection limits that exceeded established criteria shall be submitted to the Air Force for approval prior to the analysis of any project sample
		Retention time (RT) windows calculated for each analyte	One 72-hour study performed on each GC column and whenever a new column is installed	See Method 8000	1) Perform maintenance 2) Repeat test
		Initial (ICV) and Continuing (CCV) Calibration Verification	ICV-Prior to sample analysis CCV-After every 10 samples and end of analytical run	Within ± 15% of expected response	1) Perform maintenance 2) Rerun verification, if still out 3) Prepare new calibration curve for any analyte not meeting criteria 4) Reinject any samples analyzed after criteria were exceeded

**SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES**  
**Sampling and Analysis Plan**  
**Naval Air Station Fort Worth, Joint Reserve Base**  
**Fort Worth, Texas**

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8150 (Continued)	Matrix spike (MS) and matrix spike duplicate (MSD)	Matrix spike (MS) and matrix spike duplicate (MSD)	1 MS and 1 MSD per analytical batch if sufficient aliquot is received (minimum 1 pair per every 20 Air Force project samples)	Laboratory-established control limits (see Appendix A-2)	<p><b>Accuracy</b>                      If any matrix spike target compound (MSTC) is out of control in the MS or MSD, the LCS is evaluated for that compound. If that compound fails to meet LCS criterion as well, the analytical batch must be reprocessed.</p> <p><b>Precision</b>                      Department supervisor will evaluate failure with respect to an extraction problem, which will initiate analytical MS/MSD reprocessing. If failure is determined to be matrix related, no further action will be taken.</p>
	Laboratory Control Sample (LCS)	Laboratory Control Sample (LCS)	1 per extraction batch, minimum 1 per 20 samples	Laboratory-established control limits (see Appendix A-2)	LCS is evaluated independent of MS/MSD. If more than 20% of all analytes are not within criteria, the analytical batch must be reprocessed.
	Record of assessed accuracy for each matrix studied should be maintained and updated on a regular basis as per SW846-8000 and the IRP Handbook 9/93		After analysis of initial five spiked samples	NA	NA
	Surrogate standard spike		Every sample, spike, standard, and reagent blank	Limits determined as per SW846-8000 (limits are to be updated annually on a matrix-by-matrix basis)	1) Reanalyze sample; if still out 2) Re-extract and reanalyze sample; if still out 3) Report two analyses and document in report that steps 1 and 2 were performed
	Reagent blank		One per day/instrument	No analytes detected at > reporting limit	1) Source of contamination investigated and documented 2) Appropriate corrective action taken 3) All samples processed with a contaminated blank are to be re-extracted and reanalyzed
	Second-column confirmation		All positive results above the reporting limit except noted laboratory contaminants	Analysis of standards and samples performed on a second GC column of dissimilar phase and retention characteristics within specified holding times	Same as for initial or primary column analysis

# SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES

## Sampling and Analysis Plan

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

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8080	Organochlorine Pesticides	<u>FIELD QC:</u>			
		Duplicate	1 for every 10 field samples collected	Above 10x detection limit, % RPD must be < current control limits: Aqueous samples - RPD < 50% Non-aqueous samples - RPD < 50%	Review lab QC data to determine if they are in control. If not in control, flag data. Use data to evaluate whether proper collection procedures were followed. If not, determine further corrective action.
		Rinseate	1 per day	Less than reported detection limit	Qualify data if sample result is < 5x rinseate result. Non-detect field sample data need not be qualified.
		Field Blanks	(wipe samples only)	Less than reported detection limit	Qualify data.
	Refer to: SW846-3500 SW846-3600 SW846-8000 IRP Handbook, 9/93	<u>LABORATORY QC:</u>			
		Five point calibration	Initial calibration prior to sample analysis	a) RSD ≤ 20% for RFs or Correlation coefficient of ≥ 0.995 b) Quantitation by average RF if RSD ≤ 20% or use calibration curve	1) Repeat calibration
		Demonstrate ability to generate acceptable accuracy and precision using four replicate analyses of a QC check sample	Once per analyst	Analyte-specific limits as per SW846	1) Recalculate results 2) Locate and fix problem with system 3) Rerun demonstration for those analytes which did not meet criteria
		MDL Study	Once per year	Detection limits established shall not exceed those in Table 2-3 of IRP Handbook 9/93	Detection limits that exceeded established criteria shall be submitted to the Air Force for approval prior to the analysis of any project sample
		Retention time (RT) windows calculated for each analyte	One 72-hour study performed on each GC column and whenever a new column is installed	See Method 8000	1) Perform maintenance 2) Repeat test
		Breakdown check (Endrin and DDT)	Daily prior to analysis of samples	Degradation ≤ 20% (each)	Perform system maintenance as per SW846-8000

# SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES

## Sampling and Analysis Plan

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

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8080 (Continued)		Initial (ICV) and Continuing (CCV) Calibration Verification (all single component analytes only, multi-component analyte standard analyzed within 72 hours of tentatively identifying component in environmental sample)	ICV-Prior to sample analysis CCV-After every 10 samples and end of analytical run	Within $\pm$ 15% of expected response	1) Perform maintenance 2) Rerun verification, if still out 3) Prepare new calibration curve for any analyte not meeting criteria 4) Reinject any samples analyzed after criteria were exceeded
		Matrix spike (MS) and matrix spike duplicate (MSD)	1 MS and 1 MSD per analytical batch if sufficient aliquot is received (minimum 1 pair per every 20 Air Force project samples)	Laboratory-established control limits (see Appendix A-2)	<b>Accuracy</b> If any matrix spike target compound (MSTC) is out of control in the MS or MSD, the LCS is evaluated for that compound. If that compound fails to meet LCS criterion as well, the analytical batch must be reprocessed.  <b>Precision</b> Department supervisor will evaluate failure with respect to an extraction problem, which will initiate analytical MS/MSD reprocessing. If failure is determined to be matrix related, no further action will be taken.
		Laboratory Control Sample (LCS)	1 per extraction batch, minimum 1 per 20 samples	Laboratory-established control limits (see Table Appendix A-2)	LCS is evaluated independent of MS/MSD. If more than 20% of all analytes are not within criteria, the analytical batch must be reprocessed.
		Record of assessed accuracy for each matrix studied should be maintained and updated on a regular basis as per SW846-8000 and the IRP Handbook 9/93	After analysis of initial five spiked samples	NA	NA
		Two surrogate standards spiked into each sample Dibutylchloroethane (DBC) is primary surrogate	Every sample, spike, standard, and reagent blank	Limite determined as per SW846-8000 (limite are to be updated annually on a matrix-by-matrix basis) If low DBC recovery or interferences indicated, calculate secondary surrogate recovery. Proceed with corrective action when both surrogates are out of limite.	1) Reanalyze sample; if still out 2) Re-extract and reanalyze sample; if still out 3) Report two analyses and document in report that steps 1 and 2 were performed

**SUMMARY OF CALIBRATION AND INTERNAL QUALITY CONTROL PROCEDURES**  
**Sampling and Analysis Plan**  
**Naval Air Station Fort Worth, Joint Reserve Base**  
**Fort Worth, Texas**

ANALYTICAL METHOD	APPLICABLE PARAMETER	QUALITY CONTROL CHECK	MINIMUM FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION
SW8080 (Continued)		Reagent blank	One per extraction batch, minimum of 1 per 20 samples	No analytes detected at > reporting limit	1) Source of contamination investigated 2) Appropriate corrective action taken and documented 3) All samples processed with a contaminated blank are to be re-extracted and reanalyzed
		Second-column confirmation	All positive results above the reporting limit	Analysis of standards and samples performed on a second GC column of dissimilar phase and retention characteristics within specified holding times	Same as for initial or primary column analyze

NA = Not Applicable

APPENDIX B

LENL-P & KEY PERSONNEL AND THEIR POSITIONS AND RESPONSIBILITIES

Law Environmental, Inc.  
National Laboratories Branch (LENL)  
Pensacola, Florida

## LENL KEY PERSONNEL AND RESPONSIBILITIES

Position/Key Personnel	Responsibilities
Laboratory Manager James M. G. Tucci	<ul style="list-style-type: none"><li>- Provide overall management and operation of the laboratory;</li><li>- Provide a safe working environment for employees;</li><li>- Provide resolutions to items requiring corrective actions;</li><li>- Interact with QA/QC Coordinator to resolve analytical, methodology and QA problems;</li><li>- Schedule work in a manner consistent with personnel and instrumentation;</li><li>- Implement actions required to establish our laboratory as a premier laboratory in the field of environmental analytical chemistry;</li><li>- Maintain profitability of the laboratory in relation to the concept of legally defensible data;</li><li>- Plan, design and direct the branch marketing efforts;</li><li>- Plan, design and direct long-term business development and opportunities;</li><li>- Interact with Technical coordinator to resolve technical problems; and</li><li>- Insure accountability of all branch staff in the performance of their jobs.</li></ul>

## LENL KEY PERSONNEL AND RESPONSIBILITIES

Position/Key Personnel	Responsibilities
QA/QC Coordinator Keith Greene	<ul style="list-style-type: none"> <li>- Establish and update laboratory standard operating procedures;</li> <li>- Issue recommendations and corrective actions required for any aspect of laboratory operations inconsistent with established QA/QC policies and procedures;</li> <li>- Monitor and identify out-of-control or potentially out-of-control situations to Laboratory Manager, Supervisors, and Project Managers;</li> <li>- Provide technical guidance for chemistry program development;</li> <li>- Interact with external QA personnel concerning regulatory QA/QC compliance requirements;</li> <li>- Keep abreast of new techniques and programs for QA and inform Laboratory Manager, Project Managers and Supervisors;</li> <li>- Provide historical QA reports to Laboratory Manager;</li> <li>- Perform QA/QC audits, provide blind check samples and monitor results;</li> <li>- Judiciously examine QA/QC program in relation to profitability;</li> <li>- Enforce and augment the branch QA program;</li> <li>- Develop laboratory/project specific QA/QC manual;</li> <li>- Ensure accountability of all laboratory staff in the performance of their jobs; and</li> <li>- Implement methodologies and procedures consistent with the generation of legally defensible data in accordance with state, local and federal guidelines.</li> </ul>

## LENL KEY PERSONNEL AND RESPONSIBILITIES

Position/Key Personnel	Responsibilities
QA/QC Coordinator Burnie D. Fuson	<ul style="list-style-type: none"><li>- Implement the branch QA program;</li><li>- Develop the QA/QC manual;</li><li>- Establish and maintain safety standards and operating procedures;</li><li>- Coordinate and audit the technical review of deliverables;</li><li>- Issue recommendations and corrective actions required for any aspect of laboratory operations inconsistent with established policies and procedures;</li><li>- Monitor and identify out-of-control or potentially out-of-control situations to Operations Manager, Supervisors, and Branch Manager;</li><li>- Provide guidance for the chemistry QA/QC program development;</li><li>- Interact with external QA personnel concerning the lab's certifications and QA policies/procedures and coordinating QA compliance as required;</li><li>- Keep abreast of new techniques and programs for QA and safety and inform Branch Manager and Operations Manager;</li><li>- Coordinate the development of project QA plans as required;</li><li>- Provide historical QA reports for each method to the Branch Manager;</li><li>- Perform QA/QC audits, provide blind check samples and monitor results; and</li><li>- Judiciously examine QA/QC program in relation to laboratory profitability.</li></ul>

**LENL KEY PERSONNEL AND RESPONSIBILITIES**

Position/Key Personnel	Responsibilities
<b>Management Information Systems Department Damon Abbott</b>	<ul style="list-style-type: none"> <li>- Establish and maintain the computer systems, the network, and the LIMS (Laboratory Information Management System);</li> <li>- Provide data deliverables in U.S. EPA CLP format with hard copy and disc deliverable formats;</li> <li>- Develop software necessary to meet other client's deliverable formats;</li> <li>- Interpret U.S. EPA CLP Statements of Work - Organics and Inorganics for requirements and deliverables;</li> <li>- Interface analytical instruments' data systems with our IBM Token Ring Network and develop software required at the interface;</li> <li>- Train department personnel in various data entry software packages purchased or developed internally;</li> <li>- Provide guidance and direction to other departments where required or requested or as determined by Branch Manager;</li> <li>- Provide support to QA/QC Coordinator where necessary to automate, archive and generate QC trends from historical records; and</li> <li>- Provide support and guidance for entire laboratory operation, from sample receiving through the generation of data deliverable packages, to streamline and increase productivity through computer automation.</li> </ul>

## LENL KEY PERSONNEL AND RESPONSIBILITIES

Position/Key Personnel	Responsibilities
Lab Supervision Cheryl Oliver (Organics) Bruce Hunt (GC/MS) Carl Causey (GC) Gary St Pere (Inorganics)	<ul style="list-style-type: none"><li>- Provide overall supervision of department/section operations;</li><li>- Implement procedures consistent with the generation of legally defensible data;</li><li>- Provide QC activities consistent with the branch QC procedures;</li><li>- Provide additional QC activities, as needed, which are consistent with the Branch QA philosophies;</li><li>- Provide final report review before releasing;</li><li>- Provide work assignments to departmental personnel;</li><li>- Provide analytical job training and cross-training within the department and between departments where applicable and warranted;</li><li>- Provide corrective action for deficiencies;</li><li>- Provide quarterly instrument detection limit (IDL) studies;</li><li>- Maintain maintenance logs on all instruments;</li><li>- Maintain all standards logs;</li><li>- Provide leadership and management philosophies consistent with those of the Branch;</li><li>- Provide legally defensible data from each department;</li><li>- Maximize throughput of samples; and</li><li>- Plan, organize, and schedule work to obtain maximum profitability.</li></ul>

**LENL KEY PERSONNEL AND RESPONSIBILITIES**

<b>Position/Key Personnel</b>	<b>Responsibilities</b>
<b>Sample Receiving and Shipment Sharon Taber</b>	<ul style="list-style-type: none"><li>- Provide sample control via entry of all parameters to be analyzed per sample in LIMS when sample arrives;</li><li>- Provide chain-of-custody receipt of samples externally, and internal from our walk-in cooler to analysts and prep;</li><li>- Provide sample analysis report daily for all samples in-house;</li><li>- Provide prepared sample bottles in refrigerated shippers;</li><li>- Provide for sample disposal/return to sender; and</li><li>- Keep track of supplies, order when needed, bill clients for those used.</li></ul>

**APPENDIX C**

**SAMPLING PLAN DETAIL**

**C-1 AEROSPACE MUSEUM SITE**

**C-2 GROUNDS MAINTENANCE YARD**

**APPENDIX C-1**

**AEROSPACE MUSEUM SITE**

**SAMPLING PLAN DETAIL**

PREPARED 09/11/95  
DATE: 11:47  
TIME:

CLIENT: AFCEE  
PROJECT: CARSWELL AFB  
NUMBER: 11-3517-3209  
PHASE:   
SITE: Southwest Aerospace Museum  
Matrix:   
AFID:   
LOGCODE: LAW (Law Environmental, Inc.)

SAMPLE ID REQUEST MS/MSD COMMENT

SAMPLING INFORMATION LOGDATE LOGTIME

SHIP DATE

LOT/CLTNUM

NO. OF SAMPLE CONTAINERS PER PARAMETER BY LAB

Volatiles Sam/Volatiles Metals

Method: SW 8240 SW 8270 SW 6010/7000  
Container: 2oz glass jar 8oz glass jar 8oz glass jar  
Preservative 1: None None None  
Preservative 2: Cool to 4C Cool to 4C Cool to 4C

LENL-P

LENL-P

LENL-P

**FIELD SAMPLES**

1	SS-01	OT3801SA	Background Sample					2	1	1
2	SS-02	OT3802SA	Background Sample					2	1	1
3	SS-03	OT3803SA						2	1	1
4	SS-04	OT3804SA						2	1	1
5	SS-05	OT3805SA						2	1	1
6	SS-06	OT3806SA						2	1	1
7	SS-07	OT3807SA						2	1	1
8	SS-08	OT3808SA						2	1	1
9	SS-09	OT3809SA						2	1	1
10	SS-10	OT38010SA	MS/MSD			Yes		2	1	1
11	SS-11	OT3811SA						2	1	1
		FDUP-01						2	1	1
12	SS-12	OT3812SA						2	1	1

**SAMPLING PLAN DETAIL**

PREPARED: 09/11/95  
 DATE: 09/11/95  
 TIME: 11:47

CLIENT: AFCEE  
 PROJECT: CARSWELL AFB  
 NUMBER: 11-3517-3209  
 PHASE:   
 SITE: Southwest Aerospace Museum  
 Matrix:   
 AFID:   
 LOGCODE: LAW (Law Environmental, Inc.)

NO. OF SAMPLE CONTAINERS PER PARAMETER BY LAB

PARAMETER:	Volatiles		Semi-Volatiles		Metals	
	LENL-P	LENL-P	LENL-P	LENL-P	LENL-P	LENL-P
Method:	SW 8240	SW 8270	SW 8270	SW 8270	SW 8010/7000	SW 8010/7000
Container:	2oz glass jar	8oz glass jar	8oz glass jar	8oz glass jar	8oz glass jar	8oz glass jar
Preservative 1:	None	None	None	None	None	None
Preservative 2:	Cool to 4C	Cool to 4C	Cool to 4C	Cool to 4C	Cool to 4C	Cool to 4C

FIELD SAMPLES	LOCID	SAMPLE ID	COMMENT	Request MS/MSD	SAMPLING INFORMATION LOGDATE	LOGTIME	SHP DATE	LOT/CLTNUM	LENL-P	LENL-P	LENL-P
13	SS-13	OT3813SA							2	1	1
14	SS-14	OT3814SA							2	1	1
15	SS-15	OT3815SA							2	1	1
16	SS-16	OT3816SA							2	1	1
17	SS-17	OT3817SA							2	1	1
18	SS-18	OT3818SA							2	1	1
19	SS-19	OT3819SA							2	1	1
20	SS-20	OT3820SA	MS/MSD	Yes					2	1	1
21	SS-21	OT3821SA FDLP-02							2	1	1
22	SS-22	OT3822SA							2	1	1
23	SS-23	OT3823SA							2	1	1

**SAMPLING PLAN DETAIL**

PREPARED: 09/11/95  
 DATE: 09/11/95  
 TIME: 11:47

CLIENT: AFCEE  
 PROJECT: CARSWELL AFB  
 NUMBER: 11-3517-3209

SITE: \_\_\_\_\_  
 Mat'ri: Southwest Aerospace Museum

LOGCODE: LAW (Law Environmental, Inc.)

**NO. OF SAMPLE CONTAINERS PER PARAMETER BY LAB**

PARAMETER:	Volatiles		SemiVolatiles		Metals	
	SW 8240	SW 8270	SW 8270	SW 8270	SW 6010/7000	SW 6010/7000
Method:	2oz glass jar	8oz glass jar				
Container:	None	None	None	None	None	None
Preservative 1:	Cool to 4C	Cool to 4C	Cool to 4C	Cool to 4C	None	None
Preservative 2:					Cool to 4C	Cool to 4C

FIELD SAMPLES	LOCID	SAMPLE ID	COMMENT	Request MS/MSD	SAMPLING INFORMATION		SHP DATE	LOT/CL/TNUM	LENL-P		LENL-P	
					LOGDATE	LOGTIME			LENL-P	LENL-P	LENL-P	LENL-P
24	SS-24	OT3824SA							2	1	1	1
25	SS-25	OT3825SA							2	1	1	1
26	SS-26	OT3826SA							2	1	1	1
27	SS-27	OT3827SA							2	1	1	1
28	SS-28	OT3828SA							2	1	1	1
29	SS-29	OT3829SA							2	1	1	1
30	SS-30	OT3830SA	MS/MSD	Yes					2	1	1	1
31	SS-31	OT3831SA FDLP-03							2	1	1	1
32	SS-32	OT3832SA							2	1	1	1
33	SS-33	OT3833SA							2	1	1	1
34	SS-34	OT3834SA							2	1	1	1
35	SS-35	OT3835SA							2	1	1	1
36	SS-36	OT3836SA							2	1	1	1

**SAMPLING PLAN DETAIL**

PREPARED: 09/11/95  
 DATE: 09/11/95  
 TIME: 11:47

CLIENT: AFCEE  
 PROJECT: CARSWELL AFB  
 NUMBER: 11-3517-3209

SITE: Southwest Aerospace Museum  
 MATR: (Law Environmental, Inc.)

LOGCODE: LAW

PARAMETER: NO. OF SAMPLE CONTAINERS PER PARAMETER BY LAB  
 Volatiles: SW 8240 2oz glass jar 2oz glass jar 8oz glass jar  
 Semivolatiles: SW 8270 8oz glass jar 8oz glass jar 8oz glass jar  
 Metals: SW 6010/7000 8oz glass jar 8oz glass jar 8oz glass jar  
 Method: SW 8240 2oz glass jar 2oz glass jar 8oz glass jar  
 Container: SW 8270 8oz glass jar 8oz glass jar 8oz glass jar  
 Preservative 1: None None None None  
 Preservative 2: Cool to 4C Cool to 4C Cool to 4C Cool to 4C

FIELD SAMPLES	LOCID	SAMPLE ID	COMMENT	Request MS/MSD	SAMPLING INFORMATION		SHIP DATE	LOT/CLNUM	VOLATILES		SEMIVOLATILES		METALS	
					LOGDATE	LOGTIME			LENL-P	LENL-P	LENL-P	LENL-P	LENL-P	LENL-P
37	SS-37	OT38379A							2	1	1	1	1	1
38	SS-38	OT38386SA							2	1	1	1	1	1
39	SS-39	OT38396SA							2	1	1	1	1	1
40	SS-40	OT38406SA	MS/MSD	Yes					2	1	1	1	1	1
41	SS-41	OT38416SA FDUP-04							2	1	1	1	1	1
42	SS-42	OT38426SA							2	1	1	1	1	1
43	SS-43	OT38436SA							2	1	1	1	1	1
44	SS-44	OT38446SA							2	1	1	1	1	1
45	SS-45	OT38456SA							2	1	1	1	1	1
46	SS-46	OT38466SA							2	1	1	1	1	1
47	SS-47	OT38476SA							2	1	1	1	1	1
48	SS-48	OT38486SA							2	1	1	1	1	1
49	SS-49	OT38496SA							2	1	1	1	1	1

**SAMPLING PLAN DETAIL**

PREPARED: 09/11/95  
 DATE: 11:47  
 TIME:

CLIENT: AFCEE  
 PROJECT: CARSWELL AFB  
 NUMBER: 11-3517-3209

SITE: Southwest Aerospace Museum  
 Matrix: (Law Environmental, Inc.)  
 AFID: LAW

LOGCODE: LAW (Law Environmental, Inc.)

FIELD SAMPLES	LOCID	SAMPLE ID	COMMENT	Request MS/MSD	SAMPLING INFORMATION		SHP DATE	LOT/CLINUM	NO. OF SAMPLE CONTAINERS PER PARAMETER BY LAB		
					LOGDATE	LOGTIME			Volatiles	SemiVolatiles	Metals
80	SS-50	OT3850SA	MS/MSD	Yes					2	1	1
81	SS-51	OT3851SA FDUP-05							2	1	1
82	SS-52	OT3852SA							2	1	1
<b>TOTALS:</b>									114	57	57

PARAMETER: Method: SW 8240  
 SW 8270  
 2oz glass jar  
 8oz glass jar  
 None  
 None  
 Cool to 4C  
 Cool to 4C

Project Manager: James Forbes  
 Senior Chemist: Sue Max  
 Project Chemist: Dianna Johnson

Containers  
 2 oz glass jars: 114  
 8 oz glass jars: 114

**NOTES**

A = 0 - 2'

MS = Matrix Spike  
 MD = Matrix Spike Duplicate  
 FDUP = Field Duplicate

Metals include: Arsenic (SW7050), Lead (SW7421), Selenium (SW7740), and Mercury (SW7471)

PREPARED/DATE: DRJ 2-10-95  
 CHECKED/DATE: SIM 2-13-95

**APPENDIX C-2**

**GROUNDS MAINTENANCE YARD**

**SAMPLING PLAN DETAIL**

PREPARED 09/11/95  
DATE: 11:48  
TIME:

CLIENT: AFCEE  
PROJECT: CARSWELL AFB  
NUMBER: 11-3517-3209

SITE: Ground Maintenance Yard

LOGCODE: LAW (Law Environmental, Inc.)

**NO. OF SAMPLE CONTAINERS PER PARAMETER BY LAB**

PARAMETER:	Volatiles	Semivolatiles	Pesticides/PCBs	Herbicides	Metals
Method:	SW 8240	SW 8270	SW 8080	SW 8150	SW 8010/7000
Container:	2oz glass jar	6oz glass jar	6oz glass jar	6oz glass jar	6oz glass jar
Preservative 1:	None	None	None	None	None
Preservative 2:	Cool to 4C	Cool to 4C	Cool to 4C	Cool to 4C	Cool to 4C

FIELD SAMPLES	LOCID	SAMPLE ID	COMMENT	Request MS/MSD	SAMPLING INFORMATION		SHIP DATE	LOT/CLINUM	Volatiles		Semivolatiles		Pesticides/PCBs		Herbicides		Metals	
					LOGDATE	LOGTIME			LENL-P	LENL-P	LENL-P	LENL-P	LENL-P	LENL-P	LENL-P	LENL-P	LENL-P	LENL-P
1	SS-01	OT30018A	Background Sample						2	1	1	1	1	1	1	1	1	1
2	SS-02	OT30029A	Background Sample						2	1	1	1	1	1	1	1	1	1
3	SS-03	OT30035A							2	1	1	1	1	1	1	1	1	1
4	SS-04	OT30045A							2	1	1	1	1	1	1	1	1	1
5	SS-05	OT30055A							2	1	1	1	1	1	1	1	1	1
6	SS-06	OT30065A							2	1	1	1	1	1	1	1	1	1
7	SS-07	OT30075A							2	1	1	1	1	1	1	1	1	1
8	SS-08	OT30085A							2	1	1	1	1	1	1	1	1	1
9	SS-09	OT30095A							2	1	1	1	1	1	1	1	1	1
10	SS-10	OT30105A	MS/MSD	Yes					2	1	1	1	1	1	1	1	1	1
11	SS-11	OT30115A							2	1	1	1	1	1	1	1	1	1
		SS-11	FDLP-1						2	1	1	1	1	1	1	1	1	1
12	SS-12	OT30125A							2	1	1	1	1	1	1	1	1	1
13	SS-13	OT30135A							2	1	1	1	1	1	1	1	1	1
14	SS-14	OT30145A							2	1	1	1	1	1	1	1	1	1
15	SS-15	OT30155A							2	1	1	1	1	1	1	1	1	1
16	SS-16	OT30165A							2	1	1	1	1	1	1	1	1	1



**SAMPLING PLAN DETAIL**

PREPARED 09/11/95  
 DATE: 11:48  
 TIME:

CLIENT: AFCEE  
 PROJECT: CARSWELL AFB  
 NUMBER: 11-3517-3209  
 PHASE:  
 SITE: Ground Maintenance Yard  
 Matrix: (Law Environmental, Inc.)  
 LOGCODE: LAW

Request MS/MSD  
 MS/MSD  
 COMMENT

NO. OF SAMPLE CONTAINERS PER PARAMETER BY LAB  
 PARAMETER: Volatiles SemiVolatiles Pesticides PCBs Herbicides Metals  
 Method: SW 8240 SW 8270 SW 8090 SW 8150 SW 6010/7000  
 Container: 2oz glass jar 8oz glass jar 8oz glass jar 8oz glass jar 8oz glass jar  
 Preservative 1: None None None None None  
 Preservative 2: Cool to 4C Cool to 4C Cool to 4C Cool to 4C Cool to 4C

LOT/QT/NUM SHIP DATE LOGDATE LOGTIME

FIELD SAMPLES	LOCID	SAMPLE ID	COMMENT	Request MS/MSD	MS/MSD	LOGDATE	LOGTIME	SHIP DATE	LOT/QT/NUM	LENL-P	LENL-P	LENL-P	LENL-P	LENL-P
32	88-32	OT3032SA								2	1	1	1	1
33	88-33	OT3033SA								2	1	1	1	1
34	88-34	OT3034SA								2	1	1	1	1
35	88-35	OT3035SA								2	1	1	1	1
36	88-36	OT3036SA								2	1	1	1	1
37	88-37	OT3037SA								2	1	1	1	1
38	88-38	OT3038SA								2	1	1	1	1
39	88-39	OT3039SA								2	1	1	1	1
40	88-40	OT3040SA			MS/MSD			Yes		2	1	1	1	1
41	88-41	OT3041SA								2	1	1	1	1
42	88-42	OT3042SA								2	1	1	1	1
43	88-43	OT3043SA								2	1	1	1	1
44	88-44	OT3044SA								2	1	1	1	1
45	88-45	OT3045SA								2	1	1	1	1
46	88-46	OT3046SA								2	1	1	1	1

**SAMPLING PLAN DETAIL**

PREPARED: 06/11/85  
 DATE: 11:48  
 TIME:

CLIENT: AFCEE  
 PROJECT: CARISWELL AFB  
 NUMBER: 11-3517-3209

SITE: Ground Maintenance Yard  
 (Law Environmental, Inc.)

LAW (Law Environmental, Inc.)

LOGCODE: MS/MSD

SAMPLING INFORMATION  
 LOGDATE LOGTIME

SHP DATE

LOT/CLTNUM

PARAMETER: NO. OF SAMPLE CONTAINERS PER PARAMETER BY LAB  
 Volatiles      Semivolatiles      Pesticides/PPOs      Herbicides      Metals

Method: SW 8240      SW 8000      SW 8150      SW 8010/7000  
 Container: 2oz glass jar      8oz glass jar      8oz glass jar      8oz glass jar  
 Preservative 1: None      None      None      None  
 Preservative 2: Cool to 4C      Cool to 4C      Cool to 4C      Cool to 4C

FIELD SAMPLES	LOCID	SAMPLE ID	COMMENT	Request MS/MSD	SHP DATE	LOT/CLTNUM	LENL-P	LENL-P	LENL-P	LENL-P	LENL-P
47	88-47	OT3047SA	MS/MSD	Yes			2	1	1	1	1
48	88-48	OT3048SA					2	1	1	1	1
		FDUP-04					2	1	1	1	1
TOTALS:							106	53	53	53	53

Project Manager: James Forbes  
 Senior Chemist: Sue Max  
 Project Chemist: Dianna Johnson

Containers  
 2 oz glass jars: 106  
 8 oz glass jars: 150

**NOTES**

A = 0' - 2'  
 MS = Matrix Spike  
 MD = Matrix Spike Duplicate  
 FDUP = Field Duplicate  
 Metals include: Arsenic (SW7060), Lead (SW7421), Selenium (SW7740), and Mercury (SW7471)

PREPARED/DATE: DRJ 2-10-85  
 CHECKED/DATE: SM 2-13-85

**FINAL PAGE**

**ADMINISTRATIVE RECORD**

**FINAL PAGE**

**FINAL PAGE**

**ADMINISTRATIVE RECORD**

**FINAL PAGE**