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CORRECTIVE MEASURES IMPLEMENTATION PLAN/QUALITY ASSURANCE PROJECT PLAN SOLID WASTE MANAGEMENT UNIT 7 (SMWU 7) OLD RIFLE RANGE NSA CRANE IN
3/1/2012
TETRA TECH

Corrective Measures Implementation Plan/Quality Assurance Project Plan for SWMU 7 – Old Rifle Range

NAVAL SUPPORT ACTIVITY CRANE
CRANE, INDIANA

Naval Facilities Engineering Command Midwest
Contract Number N62470-08-D-1001
Contract Task Order F272

March 2012

United States Environmental Protection Agency
Statement of Basis for Corrective Action At
Solid Waste Management Unit 7 - Old Rifle Range
Naval Support Activity Crane; Crane, Indiana

This Statement of Basis (SB) was prepared to satisfy the requirements of the Resource Conservation and Recovery Act (RCRA) Corrective Action process, which is designed to identify sites that are known to be, or may be, hazardous to human health or the environment and to propose and implement remedies for correcting environmental conditions.

Purpose of Document

This SB:

- Is a mechanism and basis for gathering public comments for selection of a corrective action to correct unacceptable environmental conditions that exist in groundwater at Solid Waste Management Unit (SWMU) 7.
- Summarizes information that can be found in greater detail in reports documenting the RCRA Facility investigation (RFI) and Corrective Measures Proposal (CMP) Reports and other documents included in the Administrative Record for NSA Crane.
- Describes groundwater contamination at SWMU 7 and the proposed RCRA Corrective Action and also explains the rationale for selection of this corrective action from among other possible actions.
- Describes all corrective actions evaluated in the process of selecting the proposed corrective action
- Provides information on how the public can be involved in the corrective action selection process
- Updates the SMWU 7 boundary

Facility Background

This SB applies to SWMU 7, the Old Rifle Range (ORR), located northeast of the Demolition Range in the flat-lying floodplain of Turkey Creek, at the Naval Support Activity (NSA) Crane (Figure 1). The ORR is listed as SWMU #07/09 in NSA Crane's RCRA hazardous waste management permit, and is commonly referred to as SWMU 7. The original SWMU 7 boundaries were determined based on the area where historical open burning activities were suspected to have occurred. This area also includes the current RCRA-permitted open burning hazardous waste management unit (HWMU), various small arms ranges, which are being addressed under the Navy Military Munitions Response Program (MRP), and the area covered by the RCRA detection and corrective action monitoring well network. Areas covered by the small arms ranges, which are being investigated under the MRP, are designated as unexploded ordnance (UXO) 7 and generally include the area historically designated SWMU 7. The investigations conducted under the Navy Installation Restoration Program (IRP) have determined that there is no remaining soil contamination that can be attributed to historical open burning activities. Therefore, the boundary of SWMU 7 has been revised to only include the area covered by the RCRA-Permitted OB unit. Figures presented later in this SB show the relationship between the former SMWU 7 boundary and the current SMWU 7 boundary. Investigations and corrective action decisions will be documented separately for UXO 7.

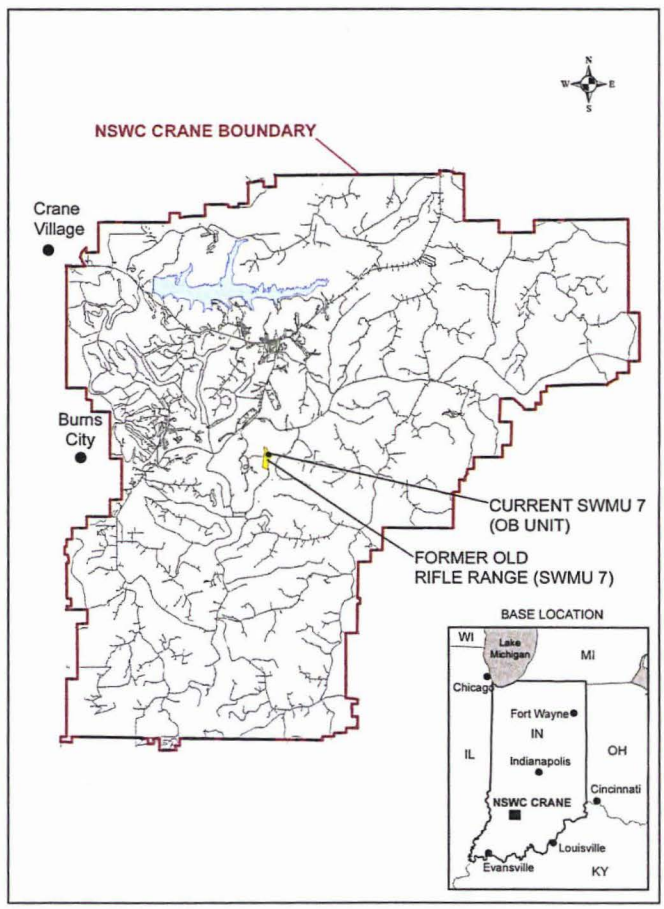

Figure 1: NSA Crane and Old Rifle Range

NSA Crane covers approximately 100 square miles and is located in a rural, sparsely populated area of south-central Indiana. Most of NSA Crane is forested, and the surrounding area is wooded or farmed land. NSA Crane manufactures, renovates, and tests equipment, shipboard weapons systems, and ordnance for the United States Navy. More detailed physical and operational descriptions of NSA Crane and SWMU 7 are provided in the RFI Report (Tetra Tech, 2005a), the RFI Report Addendum (Tetra Tech 2005b), and the Corrective Measures Proposal (CMP) Report (Tetra Tech, 2006a), and are summarized in the following sections of this SB.

Location and History of SWMU 7

SWMU 7, also called the ORR, formerly comprised three main areas, one of which is the actual ORR. These three areas are: (1) an active, open burning (OB) unit, located in the north-central portion of the former SWMU 7; (2) an abandoned shooting range referred to as the Old Pistol Range (OPR), located at the northern end of the former SWMU 7; and (3) a large area where multiple shooting ranges previously existed, referred to as the ORR. Figure 2 is an aerial photograph that shows the layout of SWMU 7 including the ORR and OPR. The OB unit portion of SWMU 7 is a RCRA-permitted facility (permit number IN5170023498) of approximately 1-acre size where bulk yellow D (ammonium picrate), projectiles loaded with yellow D, and materials contaminated by yellow D are burned in containment pans.

ORR

The ORR occupies approximately 20 acres immediately west of NSA Crane Highway 8 in the flat-lying grass-covered area bisected from north to south by a maintained gravel road. Occasionally, material that would normally be treated at SMWU 6 is treated at SWMU 7.

Operations at the ORR began in the early 1940s and have ranged from use as a firing range for small caliber arms to flashing bulk explosives and pyrotechnics. Around 1984, metal pans were installed at the OB Unit on top of the existing lined pits. In 1997, three concrete-lined burn pads were installed over the pre-existing plastic-lined shallow pits.

OPR

The OPR is triangular in shape (Figure 2) and occupies approximately 10 acres immediately adjacent to the northern end of the ORR. Little historical information about OPR activities is available, other than that pistol training occurred in this area.

The OPR contains remnants of a wooden structure believed to have been associated with two firing ranges. At these ranges, projectiles were fired toward earthen berms. Hillside Range 1, located in the southern portion of the OPR, is where pistol target shooting occurred from the east into the western hillside of the OPR (Figure 3). Range 2 Berm, located in the northern portion of the OPR, is where pistol target shooting occurred from south to north into a man-made earthen berm. White arrows on Figure 3 indicate the firing directions; the berms are the multi-segment rectangular areas around the yellow-colored rectangles.

Hydrogeological Setting

The known hydrogeology of the ORR is based on information provided in the Confirmation Work Report of April 1984 for Demolition Area/Old Rifle Range conducted by the USACE (Dunbar, 1984) and on subsequent investigations. During well installation by the USACE, ground water was encountered in fractures in the sandstone at the northern end and in the overburden at the southern end of the ORR. The uppermost occurrence of ground water is within the alluvium, which is present over much of the ORR. Ground water elevations within the underlying Big Clifty-Beech Creek aquifer are similar to those in the alluvium. The two units are hydraulically connected and considered to be one unconfined aquifer in this area (Murphy and Wade, 1988). The occurrence and movement of ground water is closely tied to the bedrock surface (USACE, 1991). Ground water elevations within the site range from approximately 510 to 495 feet msl, a difference of 15 feet. Flow direction is predominantly toward the east. Groundwater at the site is typically found between 10 to 20 feet below ground surface (Tetra Tech, 1999).

Drainage ditches on the east of SWMU 7 drain toward Turkey Creek, which flows southeast to Boggs Creek. Boggs Creek is one of seven primary creeks that carry surface water from the NSA Crane facility and eventually drain into the East Fork of the White River and then to the Wabash River to the southwest. The closest NSA Crane property boundary is approximately 3 miles west of SWMU 7.

Ecological Setting

A biological characterization of NSA Crane, including a listing of plants and animals found at the facility, is presented in the Installation Assessment (U.S. Army, 1978) and the Initial Assessment Study (IAS; NEESA, 1983), and is summarized in subsequent Environmental Monitoring Reports (Halliburton NUS, 1992a, 1992b, 1992c).

SWMU 7 vegetation includes mowed grasslands (open fields), wooded slopes, and riparian wooded vegetation that support a diverse bird population; 35 species were surveyed at SWMU 7 (Tetra Tech, 2005a and 2006a). Up to seven macroinvertebrate species have been surveyed at SWMU 7 and up to 12 fish species have been observed at SWMU 7 (Tetra Tech, 2005b and 1999). Because there is no groundskeeping at the OPR, small trees and brush cover most of the site and much of the area along the southeastern portion of the OPR is marshland.

Figure 2: Aerial Photograph of SWMU 7

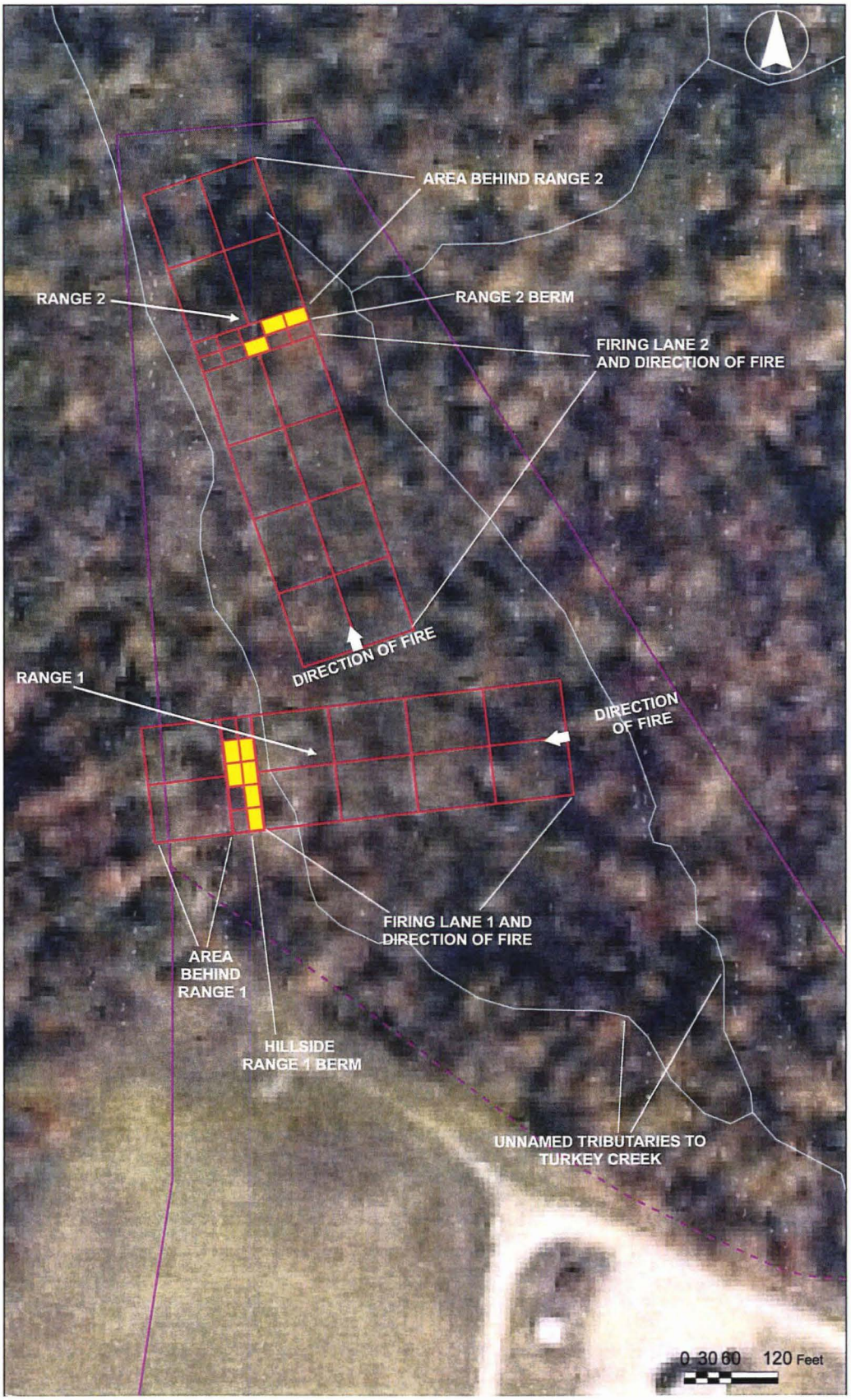

Figure 3: Hillside Range 1 Berm and Range 2 Berm

Investigations Conducted at SWMU 7

Various investigations were conducted at SWMU 7 from 1981 to 2005 as part of multi-SWMU investigations. An IAS, which began in April 1981 and concluded in May 1983, detected contamination in select areas of SWMU 7 and recommended further study of the SWMU (Naval Energy and Environmental Support Activity [NEESA], 1983).

Soil

A Current Contamination Conditions Risk Assessment (CCCRA) concluded that the effects of current ORR activities do not adversely impact the ecological population at SWMU 7 (Brown and Root Environmental [B&RE], 1997). The CCCRA concluded that no further action (NFA) was required for 2,4,6-trinitrotoluene (TNT) and that further evaluation was required for polycyclic aromatic hydrocarbons (PAHs) (B&RE, 1997).

An RFI Phase II soil characterization study was performed in 1990 and 1991 to further characterize potential chemical releases to soil. This investigation concluded that NFA was required until OB Unit closure (United States Army Corps of Engineers [USACE] Waterways Experiment Station [WES], 1991), which is required for a RCRA-permitted facility.

An RFI Phase III soil characterization study was performed in 2001 to further characterize potential chemical releases to soil at the SWMU. The Phase III soil RFI screening ecological risk evaluation concluded that metals in the Hillside Range 1 and Range 2 firing lanes do not present a risk to ecological receptors; however, metals in the berm areas (primarily lead) may adversely impact ecological receptors (Figure 2). The Phase III RFI also concluded that further investigation was required to define potential metal (primarily lead) contamination at the OPR, that arsenic contamination would be addressed during RCRA closure of the OB Unit, and NFA was required for PAH contamination (Tetra Tech, 2005a). A voluntary interim measure (VIM) (Tetra Tech, 2002) was performed at the ORR to remove an area of concern for TNT, eliminating the unacceptable risk for exposure to TNT in soil. In 2003, the Navy conducted a VIM at the OB Unit to excavate localized high concentrations of TNT (Figure 4) (Tetra Tech, 2006a).

In 2005 an additional investigation was conducted and a stand-alone addendum to the SWMU 7 Phase III Soil RFI report was completed (Tetra Tech, 2005b). This investigation completed the site characterization and evaluated human health and ecological risks at SWMU 7. This investigation concluded that, for the industrial workers and future residential receptors, unacceptable human health risk exists due to lead in limited areas of the Hillside Range 1 and Range 2 Berms (Figure 3).

In January 2007, the Navy conducted a VIM at Hillside Range 1 and Range 2 Berms (Tetra Tech, 2007) to remove soil from berm areas with lead concentrations greater than the Media Cleanup Standard (MCS) of 400 milligrams per kilogram (mg/kg). The VIM rendered the risks for exposure to lead in soil at the OPR acceptable.

Groundwater

The CCCRA concluded that there were unacceptable human health risks from explosives (dinitrotoluene [DNT], TNT, and cyclotrimethyl-trinitramine [RDX]), a pesticide (heptachlor epoxide), and metals (arsenic, barium, cadmium, lead, manganese, selenium, silver, and zinc) in groundwater if it was used as a source of drinking water. Analysis for explosives, pesticides, and metals were included as part of the OB Unit RCRA permit groundwater monitoring requirements. Pesticides were not found.

Subsequent investigations identified only arsenic as a chemical of concern (COC) for groundwater (Tetra Tech, 2006b).

Summary of SWMU 7 Risks

During the course of the RFI and subsequent investigations, ecological and human health risk assessments were performed to characterize the risks posed by site contaminants to ecological receptors and humans exposed to various environmental media. Select chemicals of potential concern (COPCs) and COCs were identified in earlier risk assessments as being responsible for the majority of unacceptable levels to human or ecological receptors but most of the COPCs were subsequently eliminated from concern. Some of the COPCs, COCs, and unacceptable risks were eliminated or reduced to acceptable levels as a result of VIMs. The actions that removed these chemicals from concern are documented in the CMP (Tetra Tech, 2006a).

There is no unacceptable risk to ecological receptors at SWMU 7. The COCs that remain are arsenic and TNT in groundwater. These two chemicals are COCs because of a potential for unacceptable human health risk from exposure of future hypothetical residents to groundwater if it would be used as a domestic water supply.

Scope of Corrective Action

Groundwater

The corrective action objectives established in the CMP Report for contaminated groundwater are as follows:

- Prevent human exposure (ingestion and dermal contact) to contaminated groundwater with concentrations greater than the EPA-established corrective action objectives.
- Prevent migration of the groundwater contaminant plume.
- Comply with chemical-specific, location-specific, and action-specific applicable or relevant and appropriate requirements (ARARs) and to be considered (TBC) criteria.

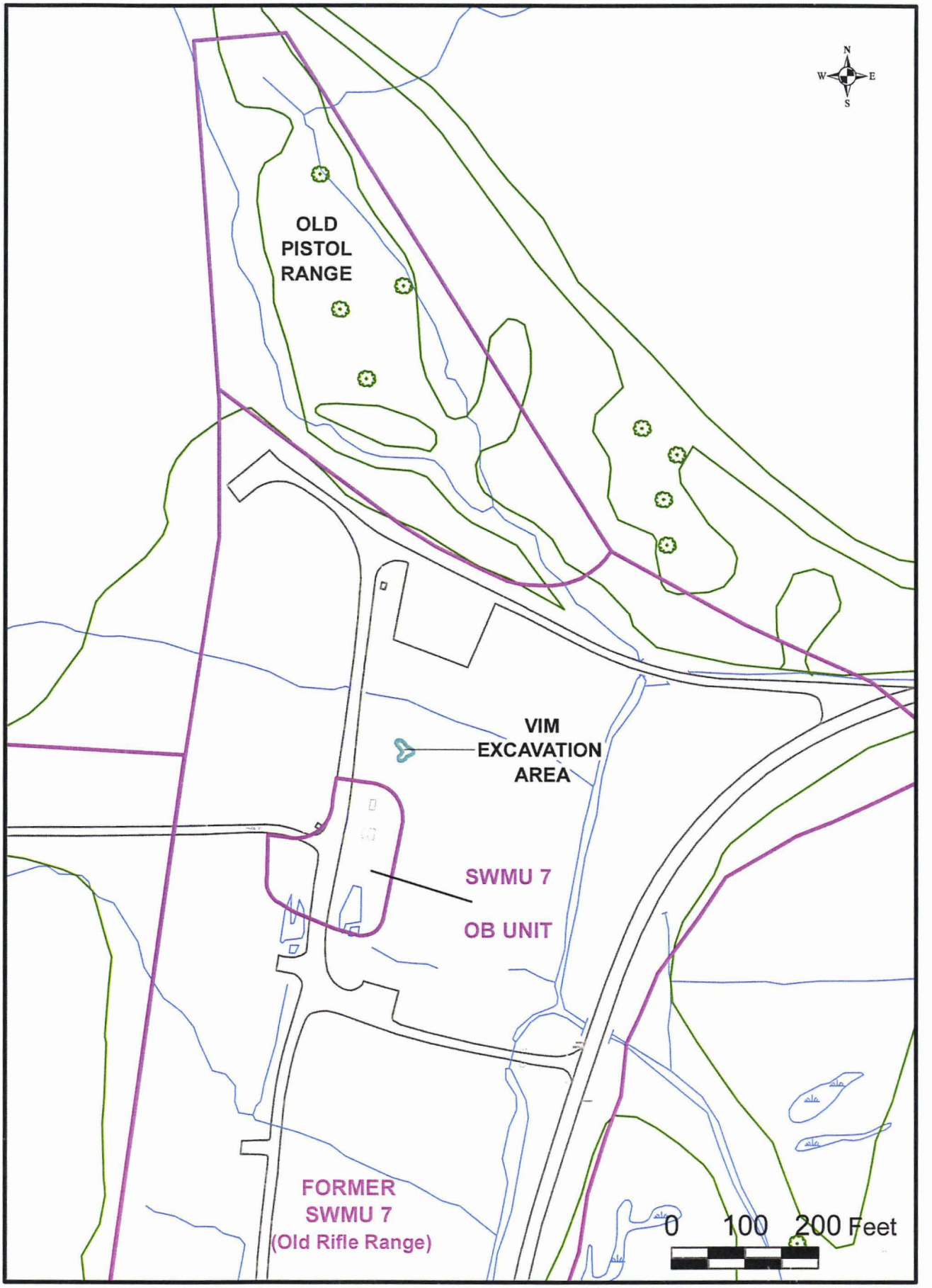

Figure 4: 2003 Voluntary Interim Measure

Based on these objectives, MCSs were developed for the groundwater chemical COCs from the CMP and are shown in Table 1. When concentrations less than or equal to MCSs are achieved, the corrective action process will be considered complete.

Soil

The corrective action objectives established in the CMP Report for contaminated soil are as follows:

- Prevent human exposure (ingestion and dermal contact) to lead-contaminated soil with concentrations greater than the EPA-established remediation objectives.
- Comply with chemical-specific, location-specific, and action-specific ARARs and TBC criteria.

Based on these objectives, an MCS for lead (400 mg/kg) was developed. Because the 2005 and 2007 VIMs achieved the MCS for soil, unacceptable risk from exposure to soil have been eliminated and corrective action for soil is no longer needed until RCRA unit closure. Therefore, the OB Unit, including any associated TNT contamination, will be characterized and, if necessary, remediated at the time of its closure.

TABLE 1 MCSs FOR GROUNDWATER

CHEMICAL	MCS (UG/L)
Arsenic	10
2, 4,6-Trinitrotoluene (TNT)	18

Contaminant levels less than the MCSs will not pose an unacceptable human health risk. Land use controls (LUCs) will be established to prevent the use of contaminated groundwater and prevent development and use of SWMU 7 for residential purposes.

SUMMARY OF CORRECTIVE ACTION ALTERNATIVES

The evaluation of corrective action alternatives began by identifying technologies considered to be practical and cost effective for SWMU 7. Technologies were combined into the corrective action alternatives listed below for particular media and contaminants:

GROUNDWATER

Explosives

Alternative No. GW-1-Exp – No Action. The No Action alternative maintains the site as is and is retained to provide a baseline for comparison to other alternatives. Attenuation of groundwater contaminants may occur as the result of naturally occurring processes such as adsorption to soil, biodegradation, and dispersion and dilution caused by groundwater movement, which generally limit or decrease the concentrations of explosives in groundwater over time. However, no monitoring would occur to determine whether natural attenuation is occurring, and no restrictions would be in place to prevent exposure to contaminated groundwater.

Alternative No. GW-2-Exp – Limited Action (Land Use Controls and Long-Term Monitoring). This alternative includes three major components: (1) natural attenuation, (2) land use controls (LUCs), and (3) long-term monitoring (LTM). Natural attenuation would rely on naturally occurring processes such as biodegradation plus dispersion and dilution through groundwater movement, and adsorption onto soil particles in order to reduce the concentrations of TNT (and other organic explosives). Processes for implementing LUCs to restrict groundwater use would be included in the Corrective Measures Implementation Plan (CMIP) that is under development. As part of the LUCs, annual site inspections would be conducted to verify and enforce the continued application of these controls. Monitoring would consist of regularly collecting groundwater samples and analyzing them for explosives to evaluate the progress of remediation and to verify that the extent of groundwater contamination is not expanding. Preliminary estimates indicate that the remediation timeframe would be somewhat greater than 15 years.

Metals

Alternative No. GW-1-Metal – No Action. The No Action alternative maintains the site as is and is retained to provide a baseline for comparison to other alternatives. Attenuation of groundwater arsenic contamination may occur as the result of naturally occurring processes such as adsorption to soil and dispesion and dilution caused by groundwater movement, which generally limit or decrease the concentrations of arsenic in groundwater over time. However, no monitoring would occur to determine whether natural attenuation is occurring, and no restrictions would be in place to prevent exposure to contaminated groundwater.

Alternative No. GW-2-Metal – Limited Action (Land Use Controls). This alternative has one major component, LUCs. Processes for implementing LUCs to restrict groundwater use would be included in the CMIP. As part of the LUCs, annual site inspections would be conducted to verify and enforce the continued application of these controls. Although Alternative GW-2-Metal does not include LTM for metals, the existing Groundwater Monitoring Program at SWMU 7, which is required by the RCRA Operating Permit for the OB Unit, includes monitoring for metals.

COST EVALUATION

There is no cost associated with Alternatives GW-1-Exp and GW-1-Metal; comparative estimated costs for Alternatives GW-2-Exp and GW-2-Metal are presented in Table 2 in terms of present worth:

Table 2. Comparative Costs for Groundwater Alternatives			
Cost Item	Alternative GW-2-EXP	Alternative GW-2-Metal	Total Alternative
Present Worth[1]	$144,000	$40,000	$184,000

[1]The present value (or worth) of an ingbestment is the total amount that a number of future payments is worth now in today's dollars.

The cost of implementing and maintaining LUCs, and performance of 5-year reviews were included in the cost estimates. Five-year site reviews would be conducted to verify the long-term reliability and effectiveness of the alternatives and, if deemed necessary, to provide direction for further corrective action. Details of the evaluation process and the factors that were considered are presented in the CMP Report (Tetra Tech, 2006a).

Evaluation of the Proposed Corrective Action and Alternatives

Corrective Action Evaluation Criteria

The corrective actions were evaluated using specific criteria set forth by the EPA (1991). Details of these evaluations are provided in the CMP Report (Tetra Tech, 2006a).

Proposed Corrective Action and Rationale for Selecting the Proposed Corrective Action

Alternatives No. GW-1-Exp and GW-2-Metal – No Action would not be sufficiently protective of human health and the environment because it would not prevent potential future exposure to contaminated groundwater and buried waste. However, the "No Action" alternative is always evaluated during a CMP, as required by EPA, to provide a point of reference for the other alternatives.

Alternative No. GW-2-Exp – Limited Action (Land Use Controls and Long-Term Monitoring) would be protective of human health and the environment because it would prevent potential future exposure to elevated TNT concentrations in groundwater and would ensure that TNT concentrations in groundwater continue to decrease and eventually achieve levels that are less than MCSs. There is no single identified TNT contaminant source but controlled access to SWMU 7 would limit any potential for exposure to TNT contamination. As part of the LUCs, annual site inspections and 5-year reviews would be conducted to verify the continued application of these controls.

Alternative No. GW-2-Metal – Limited Action (Land Use Controls) would be protective of human health and the environment because it would prevent potential future exposure to elevated arsenic concentrations in groundwater. There is no single identified arsenic contaminant source but controlled access to SWMU 7 would limit any potential for exposure to arsenic contamination. As part of the LUCs, annual site inspections and 5-year reviews would be conducted to verify the continued application of these controls.

After considering the criteria presented above, the proposed corrective actions are to implement LUCs (Alternatives GW-2-Exp and GW-2-Metal) and monitor TNT concentrations in groundwater (GW-2-Exp). These corrective actions will ensure that controls are in effect to prevent human exposure to site contaminants. With these controls in place, exposure potential is extremely low.

The proposed corrective actions were selected for the following reasons:

- The identified human health risks for exposure to TNT and arsenic in groundwater can be controlled under the proposed corrective action.
- Unacceptable risks were identified only for hypothetical future residents of SWMU 7; however, residential land use at SWMU 7 is unlikely in the near future and can be controlled with LUCs. Therefore, the estimated unacceptable risks are minor and do not require additional immediate action.
- Alternatives GW-2-Exp and GW-2-Metal are cost-effective means of protecting human health and the environment. Under GW-2-Exp, additional data will be collected routinely to assess future site conditions, to assess the effectiveness of natural attenuation, and to verify that the implemented corrective actions are protective of human health and the environment. Although GW-2-Metal does not require LTM, the NSA Crane groundwater monitoring program includes arsenic and thus will also provide future indications of the extent of arsenic contamination in groundwater. A cost comparison is presented in Table 1. This comparison does not include LTM for arsenic in groundwater.
- Alternative GW-2-Exp would provide a warning of potential migration of groundwater contaminated with TNT through LTM.

The proposed corrective actions would require long-term LUCs, which would be similar to current LUCs at other environmental sites at NSA Crane. If, at any time, it is determined that LUCs are not sufficient to effectively protect human health and the environment, another corrective action for SWMU 7 will be considered. Five-year reviews would be conducted to verify the long-term reliability and effectiveness of the proposed corrective action and to provide direction for further corrective action, if deemed necessary.

The CMIP will include details of annual LUC implementation and maintenance actions and 5-year reviews of the effectiveness of the corrective action.

Land Use Control Objectives

As part of Alternatives GW-2-Exp and GW-2-Metal, it will be necessary to protect human health by implementing LUCs. The LUC objectives for SWMU 7 are as follows:

- Prevent access to and/or use of groundwater contaminated with TNT and arsenic within the SWMU 7 groundwater LUC boundary 1 (see Figure 5) until MCSs (cleanup goals) are achieved throughout that area.

- Maintain the integrity of any current or future corrective action system, including monitoring system components (e.g., monitoring wells).

Use of the site for other purposes (such as industrial) may be acceptable and are not prohibited. However, any future industrial development that could increase the exposure of sensitive receptors such as residents would require coordination with USEPA Region 5.

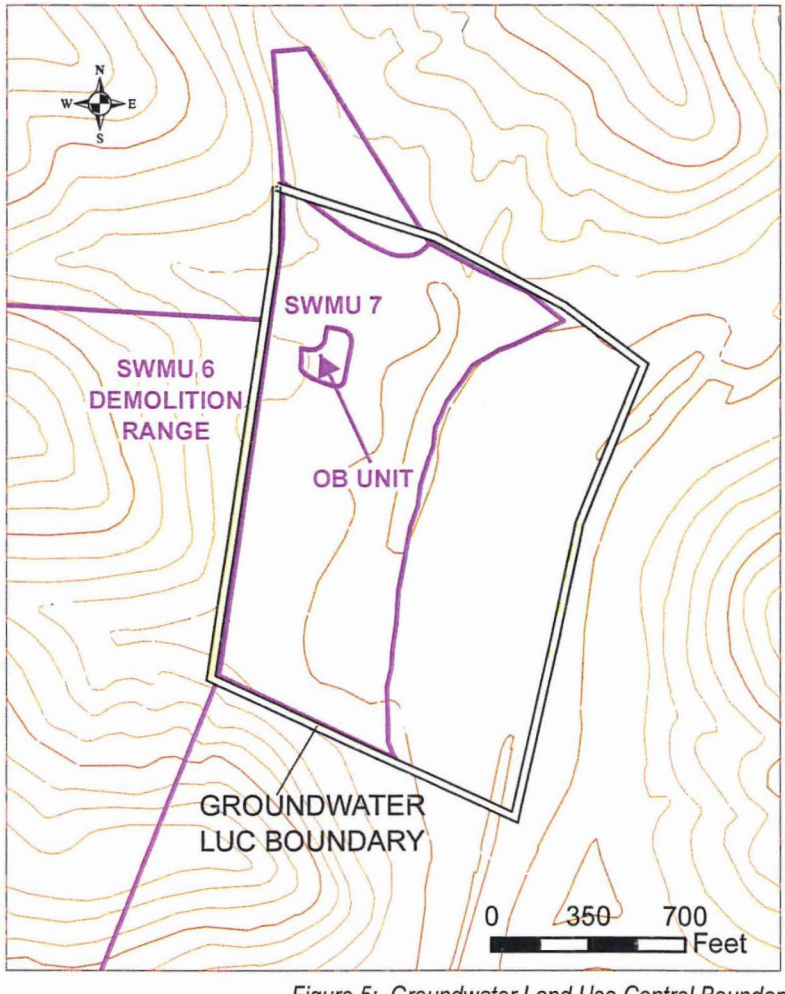

Figure 5: Groundwater Land Use Control Boundary

Public Participation

Importance of Public Comment

The "public" includes the general public, the owner or operator of NSA Crane, and other parties (for example, public interest groups and regulatory agencies). Because of a slight potential for exposure of the public to SWMU 7 contaminants, the public may have an interest in understanding the environmental conditions at SWMU 7 and the relationship of the proposed or alternate corrective actions to resolving the environmentally unacceptable conditions. EPA may modify the proposed corrective actions or select another corrective action based on new information or public comment. The public can be involved in the corrective action selection process by reviewing the documents contained in the administrative record file and submitting comments to the EPA during the public comment period. See the Public Participation section in this SB.

EPA is soliciting input from the community on the selected proposed corrective actions for SMWU 7. Comments on this SB (proposed corrective action) will be taken for 30 days. The beginning and end of the 30-day comment period will be posted on the NSA Crane website (http://www.navsea.navy.mil/nswc/crane/community/Pages/Environmental_Restoration.aspx). Members of the public may submit written comments to the EPA regarding the proposed corrective actions. Comments may either by submitted by e-mail to CRAN_RAB@navy.mil or by mail to the following:

Peter Ramanauskas
United States Environmental Protection Agency – Region 5
77 West Jackson Boulevard (LU-9J)
Chicago, IL 60604
ramanauskas.peter@epa.gov

Written comments concerning this proposal should include the name and address of the writer and the supporting relevant facts upon which the comments are based. Written comments received will be summarized, and responses will be provided to all persons on the facility mailing list. Written comments should be submitted via e-mail or postmarked by the end of the comment period.

A copy of this SB, which is part of the NSA Crane Administrative Record, and other documents in the administrative record are available at the following locations:

Anyone interested in reviewing the RFI Report, CMP Report, or report summaries, and the justification for the proposed corrective action (recorded in this SB), may view these documents at the EPA office listed above or on compact disk at the Bedford Public Library.

Location	Hours of Operation
United States Environmental Protection Agency - Region 5 77 West Jackson Boulevard 7th Floor File Room Chicago, IL 60604	8:00am to 4:00pm Monday through Friday (excluding federal holiday) By appointment: (312) 886-6173
Bedford Public Library 1323 K Street Bedford, IN 47421	9:00am to 8:00pm Monday through Friday 9:00am to 5:00pm Friday and Saturday 1:00pm to 5:00pm Sunday (812) 275-4471

In addition, text-only versions of the SB and summaries of the RFI and CMP Reports are available at, http://www.navsea.navy.mil/nswc/crane/community/Pages/Environmental_Restoration.aspx.

Acronyms

µg/L - micrograms per liter

ARAR - Applicable or relevant and appropriate requirement

B&RE - Brown and Root Environmental CAAA - Crane Army Ammunitions Activity

CCCRA - Current Contamination Conditions Risk Assessment

CMIP - Corrective Measures Implementation Plan

CMP - Corrective Measures Proposal

COC - Chemical of concern

DNT - Dinitrotoluene

EPA - United States Environmental Protection Agency

ERA - Ecological risk assessment

HHRA - Human health risk assessment

IAS - Initial Assessment Study

LTM – Long-term monitoring

LUC - Land use control

MCS - Media cleanup standard

mg/kg - milligram per kilogram

NEESA - Naval Energy and Environmental Support Activity

NFA - No further action

NSA - Naval Support Activity

OB - Open Burning

OPR - Old Pistol Range

ORR - Old Rifle Range

PAH - Polycyclic aromatic hydrocarbon

RCRA - Resource Conservation and Recovery Act

RDX - Cyclotrimethyl-trinitramine

RFI - RCRA Facility Investigation

SB - Statement of Basis

SWMU - Solid Waste Management Unit

TBC - To be considered

TNT - 2,4,6-Trinitrotoluene

UXO – Unexploded Ordnance

USACE - United States Army Corps of Engineers

USGS – United States Geological Survey

VIM – Voluntary Interim Measure

WES - Waterways Experiment Station

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CORRECTIVE MEASURES IMPLEMENTATION PLAN/ QUALITY ASSURANCE PROJECT PLA FOR SWMU 7 - OLD RIFLE RANGE

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PITTSBURGH, PENNSYLVANIA

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TABLES

NUMBER

FIGURES

NUMBER

ACRONYMS

2-ADNT	2-Amino-4,6-dinitrotoluene
4-ADNT	4-Amino-2,6-dinitrotoluene
BC/BC	Big Clifty Sandstone/Beech Creek Limestone
bgs	Below ground surface
CLEAN	Comprehensive Long-Term Environmental Action Navy
CMI	Corrective Measures Implementation
CMIP	Corrective Measures Implementation Plan
CMP	Corrective Measures Proposal
COC	Chemical of concern
COPC	Chemical of potential concern
CTO	Contract Task Order
DoD	Department of Defense
DQO	Data quality objective
DR	Demolition Range
ELAP	Environmental Laboratory Accreditation Program
EPD	Environmental Protection Department
ESM	Environmental Site Manager
FOL	Field Operations Leader
FSP	Field Sampling Plan
FTMR	Field task modification request
GDM	Geographic data management
GWMP	Groundwater monitoring plan
GIS	Geographic information system
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations for Emergency Response
HHRSE	Human Health Risk Screening Evaluation
HQ	Hazard Quotient
HSM	Health and Safety Manager
IDEM	Indiana Department of Environmental Management
ILCR	Incremental Lifetime Cancer Risk
LTM	Long-term monitoring
LUC	Land use control
LUCIP	LUC Implementation Plan

MCL	Maximum Contaminant Level
MCS	Media Cleanup Standard
msl	Mean sea level
NAVFAC	Naval Facilities Engineering Command
NSA	Naval Support Activity
OB	Open Burning
ORR	Old Rifle Range
OSHA	Occupational Health and Safety Administration
PM	Project Manager
PRG	Preliminary Remediation Goal
QA	Quality assurance
QAC	Quality Assurance Coordinator
QAM	Quality Assurance Manager
QAPP	Quality Assurance Project Plan
QC	Quality control
RBTL	Risk-based target level
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RPM	Remedial Project Manager
SB	Statement of Basis
SDWA	Safe Drinking Water Act
SOP	Standard operating procedure
SOW	Statement of work
SSO	Site Safety Officer
SWMU	Solid Waste Management Unit
TNT	Trinitrotoluene
USACE	United States Army Corps of Engineers
US EPA	United States Environmental Protection Agency
VIM	Voluntary Interim Measure
WES	Waterways Experiment Station

1.0 INTRODUCTION

This Corrective Measures Implementation Plan (CMIP)/Quality Assurance Project Plan (QAPP) was prepared for Solid Waste Management Unit (SWMU) 7 – Old Rifle Range (ORR) at the Naval Support Activity (NSA) facility located in Crane, Indiana. The CMIP/QAPP was prepared for the Naval Facilities Engineering Command (NAVFAC) Midwest under Contract Task Order (CTO) F272 of Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62470-08-D-1001. Some of the information necessary to implement portions of this CMIP/QAPP are incorporated by reference. Those sections are marked throughout this document.

Although previously much larger in size, SWMU 7 currently consists only of the Open Burning (OB) Unit associated with the ORR; therefore, the SMWU 7 boundary was revised to match its current size in 2012 (Tetra Tech, 2012). Figure 1-3 identifies the old SMWU 7 boundary (now serving as the groundwater LUC boundary) as well as the OB unit boundary, which is the updated SMWU 7 boundary. A portion of the old SMWU 7 boundary (pink line on Figure 13) is coincident with the current groundwater Land Use Control (LUC) boundary (blue line on Figure 13).

The OB Unit is a waste energetic materials and metal burning area that is permitted (Hazardous Waste Management Permit number IN5170023498) under the Resource Conservation and Recovery Act (RCRA) by the Indiana Department of Environmental Management (IDEM) as an open burning facility.

NSA Crane is located in a rural, sparsely populated region of south-central Indiana, approximately 75 miles southwest of Indianapolis and 71 miles northwest of Louisville, Kentucky (Figure 1-1), immediately east of Crane Village and Burns City. Most of the facility is located in Martin County, and a small portion is distributed among Greene, and Lawrence Counties. The NSA facility is active, and general public access is restricted. SWMU 7 is located in the central portion of NSA Crane (Figure 1-2).

Several studies have been performed at SWMU 7. Most recently, a Corrective Measures Proposal (CMP) followed a RCRA Facility Investigation (RFI) study to evaluate potential corrective actions for soil and groundwater contamination (Tetra Tech, 2006). The preferred corrective measures alternative was then proposed in a Statement of Basis (SB) prepared in 2012 (USEPA, 2012). A human health risk screening evaluation was performed as part of the CMP to quantify carcinogenic and non-carcinogenic risks posed to humans by site groundwater contaminants. The screening evaluation determined the following:

- Arsenic concentrations in groundwater exceed the Safe Drinking Water Act (SDWA) primary Maximum Contaminant Level (MCL).

- Incremental Lifetime Cancer Risk (ILCR) estimates developed for total and dissolved arsenic exceeded 1E-04 for human receptors using groundwater as a domestic water source.

- The calculated arsenic non-carcinogenic Hazard Quotient (HQ) exceeded 1, indicating a potential for adverse non-carcinogenic health effects if groundwater at SWMU 7 is used as a domestic water supply.

- The maximum observed concentration of trinitrotoluene (TNT) in groundwater exceeded USEPA Region 9 Preliminary Remediation Goals (PRGs) established for tap water [2.2 micrograms per liter (µg/L)]. However, the TNT estimated cancer risk estimate (the only carcinogen present with concentrations requiring evaluation) did not exceed 1E-05.

The preferred alternative proposed in the SB for ORR includes groundwater long-term monitoring (LTM) to determine whether groundwater contaminants are naturally attenuating and ensure there are no future unacceptable risks to human health and the environment from future domestic groundwater use. The SB also recommended that land use controls (LUCs) be established to prevent groundwater use and exposure to contaminated soil and groundwater that could result in unacceptable risks to human health.

This CMIP/QAPP describes the design of the groundwater LTM program and LUC Implementation Plan (LUCIP) for SWMU 7. This document outlines the requirements and describes the decisions to be made concerning the effectiveness of LTM and LUCs at controlling current and potential future risks associated with exposure of select human receptors to groundwater. The existing RCRA Groundwater Monitoring Plan (GWMP), associated Field Sampling Plan (FSP), and QAPP will be used to implement the LTM component of the corrective measures for SWMU 7. The LUCIP is presented in Section 6.0.

1.1 SITE DESCRIPTION

The ORR is roughly rectangular in shape and is located in Sections 26 and 35 of T5N, R4W on the Indian Springs, Indiana Topographic Quadrangle Map (USGS, 1978). The ORR occupies approximately 20 acres immediately northeast and downslope of the Demolition Range (DR) also known as SMWU 6. The OB Unit, SWMU 7, is approximately 1 acre in size and located in the northern part of the ORR (Figure 1-3).

The OB Unit is used for burning yellow D (ammonium picrate), projectiles, and metal contaminated with energetic materials in containment pans. Chain-linked fences surround concrete pads where the burning takes place.

1.1.1 Physical Description and Operational History

Unless otherwise indicated, the physical descriptions below characterize the ORR and associated areas, including SMWU 7, which is now within the ORR.

1.1.1.1 Topography

The ORR gently slopes downhill to the east. Maximum ground surface elevations within the ORR are approximately 530 feet above mean sea level (msl) and the minimum elevation is approximately 500 feet above msl near the road (NSA Crane Highway 8), for a total relief of about 30 feet within the ORR. The area east of the ORR slopes downward toward Turkey Creek, where the minimum elevation is approximately 485 feet above msl.

To the west and southwest of the ORR, the ground surface rises steeply to a ridgetop, which has a maximum elevation of 710 feet above msl. Thus, the total relief from the top of the ridge to Turkey Creek is 225 feet above msl. The DR occupies the sideslopes and top of the ridge to the west and southwest of the ORR. SWMU 7, which is located within the ORR, is relatively flat.

1.1.1.2 Geology and Soils

Bedrock underlying the NSA Crane facility, including the ORR, consists of sedimentary rocks from the Lower Pennsylvanian age Mansfield Formation (Raccoon Creek Group) and the Upper Mississippian age Stephensport and West Baden Groups. Due to erosion and moderate relief in the area, the Lower Pennsylvanian and Upper Mississippian sandstones, limestones, and shales crop out on ridge tops and underlie all of the streams and creeks at NSA Crane. The rock formations have been deformed to yield a gentle dip of 50 feet per mile in a west-southwest direction, toward the center of the Illinois structural basin.

Unconsolidated alluvium, colluvium, and residual soils, which are typically clay and silty gravel, overlie the bedrock everywhere at the ORR. A thin layer (less than 10 feet) of residual soil has been observed on the southwestern and the northeastern sides of the ORR. The thickness of soil was found to be as much as 30 feet in other areas of the ORR.

The upper portions of bedrock of the ORR hillsides and ridgetops are composed of Pennsylvanian-age Mansfield Formation. The Pennsylvanian-age sandstones, siltstones, shales, and coal beds are separated from the Mississippian-age rocks by the pre-Pennsylvanian erosional unconformity at an elevation of about 535 to 540 feet above msl.

Directly beneath the Pennsylvanian rocks lie the Golconda-Haney Limestone and the Indian Springs Shale (Upper Mississippian age). These rock units only exist in the ridge to the west of the ORR at elevations ranging from approximately 500 to 535 feet above msl. The Golconda-Haney Limestone is considered to be a minor aquifer at NSA Crane. It is hydraulically separated from the underlying Big Clifty/Beech Creek aquifer by the Indian Springs Shale. Because this limestone aquifer and the shale aquitard are located upgradient of SWMU 7 and at a higher elevation, groundwater in these units is not expected to be affected by any activities that have occurred at SWMU 7.

In nearly all of the ORR area, including the OB Unit, the Big Clifty Sandstone is the uppermost rock unit encountered near the ground surface. This sandstone is relatively uniform at 40 feet thick, except where the thickness has been reduced by post-Pennsylvanian erosion. Significant erosion has reduced the thickness of the Big Clifty Sandstone on the eastern side of the ORR. The Big Clifty Sandstone is characterized as a massive to thick-bedded, fine- to very fine-grained, well-sorted, friable sandstone with occasional shaly partings (USACE WES, 1998).

The Beech Creek Limestone lies beneath the Big Clifty Sandstone. This limestone ranged from 15 to 22 feet thick in the ORR area. This formation consists of hard, dense, fossiliferous limestone.

Together, the Big Clifty Sandstone and the Beech Creek Limestone form the Big Clifty/Beech Creek (BC/BC) aquifer. Because both units are permeable and the Big Clifty lies directly above the Beech Creek in direct hydraulic connection, they are considered one aquifer. The combined thickness ranges from 50 to 60 feet on the western side of the ORR to 30 feet on the eastern side of the ORR, where part of the aquifer has been removed by post-Pennsylvanian erosion in the Turkey Creek valley.

1.1.1.3 Surface Water Hydrology

SWMU 7 generally slopes toward Turkey Creek, where the minimum elevation is approximately 485 feet above msl. All water and sediment discharging from the SWMU eventually enters Turkey Creek. A large portion of the SWMU drains directly into Turkey Creek. The northern portion of the ORR area drains into an unnamed perennial stream that drains into Turkey Creek (Figure 1-3). Some parts of the southern

portion of the ORR drain into another unnamed tributary that drains into Turkey Creek (Figure 1-3). The tributary in the southern ORR area also drains some of the ridgetop area occupied by the DR.

1.1.1.4 Groundwater Hydrology

Groundwater in the nonglaciated southwestern portion of Indiana is generally contained in fractures and joint openings of limestone and sandstone aquifers. Aquifers are generally isolated from one another vertically by less permeable shale and siltstone units. Groundwater enters the aquifers as infiltration in outcrop areas and flows by gravity down the dip of the strata or locally in directions controlled by the potentiometric gradients, which are in most cases influenced by topography and locations of stream channels (i.e., groundwater discharge areas).

Groundwater is present beneath NSA Crane in both the natural unconsolidated materials and the bedrock. The depth to groundwater ranges from less than 5 feet below ground surface (bgs) in topographic low areas near surface water bodies to almost 25 feet bgs at higher elevations. The majority of the monitoring wells associated with the OB unit and at the former 20-acre SWMU 7 area were completed within the first groundwater-yielding unit encountered during drilling, which was typically either the natural unconsolidated material or the shallow bedrock.

The Big Clifty Sandstone and Beech Creek Limestone (BC/BC) were monitored as one aquifer at the ORR, as they were for the DR. The Beech Creek Limestone was the deepest formation monitored. The maximum thickness of the BC/BC aquifer penetrated in site borings was 58 feet and the minimum penetrated was 26 feet. The deeper site wells end in the Elwren shale aquiclude, which is persistent beneath the entire ORR.

The thick alluvial soils that occur over much of SWMU 7 constitute part of the uppermost aquifer. The similarity in water levels in wells installed solely in the soil column and wells installed in the upper Big Clifty Sandstone indicate that SWMU 7 soils are hydraulically connected with the BC/BC aquifer.

The groundwater flow direction in the overburden/upper Big Clifty zone (upper monitoring zone) is generally from northwest to southeast. Groundwater levels measured in the Beech Creek Limestone and the base of the Big Clifty Sandstone (deep monitoring zone) indicate a general groundwater flow to the east and southeast. According to the conceptual hydrologic model for the ORR, groundwater flows from high topographic elevations west of SWMU 7 toward the Turkey Creek valley on the eastern side of SWMU 7 (see Figure 1-3). Most of the groundwater flow discharges to Turkey Creek.

1.1.2 Previous Investigations and Interim Measures

Several investigations and interim measures have been conducted for the ORR, including the OB Unit.

1.1.2.1 Previous Investigations

This section presents a summary of the current contamination conditions at SWMU 7 based upon the following (only key documents relevant to current conditions are described):

- Phase III Soils RFI (Tetra Tech, 2005a).
- Phase III Soils RFI Addendum 1 (Tetra Tech, 2005b).
- Routine Groundwater Monitoring Reports for Reporting Years 2000, 2001, 2002, 2003, and 2004 (SAIC, 2002a, 2002b, 2003, 2004, and 2005), a summary of which can be found in the CMP (Tetra Tech, 2006).
- CMP (Tetra Tech, 2006).

An RFI Phase III soil characterization study was performed in 2001 to further characterize previously identified potential chemical releases to soil at SWMU 7. The Phase III RFI concluded that further investigation was required to define potential metal (primarily lead) contamination at the ORR, that arsenic contamination would be addressed during RCRA closure of the OB Unit, and no further action (NFA) was required for PAH contamination (Tetra Tech, 2005a).

In 2003, the Navy conducted a Voluntary Interim Measure (VIM) at the OB Unit to excavate localized high concentrations of TNT ((Tetra Tech, 2006a).

In 2005 a stand-alone addendum to the SWMU 7 Phase III Soils RFI was completed (Tetra Tech, 2005b). This investigation completed the site characterization and evaluated human health and ecological risks at SWMU 7. This investigation concluded that for industrial workers and future residential receptors, unacceptable human health risk exists because of lead in limited areas of the Hillside Range 1 and Range 2 Berms.

In January 2007, the Navy conducted a VIM at Hillside Range 1 and Range 2 Berms (Tetra Tech, 2007) to remove soil from berm areas with lead concentrations greater than the Media Cleanup Standard (MCS) of 400 milligrams per kilogram (mg/kg). This resulted in NFA being required at the ranges.

Groundwater Contamination

Explosives (TNT) – Routine groundwater monitoring reports for 2001, 2002, 2003, and 2004 (SAIC, 2002a, 2002b, 2003a, 2003b, and 2005) at SWMU 7 identified one explosive (TNT) that exceeded its risk-based target level (RBTL) at a single monitoring well, 06C15 (Figure 1-3). Monitoring well 06C15 is located in the vicinity of the 2003 VIM soil excavation.

For reporting years 2000 through 2004, TNT was detected during all four quarters in one well, 06C15, at concentrations greater than the RBTL. TNT degradation products were also consistently detected in this well, specifically 2-amino-4,6-dinitrotoluene (2-ADNT) and 4-amino-2,6-dinitrotoluene (4-ADNT). The presence of these daughter products indicates that some natural attenuation of TNT is occurring.

Based on the information from these routine monitoring reports and trend plots, which can be found in the CMP (Tetra Tech, 2006) the concentrations of explosives (including TNT) and degradation products 2-ADNT and 4-ADNT in groundwater are decreasing.

Metals – The CMP and SB identify arsenic as a COC (Tetra Tech, 2006 and 2012). Analysis for arsenic occurs as part of the RCRA Part B Operating Permit routine groundwater monitoring requirements.

1.1.2.2 Human Health Risk Screening Evaluation for Groundwater

As part of the groundwater monitoring program at the ORR, a Human Health Risk Screening Evaluation (HHRSE) was conducted for the metals and explosives that had higher concentrations in downgradient monitoring wells as compared to concentrations in upgradient monitoring wells and exceed the RBTL specified in the permit. The HHRSE in the CMP concluded that arsenic was the only metal recommended for further evaluation as a potential groundwater COC.

1.2 CONCEPTUAL SITE MODEL

Contaminants were released into surface/subsurface soils and migrated toward downgradient locations from those releases to groundwater. The following is a summary of the conceptual site model for the ORR.

- There is localized explosives contamination of groundwater in one monitoring well (06C15). The presence of TNT degradation products 2-ADNT and 4-ADNT indicate that natural attenuation is occurring.

- Soil contaminated with explosives in the vicinity of monitoring well 06C15 has been removed. There is no known remaining source of groundwater explosives contamination in soil.

- Current operating practices at the ORR have eliminated releases of contaminants to soil and groundwater. Therefore, the existing TNT contamination in groundwater is being depleted.

- The existing land use for SWMU 7 is military/industrial. Receptors associated with the existing use include the site worker, construction worker, and trespasser.

- Contaminated groundwater underlying SWMU 7 is not used; therefore, does not present an unacceptable risk under the military/industrial land use scenario.

- An unacceptable level of health risk exists for future residents if they were to ingest groundwater. Reasonable future uses for SWMU 7 do not include residential housing.

- There is no unacceptable risk to ecological receptors at SWMU 7.

1.3 CURRENT LAND USE

NSA Crane is situated in a rural area of south-central Indiana. The surrounding communities that form the region are in a period of transition from an economic base of agriculture, mining, and quarrying to an economy built on manufacturing and service industries. The patterns of settlement, population statistics, and median income are similar throughout the region.

There is no state or local planning within the vicinity of NSA Crane. The only zoning and land use regulations are found in the municipalities within the region. None of these municipalities are close enough to have an impact on NSA Crane. None of the areas adjacent to NSA Crane are zoned, and zoning is not anticipated in the future. SWMU 7 is approximately 3 miles east of the nearest NSA Crane property boundary. There are no known current or likely future land use or community actions under consideration or proposed at this time for off-base land in the vicinity of SWMU 7; however, Turkey Creek could carry contamination off base. SWMU 7 is contained completely within NSA Crane, and likely future land use at areas surrounding the SWMU is expected to be limited to industrial.

1.4 CORRECTIVE MEASURES GOAL

The corrective measures goals for SWMU 7 are as follows:

- Monitoring groundwater for COCs to determine whether chemical concentrations in groundwater are naturally attenuating in accordance with the SB.
- Prevent human exposure to contaminated groundwater.

To achieve these goals, implementation of groundwater LTM and LUCs is required.

1.4.1 Long-Term Monitoring Objectives

The objectives of LTM are as follows:

- Determine whether concentrations of COCs in groundwater associated with SWMU 7 are naturally attenuating and warn of potential contamination migration.

LTM will be conducted in accordance with the RCRA GWMP that is part of the RCRA operating permit for SWMU 7 (Navy, 2007).

The monitoring points, units monitored, monitoring frequency, and monitoring point objectives are presented in the RCRA GWMP. The analytes to be monitored at each monitoring point and the groundwater protection standards are presented in the RCRA GWMP.

1.4.2 Land Use Control Objectives

The objectives of LUCs are as follows:

- Prevent access to and use of contaminated groundwater within the SWMU 7 groundwater LUC boundary (Figure 1-3) until MCSs are achieved in groundwater affected by SWMU 7.

- Maintain the integrity of any current or future corrective action or monitoring system (e.g., monitoring wells).

- Prohibit the development and use of the property within the SWMU 7 Groundwater LUC Boundary for residential or other unrestricted use.

LUCs will be used to ensure that exposure of humans to contaminated groundwater associated with SWMU 7 does not occur. This requires periodic evaluations of the integrity of the monitoring network and physical controls that are in place to prevent exposure to contaminated sediment, surface water, and groundwater. Ensuring that controls remain effective will require the following:

- Management of existing LUCs.
- Periodic review of existing LUCs and additional LUCs, if necessary, to ensure that they remain effective.

The SWMU 7 Groundwater LUC boundary is shown on Figure 1-3. The LUCIP is included in Section 6.0 of this CMIP/QAPP.

1.5 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) are presented in this report in a format comparable to the Guidance for Data Quality Objectives (USEPA, 2006). Section 1 of this document presents the DQO problem statements for LTM and LUCs. An additional consideration is that the party that will implement the LTM program (e.g., collect and analyze samples, interpret the data, and generate reports) on behalf of the Navy may change in the future. Therefore, controls are included in this document to ensure that the implementing parties will meet the following criteria:

- Satisfy EPA Region 5 requirements for sample collection and management.
- Satisfy EPA Region 5 requirements for data review and management.
- Collect samples and generate data in a manner comparable in quality to past activities at the site.
- Interpret data in a technically sound and defensible manner.

Standard operating procedures (SOPs) for sampling and laboratory analysis that have been approved by the USEPA and IDEM are included in the GWMP that is part of the RCRA operating permit for SWMU 7 (Navy, 2007). The SOPs are referenced in the RCRA GWMP to provide the level of control required to ensure that the above objectives are satisfied. The RCRA GWMP and SOPs have been adopted, as written, for implementing the LTM plan described in this CMIP/QAPP. If it becomes necessary to change SOPs information (e.g., organizational structure due to changes in the implementing parties), the changes must be approved by IDEM through the RCRA permit modification process.

1.5.1 Decision Statements

Decision statements were incorporated directly into the decision rules presented in Section 1.5.4.

1.5.2 Inputs to the Decision

The analytes list for groundwater is presented in the RCRA GWMP.

Groundwater elevations will be determined during every sampling round to update groundwater flow direction information. Well stabilization parameters (e.g., pH, turbidity) will be measured to ensure that samples collected are representative of the water-bearing zones associated with the wells. Groundwater elevations and well stabilization parameters will be measured as specified in the RCRA GWMP.

Low-flow sampling of groundwater will be used to ensure comparability with previously collected data and to ensure that the samples are representative of groundwater conditions. Groundwater samples will be collected as specified in the RCRA GWMP.

Quality control (QC) samples will be collected to help estimate the precision, accuracy, representativeness, comparability, completeness, and sensitivity of samples and analyses, as appropriate. QC samples will be collected and analytical results will be evaluated as specified in the RCRA GWMP.

Monitoring in accordance with the RCRA GWMP will continue during active operation of SWMU 7 until it is closed, in accordance with RCRA. Evaluation of groundwater data will involve comparisons of chemical concentrations to the groundwater protection standards presented in RCRA GWMP. The data will be evaluated, as specified in the RCRA GWMP.

In addition to the above, periodic assessment of LUCs must be made. Section 6.0 of this CMIP/QAPP is the LUCIP developed separately from the LTM plan to describe LUC requirements. Periodic evaluation of site conditions (e.g., well integrity, lack of groundwater use) will be necessary to ensure that LUCs remain effective at preventing human exposure to contaminated media.

1.5.3 Study Boundaries

The groundwater sampling locations specified in the RCRA GWMP are shown on Figure 1-3. Groundwater potentially contaminated from site operations is the population of interest. Figure 1-3 also

shows the groundwater LUC boundaries. The LUC boundaries may be altered, with IDEM approval, based on the LTM results.

The intent is to conduct monitoring in accordance with the RCRA GWMP. This will satisfy the LTM requirements for the SWMU 7 corrective measures. Previous investigations and RCRA monitoring at SWMU 7 have indicated that the concentrations of groundwater chemicals of potential concern (COPCs) are decreasing as a result of natural attenuation processes.

If detected concentrations of COCs decrease to less than groundwater protection standards, they may be eliminated from the LTM program, with IDEM approval, in accordance with the RCRA GWMP. The optimization will be consistent with the current Navy groundwater monitoring optimization guidance.

1.5.4 Decision Rules

Based on the above characterizations, decision rules were developed to govern the decision making for this project. Evaluation of these rules depends heavily on qualitative considerations because there are many interacting variables involved in some of the decisions. In addition, there is significant overlap between the monitoring program to comply with RCRA permit requirements for SWMU 7 and the LTM for SWMU 7 corrective measures.

Modifications to the monitoring program will be in accordance with the RCRA GWMP and the RCRA corrective action permit for SWMU 7. Monitoring network optimization will be conducted in accordance with the most current version of the "Guide to Optimal Groundwater Monitoring" (DON, 2008). This includes, but is not limited to, selection of, or changes in monitoring locations, monitoring frequency, and analytical parameters. Throughout the monitoring period, the following decision rules will be used to determine when to discontinue Corrective Action monitoring:

Decision Rule 1

If MCSs have been attained for a particular monitoring round for all COCs in groundwater, and COC concentrations do not pose a threat of increasing to values greater than MCSs, then recommend discontinuation of Corrective Action monitoring; otherwise recommend continued monitoring.

Decision Rule 2

If land use is anticipated to change in a manner that will cause increased potential for exposure of humans or the environment to groundwater within the SMWU 7 groundwater LUC boundary, re-evaluate

the SMWU 7 Corrective Action to ensure that it is protective of human health and the environment. Further detail is provided in Section 6.0.

Decision Rule 3

If LUCs are determined to be ineffective at preventing human exposure to contaminated groundwater, improve the effectiveness of the LUCs by adding more LUCs or changing existing LUCs. If changes in LUCs will not prevent human exposure, alter the corrective action to be more protective of human health and the environment. Further detail is provided in Section 6.0.

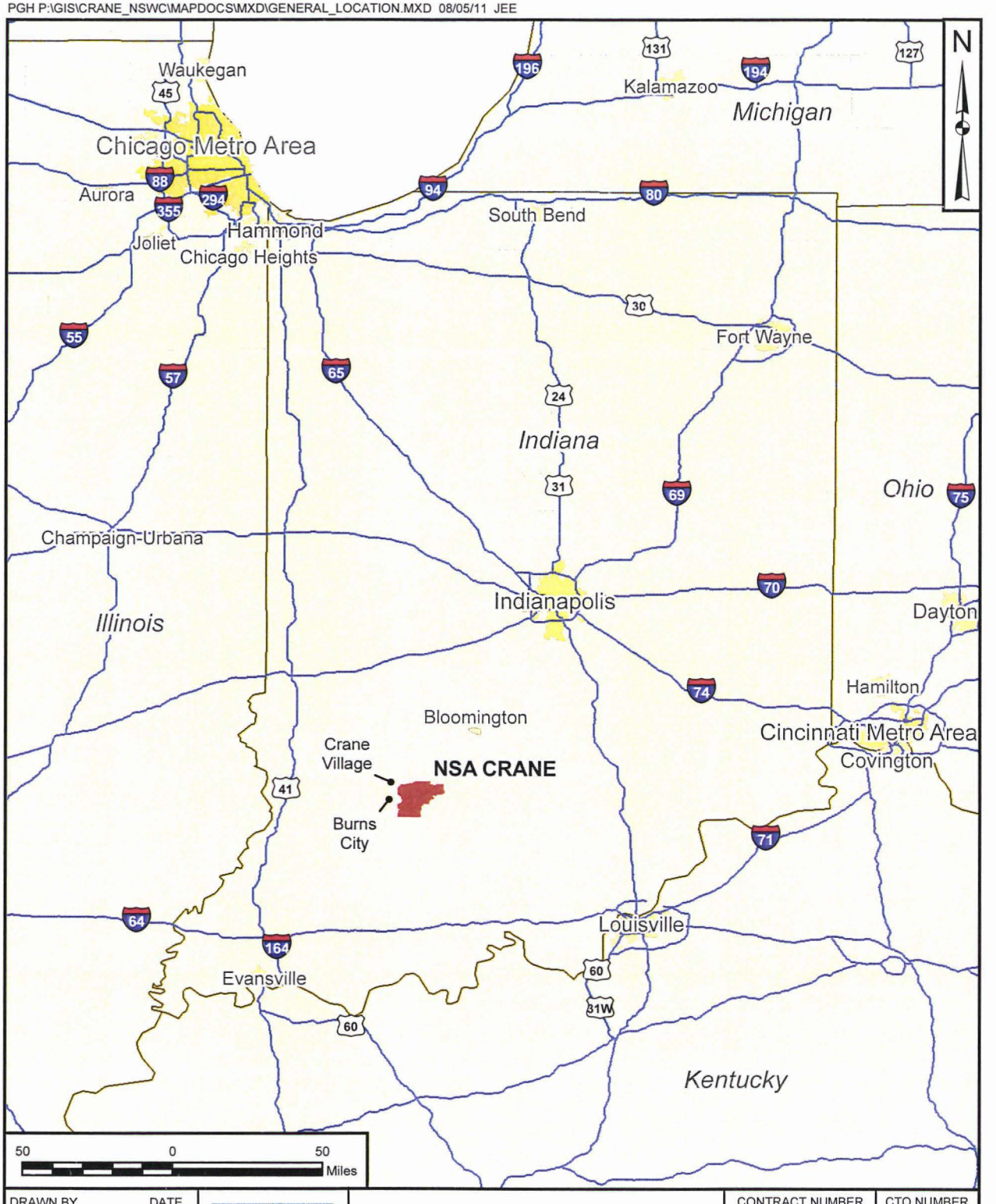
1.5.5 Establish Decision Error Tolerances

The decision error tolerances are described in the RCRA GWMP. Adherence to this CMIP/QAPP will ensure that tolerances are satisfied.

1.5.6 Optimize the Design

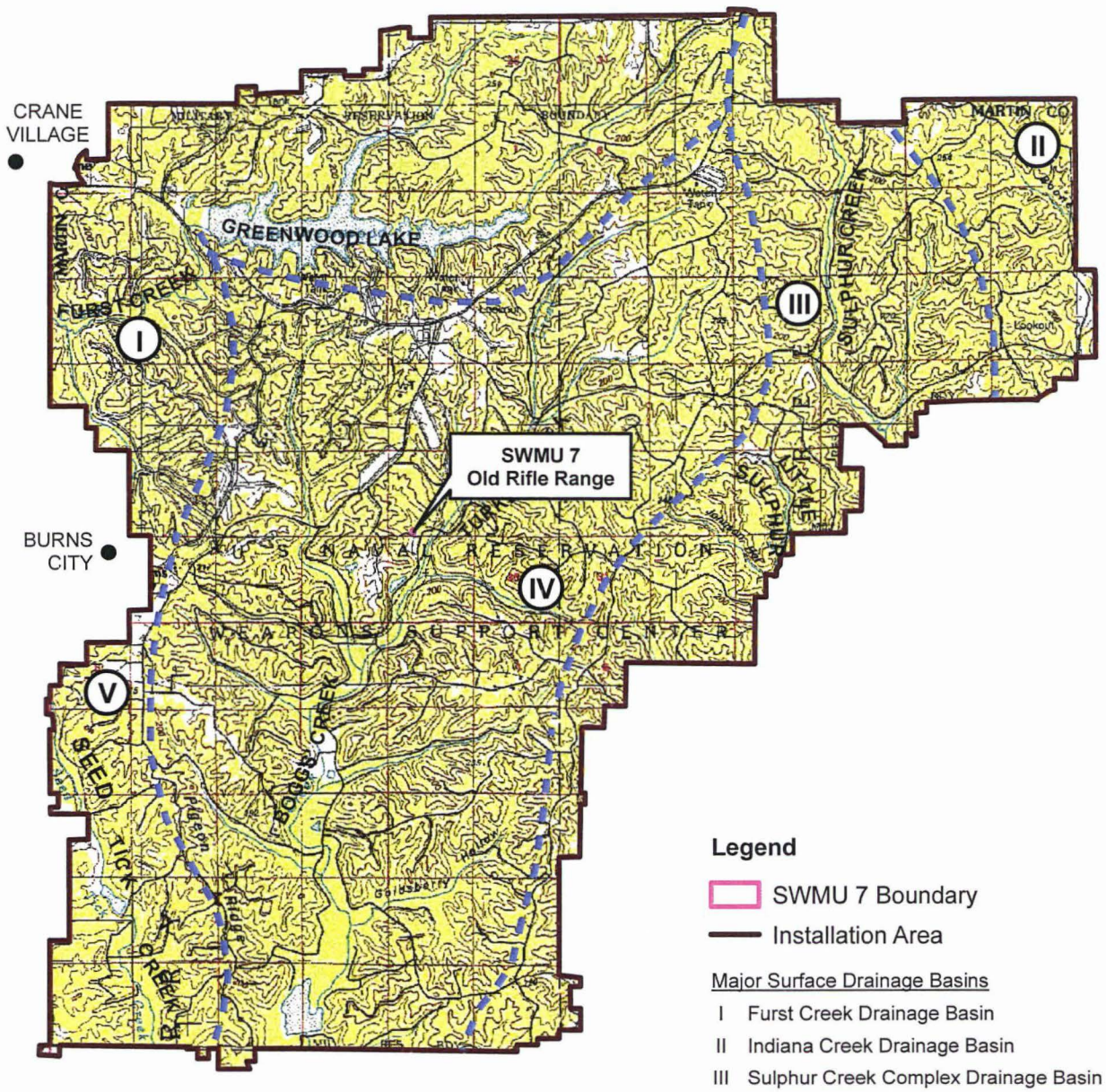
The RCRA GWMP for SWMU 7 was recently updated to address the LTM portion of the corrective measures as well as RCRA permit requirements. Any changes in the sampling plan will be in accordance with the RCRA GWMP and RCRA permit for SWMU 7.

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\GENERAL_LOCATION.MXD 08/05/11 JEE



DRAWN BY J. ENGLISH	DATE 03/10/11	NAVFAC	GENERAL LOCATION MAP SWMU 7 CMIP NSA CRANE CRANE, INDIANA	CONTRACT NUMBER ___	CTO NUMBER F272
CHECKED BY S. VASKO	DATE 08/05/11			APPROVED BY ___	DATE ___
REVISED BY	DATE			APPROVED BY ___	DATE ___
SCALE AS NOTED				FIGURE NO. FIGURE 1-1	REV 0

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU07_DRAINAGE.MXD 08/05/11 JEE



Legend

- SWMU 7 Boundary
- Installation Area

Major Surface Drainage Basins

- I Furst Creek Drainage Basin
- II Indiana Creek Drainage Basin
- III Sulphur Creek Complex Drainage Basin
- IV Boggs & Turkey Creek Drainage Basin
- V Seed Tick Creek Drainage Basin

Source: "Initial Assessment of Study of Naval Weapons Support Center Crane, Indiana." Naval Energy and Environmental Support Activity, May 1983.

2 0 2 Miles

DRAWN BY	DATE
J. ENGLISH	08/05/11
CHECKED BY	DATE
S. VASKO	08/05/11
REVISED BY	DATE
SCALE AS NOTED	

NAVFAC

SWMU 7 LOCATION
SWMU 7 CMIP
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
—	F272
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
FIGURE NO. FIGURE 1-2	REV 0

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Land Use Control Coordinates		
Point	Easting	Northing
1	3025915.273	1306055.597
2	3025928.73	1306052.856
3	3026460.416	1305767.404
4	3026682.639	1305715.321
5	3026765.973	1305684.072
6	3027165.841	1305464.842
7	3026934.484	1304889.271
8	3026849.841	1304482.985
9	3026703.127	1303817.128
10	3025631.149	1304332.096
11	3025814.293	1305628.272
12	3025870.135	1305892.401

INSET 1
Area of detail: SWMU 7 LUC Boundary & SWMU 6/Former SWMU 7 Boundaries.

These boundaries are coincident over the region west of Highway 8. SWMU 7 LUC boundary line width is exaggerated to show area of overlap.

1 in = 0.04 miles

N

Old Pistol Ranges 1 & 2

SWMU 7
Open Burning Unit

SWMU 6
Demolition Area

Old Rifle Range

See Inset 1

06C16
06C16P2
06C16P3
06C15P2
06C15
06-17
06C14P2
06C14
06-21
06-22
06-20
06-23
06C17
06C09
06-18
06C13
06C13P2
06-19
HWY-8
06C19P2
06C19
06C18P2
06C18
06-14A
Turkey Creek Valley
06C12
06C12P2
2122
06C10P2
06C10
06C11P2
06C11
Turkey Creek
3368
3321
3325

1 2 3 4 5 6 7 8 9 10 11 12

300 0 300 Feet

Legend

- Land Use Control Points
- RCRA GWMP Alluvial / Big Clifty Aquifer Well
- RCRA GWMP Big Clifty / Beech Creek Aquifer Well
- Existing Monitoring Well
- RCRA GWMP Upper Big Clifty Aquifer Well
- SWMU 7 Boundary
- SWMU 6 and former SWMU 7 Boundaries
- SWMU 7 LUC Boundary
- Building
- Road
- Railroad
- Tree Line
- Topographic Controur (10-ft Interval)
- Surface Water

DRAWN BY / DATE	J. ENGLISH 08/05/11
CHECKED BY / DATE	S. VASKO 08/11/11
REVISED BY / DATE	C. TULLEY 03/23/12
SCALE	AS NOTED

NAVFAC

LAND USE CONTROL BOUNDARY AND MONITORING WELL LOCATIONS SWMU 7 - OLD RIFLE RANGE NSA CRANE CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
—	F272
APPROVED BY / DATE	— / —
APPROVED BY / DATE	— / —
FIGURE NO.	REV
FIGURE 1-3	0

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section presents the project management and organization for Corrective Measures Implementation (CMI) at SWMU 7 at NSA Crane. Table 2-1 lists key project personnel by function. Contractors and personnel may change over time. At a minimum, such changes will be documented in a field task modification request (FTMR) or equivalent, although preparing addenda or revisions to the CMIP may also be appropriate.

The field work outlined in this plan will be conducted under the health and safety rules set forth in a Health and Safety Plan (HASP) written specifically by the Prime Contractor.

2.1 MANAGEMENT

The Prime Contractor, on behalf of the Navy, will be responsible for overall management, implementation of contract field activities, and preparation of reports, as designated in this CMIP/QAPP and the NSA Crane RCRA Hazardous Waste Management Permit number IN5170023498. Personnel from the Navy will be actively involved and will coordinate with Prime Contractor personnel in a number of areas. The authorities and organizational relationships of key personnel are depicted on Figure 2-1. Responsibilities for program management, project management, field operations, and laboratory operations are discussed in the following sections. It is intended that the individuals named will perform the designated responsibilities to the extent that the specific person is available to perform the stated activities.

2.1.1 US Environmental Protection Agency Region 5

The United States Environmental Protection Agency (US EPA) Region 5 Corrective Action Project Manager, or other US EPA Region 5 -designated staff member(s), will oversee the CMI. They represent US EPA Region 5 interests and will provide input from this perspective.

2.1.2 Indiana Department of Environmental Protection

The IDEM Corrective Action Project Manager, or other IDEM-designated staff member(s), will oversee and manage the CMI.

2.1.3 Navy Project Managers

The Navy Remedial Project Manager (RPM), Howard Hickey, will act as representative for the Navy, providing management, technical direction, and oversight for all NSA Crane project activities performed by contractors and their subcontractors. In matters such as facilitation of site access and oversight, the Navy RPM will be assisted by the NSA Crane Environmental Site Manager (ESM), Tom Brent. Additional responsibilities of the RPM are as follows:

- Define project objectives and develop a detailed schedule.
- Establish project policy and procedures to address the specific needs of the project as a whole and the objectives of each task.
- Acquire and apply technical resources (e.g., contractors) as needed to ensure performance within budget and schedule constraints.
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness.
- Review and analyze overall task performance with respect to planned requirements and authorizations.
- Approve all reports (deliverables) before their submittal to IDEM.
- Ultimately be responsible for the preparation and quality of interim and final reports.
- Represent the project team at meetings and public hearings.
- With respect to LUCs, ensure that the controls are implemented in accordance with Section 6.0 of this CMIP/QAPP.

2.1.4 Prime Contractor Management

2.1.4.1 Project Manager

The Prime Contractor Project Manager (PM) has the overall responsibility for ensuring that the project meets regulatory agency objectives and Navy and Prime Contractor quality standards. The PM will be

responsible for distribution of the CMIP/QAPP and for development of any additional documents required to implement the plan. This may include, for example, updated personnel contact lists. The PM will take direction from the Navy RPM. The PM will ensure that all parties implementing the CMI will obtain copies of this CMIP/QAPP and any additional documents required to implement the CMIP/QAPP. The PM will report to the Navy RPM and be responsible for technical quality control (QC) and project oversight. Additional responsibilities of the PM are as follows:

- Ensuring timely resolution of project-related technical, quality, safety, and waste management issues.
- Functioning as the primary interface with the Navy RPM and NSA Crane ESM, field and office personnel, and subcontractor points of contact.
- Ensuring that health and safety issues related to this project are communicated effectively to all personnel.
- Monitoring and evaluating subcontractor laboratory performance.
- Coordinating and overseeing work performed by field and office technical staff, including data validation, statistical evaluations, and report preparation.
- Coordinating and overseeing maintenance of all project records.
- Coordinating and overseeing review of project deliverables.
- Preparing and issuing final deliverables to the Navy.
- Approving the implementation of corrective actions.

2.1.4.2 Project Geologist

The services of this individual will be required only if new wells are installed or other intrusive activities occur that require the expertise of a geologist. This individual will have the responsibility of ensuring that field activities related to geology are implemented in a safe and technically sound manner. The Project Geologist, or designee, will perform lithologic logging and soil classification of all borings drilled for well installation.

2.1.4.3 Project Chemist

The Prime Contractor Project Chemist has the overall responsibility for ensuring the project meets objectives from the standpoint of laboratory performance. The Project Chemist will be responsible for the technical preparation of laboratory statements of work (SOWs) and work releases. The subcontractor laboratory PM will report to the Project Chemist. The Project Chemist will report to the Prime Contractor PM. Additional responsibilities of the Project Chemist are as follows:

- Providing technical advice to the project team on matters of project chemistry.
- Monitoring and evaluating subcontractor laboratory performance.
- Ensuring timely resolution of laboratory-related technical, quality, or other issues affecting project goals.
- Functioning as the primary interface with the subcontracted laboratory and the Prime Contractor PM.
- Coordinating and overseeing work performed by the subcontracted laboratory.
- Coordinating and overseeing review of laboratory deliverables.
- Recommending appropriate laboratory corrective actions.

2.1.4.4 Health and Safety Manager

The Prime Contractor Health and Safety Manager (HSM) will be responsible for the following:

- Providing technical advice to the Prime Contractor PM on matters of health and safety.
- Overseeing the development and review of the HASP specifically designed for LTM.
- Implementing the HASP.
- Assigning the Site Safety Officer (SSO) and supervising his/her performance.
- Conducting health and safety audits.
- Preparing health and safety reports for management.

2.2 QUALITY ASSURANCE

This section identifies the quality assurance (QA) responsibilities of IDEM, the Prime Contractor, and the analytical laboratory.

2.2.1 IDEM Quality Assurance Coordinator

The IDEM Quality Assurance Coordinator (QAC) will be responsible for reviewing and approving the CMIP/QAPP and provides overall QA support and review.

2.2.2 Prime Contractor Quality Assurance Responsibilities

2.2.2.1 Quality Assurance Manager

The Prime Contractor QA Manager (QAM) will be responsible for overall QA for the project and reports directly to the Prime Contractor PM. The QAM acts on behalf of the Navy for project QA and will be responsible for the following:

- Developing, maintaining, and monitoring QA policies and procedures.
- Providing training to Prime Contractor staff in QA/QC policies and procedures.
- Conducting systems and performance audits to monitor compliance with environmental regulations, contractual requirements, CMIP/QAPP requirements, and corporate policies and procedures.
- Auditing project records.
- Monitoring subcontractor QC and records.
- Assisting in the development of corrective action plans.
- Ensuring correction of nonconformances reported in internal or external audits.
- Overseeing implementation of CMI documents.
- Overseeing and reviewing the development and revision of CMI documents.
- Overseeing the responsibilities of the Prime Contractor Site QA/QC Advisor (see Section 2.3.2).

- Preparing QA reports for Prime Contractor management.

- Ensuring that chemistry and other quality concerns are resolved in a manner that preserves data integrity.

2.2.2.2 Data Validation Manager

The Prime Contractor Data Validation Manager will be responsible for all data validation and data review activities. The Data Validation Manager will be responsible for ensuring that analytical laboratory data are reviewed and validated in accordance with analytical project objectives outlined in this CMIP/QAPP. The following items summarize principal areas of responsibility for the Data Validation Manager:

- Reviewing compliance of the analytical laboratory with methods and analytical requirements, as outlined in this CMIP/QAPP and laboratory specifications.

- Ensuring completeness of analytical laboratory deliverables in both electronic and hard copy formats.

- Ensuring data validation qualification is conducted in accordance with IDEM and/or US EPA regional requirements.

- Performing a QA review of all data validation reports and validated analytical data.

- Reviewing and approving all data validation qualifications entered into the electronic database.

- Conducting verification and accounting for all samples, analyte fractions, and analytical parameters.

- Approving the final qualified analytical database.

2.2.3 Laboratory Responsibilities

The subcontracted laboratory will be responsible for analyzing all samples in accordance with the analytical methods and additional requirements specified in this document. The analytical laboratory will also be responsible for properly disposing of unused sample aliquots in accordance with applicable regulations.

The laboratory PM will report directly to the Prime Contractor Project Chemist and will be responsible for the following:

- Ensuring that method and project-specific requirements are properly communicated and understood by laboratory personnel.
- Ensuring that all laboratory resources are available on an as-required basis.
- Monitoring analytical and project QA requirements.
- Reviewing analytical data packages for completeness, clarity, and compliance with project requirements.
- Informing the Prime Contractor PM or designee of project status on a weekly basis and of any sample receipt or analytical problems as they occur.
- Ensuring timeliness of deliverables as specified in contract documents.

2.3 FIELD INVESTIGATION

The Prime Contractor will be responsible for all field activities related to the CMI. The Prime Contractor field team will be organized according to the activities planned. Field team members will be selected based on the type and extent of effort required. All team members will be appropriately skilled and trained for the tasks assigned to them. The team will consist of a combination of the following personnel:

- Field Operations Leader (FOL)
- Site QA/QC Advisor
- SSO
- Field technical staff

More than one activity may be performed by the same person.

2.3.1 Field Operations Leader

The FOL will be responsible for coordinating all on-site personnel and providing technical assistance when required. The FOL, or designee, will coordinate and lead all sampling activities and ensure the

availability and maintenance of sampling materials and equipment. The FOL will be responsible for completing all sampling, field, and chain of custody documentation, will assume custody of all samples, and will ensure proper handling and shipping of samples. The FOL will report directly to the Prime Contractor PM. Specific FOL requirements include the following:

- Ensuring that all health and safety requirements are implemented.
- Functioning as the communications link between field staff members, SSO, NSA Crane ESM, and PM.
- Overseeing the mobilization and demobilization of all field equipment and subcontractors.
- Coordinating and managing field technical staff.
- Adhering to work schedules provided by the PM.
- Ensuring proper maintenance of the site logbook, the field logbook, and field recordkeeping.
- Initiating FTMRs when necessary.
- Identifying and resolving problems in the field, resolving difficulties via consultation with the NSA Crane ESM, implementing and documenting corrective action procedures, and providing communication between the field team and project management.

2.3.2 Site Quality Assurance/Quality Control Advisor

The FOL, or designee, will act as the site QA/QC Advisor and will be responsible for ensuring adherence to QA/QC requirements as defined in this CMIP/QAPP. Strict adherence to these procedures is essential for collection of acceptable and representative data. The following is a summary of the Site QA/QC Advisor responsibilities:

- Ensuring that field QC samples are collected at the proper frequency.
- Ensuring that additional volumes of sample are supplied to the analytical laboratory with the proper frequency to accommodate laboratory QA/QC analyses.

- Ensuring that measuring and testing equipment are calibrated, used, and maintained in accordance with applicable procedures and technical standards.

- Acting as the liaison between site personnel, laboratory personnel, and the QAM.

- Managing bottleware shipments and overseeing field preservation.

2.3.3 Site Safety Officer

The duties of the SSO will be detailed in the HASP that is specific to the Prime Contractor. The SSO has stop-work authority, which can be executed upon the identification of an imminent safety hazard.

2.3.4 Field Technical Staff

All field team members will be experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.
Field team members are responsible for complying with field-related requirements as presented in this CMIP/QAPP and the HASP.

2.4 SPECIAL TRAINING REQUIREMENTS AND CERTIFICATIONS

Each site worker performing sampling of hazardous materials will be required to have completed appropriate Hazardous Waste Operations and Emergency Response (HAZWOPER) training specified in Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations 1910.120(e). Safety requirements are addressed in greater detail in the site-specific HASP.

The analytical laboratory must have successfully completed the laboratory evaluation process required as part of the Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP).

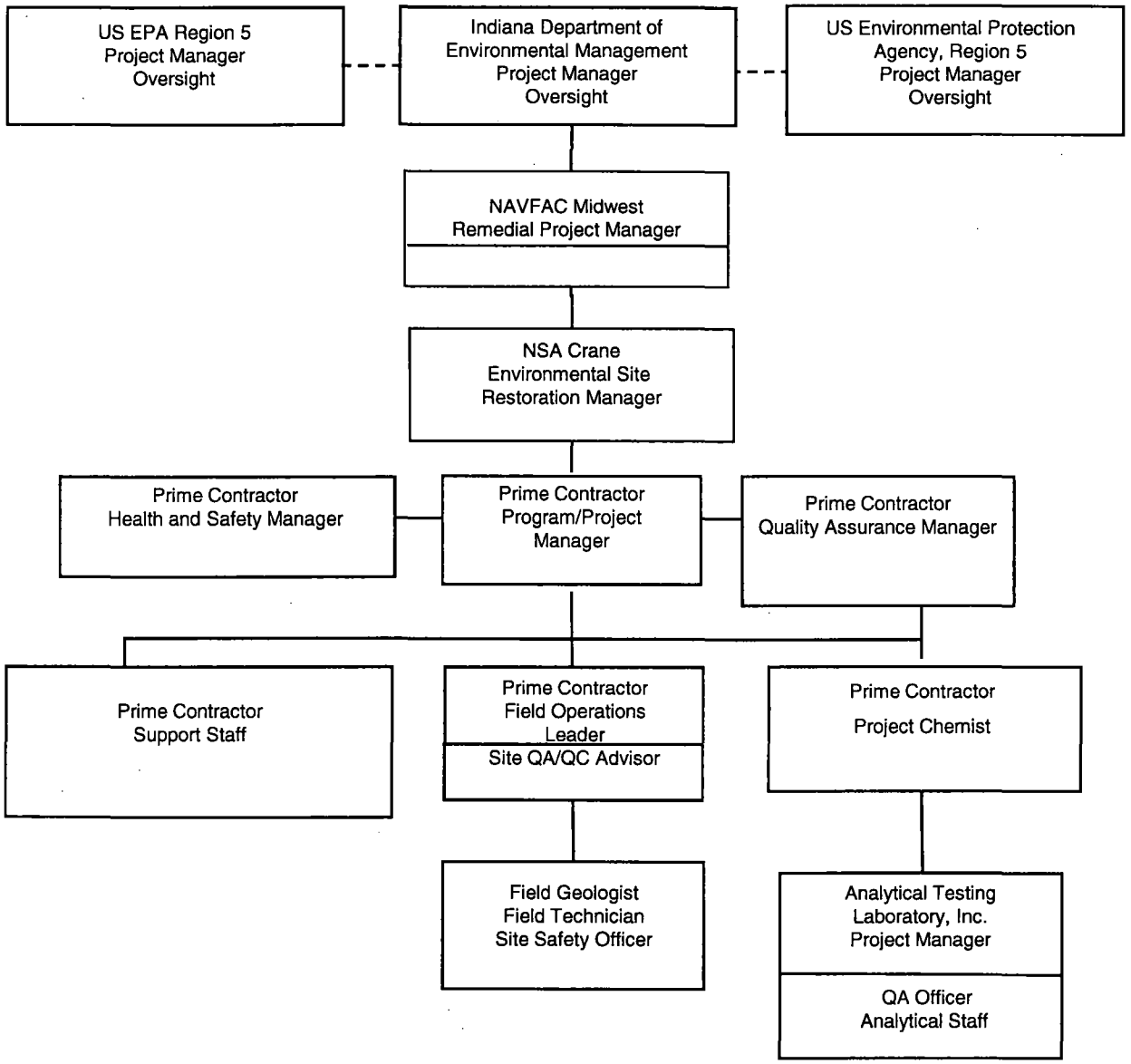
TABLE 2-1

KEY PROJECT PERSONNEL NAMES, PHONE NUMBERS, AND ADDRESSES
SWMU 7 – OLD RIFLE RANGE
NSA CRANE, CRANE, INDIANA

PERSON/TITLE/ ORGANIZATION	ADDRESS	TELEPHONE
Doug Griffin Office of Land Quality Hazardous Waste Permits IDEM	OLQ Permits Branch Mail Code 64-45 IGCN 1101 100 N. Senate Avenue Indianapolis, IN 46204	Tel: (317) 233-2710
Craig Pender Quality Assurance Office of Land Quality IDEM	OLQ Permits Branch 100 N. Senate Avenue Indianapolis, IN 46204	Tel: (313) 234-0941
Peter Ramanauskas U.S. EPA Region 5	U.S. EPA Region 5 77 West Jackson Blvd. Chicago, Illinois 60604	Tel: (312) 886-7890 FAX: (312) 353-4788
TBD Quality Assurance U.S. EPA Region 5	U.S. EPA Region 5 77 West Jackson Blvd. Chicago, Illinois 60604	Tel: (312) 886-6186
Howard Hickey Remedial Project Manager U.S. Navy NAVFAC Midwest	Department of Navy NAVFAC Midwest 201 Decatur Avenue Building 1A, Floor B, Room 18 Great Lakes, Illinois 60088	Tel: (847) 688-2600
Tom Brent Environmental Restoration Site Manager NAVFAC Crane	NSA Crane Code PRC2 Building 3245 300 Highway 361 Crane, Indiana 47522-5009	Tel: (812) 854-6160 FAX: (812) 854-4177
TBD (prime contractor) Project Manager TBD	TBD	Tel: TBD FAX: (TBD
TBD (laboratory) Project Manager TBD	TBD	Tel: TBD FAX: (TBD
TBD (laboratory) QA Manager TBD	TBD	Tel: TBD FAX: (TBD

FIGURE 2-1

PROJECT ORGANIZATION CHART
SWMU 7 – OLD RIFLE RANGE CORRECTIVE MEASURES IMPLEMENTATION PLAN/QUALITY ASSURANCE PROJECT PLAN
NAVAL SUPPORT ACTIVITY CRANE
CRANE, INDIANA



3.0 LONG-TERM MONITORING FIELD OPERATIONS

Field operations for the LTM program for SWMU 7 will be in accordance with the RCRA GWMP that is part of the RCRA operating permit for SWMU 7 (Navy, 2007). The RCRA GWMP identifies the corrective action wells and the analytes to be monitored.

4.0 FIXED-BASE LABORATORY REQUIREMENTS FOR LONG-TERM MONITORING

Fixed-base laboratory requirements for the LTM program for SWMU 7 will be in accordance with the RCRA GWMP that is part of the RCRA operating permit for SWMU 7 (Navy, 2007).

5.0 LONG-TERM MONITORING DATA EVALUATIONS

Data evaluation for the LTM program for SWMU 7 will be in accordance with the RCRA GWMP that is part of the RCRA operating permit for SWMU 7 (Navy, 2007).

6.0 LAND USE CONTROL IMPLEMENTATION PLAN

6.1 PURPOSE

The purpose of this LUCIP for SWMU 7 is to provide information on how the LUC portion of the remedy selected in the RCRA SB for SWMU 7 will be implemented and maintained. The SB stipulates that LUCs will be instituted to prevent access to and/or use of contaminated groundwater, prohibit future residential use of groundwater within the SWMU 7 Groundwater LUC Boundary, and maintain the integrity of any current or future remedial system or monitoring system. The LUC portion of this CMIP/QAPP was prepared as a result of the selection of LUCs as a component of the remedy in accordance with the SB for SWMU 7 and RCRA Hazardous Waste Management Permit IN5170023498 for NSA Crane. In addition, LTM will be conducted as described in other sections of this CMIP/QAPP and the RCRA GWMP.

The inspections and reporting requirements described herein will be effective immediately upon approval of this CMIP/QAPP by IDEM. Once put into effect, the requirements set forth in this document will remain applicable to SWMU 7 during Navy ownership, as well as subsequent ownership, or until SWMU 7 is deemed suitable for unrestricted use.

6.2 LAND USE CONTROL PERFORMANCE OBJECTIVES

The performance objectives for the Groundwater LUC remedy for SWMU 7 are as follows:

- Prevent access to and/or use of contaminated groundwater underlying the SWMU 7 Groundwater LUC Boundary (see Figure 1-3) until MCSs (cleanup goals) are achieved throughout this groundwater.

- Maintain the integrity of any current or future remedial system or monitoring system (e.g., monitoring wells).

- Prohibit the development and use of the property within the Groundwater LUC boundary for residential or other unrestricted use.

6.3 BACKGROUND

NSA Crane is currently surrounded by a chain-link fence and is accessible only through vehicular traffic gates. People allowed access to NSA Crane and SWMU 7 are base workers, authorized base visitors,

temporary residents, and permitted game hunters. Hunting permits are obtained from NSA Crane and are granted only to licensed hunters.

SWMU 7 is an active facility but contaminated groundwater underlying SWMU 7 is not used. Exposure to SWMU 7 groundwater from this aquifer can only occur if a visitor drills into the soil overburden or bedrock to extract groundwater or extracts groundwater from an existing well head.

Construction activities on the base that could result in disturbance of remedial or monitoring systems (e.g., wells) and/or any changes to land use are controlled by NSA Crane Environmental Management System Instruction 5090.13, which governs major construction activities base wide. Before any major construction activities are authorized, this instruction is reviewed to determine whether any restrictions apply.

6.4 REMEDY IMPLEMENTATION ACTIONS

Upon approval of this CMIP/QAPP, Instruction 5090.13 will be modified to include instructions to review LUCs that are managed in the NSA Crane geographic information system (GIS). The objective of the review will be to ensure that groundwater LUC objectives will be achieved at all times.

The Navy will be responsible for implementing, maintaining, reporting on, and enforcing LUCs at NSA Crane. The Director of the NSA Crane Environmental Protection Department (EPD) is responsible for undertaking the LUC implementation actions described in the following sections to ensure that the aforementioned LUC performance objectives for SWMU 7 are met and maintained.

6.4.1 LUCIP Distribution

Within 30 days of receiving IDEM approval of this CMIP/QAPP, the NSA Crane EPD will undertake the following specific actions:

a. Provide a copy of the Groundwater LUC requirements to the NSA Crane Planning Department with instructions to record the LUCs in the NSA Crane GIS and the geographical data management (GDM) systems.

b. Not issue any digging or drilling permits, other than to the Navy, for the installation of any wells for the extraction of groundwater from within the SWMU 7 groundwater LUC boundary.

c. Ensure that the land within the SWMU 7 groundwater LUC boundary not be zoned for residential use without prior written approval from the Commander of NSA Crane and IDEM and identify that the area has restrictions regarding access, installation of groundwater wells, and/or any other uses of groundwater.

d. Place this CMIP/QAPP in the NSA Crane Information Repository currently located at Building 3245.

The following are the points of contact for the Navy, IDEM and EPA Region 5:

Navy Point of Contact
Commander, NSA Crane
Code A, Building 1
300 Highway 361
Crane, Indiana 47522

Indiana Department of Environmental Management
Office of Land Quality Permits Branch
Mail Code 64-45 IGCN 1101
100 North Senate Avenue
Indianapolis, Indiana 42606-6015

US EPA Region 5 Point of Contact
Project Manager
United States Environmental Protection Agency –
Region 5
77 West Jackson Boulevard (DW-8J)
Chicago, IL 60604

6.4.2 Site Inspections

Upon approval of this CMIP/QAPP by the regulatory agency, the Navy will undertake annual on-site monitoring for compliance with this LUCIP. Furthermore, the Navy will conduct an annual field inspection to determine whether the current land use remains protective and consistent with all LUC objectives. These inspections may be combined with groundwater monitoring events.

6.4.3 Land Use Control Compliance Reporting

The Commander of NSA Crane will submit an annual LUC Compliance Certificate for SWMU 7 equivalent to the form attached hereto as Figure 6-1. This Certificate will serve as verification of LUC maintenance status. The initial submittal will verify that the requirements of Sections 6.2 and 6.4.1 were met. Should any deficiencies be found during the annual reporting period, the Navy will provide to IDEM, along with

the Certificate, a separate written explanation indicating the specific deficiencies found and what efforts or measures have been or will be taken to correct them.

6.4.4 Land Use Control Enforcement

Should the LUC remedy reflected in this CMIP/QAPP fail, the Navy will coordinate with IDEM, as described in Section 6.4.3, to ensure that appropriate actions are taken to re-establish its protectiveness.

6.4.5 Modification/Termination of Land Use Controls

When the Navy determines, with regulatory agency concurrence, that one or more of the LUCs at SWMU 7 may be modified or is no longer needed for protection of human health, the Navy shall revise the NSA Crane GIS accordingly and will also advise, in a timely manner, the entities identified in Section 6.4.1 of that action.

6.4.6 Notification of Planned Major Land Use Changes

At least 60 days prior to implementation of any major change in land usage within the SWMU 7 Groundwater LUC boundary that may result in exposure to contaminated groundwater, the Navy shall provide notification to IDEM for the purpose of obtaining concurrence with the NSA Crane determination as to whether or not such a change will require re-evaluation of the selected site controls or specific measures contained in this LUCIP.

6.4.7 Notification of Planned Property Conveyances

At least 60 days prior to conveyance of either title to, or some lesser form of property interest in, the property within the SWMU 7 Groundwater LUC boundary to any other agency, private person, or entity, the Navy will provide notice to IDEM of such intended conveyance. At that time, and pursuant to the LUC Assurance Plan requirements of the permit, it may be appropriate to develop a legal definition of the parcel of land (i.e., a certified land survey plat) with the boundary of the parcel surveyed by an Indiana state licensed surveyor, depending on requirements for land transfer or other use. In lieu of a new survey, the boundaries shown on Figure 1-3 shall apply.

FIGURE 6-1

NAVY LAND USE CONTROL (LUC) COMPLIANCE CERTIFICATE

SWMU 7 – OLD RIFLE RANGE

Naval Surface Warfare Center Crane
Hazardous Waste Management Permit IN5170023498

This evaluation is being conducted to comply with the LUC recommendations made in the Statement of Basis for SWMU 7 dated March 2012. LUC requirements are delineated in Section 6.0 of the Corrective Measures Implementation Plan, the area under control (Land Use Control Boundary) is shown on Figure 1-3 of that document. This evaluation covers the period from 1 January ____ ____ through 31 December ____ _____. This completed form shall be submitted by 1 March of the year following the reporting period.

Certification Checklist

	In Compliance	Non-Compliant	See Comment
1) The requirements of LUCIP Sections 6.4.1.a through 6.4.1.d have been met.	☐	☐	☐
2) Parcel not being used for residential purposes.	☐	☐	☐
3) No groundwater being used for any purpose.	☐	☐	☐
4) No tampering or damage to any Navy wells, monitoring system(s), or remediation system(s).	☐	☐	☐

Comments: *(Add explanatory text as needed.):*_____

_____

_____

_____

_____

I, the undersigned, hereby certify that I am an authorized representative of the Department of the Navy and that the above-described land use controls have been complied with for the period noted. Alternately, any known deficiencies and completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiencies.

_____ _____

Commander, NSA Crane Date

Mail completed form(s) to IDEM (see Table 2-1).

7.0 LONG-TERM MONITORING REPORTS

LTM reports will be prepared in accordance with the RCRA GWMP that is part of the RCRA operating permit for SWMU 7 (Navy, 2007).

8.0 SEVEN-YEAR REVIEWS

Seven-year reviews will be conducted at SWMU 7 and documented as described below.

8.1 BACKGROUND

Seven-year reviews are conducted at sites where corrective action results in hazardous substances, pollutants, or contaminants remaining on site. Corrective action at SWMU 7 does not immediately remove all contaminants from the site; therefore, residual contaminants will remain on site until natural attenuation has successfully completed, or until an active corrective measure is implemented.

The 7-year review report will be due within 6 months of the end of every seventh year of monitoring.

8.2 PURPOSE

Seven-year reviews are conducted to evaluate whether the remedies selected in the SB maintain protection of human health and the environment.

8.3 EXECUTION

The 7-year review process will consist of the following:

- Review of background documents concerning SWMU 7, including LTM reports and changes to the RCRA permit affecting corrective measures.
- Identification and review of new regulatory standards as may have been promulgated since the signing of the SB or since the previous 7-year review.
- LUC compliance review.
- Collection of cost information related to past and projected monitoring activities.
- Preparation of a 7-year review report. including conclusions and recommendations for future actions. as may be required.

8.4 REPORTING

A report will be prepared at the end of each 7-year review period and will include the following elements:

- An introduction including a summary of site characteristics.
- A brief discussion of corrective action goals and goal attainment.
- A description of monitoring and maintenance activities at the site.
- A presentation of monitoring results, including an evaluation of changes in monitoring parameters.
- A summary of LUC compliance and noncompliance, if any.
- An evaluation of how well the selected remedy has protected human health and the environment, including a formal statement of protectiveness of human health and the environment, a determination of remaining risks, and an analysis of potential deterioration of the remedy.
- A presentation of cost incurred.
- A summary description of the site visit.
- Documentation of areas of noncompliance, as may apply.
- Recommendations for future response actions, as may be required.

The 7-year review reports will be submitted to IDEM.

The 7-year review report will follow an outline similar to that shown on Figure 8-1.

FIGURE 8-1

EXAMPLE SEVEN-YEAR REVIEW REPORT OUTLINE
SWMU 7 – OLD RIFLE RANGE CORRECTIVE MEASURES IMPLEMENTATION PLAN
NAVAL SUPPORT ACTIVITY CRANE
CRANE, INDIANA

Title Page

Table of Contents, including lists of tables, figures, and acronyms

Seven-Year Review Summary Form

Executive Summary

1.0 Introduction and Purpose of Document

2.0 Site Chronology/Investigation History

3.0 Background (includes site physical description)

4.0 Remedial Actions (summarize past remedial actions, enforcement actions, cost summaries, etc.)

5.0 Progress Since the Last Seven-Year Review

6.0 Description of Seven-Year Review Process

7.0 Technical Assessments (e.g., temporal/spatial trend analysis, evaluation of continued COC attenuation, etc.)

8.0 Issues Affecting Implementation of Current Remedy

9.0 Recommendations

10.0 Protectiveness Statement

11.0 Next Review (state when the next 7-year review will be conducted)

12.0 Certification of Report Accuracy

9.0 REFERENCES

B&RE (Brown and Root Environmental), 1997. Current Contamination Conditions Risk Assessment. SWMU #03/10 (Ammunition Burning Ground), SWMU #07/09 (Old Rifle Range), SWMU #06/09 (Demolition Range).

DON, 2008. Department of the Navy Guidance for Planning and Optimizing Monitoring Strategies, Prepared for: Naval Facilities Engineering Service Center Port Hueneme, California Prepared by: Battelle 505 King Ave. Columbus, Ohio 43201.

Navy, 2009. Resource Conservation and Recovery Act Groundwater Monitoring Plan, Permit IN5170023498, Naval Support Activity, Crane, Indiana. Revised June 2009.

SAIC, 2002a. Annual Groundwater Monitoring Reporting for Ammunition Burning Grounds, Old Rifle Range, and Demo Range, CY2000, Naval Surface Warfare Center, Crane Division, Crane, Indiana.

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Tetra Tech NUS, Inc., 2006. Resource Conservation and Recovery Act Corrective Measures Proposal Report for SWMU 7 – Old Rifle Range/Old Pistol Range. Naval Surface Warfare Center. Crane, Indiana.

Tetra Tech NUS, Inc., 2012. Statement of Basis for Corrective Action at Solid Waste Management unit 7 – Old Rifle Range, Naval Support Activity Crane, Crane, Indiana, IN5 170 023 498, Draft.

USEPA (United States Environmental Protection Agency), 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4. EPA/240/B-06/001, Office of Environmental Information, Washington, D.C.

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