Final

Facility-Wide Safety and Health Plan for Environmental Investigations

Revision 0

Ravenna Army Ammunition Plant
Ravenna, Ohio

Contract No. W912QR-08-D-0008
Delivery Order No. 0016

Prepared for:

US Army Corps of Engineers®

United States Army Corps of Engineers
Louisville District

Prepared by:

Science Applications International Corporation
8866 Commons Boulevard
Twinsburg, Ohio 44087

February 24, 2011

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
24-02-2011	Technical	February 2011

4. TITLE AND SUBTITLE

Final
Facility-Wide Safety and Health Plan
for Environmental Investigations, Revision 0
Ravenna Army Ammunition Plant
Ravenna, Ohio

5a. CONTRACT NUMBER
W912QR-08-D-0008

5b. GRANT NUMBER
NA

5c. PROGRAM ELEMENT NUMBER
NA

6. AUTHOR(S)
Miller, Heather

5d. PROJECT NUMBER
Delivery Order No. 0016

5e. TASK NUMBER
NA

5f. WORK UNIT NUMBER
NA

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Science Applications International Corporation (SAIC)
8866 Commons Blvd
Twinsburg, Ohio 44087

8. PERFORMING ORGANIZATION REPORT NUMBER
3827.20110224.003

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

USACE - Louisville District
U.S. Army Corps of Engineers
600 Martin Luther King Jr., Place
PO Box 59
Louisville, Kentucky 40202-0059

10. SPONSOR/MONITOR'S ACRONYM(S)
USACE

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
NA

12. DISTRIBUTION/AVAILABILITY STATEMENT
Reference distribution page.

13. SUPPLEMENTARY NOTES
None.

14. ABSTRACT

This Facility-Wide Safety and Health Plan (FWSHP) sets forth the minimum requirements for protecting personnel involved in environmental investigations at the Ravenna Army Ammunition Plant (RVAAP). This FWSHP serves as an upper-tier document addressing the hazards and controls expected to be common to the environmental investigations of all RVAAP areas of concern (AOCs) and the anticipated on-site tasks.

15. SUBJECT TERMS
Facility-wide Safety and Health Plan, hazards, hazard controls, hazard analysis, safety procedures

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Kathy Krantz
U	U	U	SAR	137	19b. TELEPHONE NUMBER *(Include area code)* 502.315.6355

Standard Form 298 (Rev. 8/98)
Prescribed by ANSI Std. Z39.18

PLACE HOLDER FOR:

Documentation of Ohio EPA Approval of Final Document

(Documentation to be provided once approval is issued.)

Final

Facility-Wide Safety and Health Plan for Environmental Investigations

Revision 0

Ravenna Army Ammunition Plant
Ravenna, Ohio

Contract No. W912QR-08-D-0008
Delivery Order No. 0016

Prepared for:
U.S. Army Corps of Engineers
600 Martin Luther King, Jr. Place
Louisville, Kentucky 40202

Prepared by:
Science Applications International Corporation
8866 Commons Boulevard
Twinsburg, Ohio 44087

February 24, 2011

CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Science Applications International Corporation (SAIC) has completed the Safety and Health Plan for the Revision of the Facility-Wide Environmental Documents at the Ravenna Army Ammunition Plant, Ravenna, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing USACE policy.

Jill Kovalchik

Jill Kovalchik
Study/Design Team Leader

02-22-11
Date

Stephen L Davis

Steve Davis, CIH
Independent Technical Review Team Leader

02-22-11
Date

Significant concerns and the explanation of the resolution are as follows:

Internal SAIC Independent Technical Review was conducted on the Preliminary Draft version of this document. Subsequent versions of this document (e.g., Draft and Final) incorporated changes based on the technical reviews of USACE, the Ohio Army National Guard, and the Ohio Environmental Protection Agency. Internal SAIC Independent Technical Review comments are recorded on a Document Review Record per SAIC quality assurance procedure QAAP 3.1. This Document Review Record is maintained in the project file. Changes to the report addressing the comments have been verified by the Study/Design Team Leader. As noted above, all concerns resulting from independent technical review of the project have been considered.

W. Kevin Jago

Kevin Jago, P.G.
Principal w/ A-E firm

02-22-11
Date

DOCUMENT DISTRIBUTION
for the

Final

Facility-Wide Safety and Health Plan
for Environmental Investigations
Revision 0

Ravenna Army Ammunition Plant
Ravenna, Ohio

Name/Organization	Number of Printed Copies	Number of Electronic Copies
J. Kimberly Harriz, NGB	0	1
Kevin Jago, SAIC	2	2
Kathy Krantz, USACE – Louisville District	1	1
Mark Krivansky, USAEC	0	1
Eileen Mohr, Ohio EPA - NEDO	2	2
Mark Patterson, RVAAP Facility Manager	2	2
Mark Nichter, USACE – Louisville District	1	1
Katie Tait, OHARNG	1	1
Jed Thomas, SAIC	1	1
REIMS	0	1
SAIC Project File W912QR-08-D-0008, DO0016	1	1
SAIC Central Records Facility	0	1

NGB = National Guard Bureau
OHARNG = Ohio Army National Guard
RVAAP = Ravenna Army Ammunition Plant
USACE = United States Army Corps of Engineers
USAEC = United States Army Environmental Command
REIMS = Ravenna Environmental Information Management System
SAIC = Science Applications International Corporation

TABLE OF CONTENTS

LIST OF TABLES iii
LIST OF FIGURES iii
LIST OF APPENDICES iii
ACRONYMS AND ABBREVIATIONS iv

1.0 INTRODUCTION 1-1

2.0 FACILITY DESCRIPTION AND CONTAMINATION CHARACTERIZATION 2-1
2.1 SITE DESCRIPTION 2-1
2.2 CONTAMINANTS 2-2

3.0 HAZARD/RISK ANALYSIS 3-1
3.1 TASK-SPECIFIC ACTIVITY HAZARD ANALYSIS 3-2
3.2 POTENTIAL EXPOSURES 3-3

4.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES 4-1
4.1 CONTRACTOR PROGRAM MANAGER 4-1
4.2 CONTRACTOR CERTIFIED INDUSTRIAL HYGIENIST 4-1
4.3 CONTRACTOR PROJECT MANAGER 4-2
4.4 CONTRACTOR FIELD OPERATIONS MANAGER 4-2
4.5 CONTRACTOR SITE SAFETY AND HEALTH OFFICER 4-3

5.0 TRAINING 5-1
5.1 OFF-SITE TRAINING 5-1
5.2 SITE-SPECIFIC TRAINING 5-2
5.3 DOCUMENTATION 5-3

6.0 PERSONAL PROTECTIVE EQUIPMENT 6-1
6.1 PERSONAL PROTECTIVE EQUIPMENT PROGRAM 6-1
6.2 TYPES OF EQUIPMENT 6-2
6.3 CLEANING, STORAGE, AND PROGRAM VERIFICATION 6-3

7.0 MEDICAL SURVEILLANCE 7-1
7.1 FREQUENCY OF EXAM 7-1
7.2 MEDICAL EXAM CONTENT 7-1

8.0 EXPOSURE MONITORING/AIR SAMPLING PROGRAM 8-1

9.0 HEAT/COLD STRESS 9-1
9.1 INCLEMENT WEATHER 9-1
9.2 HEAT/COLD STRESS MONITORING AND CONTROLS 9-1
9.3 HEAT/COLD STRESS-INDUCED ILLNESS SIGNS AND SYMPTOMS 9-2

TABLE OF CONTENTS (CONTINUED)

10.0 STANDARD OPERATING SAFETY PROCEDURES 10-1
10.1 SITE RULES 10-1
10.2 DRIVING 10-2
10.3 PERMIT REQUIREMENTS 10-2
10.4 INVESTIGATION-DERIVED WASTE DRUM/CONTAINER HANDLING 10-2
10.5 CONFINED SPACE ENTRY 10-2
10.6 HOT WORK, SOURCES OF IGNITION, AND FIRE PROTECTION 10-2
10.7 ELECTRICAL SAFETY 10-3
10.8 EXCAVATION AND TRENCH SAFETY 10-3
10.9 MACHINE GUARDING 10-4
10.10 LOCKOUT/TAGOUT 10-4
10.11 FALL PROTECTION 10-4
10.12 HAZARD COMMUNICATION 10-4
10.13 ILLUMINATION 10-5
10.14 SANITATION 10-5
10.15 DRILL RIG OPERATIONS 10-6
10.16 MUNITIONS AND EXPLOSIVES OF CONCERN 10-7
10.17 HISTOPLASMOSIS 10-8
10.18 LYME DISEASE 10-9
10.19 ROCKY MOUNTAIN SPOTTED FEVER 10-10
10.20 MOSQUITO-BORNE VIRUSES 10-11
10.21 IONIZING RADIATION 10-11
10.22 FUELS 10-12

11.0 SITE CONTROL MEASURES 11-1
11.1 EXCLUSION ZONE 11-1
11.2 CONTAMINATION REDUCTION ZONE 11-2
11.3 SUPPORT ZONE 11-2
11.4 SITE VISITORS 11-2
11.5 SITE COMMUNICATION 11-3

12.0 PERSONNEL HYGIENE AND DECONTAMINATION 12-1
12.1 LEVEL D+ PROTECTION DECONTAMINATION 12-1
12.2 LEVEL C PROTECTION DECONTAMINATION 12-1

13.0 EMERGENCY PROCEDURES AND EQUIPMENT 13-1
13.1 POTENTIAL EMERGENCIES 13-1
13.1.1 Fires 13-1
13.1.2 Spills 13-1
13.1.3 Medical Emergencies 13-2
13.2 EMERGENCY PHONE NUMBERS 13-2

TABLE OF CONTENTS (CONTINUED)

13.3 EMERGENCY ALERTING 13-3
13.4 EVACUATION 13-3
13.5 EMERGENCY EQUIPMENT 13-4

14.0 LOGS, REPORTS, AND RECORD KEEPING 14-1

15.0 REFERENCES 15-1

LIST OF TABLES

Table 3-1. Hazards Inventory 3-1
Table 3-2. Activity Hazard Analysis 3-4
Table 3-3. Potential Exposures 3-34
Table 5-1. Training Requirements 5-1
Table 9-1. Recommended Work/Rest Cycle 9-2
Table 13-1. Emergency Contact Phone Numbers 13-3

LIST OF FIGURES

Figure 1-1. RVAAP Installation Map with Areas of Concern, Compliance Restoration Sites, and Munitions Response Site Locations 1-3
Figure 2-1. General Location and Orientation of RVAAP/Camp Ravenna 2-3
Figure 13-1. Route Map and Directions to Pre-Notified Medical Facility 13-5
Figure 13-2. RVAAP Facility-Wide Assembly Area 13-7

LIST OF APPENDICES

Appendix A. Reporting Forms

ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
AOC	Area of Concern
BEL	Biological Exposure Indices
Camp Ravenna	Camp Ravenna Joint Military Training Center
CDC	Center for Disease Control
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CIH	Certified Industrial Hygienist
COTR	Contracting Officer's Technical Representative
CPR	Cardiopulmonary Resuscitation
DEET	n,n-diethyl-m-toluamide
DPT	Direct Push Technology
ESS	Explosives Safety Submission
FSP	Field Sampling Plan
FWSAP	Facility-Wide Sampling and Analysis Plan
FWSHP	Facility-Wide Safety and Health Plan
GFCI	Ground Fault Circuit Interrupter
HAZWOPER	Hazardous Waste Operations and Emergency Response
HTRW	Hazardous, Toxic, and Radioactive Waste
IDW	Investigation Derived Waste
IRP	Installation Restoration Program
MEC	Munitions and Explosives of Concern
MRS	Munitions Response Site
MSDS	Material Safety Data Sheet
NIOSH	National Institute of Occupational Safety and Health/
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
OJT	On-the-Job Training
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PPE	Personal Protective Equipment
RAC	Risk Assessment Code
RCRA	Resource Conservation and Recovery Act
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SPF	Sun Protection Factor
SSHO	Site Safety and Health Officer

ACRONYMS AND ABBREVIATIONS (CONTINUED)

SSHP	Site Safety and Health Plan
TBD	To Be Determined
TLV	Threshold Limit Value
TNT	2,4,6-trinitrotoluene
USACE	United States Army Corps of Engineers
U.S. EPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
WBGT	Wet Bulb Globe Temperature
WNV	West Nile Virus

THIS PAGE INTENTIONALLY LEFT BLANK.

1.0 INTRODUCTION

Science Applications International Corporation (SAIC) prepared this Facility-Wide Safety and Health Plan (FWSHP) for environmental investigations at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio, under contract number W912QR-08-D-0008, delivery order number 0016 with the U.S. Army Corps of Engineers (USACE), Louisville District. This FWSHP is developed in accordance with U.S. Army and Ohio Environmental Protection Agency (Ohio EPA) guidance documents to meet the requirements for the investigation of known or suspected contaminated sites regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Resource Conservation and Recovery Act (RCRA); and other federal or state regulations that govern environmental restoration activities at RVAAP. This FWSHP accompanies, and is to be used in conjunction with, a Facility-Wide Field Sampling Plan (FWFSP) and Facility-Wide Quality Assurance Program Plan (FWQAPP) to provide consistent programmatic and technical requirements for environmental investigations at RVAAP.

This FWSHP sets forth the minimum requirements for protecting personnel involved in environmental investigations at the RVAAP. Standard procedures must be used to minimize the potential for personnel injury or illness. These will include on-site training, routine inspections, visual and instrument surveillance for munitions and explosives of concern (MEC) at Munitions Response Sites (MRSs), and enforcement of the health and safety requirements by project management. This plan follows and addresses requirements in the USACE's *Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste and Ordnance and Explosive Waste Activities* (USACE 2007). This FWSHP complies with the requirements of the *USACE Safety and Health Requirements Manual* (USACE 2008); relevant Occupational Safety and Health Administration (OSHA) regulations; and other applicable federal, state, and local government safety and health requirements. This plan provides Contractors with guidance on health and safety hazards and controls. Nothing in this document relieves the Contractor from the requirement to comply with all applicable portions of the *USACE Safety and Health Requirements Manual* and OSHA regulations and to provide a safe workplace.

This FWSHP serves as an upper-tier document addressing the hazards and controls expected to be common to the environmental investigations of all RVAAP areas of concern (AOCs) and the anticipated on-site tasks. Currently, environmental investigations are conducted at 27 installation restoration program (IRP) AOCs, two facility-wide AOCs, 13 Compliance Restoration Sites, and 14 MRSs in the 2010 RVAAP Installation Action Plan (Figure 1-1).

A Contractor and investigation-specific Site Safety and Health Plan (SSHP) Addendum must be prepared to address the specific hazards and controls relevant to work at each AOC or investigation prior to beginning work at that particular AOC. Each addendum must reference this FWSHP or all those items not duplicated within it. Details such as a description of site conditions, maximum anticipated contaminant concentrations, and investigation-specific variations from this FWSHP will be presented in project-specific addenda. Work cannot be performed under this FWSHP without

being accompanied by an investigation-specific SSHP Addendum for each AOC or investigation. A copy of this FWSHP and the appropriate SSHP Addendum will be present at each work site. Each SSHP Addendum must contain Contractor- and investigation-specific details in addition to all elements outlined in Appendix A of the *USACE Safety and Health Requirements Manual* including:

- Signature Page – Title, signature, and phone number of the Contractor's plan preparer, approver, and concurrence.

- Background Information – Contractor, contract number, project name, and brief description of work to be performed.

- Statement of Contractor's Safety and Health Policy – Copy of the current corporate/company safety and health policy statement.

- Responsibilities and Lines of Authority – List of Contractor personnel for each project position described in Section 4.0 of this FWSHP.

- Subcontractors and Suppliers – List of subcontractors and suppliers and their safety responsibilities.

- Training – Update Table 5-1 of this FWSHP to include all investigation-specific training requirements.

- Safety and Health Inspections – Procedures for conducting daily inspections including documentation deficiency tracking, follow-up, and external inspections.

- Accident Reporting – Procedures and personnel responsible for exposure data, accident investigation, reports, and logs.

- Plans (programs and procedures) Required by the Safety Manual – Procedures or programs for each activity and on mandatory OSHA compliance programs not included in Section 10.0 of this FWSHP. The Contractor shall address all applicable occupational risks and compliance plans using Appendix A of the *USACE Safety and Health Requirements Manual* as a guide.

- Risk Management Processes – Project-specific hazards and controls developed for each major phase or activity of work based on the Activity Hazard Analysis (AHA) provided in Table 3-2 of this FWSHP. Each SSHP Addendum must include investigation-specific AHAs and Risk Assessment Codes.

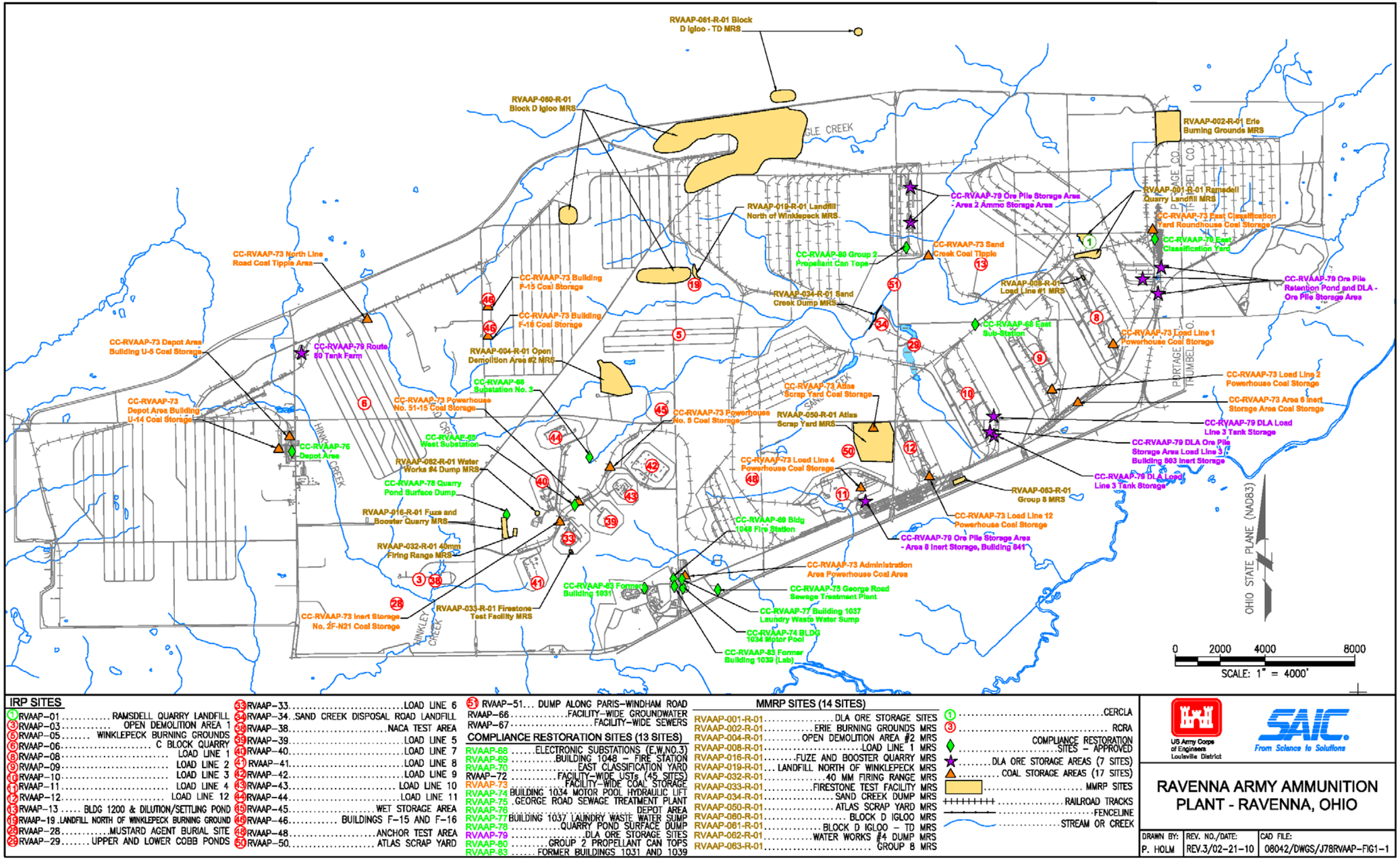


Figure 1-1. RVAAP Installation Map with Areas of Concern, Compliance Restoration Sites, and Munitions Response Site Locations

THIS PAGE INTENTIONALLY LEFT BLANK.

2.0 FACILITY DESCRIPTION AND CONTAMINATION CHARACTERIZATION

2.1 SITE DESCRIPTION

When the RVAAP IRP began in 1989, RVAAP was identified as a 21,419-acre installation. The property boundary was resurveyed by the Ohio Army National Guard (OHARNG) over a 2-year period (2002 and 2003) and the total acreage of the property was found to be 21,683.289 acres. As of February 2006, a total of 20,423 acres of the former 21,683-acre RVAAP has been transferred to the National Guard Bureau and subsequently licensed to OHARNG for use as a military training site.

The current RVAAP consists of 1,260 acres scattered throughout the OHARNG Camp Ravenna Joint Military Training Center, herein referred to as Camp Ravenna (Figure 2-1). Camp Ravenna is in northeastern Ohio within Portage and Trumbull Counties, approximately 3 miles (4.8 km) east-northeast of the city of Ravenna and approximately 1 mile (1.6 km) northwest of the city of Newton Falls (Figure 2-1). The RVAAP portions of the property are solely located within Portage County. RVAAP/Camp Ravenna is a parcel of property approximately 11 miles (17.7 km) long and 3.5 miles (5.6 km) wide bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad on the south; Garret, McCormick, and Berry roads on the west; the Norfolk Southern Railroad on the north; and State Route 534 on the east. Camp Ravenna is surrounded by several communities: Windham on the north; Garrettsville 6 miles (9.6 km) to the northwest; Newton Falls 1 mile (1.6 km) to the southeast; Charlestown to the southwest; and Wayland 3 miles (4.8 km) to the south (Figure 2-1).

When RVAAP was operational, Camp Ravenna did not exist and the entire 21,683-acre parcel was a government-owned, contractor-operated industrial facility. The RVAAP IRP encompasses investigation and cleanup of past activities over the entire 21,683 acres of the former RVAAP. References to RVAAP in this document are considered to be inclusive of the historical extent of RVAAP, which is inclusive of the combined acreages of the current Camp Ravenna and RVAAP, unless otherwise specifically stated. Industrial operations at the former RVAAP consisted of 12 munitions-assembly facilities referred to as "load lines." Load Lines 1 through 4 were used to melt and load 2,4,6-trinitrotoluene (TNT) and Composition B into large-caliber shells and bombs. The operations on the load lines produced explosive dust, spills, and vapors that collected on the floors and walls of each building. Periodically, the floors and walls were cleaned with water and steam. Following cleaning, the wastewater, containing TNT and Composition B, was known as "pink water" for its characteristic color. Pink water was collected in concrete holding tanks, filtered, and pumped into unlined ditches for transport to earthen settling ponds. Load Lines 5 through 11 were used to manufacture fuzes, primers, and boosters. Potential contaminants in these load lines include lead compounds, mercury compounds, and explosives. From 1946 to 1949, Load Line 12 was used to produce ammonium nitrate for explosives and fertilizers prior to use as a weapons demilitarization facility.

In 1950, the facility was placed in standby status and operations were limited to renovation, demilitarization, and normal maintenance of equipment, along with storage of munitions. Production activities were resumed from July 1954 to October 1957 and again from May 1968 to August 1972. In addition to production missions, various demilitarization activities were conducted at facilities constructed at Load Lines 1, 2, 3, and 12. Demilitarization activities included disassembly of munitions and explosives melt-out and recovery operations using hot water and steam processes. Periodic demilitarization of various munitions continued through 1992.

In addition to production and demilitarization activities at the load lines, other facilities at RVAAP include AOCs that were used for the burning, demolition, and testing of munitions. These burning and demolition grounds consist of large parcels of open space or abandoned quarries. Potential contaminants at these AOCs include explosives, propellants, metals, and waste oils. Other types of AOCs present at RVAAP include landfills, an aircraft fuel tank testing facility, and various general industrial support and maintenance facilities.

2.2 CONTAMINANTS

The RVAAP AOCs were associated with the assembly, storage, shipment, and/or disposal of a variety of materials including munitions and wastes. The principal munitions assembled on the installation were artillery rounds of 90 mm or more and 2,000-lb bombs. Chemicals of concern that are potentially present include explosive compounds (i.e., cyclonite, TNT, and smokeless powder), propellants, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and metals (i.e., aluminum, arsenic, barium, cadmium, chromium, lead, manganese, mercury, selenium, silver, and zinc). Contaminants that are potentially present at each AOC must be discussed in an investigation-specific SSHP addendum.

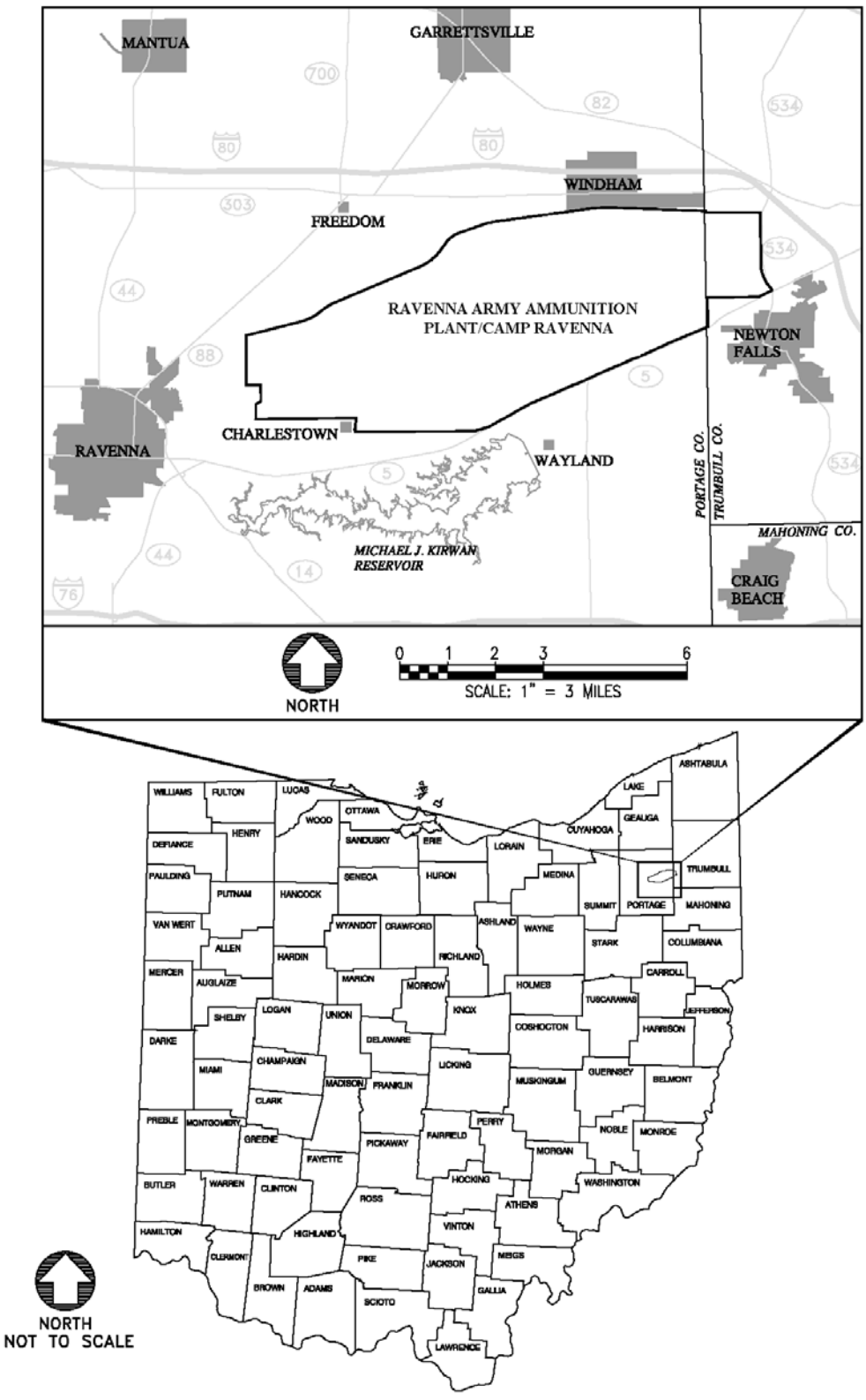


Figure 2-1. General Location and Orientation of RVAAP/Camp Ravenna

THIS PAGE INTENTIONALLY LEFT BLANK.

3.0 HAZARD/RISK ANALYSIS

The AHA identifies and assesses potential hazards that may be encountered by personnel and prescribes the required controls. Table 3-1 is a checklist of common hazards that may be posed during environmental investigations at RVAAP, and indicates whether a particular major type of hazard is present. The tasks are expected to consist of clearing vegetation; trenching; collecting surface soil, subsurface soil, sediment, and surface water samples; installing and abandoning piezometers and monitoring wells; decontaminating equipment, and managing IDW. In general, given these tasks, the potential for unacceptable exposure to contaminants appears to be low. Expected tasks present a variety of physical hazards including biological, contact with equipment or MEC, falls into excavations, engulfment by loose soil in an excavation, noise, and heat/cold stress. The Contractor must include an assessment of project-specific hazards by completing a hazard inventory (Table 3-1) in the SSHP Addendum.

Table 3-1. Hazards Inventory

Yes	No	Hazard
	X	Confined space entry (Not anticipated. Any confined space entry will require assessment in project-specific SSHP addenda and compliance with Section 10.5)
	X	Excavation entry (Not anticipated. Any excavation entry will require sloping or shoring excavation and compliance with all other applicable requirements)
X		Heavy equipment (i.e., drill rigs, Geoprobes, and backhoes)
X		Potential dangerous tools (i.e., brush clearing with chainsaws, machetes, sling blades)
X		Heavy lifting (IDW handling)
X		Fire (fuels)
X		Spills or leaks
X		Drowning
X		Explosion (MEC)
X		Electrical shock (electrical equipment)
X		Exposure to chemicals (e.g., site contaminants and chemicals used during site work)
X		Temperature extremes
X		Biological hazards (i.e., poison ivy, Lyme disease, Histoplasmosis, and West Nile)
	X	Radiation or radioactive contamination
	X	Gunfire (No environmental contractors will perform work during OHARNG hunts)
X		Noise (equipment)

IDW = Investigation-Derived Waste
MEC = Munitions and Explosives of Concern
OHARNG = Ohio Army National Guard
SSHP = Site Safety and Health Plan

3.1 TASK-SPECIFIC ACTIVITY HAZARD ANALYSIS

Table 3-2 presents AHAs, including task-specific job steps, hazards, actions to eliminate or minimize hazards, equipment to be used, and inspection and training requirements, if appropriate, for all of the planned environmental investigation activities at RVAAP. Specific sampling tasks considered in this document are as follows:

- Site mobilization and demobilization;
- Site walk and/or civil survey
- Soil sampling with excavation equipment;
- Soil boring and sampling, monitoring well installation using a drill rig and groundwater sampling;
- Soil boring and sampling using direct push technology (DPT);
- Monitoring well and borehole abandonment;
- Soil, sediment or surface water sampling using hand augers, scoops or sediment sampler on foot;
- Surface water and sediment collection from a boat using hand augers and hand tools;
- Vegetation clearing with chainsaws, machetes and sling blades;
- IDW handling; and
- Equipment decontamination.

The hazard assessments for each of these tasks are based on USACE expectations, as presented in the *USACE Safety and Health Requirements Manual* (USACE 2008), and some assumptions regarding the planned activities. Ultimately, the Contractor is responsible for ensuring that the hazards of each activity are adequately controlled. In cases where the following controls are not appropriate or sufficient for the specific task(s) to be performed by the Contractor, the Contractor must specify additional appropriate and sufficient controls by submitting an AHA with the investigation-specific SSHP Addendum. Work requiring lead control and asbestos disturbance will require a separate compliance plan as an attachment or appendix to the project-specific SSHP addenda. These compliance plans will be consistent with standards in Section 06.B.05 of the *USACE Safety and Health Requirement Manual*. The Contractor must use CELRL Form 1259, or the most currently approved USACE form, to complete the AHAs. Each applicable AHA must be approved by the Contractor Certified Industrial Hygienist (CIH), or designee, and must include a completed Risk Assessment Code (RAC).

3.2 POTENTIAL EXPOSURES

Table 3-3 provides information on the significant suspected contaminants and the chemical tools that may be used to investigate all AOCs. Note that Table 3-3 includes contaminants known or suspected to occur at any of the AOCs at concentrations sufficient to pose a risk of overexposure. Information on contaminants and chemical tools for work at a specific AOC must be included in each investigation-specific SSHP Addendum.

Table 3-2. Activity Hazard Analysis

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Site Mobilization and Demobilization
Prepared By:
Reviewed By:

Risk Assessment Code (RAC):

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic					
Critical					
Marginal					
Negligible					

Recommended Protective Clothing & Equipment:
Level D PPE

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	Level D PPE Insect repellant, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry or contact with harmful plants Inspect for ticks during the day and at the end of each work day (see Section 10.18) Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments and/or specialized cleaners if working in areas with poisonous plants Site-specific instruction in recognition and avoidance of harmful plants and/or animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area and unscheduled breaks, if needed (see Section 9.0) Chilled water if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily. Temperatures greater than 80°F, temperatures less than 30°F, and the use of impermeable clothing require additional controls (see Section 9.0) Site- and season-specific instruction in weather hazards and hazard controls	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdraw all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Site Mobilization and Demobilization

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Exposure to chemicals	Wash face and hands and any other exposed areas prior to taking anything by mouth. HAZWOPER training and medical clearance	EM 385-1-1 06.A and B, and Section 28
	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Vehicle Operation	Vehicle accidents	Vehicle operation (valid driver's license, seat belt use, routine vehicle inspections, no cell phone use while driving, compliance with applicable laws and regulations, and defensive driving). Visual inspection includes the vehicle and any associated items such as trailers or external cargo carriers. The operator verifies that the following items are present and functional: seatbelt(s), lights, turn signals, operating brakes, speedometer, fuel gage, horn, windshield, windshield wiper, defrosting/defogging system, rear view mirror, cab, non-slip surfaces on steps, and tires (approximately proper inflation) While driving on RVAAP, facility personnel shall take necessary precautions to avoid hitting deer. Observe and maintain posted speed limits for both day and night driving conditions.	EM 385-1-1 18
Moving Equipment	Musculoskeletal injuries (lifting heavy items)	Maximum 50 lb per individual, safety shoes, mechanical assistance >50 lb An evaluation of potential pinch points and/or weight strain should be conducted. Clear area of all unnecessary equipment and slip/trip hazards. Additional help will be obtained by workers or mechanical assistance used on-site if equipment to be moved is unwieldy, has a weight >50 lb, or has to be moved by maneuvering through awkward positioning Plan activities so body is not twisted/contorted	EM 385-1-1 14.A
	General safety hazards (slips, trips, and falls)	Clean and organized work areas, keeping walkways and working areas clear, including snow, ice, and standing water	EM 385-1-1 2.B

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Site Mobilization and Demobilization

Equipment to be Used	Inspection Requirements	Training Requirements
Vehicles General hand tools, if necessary	Daily safety inspections of operations. Initial and at least weekly inspections of equipment All tools must be inspected daily and taken out of service if damaged Daily vehicle inspection	HAZWOPER 40-hr training and current refresher training Medical clearance Properly trained personnel to operate equipment Valid driver's licenses Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Risk Assessment Code (RAC):

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Site Walk and/or Civil Survey
Prepared By:
Reviewed By:

Recommended Protective Clothing & Equipment:
Level D PPE

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic					
Critical					
Marginal					
Negligible					

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	Level D PPE Insect repellant, as necessary Pant legs tucked into boots or otherwise closed to minimize tick entry and contact with harmful plants Inspect for ticks during the day and at the end of each work day (see Section 10.18) Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments and/or specialized cleaners if working in areas with poisonous plants Site-specific instruction in recognition and avoidance of harmful plants and/or animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area and unscheduled breaks if needed (see Section 9.0) Chilled water if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily. Temperatures greater than 80°F, temperatures less than 30°F, and the use of impermeable clothing require additional controls (see Section9.0) Site- and season-specific instruction in weather hazards and hazard controls	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdraw all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Site Walk and/or Civil Survey

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Exposure to chemicals	Wash face and hands and any other exposed areas prior to taking anything by mouth. HAZWOPER training and medical clearance	EM 385-1-1 06.A and B and Section 28
	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Vehicle Operation	Vehicle accidents	Vehicle operation (valid driver's license, seat belt use, routine vehicle inspections, no cell phone use while driving, compliance with applicable laws and regulations, and defensive driving). The visual inspection includes the vehicle and any associated items such as trailers or external cargo carriers. The operator verifies that the following items are present and functional: seatbelt(s), lights, turn signals, operating brakes, speedometer, fuel gage, horn, windshield, windshield wiper, defrosting/defogging system, rear view mirror, cab, non-slip surfaces on steps, and tires (approximately proper inflation) While driving on RVAAP, facility personnel shall take necessary precautions to avoid hitting wildlife. Observe and maintain posted speed limits for both day and night driving conditions.	EM 385-1-1 06

Equipment to be Used	Inspection Requirements	Training Requirements
Vehicles	Daily safety inspections of operations. Initial and at least weekly inspections of equipment Daily vehicle inspection	HAZWOPER 40-hr training and current refresher training Medical clearance Properly trained personnel to operate equipment Valid driver's licenses Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Soil Sampling with Excavation Equipment
Prepared By:
Reviewed By:

Risk Assessment Code (RAC):

Recommended Protective Clothing & Equipment:
Level D PPE including hardhat plus nitrile or equivalent gloves for contact with contaminated material

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

		Probability				
		Frequent	Likely	Occasional	Seldom	Unlikely
Severity	Catastrophic					
	Critical					
	Marginal					
	Negligible					

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	Level D PPE Insect repellant, as necessary Pant legs tucked into boots or otherwise closed to minimize tick entry and contact with hazardous plants Inspect for ticks during the day and at the end of each work day (see Section 10.18) Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments and/or specialized cleaners if working in areas with poisonous plants. Site-specific instruction in recognition and avoidance of harmful plants and/or animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area and unscheduled breaks if needed (see Section 9.0) Chilled water if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily. Temperatures greater than 80°F, temperatures less than 30°F, and the use of impermeable clothing require additional controls (see Section 9.0) Site- and season-specific instruction in weather hazards and hazard controls	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdraw all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A and 25.A.01.m

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Soil Sampling with Excavation Equipment

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Lifting heavy items	Evaluate potential pinch points and/or weight strain prior to lifting. Clear area of all unnecessary equipment and slip/trip hazards. Additional help will be obtained by workers or mechanical assistance used on-site if equipment to be moved is unwieldy, has a weight >50 lb, or has to be moved by maneuvering through awkward positioning	EM 385-1-1 14.A
	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Using Excavation Equipment	Safety hazards associated with excavation equipment	Level D PPE including hardhat (see Section 6.0) Unnecessary personnel will stay well clear of operating equipment Functional back-up alarm Exclusion zone around excavation areas Only experienced operators will be allowed to operate equipment HAZWOPER safety training Monitoring - daily safety inspections of operations. Initial and at least weekly inspections of excavation equipment	EM 385-1-1 25
	Noise	Hearing protection within 7.6 m (25 ft) of backhoe or similar equipment unless equipment-specific monitoring indicates exposures less than 90 dB Monitoring - daily safety inspections	EM 385-1-1 05.C
	Contact with buried or overhead electrical or other hazards	Identification and clearance of overhead and underground utilities Monitoring - visual of all work areas	EM 385-1-1 25.A.01.l
	Fire (vehicle fuels and flammable contaminants)	Fuels stored in safety containers labeled/listed by a nationally recognized testing laboratory Bonding and grounding during fuel transfers Fuel storage areas marked with “No smoking” or “Open Flame” signs No ignition sources within 50 ft of fuel storage areas Fire extinguishers near fuel storage areas and inspected monthly Monitoring - daily safety inspection. Combustible gas indicator if buried organic material or other source of flammable gas suspected	EM 385-1-1 09.A

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Soil Sampling with Excavation Equipment

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Soil Sampling	Potential excavation cave-in	Designated excavation competent person. If personnel will enter trenches deeper than 5 ft, trench cave-in must be prevented as required in EM 385-1-1.25. Whenever possible, samples will be collected from outside the excavation by sampling soil in the backhoe bucket or soil from the bottom of the excavation using an auger extension. Prior to sampling from excavations deeper than 1.5 m (4 ft) deep, excavation edges will be examined visually and approached only at points that are clearly cohesive and show no signs of collapse (see Section 10.8) Monitoring - daily safety inspections of operations. Examine excavation edge for signs of spalling or collapse	EM 385-1-1 25
	Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Staying upwind of any dust-generating activities Hazard communication training MSDS for chemical tools on-site Chemical containers labeled to indicate contents and hazard Medical clearance for hazardous waste work Decontamination of potentially contaminated equipment prior to servicing Monitoring - photoionization detector or other monitoring as appropriate	EM 385-1-1 06.A and B and Section 28
Shipping and Packing Samples	Hazardous material shipping/transportation regulatory violation or spill	Ensure DOT/IATA compliance if shipping chemicals or other hazardous materials or samples Hazardous materials shippers must be trained and certified	EM 385-1-1 6.B.03.f

Equipment to be Used	Inspection Requirements	Training Requirements
Trucks Excavators Sample containers/dipper if necessary	Daily safety inspections of operations. Initial and at least weekly inspections of excavation equipment All tools must be inspected daily and taken out of service if damaged Daily vehicle inspection	HAZWOPER 40-hr training and current refresher training Medical clearance Properly trained personnel to operate excavator Excavation competent person training Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Risk Assessment Code (RAC):

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Soil Boring and Sampling, Monitoring Well Installation Using a Drill Rig, and Groundwater Sampling
Prepared By:
Reviewed By:

Recommended Protective Clothing & Equipment:
Level D PPE including hardhat plus nitrile or equivalent gloves for contact with contaminated material

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic					
Critical					
Marginal					
Negligible					

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	Level D PPE Insect repellant, as necessary Pant legs tucked into boots or otherwise closed to minimize tick entry and contact with harmful plants Inspect for ticks during the day and at the end of each work day (see Section 10.18) Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments or specialized cleaners if working in areas with poisonous plants Site-specific instruction in recognition and avoidance of harmful plants and animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area and unscheduled breaks if need (see Section 9.0) Chilled water if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily. Temperatures greater than 80°F, temperatures less than 30°F, and impermeable clothing require additional controls Site- and season-specific instruction in weather hazards and hazard controls	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdraw all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Soil Boring and Sampling, Monitoring Well Installation Using a Drill Rig, and Groundwater Sampling

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Lifting heavy items	Evaluation of potential pinch points and/or weight strain. Clear area of all unnecessary equipment and slip/trip hazards. Additional help will be obtained by workers or mechanical assistance used on-site if equipment to be moved is unwieldy, has a weight >50 lb, or has to be moved by maneuvering through awkward positioning	EM 385-1-1 14.A
	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Drilling	General safety hazards (rotating machinery, suspended loads, moving equipment, slips, and falls)	Level D PPE (see Section 6.0) plus hard hat No employees under lifted loads At least two functional kill switches Functional back-up alarm Drill rig manual on-site Only experienced operators Exclusion zone at least equal to mast height Hazardous waste safety training Monitoring - daily site safety inspections. Weekly drill rig inspections	EM 385-1-1 18.H
	Noise	Hearing protection within 7.6 m (25 ft) of rig unless rig-specific monitoring indicates noise exposure of less than 90 dB Monitoring - daily safety inspections	EM 385-1-1 05.C
	Fire (vehicle fuels or subsurface contaminants)	Fuels stored in safety containers labeled/listed by nationally recognized testing laboratory Bonding and grounding during fuel transfers Fuel storage areas marked with “No Smoking” or “Open Flame” signs No ignition sources within 50 ft of fuel storage areas Fire extinguishers in all fuel use areas and inspected monthly Monitoring - combustible gas indicator if buried organic material or other source of flammable gas is suspected	EM 385-1-1 09.A
	Contact with buried or overhead electrical or other hazards	Identification and clearance of overhead and underground utilities Monitoring - visual of all work areas	EM 385-1-1 05.I

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Soil Boring and Sampling, Monitoring Well Installation Using a Drill Rig, and Groundwater Sampling

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Drilling	Operating hand tools or power tools	Clean and organized work areas, keeping walkways and working areas clear. 110-V portable tools will be connected through GFCI	EM 385-1-1 13.A
Soil and Groundwater Sampling	Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Staying upwind of any dust-generating activities. Minimal contact Hazard communication training MSDS for chemical tools on-site Chemical containers labeled to indicate contents and hazard Medical clearance for hazardous waste work Decontamination of potentially contaminated equipment prior to servicing Monitoring - photoionization detector or other monitoring as appropriate	EM 385-1-1 06.A and B
	Cuts or other injuries from opening sampling tubes	Use dedicated tube cutter or hooked safety blades when using polymer sample tubes. Wear heavy cut-resistant gloves when opening polymer sample tubes. Keep fingers from between split spoon halves	EM 385-1-1 13.A
Shipping and Packing Samples	Hazardous material shipping/transportation regulatory violation or spill (soil and groundwater samples)	Ensure DOT/IATA compliance if shipping chemicals or other hazardous materials or samples Hazardous materials shippers must be trained and certified	EM 385-1-1 6.B.03.f

Equipment to be Used	Inspection Requirements	Training Requirements
Drill rig Support truck Sampling equipment if necessary	Daily safety inspections of operations. Initial and at least weekly inspections of excavation equipment Daily vehicle inspection All tools must be inspected daily and taken out of service if damaged	HAZWOPER 40-hr training and current refresher training Medical clearance Properly trained personnel to operate drill rig Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Soil Boring and Soil Sampling Using DPT
Prepared By:
Reviewed By:

Risk Assessment Code (RAC):

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic					
Critical					
Marginal					
Negligible					

Recommended Protective Clothing & Equipment:
Level D PPE including hardhat plus nitrile or equivalent gloves for contact with contaminated material

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	Level D PPE Insect repellant, as necessary Pant legs tucked into boots or otherwise closed to minimize tick entry and contact with harmful plants Inspect for ticks during the day and at the end of each work day (see Section 10.18) Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments or specialized cleaners if working in areas with poisonous plants Site-specific instruction in recognition and avoidance of harmful plants and animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area and unscheduled breaks if needed (see Section 9.0) Chilled water if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily Temperatures greater than 80°F, temperatures less than 30°F, and impermeable clothing require additional controls Site- and season-specific instruction in weather hazards and hazard controls	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdraw all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A
	Lifting heavy items	Evaluate the lift and potential pinch points. Clear area of all unnecessary equipment and slip/trip hazards. Additional help will be obtained by workers or mechanical assistance used on-site if equipment to be moved is unwieldy, has a weight >50 lb, or has to be moved by maneuvering through awkward positioning	EM 385-1-1 14.A

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Soil Boring and Soil Sampling Using DPT

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Drilling	General safety hazards (rotating machinery, suspended loads, moving equipment, slips, and falls)	Level D PPE (see Section 6.0) plus hard hat No employees under lifted loads At least two functional kill switches or switches that require continuous force to activate Functional back-up alarm Drill rig manual on-site Only experienced operators Exclusion zone at least equal to mast height HAZWOPER safety training Monitoring - daily site safety inspections. Weekly drill rig inspections	EM 385-1-1 18.H
	Noise	Hearing protection within 7.6 m (25 ft) of rig unless rig-specific monitoring indicates noise exposure of less than 90 dB Monitoring - daily safety inspections	EM 385-1-1 05.C
	Fire (vehicle fuels or subsurface contaminants)	Fuels stored in safety containers labeled/listed by nationally recognized testing laboratory Bonding and grounding during fuel transfers Fuel storage areas marked with "No Smoking" or "Open Flame" signs No ignition sources within 50 ft of fuel storage areas Fire extinguishers in all fuel use areas and inspected monthly Monitoring - combustible gas indicator if buried organic material or other source of flammable gas is suspected	EM 385-1-1 09.A
	Electric shock	Identification and clearance of overhead and underground utilities Monitoring - visual of all work areas 110-V electrical tools connected through GFCI	EM 385-1-1 05.I
	Operating hand tools or power tools	Clean and organized work areas, keeping walkways and working areas clear. 110-V portable tools will be connected through GFCI	EM 385-1-1 13.A

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Soil Boring and Soil Sampling Using DPT

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Soil Sampling	Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Staying upwind of any dust-generating activities. Minimal contact Hazard communication training MSDS for chemical tools on-site Chemical containers labeled to indicate contents and hazard Medical clearance for hazardous waste work Decontamination of potentially contaminated equipment prior to servicing Monitoring - photoionization detector or other monitoring as appropriate HAZWOPER training and medical clearance	EM 385-1-1 06.A and B and Section 28
	Cuts or other injuries from opening sampling tubes	Use dedicated tube cutter or hooked safety blades when using polymer sample tubes. Wear heavy cut-resistant gloves when opening polymer sample tubes. Keep fingers from between split spoon halves	EM 385-1-1 13.A
Shipping and Packing Samples	Hazardous material shipping/transportation regulatory violation or spill (soil and groundwater samples)	Ensure DOT/IATA compliance if shipping chemicals or other hazardous materials or samples. Hazardous materials shippers must be trained and certified	EM 385-1-1 6.B.03.f

Equipment to be Used	Inspection Requirements	Training Requirements
DPT rig (such as Geoprobe rig) Support truck Sampling equipment if necessary	Daily safety inspections of operations. Initial and at least weekly inspections of excavation equipment Daily vehicle inspection All tools must be inspected daily and taken out of service if damaged	HAZWOPER 40-hr training and current refresher training Medical clearance Properly trained personnel to operate drill rig Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Monitoring Well and Borehole Abandonment
Prepared By:
Reviewed By:

Risk Assessment Code (RAC):

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic					
Critical					
Marginal					
Negligible					

Recommended Protective Clothing & Equipment:
Level D PPE including hardhat plus nitrile or equivalent gloves for contact with contaminated material

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	Level D PPE Insect repellant, as necessary Pant legs tucked into boots or otherwise closed to minimize tick entry and contact with harmful plants Inspect for ticks during the day and at the end of each work day (see Section 10.18) Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments or specialized cleaners if working in areas with poisonous plants Site-specific instruction in recognition and avoidance of harmful plants and animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area and unscheduled breaks if needed (see Section 9.0) Chilled water if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily Temperatures greater than 80°F, temperatures less than 30°F, and impermeable clothing require additional controls Site- and season-specific instruction in weather hazards and hazard controls	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdraw all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Monitoring Well and Borehole Abandonment

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Lifting heavy items	Evaluate the lift and potential pinch points and/or weight strain. Clear area of all unnecessary equipment and slip/trip hazards. Additional help will be obtained by workers or mechanical assistance used on-site if equipment to be moved is unwieldy, has a weight >50 lb, or has to be moved by maneuvering through awkward positioning	EM 385-1-1 14.A
	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Drilling to Abandon Wells	General safety hazards (rotating machinery, suspended loads, moving equipment, slips, and falls)	Level D PPE (see Section 6.0) plus hard hat No employees under lifted loads At least two functional kill switches or switches that require continuous force to activate Functional back-up alarm Drill rig manual on-site Only experienced operators Exclusion zone at least equal to mast height	EM 385-1-1 18.H
	Noise	Hearing protection within 7.6 m (25 ft) of rig unless rig-specific monitoring indicates noise exposure of less than 90 dB Monitoring - daily safety inspections	EM 385-1-1 05.C
	Fire (vehicle fuels or subsurface contaminants)	Fuels stored in safety containers labeled/listed by nationally recognized testing laboratory Bonding and grounding during fuel transfers Fuel storage areas marked with “No Smoking” or “Open Flame” signs No ignition sources within 50 ft of fuel storage areas Fire extinguishers in all fuel use areas and inspected monthly Monitoring - combustible gas indicator if buried organic material or other source of flammable gas is suspected	EM 385-1-1 09.A
	Electric shock	Identification and clearance of overhead and underground utilities Monitoring - visual of all work areas 110-V electrical tools connected through GFCI	EM 385-1-1 05.I
	Struck by equipment, cables, drill rods	Level D+ PPE with hard hat. Maintain general work area awareness, separate work area from drill rig and moving parts where possible. Drilling subcontractor will operate per their own health and safety programs, plans, and procedures and will provide trained and qualified personnel. Driller will inspect the rig at the start of each shift. Drill rig will be equipped with at least two kill switches or will be operated by dead man switches. No workers under suspended heavy loads	EM 385-1-1 18.H
	Operating hand tools or power tools	Clean and organized work areas, keeping walkways and working areas clear. 110-V portable tools will be connected through GFCI	EM 385-1-1 13.A

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Monitoring Well and Borehole Abandonment

Equipment to be Used	Inspection Requirements	Training Requirements
Drill rig Support truck Hand tools, if necessary	Daily safety inspections of operations. Initial and at least weekly inspections of excavation equipment Daily vehicle inspection All tools must be inspected daily and taken out of service if damaged	HAZWOPER 40-hr training and current refresher training Medical clearance Properly trained personnel to operate drill rig Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Soil, Sediment, or Surface Water Sampling Using Hand Augers, Scoops, or Sediment Sampler on Foot
Prepared By:
Reviewed By:

Risk Assessment Code (RAC):

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic					
Critical					
Marginal					
Negligible					

Recommended Protective Clothing & Equipment:
Level D PPE plus nitrile or equivalent gloves for contact with contaminated material

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	Level D PPE Insect repellant, as necessary Pant legs tucked into boots or otherwise closed to minimize tick entry and contact with harmful plants Inspect for ticks during the day and at the end of each work day (see Section 10.18) Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments or specialized cleaners if working in areas with poisonous plants Site-specific instruction in recognition and avoidance of harmful plants and animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area (see Section 9.0) Chilled water if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily. Temperatures greater than 80°F, less than 30°F, and impermeable clothing require additional controls	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdraw all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010

Project: RVAAP Facility-Wide Environmental Investigation Activities

Job: Soil, Sediment, or Surface Water Sampling Using Hand Augers, Scoops, or Sediment Sampler on Foot

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Lifting heavy items	Evaluation of potential pinch points and/or weight strain. Clear area of all unnecessary equipment and slip/trip hazards. Additional help will be obtained by workers or mechanical assistance used on-site if equipment to be moved is unwieldy, has a weight >50 lb, or has to be moved by maneuvering through awkward positioning	EM 385-1-1 14.A
	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Soil and Surface Water Sampling	Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Staying upwind of any dust-generating activities. Minimal contact Hazard communication training MSDS for chemical tools on-site Chemical containers labeled to indicate contents and hazard HAZWOPER training and medical clearance for hazardous waste work Decontamination of potentially contaminated equipment prior to servicing Monitoring - photoionization detector or other sampling as appropriate	EM 385-1-1 06.A and B and Section 28
Surface Water Sampling	Drowning	Coast Guard approved personal floatation vests if working near (≤ 6 feet) or over water deeper than 4 feet.	EM 385-1-1 05.J
Shipping and Packing Samples	Hazardous material shipping/transportation regulatory violation or spill (soil and groundwater samples)	Ensure DOT/IATA compliance if shipping chemicals or other hazardous materials or samples. Hazardous materials shippers must be trained and certified	EM 385-1-1 6.B.03.f

Equipment to be Used	Inspection Requirements	Training Requirements
Sampling equipment if necessary	All tools must be inspected daily and taken out of service if damaged	HAZWOPER 40-hr training and current refresher training Medical clearance Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Surface Water and Sediment Collection from a Boat Using Hand Augers and Hand Tools
Prepared By:
Reviewed By:

Risk Assessment Code (RAC):

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic					
Critical					
Marginal					
Negligible					

Recommended Protective Clothing & Equipment:
Level D PPE with Personal Flotation Devices (PFDs) and nitrile or equivalent gloves for contact with contaminated material

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	Level D PPE Insect repellant, as necessary Pant legs tucked into boots or otherwise closed to minimize tick entry and contact with harmful plants Inspect for ticks during the day and at the end of each work day (see Section 10.18) Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments or specialized cleaners if working in areas with poisonous plants Site-specific instruction in recognition and avoidance of harmful plants and animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area and unscheduled breaks if needed (see Section 9.0) Chilled water if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily. Temperatures greater than 80°F, temperatures less than 30°F, and impermeable clothing require additional hazard controls Site- and season-specific instruction in weather hazards and hazard controls	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdraw all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010

Project: RVAAP Facility-Wide Environmental Investigation Activities

Job: Surface Water and Sediment Collection from a Boat Using Hand Augers and Hand Tools

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Lifting heavy items	Evaluation of potential pinch points and/or weight strain. Clear area of all unnecessary equipment and slip/trip hazards. Additional help will be obtained by workers or mechanical assistance used on-site if equipment to be moved is unwieldy, has a weight >50 lb, or has to be moved by maneuvering through awkward positioning	EM 385-1-1 14.A
	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Operating Boat	General safety hazards (water safety concerns, slips, trips, falls, drowning, equipment handling, boat and motor safety, and weather)	Level D PPE Personal flotation devices worn by crew Boat operator must be trained and experienced Motor kill switch Functional navigation and anchor light for nighttime operation Throw ring or cushion	EM 385-1-1 05.J and 19.F
	Fire	Fire extinguisher (serviced annually and inspected monthly) on board	EM 385-1-1 09.A
	Operating hand tools	Clean and organized work areas, keeping walkways and working areas clear	EM 385-1-1 13.A
Sediment and Water Sampling	Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Staying upwind of any dust-generating activities. Minimal contact Hazard communication training MSDS for chemical tools on-site Chemical containers labeled to indicate contents and hazard Medical clearance for hazardous waste work Decontamination of potentially contaminated equipment prior to servicing Monitoring - photoionization detector or other monitoring as appropriate	EM 385-1-1 06.A and B
	Operating hand tools	Clean and organized work areas, keeping walkways and working areas clear	EM 385-1-1 13.A
Shipping and Packing Samples	Hazardous material shipping/transportation regulatory violation or spill (soil and groundwater samples)	Ensure DOT/IATA compliance if shipping chemicals or other hazardous materials or samples. Hazardous materials shippers must be trained and certified	EM 385-1-1 6.B.03.f

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Surface Water and Sediment Collection from a Boat Using Hand Augers and Hand Tools

Equipment to be Used	Inspection Requirements	Training Requirements
Boat	Daily safety inspections of operations. Initial and at least weekly inspections of boat	HAZWOPER 40-hr training and current refresher training Medical clearance
Sampling equipment	All tools must be inspected daily and taken out of service if damaged	Properly trained personnel to operate boat and motor Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Risk Assessment Code (RAC):

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Vegetation Clearing with Chainsaws, Machetes, and Sling Blades
Prepared By:
Reviewed By:

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic					
Critical					
Marginal					
Negligible					

Recommended Protective Clothing & Equipment:
Level D PPE with hardhat and nitrile or equivalent gloves for contact with contaminated material. Leg protection required when operating chainsaw.

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	PPE (boots, work clothes – long pants and shirts with sleeves) Insect repellant, as necessary Pant legs tucked into boots or otherwise closed to minimize tick entry or contact with harmful plants Inspect for ticks during the day and at the end of each work day (see Section 10.18) Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments and/or specialized cleaners if working in areas with poisonous plants Site-specific instruction in recognition and avoidance of harmful plants and/or animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area and unscheduled breaks if needed (see Section 9.0) Chilled water if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily. Site- and season-specific instruction in weather hazards and hazard controls. Temperatures greater than 80°F, temperatures less than 30°F, and the use of impermeable clothing require additional controls (see Section 9.0)	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdraw all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Vegetation Clearing with Chainsaws, Machetes, and Sling Blades

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Lifting heavy items	Evaluate potential pinch points and/or weight strain. Clear area of all unnecessary equipment and slip/trip hazards. Additional help will be obtained by workers or mechanical assistance used on-site if equipment to be moved is unwieldy, has a weight >50 lb, or has to be moved by maneuvering through awkward positioning	EM 385-1-1 14.A
	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Operating Machinery	General safety hazards (rotating machinery, contact with sharp edges, slips, and falls)	Level D PPE (see Section 6.0) plus hard hat Only experienced operators Personnel operating brush-clearing tools must maintain separation of at least 4.5 m (15 ft) Tools must be inspected daily and taken out of service if damaged Exclusion zone if there is a potential for entry of unauthorized personnel	EM 385-1-1 13.A and F
	Chainsaw kickback and related hazards	Level D protection including safety glasses or goggles, safety shoes, heavy duty work gloves, chainsaw chaps Saws must have automatic chain brake or kickback device Idle speed adjusted so chain does not move when idling Saws must not be used to cut above shoulder height Saws must be held with both hands when operating Additional requirements at EM 385-1-1, Section 31	EM 385-1-1 13.F
	Noise (chainsaw)	Hearing protection within 7.6 m (25 ft) of operating chainsaw unless equipment-specific monitoring indicates noise exposure of less than 90 dB	EM 385-1-1 05.C
	Fire (fuels)	Fuels stored in safety containers labeled/listed by a nationally recognized testing laboratory Bonding and grounding during fuel transfers Fuel storage areas marked with “No Smoking” or “Open Flame” signs No ignition sources within 50 ft of fuel storage areas Fire extinguishers in all fuel use areas and inspected monthly Gasoline-powered equipment turned off and allowed to cool for at least 5 min prior to fueling	EM 385-1-1 09.A
	Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Minimal contact Chemical containers labeled to indicate contents and hazard	EM 385-1-1 06.A and B
	Electric shock	Electrical tools (110 V) must be connected through heavy duty power cord to GFCI	EM 385-1-1 05.I

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Vegetation Clearing with Chainsaws, Machetes, and Sling Blades

Equipment to be Used	Inspection Requirements	Training Requirements
Chainsaws, Machetes, and Sling Blades	Daily safety inspections of operations All tools must be inspected daily and taken out of service if damaged	HAZWOPER 40-hr training and current refresher training Medical clearance Properly trained personnel to operate tools Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: IDW Handling
Prepared By:
Reviewed By:

Risk Assessment Code (RAC):

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic					
Critical					
Marginal					
Negligible					

Recommended Protective Clothing & Equipment:
Level D PPE and nitrile or equivalent gloves for contact with contaminated material

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	PPE (boots, work clothes – long pants and shirts with sleeves) Insect repellant, as necessary Pant legs tucked into boots or otherwise closed to minimize tick entry or contact with harmful plants Inspect for ticks during the day and at the end of each work day (see Section 10.18 Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments and/or specialized cleaners if working in areas with poisonous plants Site-specific instruction in recognition and avoidance of harmful plants and/or animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area and unscheduled breaks if needed (see Section 9.0) Chilled water if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily Temperatures greater than 80°F, temperatures less than 30°F, and use of impermeable clothing require additional controls Site- and season-specific instruction in weather hazards and hazard controls	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdrawal of all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: IDW Handling

3**JOB STEPS**	**HAZARDS**	**ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS**	**EM 385-1-1 (PARA REF)**
General	Lifting heavy items	Evaluate lifts in advance. Clear area of all unnecessary equipment and slip/trip hazards. Additional help will be obtained by workers or mechanical assistance used on-site if equipment to be moved is unwieldy, has a weight >50 lb, or has to be moved by maneuvering through awkward positioning	EM 385-1-1 14.A
	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Operating equipment	General hazards (lifting equipment, manual lifting, and slips)	Level D PPE including heavy duty gloves for materials handling (see Section 6.0) Unnecessary personnel will stay well clear of operating equipment Functional back-up alarm on fork trucks, bobcats, trucks, etc. Documented forklift training for forklift operators Only experienced operators will be allowed to operate equipment No personnel allowed under lifted loads Lifts of over 50 lb will be made with two or more personnel or with lifting equipment Hazardous waste safety training Compliance with EM 385-1-1, Sections 14 and 16	EM 385-1-1 14.A and 18.G.29
	Load stability	All loads will be secured to the forklift with locking strap or equivalent. Whenever possible, loads will be transported without stacking	EM 385-1-1 14.A and 18.G.29
	Visibility	Ensure maximum visibility is available when transporting drums. If vision is obscured, drive in reverse if possible	EM 385-1-1 14.A
	Pinch points	Be aware of all pinch points when handling drums or containers. Heavy duty gloves	EM 385-1-1 14.A
	Musculoskeletal injuries (opening/closing drums)	Plan activities so body is not twisted/contorted. Evaluate potential pinch points. Use proper tools for the task. Lifts of more than 50 lb require mechanical assistance or buddy lift	EM 385-1-1 13.A
	Fire (vehicle fuels and flammable contaminants)	Fuels stored in safety containers labeled/listed by a nationally recognized testing laboratory Bonding and grounding during fuel transfers Fuel storage areas marked with “No Smoking” or “Open Flame” signs Fire extinguishers in all fuel use areas and inspected monthly No ignition sources within 50 ft of areas where flammable materials are stored	EM 385-1-1 09.A
	Noise	Hearing protection within 7.6 m (25 ft) of any noisy drum moving equipment unless equipment-specific monitoring indicates exposures less than 90 dB	EM 385-1-1 05.C
	Electric shock	Identification and clearance of overhead utilities. Maintain at least 10 ft from all electrical wiring, more for high-voltage systems. Electrical tools must be connected through GFCI	EM 385-1-1 05.I
	Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth Minimal contact	EM 385-1-1 06.A and B

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: IDW Handling

Equipment to be Used	Inspection Requirements	Training Requirements
Fork trucks, bobcats, and trucks, if necessary	Daily safety inspections of operations. Initial and at least weekly inspections of equipment	HAZWOPER 40-hr training and current refresher training Medical clearance
Hand tools	All tools must be inspected daily and taken out of service if damaged	Properly trained personnel to operate equipment Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010
Project: RVAAP Facility-Wide Environmental Investigation Activities
Job: Equipment Decontamination (Hot or Pressurized Water Washing, Soap and Water Washing, HCl, and Methanol or Isopropanol Rinse)
Prepared By:
Reviewed By:

Risk Assessment Code (RAC):

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic					
Critical					
Marginal					
Negligible					

Recommended Protective Clothing & Equipment:
Level D PPE and nitrile or equivalent gloves for contact with contaminated material

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Biological hazards (bees, mosquitoes, ticks, Lyme disease, histoplasmosis, poisonous plants, wasps, and snakes)	PPE (boots, work clothes – long pants and shirts with sleeves) Insect repellant, as necessary Pant legs tucked into boots or otherwise closed to minimize tick entry or contact with harmful plants Inspect for ticks during the day and at the end of each work day (see Section 10.18) Avoidance of accumulations of bird or bat droppings (see Section 10.17) Protective ointments and/or specialized cleaners if working in areas with poisonous plants Site-specific instruction in recognition and avoidance of harmful plants and/or animals	EM 385-1-1 06.D
	Temperature extremes	Administrative controls (see Section 9.0) Cooled (shaded) or warmed break area depending on the season Routine breaks in established break area and unscheduled breaks if needed (see Section 9.0) Chilled drinks if temperature exceeds 70°F Monitoring – ambient temperature measurements at least twice daily. Temperatures greater than 80°F, temperatures less than 30°F, and the use of impermeable clothing require additional controls	EM 385-1-1 06.I
	Contact with MEC	On-site training in ordnance recognition for all field personnel. Any investigation work within a MRS will follow MEC avoidance protocol. MEC surveys will be conducted in MRSs by a UXO technician for intrusive work and a UXO technician will accompany investigation teams. Avoid areas or withdraw all personnel from area, as directed by UXO technician, if ordnance or suspected ordnance is discovered. Monitoring - visual surveys for ordnance. Instrument surveys by UXO technicians in MRS. Follow requirements of governing Explosive Safety Submittal, if required, for the project.	EM 385-1-1 33.A
	Electric shock	GFCIs for electrical equipment/tools used in decontamination. Inspect electrical equipment for damaged or missing insulation and remove unsafe equipment from use	EM 385-1-1 11.E

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-2. Activity Hazard Analysis (continued)

Date Prepared: July 1, 2010

Project: RVAAP Facility-Wide Environmental Investigation Activities

Job: Equipment Decontamination (Hot or Pressurized Water Washing, Soap and Water Washing, HCl, and Methanol or Isopropanol Rinse)

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
General	Lifting heavy items	Evaluate potential pinch points and/or weight strain prior to lifting. Clear area of all unnecessary equipment and slip/trip hazards. Additional help will be obtained by workers or mechanical assistance used on-site if equipment to be moved is unwieldy, has a weight >50 lb, or has to be moved by maneuvering through awkward positioning	EM 385-1-1 14.A
	Severe weather	Locate nearest severe weather shelter/strong structure before beginning fieldwork. Suspend fieldwork if lightning within 10 miles of site or tornado warning issued. Do not work in areas subject to flash flooding	EM 385-1-1 06.I
Equipment Decontamination	Hot water, slips, falls, and equipment handling	Level D PPE (see Section 6.0) plus nitrile or PVC gloves Face shield and Saranax or rain suit (when operating steam washer)	EM 385-1-1 13.A
	Noise (spray washer)	Hearing protection when washer is operating unless equipment-specific monitoring indicates that exposure is less than 90 dB	EM 385-1-1 05.C
	Fire (decontamination solvents and gasoline)	Flammable material stored in original containers or in safety containers labeled/listed by a nationally recognized testing laboratory. Fuel storage areas marked with "No Smoking" or "Open Flame" signs Fire extinguisher kept near decontamination area and inspected monthly No ignition sources within 50 ft of areas where flammable materials are stored or used for decontamination	EM 385-1-1 09.A
	Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Minimal contact. When using volatile chemicals, work should be performed under conditions of adequate ventilation. Hazard communication training for chemical tools MSDS on-site All chemical containers labeled to indicate contents and hazard Suitable facilities/equipment for flushing eyes of harmful chemicals	EM 385-1-1 06.A and B

Equipment to be Used	Inspection Requirements	Training Requirements
Hand tools	Daily safety inspections of operations. Initial and at least weekly inspections of equipment Daily test of GFCIs All tools must be inspected daily and taken out of service if damaged	HAZWOPER 40-hr training and current refresher training Medical clearance Site-specific training including site hazard communication training CPR and first aid training for at least two on-site personnel and at least one person per field team

CELRL Form 1259, 1 November 2001 Previous Versions are Obsolete and Should Not Be Used

Table 3-3. Potential Exposures

Chemical[a]	Health Effects/Potential Hazards[b]	Chemical and Physical Properties[b]	Exposure Route(s)[b]
Potential Chemical Exposures			
Arsenic	Dermatitis, nasal tissue damage, stomach upset, potential cancer	Solid; VP: 0 mmHg; FP: NA	Inhalation Indigestion Absorption Contact
Asbestos	Asbestosis, difficulty breathing, interstitial fibrosis, restricted pulmonary function, finger clubbing, eye irritant, potential cancer	Solid; VP: 0 mmHg: FP: NA	Inhalation Ingestion Contact
Barium	Irritation of eyes, skin, lungs; muscle spasm	Solid; VP: Low; FP: NA	Inhalation Ingestion Contact
Chromium	Eye irritation, sensitization	Solid; properties vary depending upon specific compound	Inhalation Congestion Contact
Cadmium	Breathing difficulty, cough, chest tightness, pain beneath the sternum, headache, chills, aches, vomiting	Solid; VP: 0 mmHg; FP: NA	Inhalation Ingestion Contact
Dinitrotoluene	Suspected human carcinogen, anorexia, cyanosis, reproductive effects	Orange-yellow solid, VP: 1 mmHg; FP: 404°F	Inhalation Absorption Ingestion Contact
Lead	Weakness, anorexia, abdominal pain, anemia	Solid metal; VP: 0 mmHg; FP: NA; IP: NA	Inhalation Ingestion Contact
Mercury	Irritation of eyes and skin; coughing, gastrointestinal disturbance, anorexia	Silver liquid; FP: NA; VP: 0.0012 mmHg	Inhalation Absorption Ingestion Contact
PAHs and SVOCs	Suspected human carcinogen	PAHs are typically colorless, white, or pale yellow-green solid. Colorless liquid with almost no odor	Inhalation Ingestion Contact
Propellants (containing nitrocellulose and potentially nitroglycerin)	Faintness, rapid pulse, dizziness, muscle twitch, damage to blood cells, vomiting	Solid; VP: 0 mmHg; FP: NA May burn or explode if exposed to high temperatures or shock	Inhalation Ingestion Absorption Contact

Table 3-3. Potential Exposures (continued)

Chemical[a]	Health Effects/Potential Hazards[b]	Chemical and Physical Properties[b]	Exposure Route(s)[b]
Cyclonite	Explosive; irritation of eyes and skin, dizziness, weakness	White powder; FP: explodes; VP: 0.0004 mmHg at 230°F	Inhalation Absorption Ingestion Contact
Selenium	Irritation of eyes, skin, throat; liver and/or spleen damage	Solid; FP: NA; VP: 0 mmHg	Inhalation Ingestion Contact
Smokeless Powder (nitrocellulose)	Low toxicity	Amorphous solid; FP: 55°F	Not given
Trinitrotoluene	Irritation of skin and mucus membranes, liver damage, kidney damage	Pale solid; FP: explodes; VP: 0.0002 mmHg	Inhalation Absorption Ingestion Contact
VOCs (trichloroethene used as an example; however, properties vary depending upon the specific compound)	Irritant to eyes and skin; headache; visual disturbance; lassitude; dizziness; tremor; drowsiness; nauseous; vomiting; cardiac arrhythmias; parethesia; damage to liver; potential cancer	Liquid; colorless; chloroform-like odor; VP: 58 mmHg; IP: 9.45 eV	Inhalation Absorption Ingestion Contact
Zinc	Irritant to eyes	Soft white metal with a bluish tinge	NA
Decontamination Chemicals and Sample Preservatives			
Hydrochloric Acid	Eye and skin irritation and/or destruction	Liquid with acrid odor; FP: NA; IP: NA	Inhalation Absorption Ingestion Contact
Isopropyl Alcohol	Irritation of eyes, nose, throat; drowsiness, dizziness, headache; dry cracking skin.	Colorless liquid with the odor of rubbing alcohol. VP: 33 mmHg; FP: 53°F; IP: 10.10 eV	Inhalation, ingestion, skin and/or eye contact
Liquinox (used for decontamination)	Inhalation of powder may cause local irritation of mucus membranes	White powder, odorless, nonflammable	Inhalation Ingestion Contact

Table 3-3. Potential Exposures (continued)

Chemical[a]	Health Effects/Potential Hazards[b]	Chemical and Physical Properties[b]	Exposure Route(s)[b]
Methanol (potentially used for equipment decontamination)	Eye and skin irritation, headache, cough; optic nerve damage	Liquid; VP: 96 mmHg; FP: 52°F; IP: 10.84 eV	Inhalation Absorption Ingestion Contact
Sulfuric Acid (H_2SO_4)	Irritant to eyes, skin, nose, throat; pulmonary edema; bronchitis; emphysema; conjunctivitis; stomatis, dental erosion; eye and skin burn; dermatitis	Liquid, colorless to dark brown, oily, odorless. VP: 0.001mmHg, FP: NA	Inhalation Ingestion Contact
Sodium Hydroxide (NaOH)	Irritant to eyes, skin, mucous membrane; pneumonia; eye and skin burns; temporary loss of hair	Solid, colorless to white, odorless VP: 0 mmHg; FP: NA, IP: NA	Inhalation Ingestion Contact
Nitric Acid (HNO_3)	Irritant to eyes, skin, and mucous membrane; delayed pulmonary edema, pneumonia, bronchitis, dental erosion	Liquid, colorless, yellow, or red; acrid, suffocating odor VP: 48 mmHg; FP: NA; IP: 11.95eV	Inhalation Ingestion Contact
Zinc Acetate (only used as sample preservative for sulfide samples)	Not hazardous	Crystalline solid	
Other Potential Exposures			
Diesel (used for fuel for heavy equipment)	Irritation of eyes, skin, respiratory system; dizziness; headache; nausea; central nervous system	Brown, slightly viscous liquid, with characteristic odor; FP: 125.6°F	Inhalation Ingestion Contact
Diesel Exhaust	Irritation of eyes and respiratory system; potential occupational carcinogen	Appearance odor and properties vary depending upon the specific diesel exhaust component	Inhalation Contact
Gasoline (used for fuel)	Potential carcinogen per NIOSH, dizziness, eye irritation, dermatitis	Liquid with aromatic odor; FP: -45°F; VP: 38-300 mm	Inhalation Absorption Ingestion Contact
Silica Dust (from concrete cutting/breaking)	Cough, difficulty breathing, wheezing, decreased pulmonary function; progressive respiratory symptoms; irritant to eyes; potential cancer	Solid; colorless; odorless VP: 0 mmHg; FP: NA; IP: NA	Inhalation Contact

[a] The potential chemicals on this list reflect a partial compilation based on historical investigations conducted at RVAAP. Project-specific addenda must address specific potential exposure based on AOC operational history and anticipated activities to be conducted.
[b] From 1997 NIOSH Pocket Guide to Chemical Hazards, the Condensed Chemical Dictionary, Tenth Edition.
FP = Flash point.
IP = Ionization potential.
NA = Not available.
NIOSH = National Institute for Occupational Safety and Health
PAH = Polycyclic aromatic hydrocarbon.
SVOC = Semi-volatile organic compound.
VP = Vapor pressure.

4.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

This section presents the general lines of authority, responsibilities, and communication procedures concerning site safety and health and emergency response. It includes key Contractor positions. The FWSHP project-specific addenda must contain a table that lists the responsible parties and telephone numbers for each of the following key contractor positions:

- Program Manager;
- Certified Industrial Hygienist (CIH);
- Field Operations Manager;
- Site Safety and Health Officer (SSHO); and
- All subcontractors and suppliers.

4.1 CONTRACTOR PROGRAM MANAGER

The Contractor Program Manager will ensure conformance with corporate and USACE policies and procedures. Specific responsibilities of the Contractor Program Manager are as follows:

- Coordinate with USACE personnel;
- Ensure project managers satisfy USACE health and safety requirements;
- Ensure project staff implement the SSHP;
- Ensure projects have the necessary resources to operate safely; and
- Ensure project personnel have the appropriate regard for safe job performance.
- Exercise Stop Work Authority if unsafe work conditions develop.

4.2 CONTRACTOR CERTIFIED INDUSTRIAL HYGIENIST

The Contractor CIH manages the health and safety program. This includes establishing health and safety policies and procedures, supporting project and office activities, and verifying safe work practices and conditions. The specific responsibilities of the Contractor CIH are as follows:

- Coordinate with USACE health and safety personnel;
- Review and approve SSHPs;
- Approve downgrades in personal protective equipment (PPE) or protective procedures; and
- Interface with project personnel through routine communications and audits of selected projects.
- Exercise Stop Work Authority if unsafe work conditions develop.

4.3 CONTRACTOR PROJECT MANAGER

The Contractor Project Manager will be responsible for overall project execution. The responsibilities of the Contractor Project Manager are as follows:

- Coordinate with USACE personnel, including reporting accidents and incidents to the USACE Project Manager immediately and submitting written reports within 2 working days;
- Ensure implementation of this FWSHP and all project-specific addenda;
- Maintain auditable project documentation of all required records;
- Ensure that a qualified SSHO is designated; and
- Maintain a current copy of this FWSHP and the project-specific addenda.
- Exercise Stop Work Authority if unsafe work conditions develop.

4.4 CONTRACTOR FIELD OPERATIONS MANAGER

The Contractor Field Operations Manager will oversees the field activities associated with a project and is responsible for site accessibility, safety, and quality assurance. He/she will enforce the field requirements of this FWSHP and project-specific addenda. Specific responsibilities of the Contractor Field Operations Manager are as follows:

- Enforce compliance with this FWSHP and the project-specific addenda;
- Coordinate on-site operations, including subcontractor activities;
- Ensure that subcontractors follow the requirements of this FWSHP and the project-specific addenda;
- Coordinate and control any emergency response actions;
- Ensure that at least one person per field team, who is currently certified in first aid and cardiopulmonary resuscitation (CPR), is on-site during site operations; and
- Maintain current copies of this FWSHP, the project-specific addenda, and the *USACE Safety and Health Requirements Manual* (USACE 2008) on-site.
- Exercise Stop Work Authority if unsafe work conditions develop.

4.5 CONTRACTOR SITE SAFETY AND HEALTH OFFICER

The Contractor SSHO will implement this FWSHP and the project-specific addenda, make health and safety decisions for specific health and safety activities, and verify the effectiveness of the health and safety program. The Contractor SSHO's qualifications include, at a minimum, experience with similar projects, knowledge of and understanding of this FWSHP and the project-specific addenda, and the ability to use the required monitoring equipment. The Contractor SSHO's primary responsibilities will be as follows:

- Stop work or upgrade protective measures (including protective clothing) if uncontrolled health and safety hazards are encountered. Indications of uncontrolled health and safety hazards include monitoring instrument readings in excess of the established action limits, heavy equipment without back-up alarms, exposed unexploded ordnance (UXO), unguarded moving/rotating equipment, exposed electrical connections, non-compliance with health and safety requirements, encountering liquids other than water, soil staining suggestive of unexpectedly high concentrations of non-volatile contaminants. The SSHO authorizes resumption of work following correction of the adverse condition(s).

- Implement and verify compliance with this FWSHP and the project-specific addenda and report to the Field Operations Manager, Project Manager, and Health and Safety Manager any deviations from anticipated conditions.

- Conduct daily safety inspections using the form provided in Appendix A.

- Document deficiencies identified in the daily inspections and responsible parties, procedures, and timetables for correction.

- Ensure that site personnel have access to this plan and are aware of its provisions.

- Conduct a site-specific pre-entry health and safety briefing covering potential chemical and physical hazards, safe work practices, and emergency procedures.

- Maintain on-site auditable documentation of:

    — Material Safety Data Sheets (MSDS) for applicable materials utilized at the site;
    — Daily tailgate and health and safety training for site workers and visitors (Appendix A);
    — Calibration/maintenance of field instruments such as photoionization detectors, combustible gas indicators (an example is included in Section 6.0 of the Field Sampling Plan [FSP]);
    — Calibration standards tracking (an example is included in Section 6.0 of the FSP);
    — Environmental and personal exposure monitoring results (Appendix A);
    — Notification of accidents/incidents (Appendix A);
    — Reports of any overexposure or excessive levels;

  - — Notification of employees of exposure data; and
  - — Medical surveillance.

- Confirm that all on-site personnel have received the required training (see Section 5.0).

- Issue respirators, as necessary, and ensure that all respirator users have received medical clearance within the last year, have been properly trained, and have been successfully fitted for respiratory protection.

- Verify that this FWSHP's and the project-specific addenda's emergency points of contact are correct and supply correcting information as necessary.

- Ensure that all monitoring equipment is operating according to the manufacturer's specifications and perform field checks of instrument calibration.

- Ensure monitoring for potential on-site exposures is conducted in accordance with this FWSHP and its project-specific addenda.

- Investigate accidents and near accidents and report (in concert with the Contractor Field Operations Manager) findings to the Contractor Project Manager and Contractor CIH.

- Conduct daily "tailgate" safety briefings using the form provided in Appendix A.

- Control visitor access to the exclusion zone.

- Exercise Stop Work Authority if unsafe work conditions develop.

5.0 TRAINING

Personnel participating in the investigation of an AOC are subject to the training requirements presented in Table 5-1 and discussed below.

Table 5-1. Training Requirements

Training	Worker	Supervisor	Site Visitor (exclusion zone)
HAZWOPER (40-hr, 3-day OJT)	√	√	√
HAZWOPER Annual Refresher (8 hr)	√	√	√
HAZWOPER Supervisors Training (8 hr)		√	
CPR and First Aid Training (required for two personnel and a minimum of one person per field team)	√	√	√
General Hazard Communication Training (contained in 40- and 8-hr courses)	√	√	√
Respiratory Protection Training (required only if respirators are worn; contained in 40-hr course)	√	√	√
Hearing Conservation Training (for workers in hearing conservation program; contained in 40- and 8-hr courses)	√	√	√
Pre-entry Briefing	√	√	√
Site-specific Hazard Communication (contained in pre-entry briefing)	√	√	√
Safety Briefing (daily and whenever conditions or tasks change)	√	√	√
Equipment-specific Training (equipment operators)	√	√	

√ = Required
CPR = Cardiopulmonary Resuscitation
HAZWOPER = Hazardous Waste Operations and Emergency Response
OJT = On-the-Job Training

The following paragraphs briefly summarize the training requirements. These summaries include a course description and guidance on who must take each course.

5.1 OFF-SITE TRAINING

The 40-hr Hazardous Waste Site Worker course is required for hazardous, toxic, and radioactive waste activities in the exclusion (contamination) zone, contamination reduction (buffer) zone, or other hazardous areas on-site including areas of sample preparation and packaging. Three days of relevant field experience are required in conjunction with this training.

The 8-hr Hazardous Waste Refresher course is required annually to maintain currency in the 40-hr course.

The Hazardous Waste Supervisor's Training is required for personnel who directly supervise hazardous waste site workers. This course must address the health and safety program and procedural requirements of the supervisor's company. Note that the 40-hr course is a prerequisite.

General Hazard Communication Training is required for all site workers. This training must communicate the risks and protective measures for chemicals that employees may encounter. This requirement is met by taking the 40-hr Hazardous Waste Site Worker course and the site-specific hazard communication training addressing the chemicals in use on the project. MSDSs must be kept on-site during field investigations for all chemicals expected to be encountered or used on-site.

At least two on-site employees must be certified in CPR and first aid. For multiple field teams working under the required buddy system, at least one field team member must be certified in CPR and first aid. The 43.5-hr American Red Cross Emergency Response training is no longer required.

Respiratory Protection Training is required for all individuals who wear respirators. This requirement can be met by taking the 40-hr Hazardous Waste Site Worker course, annual refreshers, and site-specific training covering the types of respirators to be used on-site. Respirator fit-test certifications must be kept on-site for anyone who might wear one.

Hearing Conservation Training is required on an annual basis by 29 *Code of Federal Regulations (CFR)* 1910.95 for all employees enrolled in a hearing conservation program. This requirement includes all employees exposed to occupational noise in excess of 85 dB on a time-weighted average.

5.2 SITE-SPECIFIC TRAINING

Personnel on-site must receive the investigation-specific safety training. Two versions of this training will be used. The site worker version will contain full information regarding site hazards, hazard controls, and emergency procedures. A shortened version will be used for visitors who will be on-site for short times and who will not do hands-on work. This shortened version will contain the hazard information that is directly relevant to the purpose of the visit. Signatures of those attending and the type of briefing must be entered in the field logbook before site access will be granted. Note that casual visitors (e.g., package deliverers, observers) to the support zone (Administration Area-Buildings 1036, 1037, and 1038) will not be required to have the site-specific training. The site-specific training will include the following site-specific information:

- Names of site health and safety personnel and alternates;
- Contents of this FWSHP and the appropriate addendum;
- Hazards and symptoms of contaminant exposure;
- Hazards and symptoms of exposure to chemicals present in the workplace;
- Physical hazards in the workplace;
- Recognition and avoidance of live ordnance;
- Site and task PPE (i.e., purpose, donning, doffing, and proper use);
- Safe work practices to minimize risks;

- Safe use of engineering controls and equipment;
- Medical surveillance requirements;
- Site control measures;
- Reporting requirements for spills and emergencies;
- Personnel decontamination procedures;
- Contingency plans (e.g., communications, phone numbers, emergency exits, assembly point);
- Verification of communication with Post 1 (two-way radios and cell phones);
- Spill containment procedures (e.g., reporting, cleanup methods); and
- Emergency equipment locations and use (e.g., fire extinguishers, spill kits).

Safety briefings will be held at least daily and also when conditions or tasks change. These briefings will be conducted by the SSHO and/or Field Operations Manager and will be attended by all site workers and supervisors. These briefings will address site-specific safety issues and are used as an opportunity to refresh workers on specific procedures and to address new hazards and controls.

5.3 DOCUMENTATION

Documentation of the required training must be maintained in the on-site project files. This documentation will include copies of 40-hr, 8-hr refresher, respirator fit-test certifications, and supervisor training certificates; copies of medical clearance reports; and entries in project logs showing the topics covered, trainer, and signatures of those attending on-site training.

THIS PAGE INTENTIONALLY LEFT BLANK.

6.0 PERSONAL PROTECTIVE EQUIPMENT

PPE for site tasks is based on potential site-specific hazards. In cases where multiple hazards are present, a combination of protective equipment will be selected so that adequate protection is provided for each hazard. When a conflict exists with the PPE requirements, the more restrictive shall apply. This section emphasizes the programmatic requirements for PPE. For task-specific equipment, see Section 3.0 (Hazard/Risk Analysis). All task-specific PPE requirements will be listed in the SSHP Addendum.

6.1 PERSONAL PROTECTIVE EQUIPMENT PROGRAM

PPE use must comply with 29 *CFR* 1910, Subpart I and Section 5 of the *USACE Safety and Health Requirements Manual* (USACE 2009). The level of protection and types of materials selected for a particular task must be based on the following:

- Potential for exposure because of work being done;
- Route of exposure;
- Measured or anticipated concentration in the medium of concern;
- Toxicity, reactivity, or other measure of adverse effect; and
- Physical hazards such as falling objects and flying projectiles.

In situations where the type of contamination, concentration, and probability of contact are not known, the appropriate protection is selected based on the Contractor CIH's professional judgment until the hazards are further evaluated.

The Contractor SSHO may raise or lower the level of PPE worn by the teams depending upon the site-specific hazards encountered in the field. Prior to lowering the level of PPE, the Contractor Field Operations Manager and the Contractor CIH must be contacted/consulted and approval given and documented. If site conditions are such that the level of PPE is insufficient or work must be stopped, the Contractor SSHO will take appropriate action immediately, and the appropriate personnel (see above) will be contacted afterwards. The following criteria indicate a possible need for re-assessing the PPE selection:

- Introduction of new types of equipment;
- Commencement of an unplanned (hazard not previously assessed) work phase;
- Working in unplanned temperature extremes;
- Evidence of contamination such as discolored soil or elevated instrument readings near the soil;
- Exceeding the action limits; or
- Changing the work scope so that the degree of contact with contaminants changes.

6.2 TYPES OF EQUIPMENT

This section presents the types of protective clothing that may be used for the project. Requirements for task-specific levels of protective clothing are presented in Table 3-2. Levels of protection will be used to protect against chemical and physical hazards at this site are as follows:

- Level C Protective Equipment
  - — Full-face respirator and air-purifying cartridges capable of filtering out organic vapors, acid gasses, and radionuclides. A half-face respirator with appropriate protective eyewear (e.g., goggles and faceshield) may be deemed protective under certain conditions, but such a determination may only be made by the Contractor CIH and SSHO in accordance with the Contractor's health and safety procedures and policies, approved by USACE, and documented in the project-specific SSHP addendum or field change order. Half-face respirators may only be used in environments where contaminants are not an exposure hazard to the eyes or exposed skin;
  - — Hooded chemical-resistant clothing (polyethylene-coated Tyvek® or equivalent) with all openings taped;
  - — Two pairs of chemical-resistant gloves (nitrile and exam gloves);
  - — Heavy duty leather, Kevlar, or equivalent gloves (in addition to chemical-resistant gloves) for materials handling or other tasks that pose physical hazards to the hands;
  - — Safety boots;
  - — Shoe covers; and
  - — Hard hat (if overhead hazards are present).

- Level D+ Protective Equipment
  - — Tyvek® or equivalent coveralls;
  - — Nitrile or polyvinyl chloride gloves;
  - — Heavy duty leather, Kevlar, or equivalent gloves (in addition to chemical-resistant gloves) for materials handling or other tasks that pose physical hazards to the hands;
  - — Safety boots;
  - — Boot covers;
  - — Hard hat (if overhead hazards are present); and
  - — Safety glasses with side shields.

- Level D Protective Equipment
  - — Coveralls/field clothes;
  - — Safety boots;
  - — Safety glasses with side shields;
  - — Hard hat (if overhead hazards are present);
  - — Nitrile or equivalent gloves if contaminated materials are handled; and
  - — Heavy duty leather, Kevlar, or equivalent gloves (in addition to chemical-resistant gloves) for materials handling or other tasks that pose physical hazards to the hands.

6.3 CLEANING, STORAGE, AND PROGRAM VERIFICATION

If site tasks require the use of chemical protective clothing, disposable clothing will be used and will be disposed as project-generated waste in accordance with Section 8.0 of the Facility-Wide Field Sampling Plan (FWFSP) and project-specific addenda. Unused chemical protective clothing will be stored in clean staging areas until needed. The Contractor SSHO will verify that the PPE in use is appropriate and is being used properly.

THIS PAGE INTENTIONALLY LEFT BLANK.

7.0 MEDICAL SURVEILLANCE

All employees performing on-site hazardous waste-related work will be enrolled in a medical surveillance program to meet the requirements of 29 *CFR* 1910.120(f), 1910.134, 1910.20 and to assess and monitor workers' health and fitness for employment in this field. Employees must be provided with summaries of medical examination results following each examination and must be provided more detailed information upon written request.

7.1 FREQUENCY OF EXAM

The frequency of employee medical exams will be as follows:

- Prior to assignment to hazardous waste work that involves potential exposure above occupational exposure limits;

- Once every 12 months for each employee covered unless the attending physician believes a shorter or longer interval (not to exceed 2 years) is appropriate;

- At termination of employment or re-assignment to an area where the employee would not be covered if the employee has performed fieldwork since his/her last examination and has not had an examination within the last 6 months; and

- As soon as possible upon notification by an employee that he/she has developed signs or symptoms indicating possible overexposure to hazardous substances or health hazards, or that the employee has been injured or exposed above the permissible exposure limit or published exposure levels in an emergency situation.

7.2 MEDICAL EXAM CONTENT

Medical examinations will include a medical and work history (or updated history if one is available in the employee's file) with special emphasis on symptoms related to the handling of hazardous substances. The examination will determine potential health impairments and fitness for duty, including the ability to wear any required PPE. As a minimum, the exam will include

- Collection of information on the employee's medical and work history;
- Hands-on examination;
- Audiometry;
- Blood screen such as Sequential Multiple Analyzer with Computer 24;
- Chest P/A X-ray at intervals specified by the attending physician;
- Complete blood count;

- Electrocardiogram for persons older than 45 or where medically indicated;
- Physical examination;
- Spirometry (forced expiratory volume/forced vital capacity); and
- Urinalysis (dipstick and microscopic).

8.0 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

Airborne chemical concentrations will be assessed, as appropriate, to ensure exposures do not exceed acceptable levels, as specified in the most recent *Threshold Limits Values and Biological Exposure Indices* or by OSHA, whichever is more stringent. The *USACE Safety and Health Requirement Manual* identifies this more stringent value as the Occupational Exposure Limit (OEL). Action levels, with appropriate actions, will be established by a qualified industrial hygienist or equally competent person for this monitoring, and will be listed in project-specific SSHP addenda to this FWSHP. Monitoring equipment deployment will depend on the activities being conducted and the potential exposures. All monitoring equipment must be approved, inspected, and maintained and calibrated per manufacturer's specifications prior to use. Calibration will be performed by a trained individual and results will be recorded per specifications of Section 06.A.03 of the *USACE Safety and Health Requirement Manual*. All monitoring and analysis must be performed using approved NIOSH or OSHA sampling and analytical methods, as specified in Section 06.A.03 of the *USACE Safety and Health Requirement Manual*. All personal exposure monitoring records will be maintained in accordance with 29 *CFR* 1910.20. Project-specific SSHP addenda will contain the minimum monitoring requirements and action levels for each AOC or investigation as well as engineering controls, work practice controls, and appropriate PPE as needed. If it is determined that no monitoring is necessary, the justification for this determination must be incorporated into project-specific SSHP addenda.

THIS PAGE INTENTIONALLY LEFT BLANK.

9.0 HEAT/COLD STRESS

9.1 INCLEMENT WEATHER

When warnings or indications of impending severe weather exist (e.g., heavy rains, thunderstorms, damaging winds, tornados, hurricanes, floods, lightning), the Contractor SSHO will monitor the weather conditions using a weather notification system. Appropriate precautions will be taken to protect personnel and property from the effects of the severe weather. In accordance with Section 6 of the *USACE Safety and Health Requirements Manual* (USACE 2008), project-specific SSHP addenda should include, at a minimum:

- Severe weather triggers to alert the Contractor SSHO to monitor weather conditions;
- Training on severe weather precautions and actions; and
- Identified area of retreat, preferably a substantial building.

9.2 HEAT/COLD STRESS MONITORING AND CONTROLS

Acclimatization, consumption of copious quantities of fluids, and appropriate work/rest cycles are important factors in preventing heat stress-induced illnesses. General controls will consist of making fluids readily available, using the buddy system, and taking scheduled and unscheduled breaks in a temperature-controlled environment as necessary. The following specific steps will be taken to reduce the potential for heat stress-induced illness:

- When possible, schedule work for cooler periods during the day.

- Provide site training to include controlling heat stress, recognizing heat stress-induced illness, and administering first aid for heat stress.

- Provide cool Gatorade™, equivalent drink, or water to site workers and encourage their consumption.

- Where employees are exposed to solar radiation for short periods and there is the potential for sunburn, or exposure for prolonged periods where long-term exposure could lead to health effects such as skin cancer, they shall be provided sun screen with a sun protection factor (SPF) appropriate for their skin type and exposure. Sunscreens shall be used only in accordance with the manufacturer's recommendations.

- Instruct workers to monitor their own and their buddy's condition relative to heat stress.

- Develop an initial work/rest cycle based on the site-specific conditions and the capabilities of the work crew. The American Conference of Governmental Industrial Hygienists (ACGIH) heat stress Threshold Limit Value (TLV) will be instituted per Table 9-1.

Table 9-1. Recommended Work/Rest Cycle

Work-Rest Regimen	Work Load		
	Light	Moderate	Heavy
Continuous work	86[b]	80	77
45 min work/15 min rest[a]	87	82	78
30 min work/30 min rest	89	85	82
15 min work/45 min rest	90	88	86

[a]Non-work, sitting in the shade or air conditioned area.

[b]Wet bulb globe temperature (WBGT) index expressed in degrees Fahrenheit or standard dry bulb temperature if WBGT is unavailable.

- Provide a cool environment, such as a vehicle with air conditioning, for breaks.

- Encourage and allow workers to take unscheduled breaks, if needed.

- Monitor workers wearing Tyvek® or other impermeable clothing for heat stress by taking their pulses at the beginning of each rest period. If any worker's heart rate exceeds 110 beats per minute, the next work period will be shortened by one third (NIOSH et al 1985).

Adequate clothing and staying dry are critical factors in preventing cold stress disorders. The SSHO and Field Operations Manager will ensure the capability to quickly move individuals who become wet to a sheltered, warm area. The following specific steps will be taken (adapted from ACGIH 2010).

- If ambient temperatures are less than 40°F, provide site training on preventing cold injury, recognizing cold injury symptoms, and administering cold injury first aid.

- Provide a heated break area if ambient temperatures are less than 32°F.

- Implement breaks in a warm area every 120 min, at a minimum, if ambient temperatures are less than 32°F.

- Allow workers to take unscheduled breaks, if needed, in a warm area.

- Outdoor work will not be performed if the equivalent chill temperature (temperature combined with the effect of wind) is less than -29°F.

9.3 HEAT/COLD STRESS-INDUCED ILLNESS SIGNS AND SYMPTOMS

Heat cramps are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms are muscle spasms and pain in the hands, feet, and abdomen. Personnel exhibiting these symptoms should rest in a cool place and consume fluids and salt.

Heat exhaustion occurs from increased stress on various body organs. Signs and symptoms are:

- Pale, cool, moist skin;
- Heavy sweating;
- Dizziness and nausea; and
- Fainting.

Heat stroke is the most serious form of heat-related illness and should always be treated as a medical emergency. The body's temperature regulation system fails, and the body temperature rapidly rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Signs and symptoms of heat stroke are:

- Red, hot, usually dry skin;
- Lack of or reduced perspiration;
- Nausea;
- Dizziness and confusion;
- Strong, rapid pulse and confusion; and
- Coma.

Hypothermia is the uncontrolled loss of body heat. As the body's core temperature decreases, bodily functions are slowed. The victim becomes weak and disoriented and may become comatose if steps are not taken to return the core temperature to the normal range. Hypothermia can occur whenever temperatures are below 45°F and is most common during wet, windy conditions, with temperatures between 40 and 30°F. The principal cause of hypothermia in these conditions is loss of insulating properties of clothing due to moisture, coupled with heat loss due to wind and evaporation of moisture on the skin.

Frostbite is the freezing of body tissue, which ranges from superficial freezing of surface skin layers to deep freezing of underlying tissue. Frostbite will only occur when ambient temperatures are below 32°F. The risk of frostbite increases as the temperature drops and wind speed increases.

THIS PAGE INTENTIONALLY LEFT BLANK.

10.0 STANDARD OPERATING SAFETY PROCEDURES

This section presents general safety rules applicable to the anticipated tasks. The provisions of the plan are mandatory for all on-site employees and visitors, including employees engaged in initial site reconnaissance, preliminary field investigations, mobilization, project operations, and demobilization. These standard operating procedures are offered for guidance. The Contractor will be responsible for ensuring that the appropriate and sufficient procedures presented in project-specific SSHP addenda are used to protect its employees.

10.1 SITE RULES

The following rules will apply to all site activities:

- Personnel must maintain contact with Post 1 at all times through two-way radios or phones.
- All work will be conducted in compliance with the *USACE Safety and Health Requirements Manual* (USACE 2008).
- Daily safety briefings ("tailgate") will be held during field activities to inform personnel of new hazards or procedures.
- The SSHO or Field Operations Manager will conduct and document daily safety inspections.
- Personnel will notify the SSHO of any medical conditions (e.g., allergic to bee stings, diabetes, pregnancy) that require special consideration.
- Personnel will maintain proper workplace housekeeping to minimize the potential for tripping and other accidents.
- Contact with potentially contaminated substances will be avoided. Site personnel in the exclusion zone will avoid walking through puddles, pools, and mud; kneeling on the ground; and placing equipment on the ground.
- Spills will be prevented to the extent possible. If a spill occurs, the material will be contained.
- All injuries and accidents requiring first aid will be reported to the SSHO, Field Operations Manager, Contractor CIH, and the Army Project Manager.
- All workers will abide by a buddy system. Members of a buddy team will maintain verbal or visual contact.

10.2 DRIVING

All posted speed limits and state vehicle operation laws must be obeyed at all times. Contractors driving motor vehicles/equipment may not use hand-held cellular phones but may use hands-free telephones while the vehicle is in motion. Prior to using a hand-held cellular phone, drivers shall find a safe place to bring their vehicle to a stop. This requirement does not preclude passenger(s) from using cellular phones while the vehicle is in motion. Using headphones and earphones is prohibited while operating a motor vehicle/equipment.

10.3 PERMIT REQUIREMENTS

Contractors will coordinate with RVAAP to obtain, as necessary, all permits necessary for the safe execution of a project, which will include, at a minimum, digging permits/clearance from local utilities prior to any drilling or excavation.

10.4 INVESTIGATION-DERIVED WASTE DRUM/CONTAINER HANDLING

Any drums used for the project will meet the requirements of the FWSAP and project-specific addenda. RVAAP Operations and Maintenance Contractor personnel will provide any required fork truck services in the investigation-derived waste (IDW) staging area (Building 1036). IDW movement from field sites to Building 1036 will be conducted by the drilling subcontractor using a backhoe equipped with forks and drum dollies. No personnel will be allowed under lifted loads. Lifts of greater than 50 lb will be made with two or more personnel or with lifting equipment in compliance hazardous waste safety training and Sections 14 and 16 of the *USACE Safety and Health Requirements Manual*.

10.5 CONFINED SPACE ENTRY

Confined space entry will conform with the requirements of 29 *CFR* 1910.146 and Section 34 of the *USACE Safety and Health Requirement Manual*. The minimum applicable requirements are completion of an entry permit, atmospheric testing for oxygen (must be 19.5 to 22%), atmospheric testing for toxic gases (must be less than 5 parts per million [ppm] or the chemical-specific limit), atmospheric testing for flammable gases (must be less than 10% of the lower explosive limit), and stationing an attendant nearby but outside the excavation.

10.6 HOT WORK, SOURCES OF IGNITION, AND FIRE PROTECTION

This work will be conducted according to Sections 9 and 10 the *USACE Safety and Health Requirement Manual*.

- Notify Post 1 before hot work activities begin. Such notification includes the location where the hot work will be conducted and the start and stop time of the hot work.

- Use a welder's helmet or shaded goggles, leather gloves, and long-sleeved shirt to conduct hot work (oxyfuel cutting).

- Provide a fire extinguisher, rated not less than 10-ABC, in the immediate vicinity of hot work.

- Keep sources of ignition at least 15.2 m (50 ft) from flammables storage areas.

- Post flammables storage areas with signs indicating "No Smoking or Open Flame."

- Keep at least one fire extinguisher, rated not less than 20-B, 7.6 to 22.9 m (25 to 75 ft) from all flammables storage areas.

- Use an approved flammables cabinet to store 94.6 L or more (25 gal or more) of flammable liquid.

- Keep flammable liquids (other than decontamination solvents) in safety containers with flame arresters.

10.7 ELECTRICAL SAFETY

This work will be conducted according to 29 *CFR* 1910 Subpart S and Section 11 of the *USACE Safety and Health Requirement Manual*.

- Connect all portable 110-V electrical equipment through ground fault circuit interrupters (GFCIs).

- Keep conductive materials (drill rigs) clear of energized power lines. Observe the following minimum distances: 0 to 50 kV (10 ft); 51 to 100 kV (12 ft); 101 to 200 kV (15 ft); 201 to 300 kV (20 ft); 301 to 500 kV (25 ft); 501 to 750 kV (35 ft); and 750 to 1000 kV (45 ft).

10.8 EXCAVATION AND TRENCH SAFETY

Trench excavation potentially poses the following hazards: contact with buried utilities, trench cave-in and engulfment, confined space hazards such as hazardous airborne concentrations of toxic chemicals, flammable concentrations of vapors or gases, and oxygen deficiency. The depth of the excavation and the nature of the excavated material significantly impact the potential hazard—the greater the depth, the greater the hazard.

Prior to opening an excavation, the site will be verified free of underground utilities by contacting the local utility companies and/or appropriate base personnel. Notification will include submitting maps with planned excavation locations clearly marked for appropriate base personnel approval. If underground utilities are present, they will be located and protected from damage or movement.

Other location-specific hazards, such as the potential for UXO, building foundations, and unstable rocks will be controlled.

Cave-in hazards will be controlled by excluding personnel from inside or near (within 3 ft) excavations 5 ft or deeper. This restriction will not be applied to excavations less than 5 ft deep if the SSHO or Field Operations Manager has examined the excavations and determined there is no potential for cave-in.

If personnel must enter trenches deeper than 1.2 m (4 ft), the requirements of 29 *CFR* 1926.651 and Section 25 of the *USACE Safety and Health Requirement Manual* will be applied. This will include daily inspections of the excavation and shoring or sloping the trench sides. Shoring will be accomplished using a trench box with rigid sides to prevent engulfment. If a trench box is not utilized, the trench sides will be sloped at a 34° angle (one and one-half horizontal to one vertical). All spoils will be located at least 0.6 m (2 ft) from the edge of the excavation. Such entry also will be treated as confined space entry and procedures will comply with Section 10.5 (Confined Space Entry).

10.9 MACHINE GUARDING

All equipment will be operated with all guards provided by the manufacturer and in compliance with 29 *CFR* 1910, Subpart O and Section 16.A.11 of the *USACE Safety and Health Requirement Manual*. If any guarding must be removed for servicing, the equipment will be disabled to preclude movement or release of energy.

10.10 LOCKOUT/TAGOUT

All potentially hazardous servicing or equipment repair will be governed by 29 *CFR* 1910.147 and Section 12 of the *USACE Safety and Health Requirement Manual*.

10.11 FALL PROTECTION

Work areas with the potential for a fall of 1.2 m (4 ft) or more will be provided with fall protection in compliance with Section 21.C of the *USACE Safety and Health Requirement Manual*. This fall protection will consist of guardrails or personal fall protection. Personal fall protection will be used if drilling personnel must climb the upright mast or derrick.

10.12 HAZARD COMMUNICATION

Hazard communication will be governed by 29 *CFR* 1910.1200 and Section 06.B of the *USACE Safety and Health Requirement Manual*. At a minimum, the following steps will be taken:

- All hazardous materials on-site will be labeled to comply with the hazard communication standard, and will include the following.

— Clear labeling as to the contents; and
— The appropriate hazard warning.

- MSDSs will be available on-site for all hazardous materials that are present.

- Site-specific training will be provided for the hazards posed by site chemicals, protective measures, and emergency procedures.

- Copies of MSDSs for all hazardous chemicals (chemicals brought on-site) will be maintained in the work area. MSDSs will be available to all employees for review during each work shift.

For all activities where lead control and asbestos disturbance is performed, a separate compliance plan must be written to adequately communicate planned activities and implemented controls. Compliance plans will appear as attachments or appendices to project-specific SSHP addenda and will be consistent with standards in Section 06.B.05 of the *USACE Safety and Health Requirement Manual.*

10.13 ILLUMINATION

All site fieldwork will be conducted during daylight hours (no earlier than 15 min after sunrise and no later than 15 min before sunset) and natural illumination will be used. Non-fieldwork conducted in buildings will be illuminated to meet the following minimums stated in Section 7 of the *USACE Safety and Health Requirement Manual*: general outdoors - 33 lx, stairs and ladders - 110 lx, offices - 540 lx, and first aid areas - 325 lx.

10.14 SANITATION

- Sanitation will comply with 29 *CFR* 1910.120(n) and Section 2 of the *USACE Safety and Health Requirement Manual*.

- Provide means at the work site for washing hands and faces prior to eating.

- Provide potable drinking water in closed, labeled ("Drinking Water"), sanitary dispensers and protect them from contamination.

- Post any containers or dispensers of non-potable water with "Caution – Water Unsafe for Drinking, Washing, or Cooking."

- Provide toilets, except for mobile crews with transportation to adequate facilities, according to the following: 1 to 15 personnel = 1 toilet, 16 to 35 personnel = 2 toilets, 36 to 55 personnel = 3 toilets, and 56 to 80 personnel = 4 toilets. Toilet facilities must be lit, ventilated, and have areas for hand washing per Section 02.E of the *USACE Safety and Health Requirement Manual*.

10.15 DRILL RIG OPERATIONS

General drilling practices will comply with Section 18H of the *USACE Safety and Health Requirement Manual*.

- Operating manuals will be present on-site for each type of drill rig in use and rigs will be operated per the operating manuals.

- Drill rigs will have at least two functional emergency shutdown devices, one for the driller and one for the driller's helper. These switches will be confirmed to be functional each day that the rig will be used and the confirmation will be recorded in the daily task activity log.

- Drill rigs will have functional backup alarms.

- Drill rigs will be inspected weekly by the driller and recorded on the weekly drill rig inspection form; the SSHO will confirms this inspection.

- Only the driller, driller's helper, and personnel who have a critical need will be allowed near moving parts of the drill rig.

- Drill sites will be verified free of underground utilities by clearing each site with local utilities and/or appropriate installation personnel prior to beginning drilling. Drill sites will be evaluated for proximity to overhead utilities, and minimum distances will be maintained as specified in Table 11-1 of the *USACE Safety and Health Requirement Manual*. Notification will include submitting maps with planned excavation locations clearly marked for appropriate base personnel approval.

- Drill-mounted fire-fighting equipment will be inspected monthly, will not be tampered with, and will not be removed for other than the intended fire-fighting purposes or for servicing.

- Drilling crews and personnel who work near the drill rig will be trained in the location and use of the emergency shutdown devices.

- Drilling will cease during electrical storms or when electrical storms are imminent.

- If lubrication fittings are not accessible with guards in place, machinery will be stopped and disabled (locked out or ignition key removed) for oiling and greasing.

- Work areas and walkways will not be obstructed.

General hoisting operations comply with the *USACE Safety and Health Requirement Manual*.

- The derrick (mast) will not be raised unless the area is free of overhead obstructions and far enough from power lines (see Section 10.7, Electrical Safety).

- The derrick will not be raised until the rig has been blocked, leveled, and chocked.

- Rigging equipment for material handling will be checked prior to use on each shift and as often as necessary to ensure it is safe. Defective rigging will be removed from service.

- A hoisting line with a load imposed will not be permitted to be in direct contact with any derrick member or stationary equipment unless it has been specifically designed for line contact.

- Workers will stand clear of the well bore when any wire line device is being run.

- No loads will be lifted over workers.

- Drill rods will not be run or rotated through rod slipping devices. No more than 1 ft of drill rod column will be hoisted above the top of the drill mast.

10.16 MUNITIONS AND EXPLOSIVES OF CONCERN

Work that involves, or may involve, exposure to MEC will comply with Section 33 of the *USACE Safety and Health Requirement Manual*. The Contractor, at a minimum, will follow the procedures listed below for work in all areas at RVAAP. For work within MRSs (Figure 1-1) or in other areas where MEC hazards may reasonably be expected (e.g., former ordnance disposal sites), MEC avoidance protocols will be included in the SSHP addendum, as discussed below, and qualified UXO personnel will support the field investigation. UXO personnel will survey the area (visually and instrument-assisted) prior to work, establish appropriate controls, and accompany field teams during project execution. Environmental work may be conducted in association with an activity requiring an Explosives Safety Submission (ESS). In this event, the SSHP addendum will reference the ESS and field investigation activities must be performed in accordance with all applicable ESS requirements.

- All on-site workers will be trained to recognize and avoid the types of MEC that may be present.

- Contractors and their subcontractors will not handle, move, or otherwise disturb MEC or any items that cannot be identified as non-MEC without specific authorization from Army.

- If MEC or potential MEC is discovered, work will be stopped and the area evacuated and cordoned off.

- If MEC or potential MEC is discovered, the RVAAP Facility Manager, Army Project Manager, and security organization will be notified immediately.

The *Site Inspection Report for the Ravenna Army Ammunition Plant, Ohio, Military Munitions Response Program, Site Inspection Munitions Response Sites* conducted by engineering-environment Management in 2008 identified MRS throughout the installation. These sites are suspected or believed to contain MEC. When sampling within an MRS, Contractors will follow the requirements in Chapter 5 of USACE Engineering Pamphlet 75-1-2 (USACE 2004b) and previously agreed to protocols at RVAAP. In general, MEC avoidance is conducted as follows:

- Contractors will be escorted by the UXO Technician at all times within MRSs until the UXO Technician has completed a visual and magnetometer survey of access routes, work areas, and sampling locations and all cleared areas are marked. Whites XLT magnetometers or Schonstedt Model MG-220/230 Magnetic Gradiometers (or equivalent) normally will be used as the unit is designed to detect the presence of buried iron or steel objects. The unit responds when the magnetic field strength at the two sensors located in the sensor assembly is different.

- Escorted personnel will follow behind the UXO Technician. If anomalies or MEC are detected, the UXO Technician will halt escorted personnel in place, mark the item(s), select a course around the item, and instruct escorted personnel to follow. The anomaly will be reported to the on-site Field Operations Manger, who will initiate the appropriate response actions.

- Cleared access routes will be at least twice as wide as the widest vehicle entering the MRS. At a minimum, the cleared work area will be a square, with a side dimension equal to twice the length of the largest vehicle or piece of equipment for use on-site.

- The UXO Technician will use a hand-held magnetometer to clear an area prior to soil sampling/well drilling operations commencing. At not more than a 2-ft depth, a Forster Ferex, MK 26 ordnance locator or Schonstedt-down-hole instrument will be lowered into the soil sampling hole. This procedure ensures that smaller items of MEC, undetectable from the surface, can be detected. If no magnetic anomalies are located, the procedure will be repeated at 2-ft intervals to the maximum depth of the sample to be taken. Anomaly avoidance for groundwater monitoring wells and test pits will be conducted in 2-ft intervals to a depth of 10 ft or encountering bedrock, whichever occurs first.

10.17 HISTOPLASMOSIS

Histoplasmosis is an infectious disease caused by inhaling the spores of a fungus called *Histoplasma capsulatum*. Histoplasmosis is not contagious; it cannot be transmitted from an infected person or animal to someone else. Histoplasmosis primarily affects a person's lungs, and its symptoms vary greatly. The vast majority of infected people are asymptomatic (have no apparent ill effects) or they experience symptoms so mild they do not seek medical attention and may not even realize that their illness was histoplasmosis. If symptoms do occur, they will usually start within 3 to 17 days after exposure, with an average of 10 days. Histoplasmosis can appear as a mild, flu-like respiratory illness and has a combination of symptoms, including malaise (a general ill feeling), fever, chest pain, dry or non-productive cough, headache, loss of appetite, shortness of breath, joint and muscle pains,

chills, and hoarseness. Chronic lung disease due to histoplasmosis resembles tuberculosis and can worsen over months or years. Special antifungal medications are needed to arrest the disease.
H. capsulatum grows in soil throughout the world. In the United States, the fungus is endemic (more prevalent) and the proportion of people infected by *H. capsulatum* is higher in central and eastern states, especially along the valleys of the Ohio, Mississippi, and St. Lawrence Rivers and the Rio Grande. The fungus seems to grow best in soil having a high nitrogen content, especially that enriched with bat droppings or bird manure. Disturbances of contaminated material cause small *H. capsulatum* spores to become airborne or aerosolized.
The following actions must be taken to minimize the potential for infection:

- Workers who will disturb collections of bird or bat droppings must be trained in the potential hazard and control measures.

- Avoid disturbing collections of bird or bat droppings in any way that causes airborne dust.

- If collections of bird or bat droppings will be disturbed, wet droppings with water and surfactant before disturbing and continuously during disturbance.

- Stop work and take additional corrective action if visible airborne dust is observed.

- Use particulate respirators and disposable coveralls for work that may involve potentially significant or uncontrolled exposure to collections of droppings.

10.18 LYME DISEASE

Lyme disease is an infection caused by the corkscrew-shaped bacteria Borrelia burgdorferi that is transmitted by the bite of deer *(Ixodes scapularis)* and western black-legged *(Ixodes pacificus)* ticks. The deer tick, which normally feeds on the white-footed mouse, the white-tailed deer, other mammals, and birds, is responsible for transmitting Lyme disease bacteria to humans in the northeastern and north-central United States. On the Pacific Coast, the bacteria are transmitted to humans by the western black-legged tick. Ixodes ticks are much smaller than common dog and cattle ticks. In their larval and nymphal stages, they are no bigger than a pinhead. Adult ticks are slightly larger.

Ticks search for host animals from the tips of grasses and shrubs (not from trees) and transfer to animals or persons that brush against vegetation. Ticks only crawl; they do not fly or jump. Ticks found on the scalp usually have crawled there from lower parts of the body. Ticks can attach to any part of the human body but often attach to the more hidden and hairy areas such as the groin, armpits, and scalp. Research in the eastern United States has indicated that, for the most part, ticks transmit Lyme disease to humans during the nymph stage, probably because nymphs are more likely to feed on a person and are rarely noticed because of their small size. Thus, the nymphs typically have ample time to feed and transmit the infection (ticks are most likely to transmit infection after approximately 2 or more days of feeding). Adult ticks can transmit the disease, but since they are larger and more

likely to be removed from a person's body within a few hours, they are less likely than the nymphs to have sufficient time to transmit the infection.

The following control measures must be followed:

- Whenever possible, avoid entering areas that are likely to be infested with ticks, particularly in spring and summer when nymphal ticks feed. Ticks favor a moist, shaded environment, especially that provided by leaf litter and low-lying vegetation in wooded, brushy, or overgrown grassy habitat.

- Wear light-colored clothing so that ticks can be spotted more easily and removed before becoming attached.

- Wear long pants and tuck pant legs into socks or boot tops or close the pant legs with tape or other means.

- Apply insect repellents containing n,n-diethyl-m-toluamide (DEET) to clothes and exposed skin.

- If personnel must enter areas with known heavy infestation, consider applying permethrin (which kills ticks on contact) to clothes.

- Conduct daily checks for ticks. Embedded ticks should be removed using fine-tipped tweezers. DO NOT use petroleum jelly, a hot match, nail polish, or other products. Grasp the tick firmly and as closely to the skin as possible. With a steady motion, pull the tick's body away from the skin. The tick's mouthparts may remain in the skin, but do not be alarmed. The bacteria that cause Lyme disease are contained in the tick's midgut. Cleanse the area with an antiseptic.

- Note the date of removal of any imbedded tick and seek medical attention if any signs and symptoms of early Lyme disease, Ehrlichiosis, or Babesiosis develop over the ensuing days or weeks.

10.19 ROCKY MOUNTAIN SPOTTED FEVER

Rocky Mountain Spotted Fever is a rickettsial disease caused by the organism *Rickettsia rickettsii*. It is transmitted by the bite of an infected tick and results in a systemic, febrile illness. Several ticks are responsible for the spread of this disease, and these vary by geographic region. The dog tick, *Dermacentor variabilis*, is probably the most common vector. According to the Ohio Department of Health, the incidence of Rocky Mountain Spotted Fever has increased in recent years.

The organism becomes infectious after the tick has been attached to the skin for at least 4 to 6 hr. It can also be transmitted in the process of tick removal if the tick is crushed, which allows infectious material to escape.

Symptoms of Rocky Mountain Spotted Fever include the sudden onset of a moderate to high fever (which can last 2 to 3 weeks if untreated), muscle pain, severe headache, and chills. A rash occurs in about half of the cases. It starts with the extremities and soon spreads to the palms of the hands and soles of the feet, then quickly spreads to the trunk and rest of the body.

Control measures are the same as those for Lyme disease ticks.

10.20 MOSQUITO-BORNE VIRUSES

According the Center for Disease Control, West Nile Virus (WNV) is a potentially serious illness. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall. Most often, WNV is spread by the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then spread WNV to humans and other animals when they bite. The easiest and best way to avoid WNV is to prevent mosquito bites.

- When outdoors, use insect repellent containing an United States Environmental Protection Agency (USEPA)-registered active ingredient. Follow the directions on the package.

- Many mosquitoes are most active at dusk and dawn. Be sure to use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours.

About 1 in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness, and paralysis. These symptoms may last several weeks, and neurological effects may be permanent. Up to 20% of the people who become infected have symptoms such as fever, headache, body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach, and back. Symptoms can last for as short as a few days; although, even healthy people have become sick for several weeks. Approximately 80% of people (about four out of five) who are infected with WNV will not show any symptoms at all. People typically develop symptoms between 3 and 14 days after they are bitten by the infected mosquito (CDC 2006).

10.21 IONIZING RADIATION

All work involving regulated radiation sources must be conducted in accordance with the requirements of the *USACE Safety and Health Requirements Manual*, Section 06.E, Ionizing Radiation (USACE 2008). Requirements include, but are not limited to:

- United States Department of Defense Form 3337, Application for Army Radiation Authorization, must be completed and approved by RVAAP prior to bringing a source onto RVAAP.

- All regulatory requirements, including source security, must be met during the period the source is on RVAAP.

- RVAAP must be notified when the source is removed.

10.22 FUELS

RVAAP procedures and applicable portions of Section 9 of the *USACE Safety and Health Requirements Manual* for use and storage of fuels, such as gasoline and diesel fuel, must be followed. These include, but are not limited to:

- Secondary containment for containers with a capacity of 100 gal or more;

- All spills must be immediately reported to RVAAP;

- Spill response must comply with the current Installation Spill Contingency Plan for RVAAP;

- Fuel storage areas will be posted with signs stating "No Smoking, Matches, or Open Flame," and no ignition sources will be allowed within 50 ft.

- Only labeled/listed (by a nationally recognized testing laboratory) containers and portable tanks will be used for the storage of flammable and combustible liquids.

11.0 SITE CONTROL MEASURES

The Field Operations Manager will be responsible for establishing the site control zones, as necessary, around Contractor-controlled areas that present physical or chemical hazards. Implementation of the site control zones will help to minimize the number of employees potentially exposed and to minimize the potential for the spread of contamination. The SSHO will monitor the implementation of the required site control work rules and will report any deviations from prescribed practice to the Field Operations Manager or stop work, as appropriate.

Most AOCs are in remote locations with limited activity. An exclusion zone may not be practical at these locations. The SSHO will be responsible for determining the need for establishing site controls and exclusion zones. An exclusion zone will be established if the work site will be left intact and unattended for an extended period of time (e.g., leaving an open excavation or drill rig in place overnight). If the SSHO determines that a potential exists for unauthorized personnel to approach within 25 ft of a work zone or otherwise be at risk due to proximity, then exclusion zones will be established as described in the following sections.

11.1 EXCLUSION ZONE

The exclusion (contamination) zone is the area where the greatest potential exists for exposure to contamination or physical hazards. The periphery of the exclusion zone will be identified by barricade tape or rope suspended above the ground. An entry and exit checkpoint will be visually defined to regulate the flow of personnel and equipment. The entry and exit checkpoint will be delineated with barricade tape/rope and signs. Signs may state "Construction Area," or "High Noise Area," as deemed appropriate by the SSHO. The number of people and equipment in the exclusion zone will be minimized to control physical hazards and the spread of contamination.

The following standard rules will apply to all entry into the exclusion zone:

- The SSHO or Field Operations Manager must approve (and log) entry into the exclusion zone.
- All personnel entering the exclusion zone will wear the prescribed level of protective clothing.
- All items and related paraphernalia intended to be placed on the face or in the mouth (e.g., cigarettes, lighters, matches, chewing tobacco, food, cosmetics) are prohibited in the exclusion zone.
- All personnel in the exclusion zone will follow the buddy system.

Exclusion zones will be established around drilling sites, areas of heavy equipment use, and all activities where contamination is a potential hazard. As a minimum, the exclusion zone will extend 25 ft from the hazard. For drilling operations, the exclusion zone will also be at least equal to the

mast height in radius so that no part of an overturned drill rig will fall outside the zone. A larger exclusion zone will be used, as necessary, to protect bystanders and the public from chemical or other hazards. Exclusion zones for other activities will be appropriate to the hazard and surroundings.

11.2 CONTAMINATION REDUCTION ZONE

A contamination reduction (buffer) zone will be established, as necessary, outside the exclusion zone to provide a transition from and a buffer between the exclusion zone and the support zone. A formal contamination reduction zone for personnel will not be established unless Level D+ PPE or higher level (A, B, C) is used or significant surface contamination is present or suspected. An entry and exit checkpoint will be visually defined at the periphery of the zone to regulate the flow of personnel and equipment. The entry and exit checkpoint and the perimeter of the zone will be delineated with the use of ropes/barricade tape and signs. A contamination reduction zone will be established around the central equipment decontamination pad.

All personnel entering the contamination reduction zone will wear the prescribed level of protective clothing required for that zone. All items intended to be placed on the face or in the mouth (e.g., cigarettes, chewing tobacco, food, cosmetics) are prohibited in the contamination reduction zone. Doffing of protective clothing and personnel decontamination will occur in the contamination reduction zones.

11.3 SUPPORT ZONE

The support zone is the clean and relatively safe area surrounding the exclusion and contamination reduction zones. Entry requirements for the support zone consist of those required for entry into the general area of the facility. Primary functions of the support zone are

- Staging area for clean equipment and supplies; and

- Location for support services (e.g., office trailers, laboratory trailers, eating area[s], toilet facilities, parking, visitor area[s]).

11.4 SITE VISITORS

The Field Operations Manager will add all employees/visitors to the on-site access roster that is maintained by the RVAAP Operations and Maintenance (O&M) Contractor. The O&M Contractor will approve and coordinate site access with Guard Post 1. All visitors are required to sign-in with Guard Post 1 to gain site access. Visitors will not be allowed inside areas controlled by the Contractor without specific approval of the SSHO and Field Operations Manager. Visitors must meet all regulatory (specifically 29 *CFR* 1910.120) and site health and safety requirements (e.g., proof of training, medical surveillance) to be considered for RVAAP entry. All visitors will receive a health and safety briefing appropriate to the nature of the visit and the potential hazards associated with the visit. All visitors must sign the daily tailgate and health and safety briefing form (Appendix A).

11.5 SITE COMMUNICATION

Field personnel will be capable of contacting other field personnel and outside agencies. Communication on-site will be assured by hand-held radio, cellular phone, portable air horns, or vehicle horns. Short blasts (less than 1/2 sec) of an air horn or car horn will be used to request assistance. Prolonged blasts (more than 2 sec) will be used to signal an evacuation. If phone service is not immediately available on the site, the crew will be equipped with a cellular phone. If cell phone reception cannot be obtained at the site, available RVAAP hand-held radios should be used.

THIS PAGE INTENTIONALLY LEFT BLANK.

12.0 PERSONNEL HYGIENE AND DECONTAMINATION

A system of procedures will be used to control the spread of contamination from the exclusion (contamination) zone and to ensure that workers are sufficiently free of contamination to preclude adverse health effects. PPE doffing and personnel decontamination are part of this system. The SSHO will ensure the construction of a decontamination station, as necessary; instruct personnel on its proper use; and verify that personnel follow the appropriate steps. This section presents examples of basic requirements for personnel decontamination keyed to the level of protective clothing in use. It is the SSHO's responsibility to verify that personnel hygiene and decontamination processes are adequate to protect personnel and meet the requirements of Sections 06.M and 28 of the *USACE Safety and Health Requirements Manual* (USACE 2008).

12.1 LEVEL D+ PROTECTION DECONTAMINATION

Station 1: Tape removal

Remove all tape (if used) from outer clothing and place in appropriate waste container.

Station 2: Boot covers, outer disposable garment, and chemical-resistant gloves removal

Carefully remove boot covers, outer contamination-resistant garment, and gloves.

Station 3: Field wash

Wash hands and face prior to eating, drinking, or smoking. This step may be accomplished with soap and water or disposable disinfectant wipes.

12.2 LEVEL C PROTECTION DECONTAMINATION

Station 1: Segregated equipment drop

Deposit equipment used on-site (e.g., tools, sampling devices, containers, monitoring instruments, clipboards) on plastic sheets or in different containers with plastic liners. Segregating the equipment at the drop site reduces the possibility of cross-contamination.

Station 2: Outer boot and glove removal

Remove tape from outer boots and outer gloves. Remove outer boot covers and outer gloves. Deposit gloves and boot covers in plastic trash bags.

Station 3: Cartridge change

If a worker has left the exclusion zone for the sole purpose of changing a canister/cartridge of the respirator, this is the last step of the decontamination procedure. Once the worker's canister/cartridge has been replaced, the outer boots and gloves will be replaced and re-taped so that all potential pathways to the skin are sealed.

Station 4: Disposable outer garment removal

Remove the disposable outer garment, deposit in a plastic trash bag, and dispose of it in accordance with the FWSAP.

Station 5: Respiratory protection and disposable inner glove removal

The respirator is the next-to-last item for removal. The cartridges/canisters are placed in a plastic trash bag and disposed of in accordance with the FWSAP. The respirator is placed in a plastic bag dedicated for used respirators only. Disposable inner gloves are the last item removed; deposit them in a plastic trash bag in accordance with the FWSAP.

Station 6: Field wash

Wash hands and face prior to eating, drinking, or smoking. This step may be accomplished with soap and water or disposable disinfectant wipes.

13.0 EMERGENCY PROCEDURES AND EQUIPMENT

The Contractor must establish sufficient emergency procedures and equipment to allow a safe and effective response to credible emergencies. If an emergency occurs, the Field Operations Manager, the SSHO, and the field team will participate in a post-emergency briefing to discuss the event, identify the causes, identify corrective measures, and evaluate the responses.

In the event of an accident or incident, the Field Operations Manager must first notify Guard Post 1 (330-358-2017) who will coordinate the response. The Field Operations Manager should then notify the USACE Project Manager immediately according to the requirements of the *USACE Safety and Health Requirements Manual* (USACE 2008). The required Accident Report (ENG Form 3394) must be completed and submitted to the USACE Project Manager within 2 days.

All personnel working on-site will be trained in the applicable emergency response requirements. This includes recognizing emergencies, reporting emergencies to the Field Operations Manager or SSHO, and responding to emergencies. Employees will also be informed of any changes in potential emergencies or response plans.

13.1 POTENTIAL EMERGENCIES

Credible potential emergencies for this work include fires, minor chemical spills, and personnel injury.

13.1.1 Fires

Small quantities of flammable solvents [typically less than 18.9 L (5 gal)], gasoline, and diesel fuel may be present on-site. In the event of a fire, Guard Post 1 will be notified immediately. If it is safe to do so, on-site personnel may attempt to extinguish the fire with the available fire extinguishers and isolate any nearby flammable materials. If there is any doubt about the safety of extinguishing the fire, site personnel will evacuate the area. The supervisor or knowledgeable employee will provide the Guard Post 1 with relevant information when they arrive.

13.1.2 Spills

Potential spills include releases of fuels, lubricants, hydraulic fluids, and decontamination solvents. In the event of a spill or leak, the employee making the discovery will immediately notify the SSHO and/or the Field Operations Manager. The Field Operations Manager will determine whether the leak poses an environmental risk or will exceed the capacity of on-site personnel and equipment. In the unlikely event that there is a probability that the spill will extend beyond the immediate area, result in an environmental insult, or exceed the capabilities of the on-site personnel, the Field Operations Manager will inform Guard Post 1. If this is not the case, the on-site spill kit will be utilized to clean

up the spill. All spills of reportable quantities will be reported to the Ohio EPA Spill Hotline (1-800-282-9378).

13.1.3 Medical Emergencies

Field crews will use a variety of equipment that could cause injuries. In the event of a medical emergency, the Field Operations Manager will notify Guard Post 1. At least two first aid/ CPR-trained individuals will be on-site at all times, and these personnel will provide first aid pending release of the injured person to emergency medical staff. Automated External Defibrillators are located at Building 1037 and Guard Post 1. Contaminated injured personnel will be decontaminated to the extent feasible. Personnel with minor injuries will follow normal decontamination procedures. Personnel with serious injuries will be decontaminated, if necessary, by disrobing and wrapping in a blanket. Decontamination may be bypassed in the event of life-threatening injuries or illnesses.

13.1.4 Unplanned Detonations

Environmental investigations conducted at RVAAP within munitions response sites or areas suspected to contain MEC will follow the avoidance protocol presented in Section 10.16, which includes response actions and notification requirements for discovery of MEC. Awareness of planned or scheduled detonation events are part of the Army coordination responsibility of the Contractor Project Manager, Field Operations Manager, and SSHO who will communicate these planned activities to field personnel as part of project and daily safety briefings. In the event of an unplanned detonation, site personnel will evacuate the area immediately and will notify security personnel at Guard Post 1 to initiate the appropriate civil and military emergency response actions. The Field Manager, SSHO, or other knowledgeable employees will remain in the evacuation area to provide security personnel with relevant information when they arrive. First aid/CPR-trained individuals on-site will provide first aid to any injured persons as discussed in Section 13.1.3 pending release of the injured person to emergency medical staff.

13.2 EMERGENCY PHONE NUMBERS

Table 13-1 lists the emergency groups and their telephone numbers. A telephone and two-way radio will be present in the field and available for use at all times. All emergencies on-site will be coordinated first through Guard Post 1 (330-358-2017) who will coordinate the response.

At least one person (i.e., Contractor Project Manager or Field Operations Manager) must have a working two-way radio on the RVAAP frequency. The radio must be tested each morning before the start of work by radioing Security with a communication check. Each team must have direct radio or telephone communication with the Project Manager or Field Operations Manager. For the purposes of this requirement, a team is any individual(s) not having a line of sight or within normal voice range of another individual(s) having means of communication with the Field Operations Manager.

Table 13-1. Emergency Contact Phone Numbers

Position	Phone
RVAAP Guard Post 1 (Police, Fire, Emergency Medical)	(330) 358-2017
Hospital (Robinson Memorial, Ravenna)	(330) 297-2449/0811
RVAAP Facility Manager (Currently) Mark Patterson	(330) 358-7311
RVAAP Operation and Maintenance Contractor (Currently) Jim McGee, Vista Sciences	(330) 358-3005
USACE COTR TBD	TBD
Ohio EPA (Currently) Eileen Mohr	(330) 963-1221
Ohio EPA Spill Hotline	(800) 282-9378
Contractor Project Manager TBD	TBD
Contractor Health and Safety Personnel TBD	TBD

COTR = Contracting Officer's Technical Representative. TBD = To be determined.
Ohio EPA = Ohio Environmental Protection Agency. USACE = United States Army Corps of Engineers.
RVAAP = Ravenna Army Ammunition Plant.

Robinson Memorial Hospital is located approximately 32 km (20 miles) from the site at 6847 N. Chestnut Street in Ravenna, Ohio. It can be reached by taking Highway 5 E approximately 11 km (7 miles), Highway 5 approximately 3.2 km (2 miles), Highway 59, then right onto Highway 44 (Chestnut Street). Figure 13-1 contains a map and directions to Robinson Memorial Hospital.

13.3 EMERGENCY ALERTING

In the event of an emergency, contact Guard Post 1 trough the two-way radio or call (330-358-2017). If these attempts fail, additional emergency alerting procedures are as follows. Each team will have a means for generating an audible alarm, which will consist of a compressed gas horn or vehicle horn. These devices will be used to signal to other project personnel in the event of accidents or emergencies. Short blasts (less than 1/2 sec) of the horn will be used to request assistance, while extended blasts (more than 2 sec) will signal an evacuation.

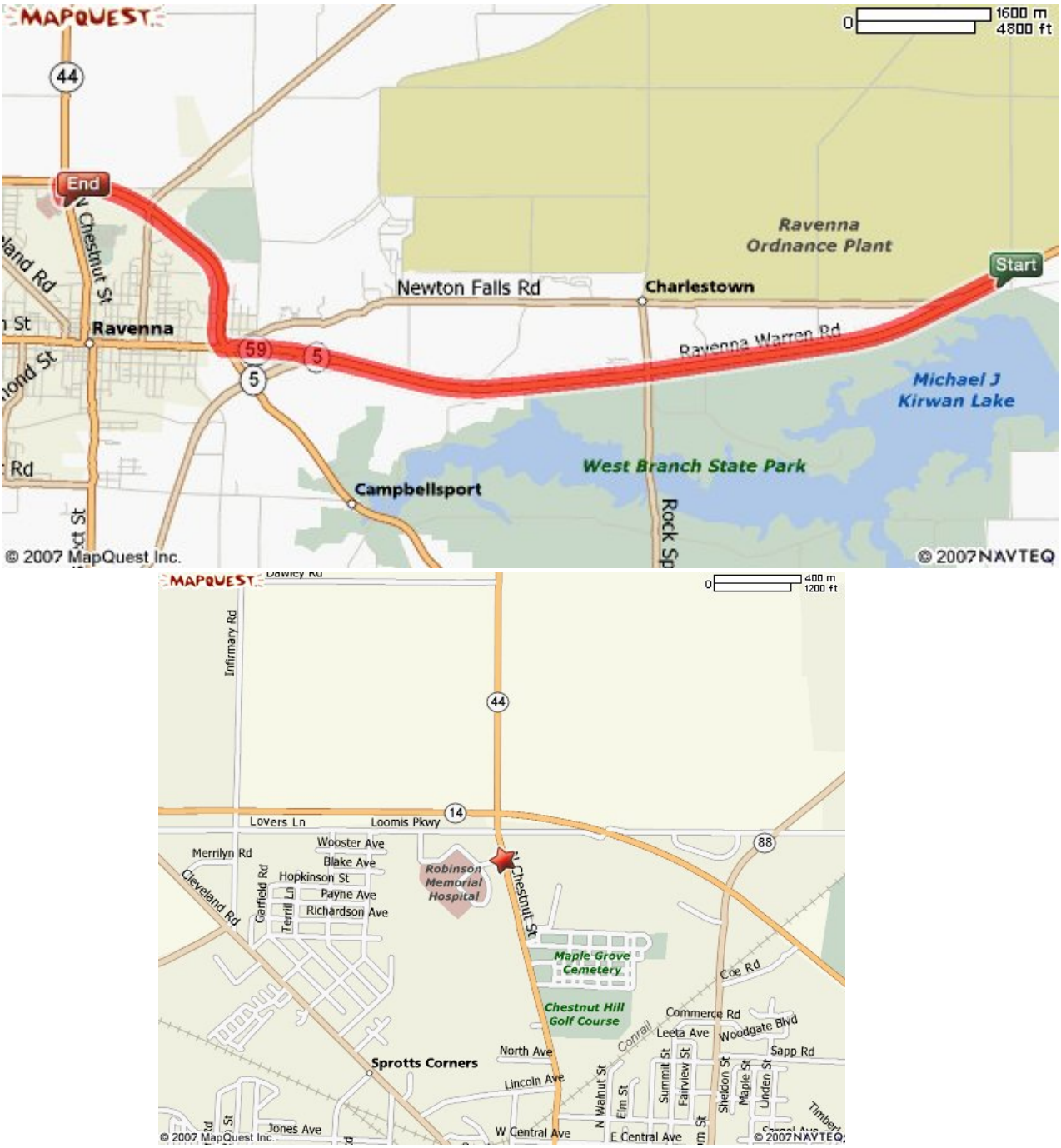
13.4 EVACUATION

The FWSHP project-specific addenda must contain a map that illustrates assembly points and egress routes from each AOC included in the investigation. The SSHO or Field Operations Manager will inform all employees of the designated evacuation routes and assembly area. The facility-wide assembly point is Guard Post 1 as indicated on Figure 13-2.

13.5 EMERGENCY EQUIPMENT

Several items of emergency equipment will be maintained at the work site. Any incident that is not clearly controllable by personnel wearing standard site clothing plus protective gloves and using the listed equipment will require re-evaluation by the SSHO. If the SSHO does not feel that on-site personnel can safely control the emergency with the available equipment, the crew will use an alternate approach such as allowing a small fire to burn out or evacuating the site. The required emergency equipment includes the following:

- Fully stocked first aid kit indoors or in a weather-proof container, inspected weekly;
- Compressed gas horns;
- Emergency eye wash to meet American National Standards Institute standard if corrosives (water sample preservatives) are being poured;
- Fire extinguisher(s) (at least 20-B) 7.6-22.9 m (25-75 ft) from outside the flammables storage (or use) area;
- Basic spill kit suitable to handle small spills of decontamination fluids, hydraulic fluid, or fuels and containing sorbent pads, tubes, and nitrile or similar gloves; and
- Telephone and two-way radios.

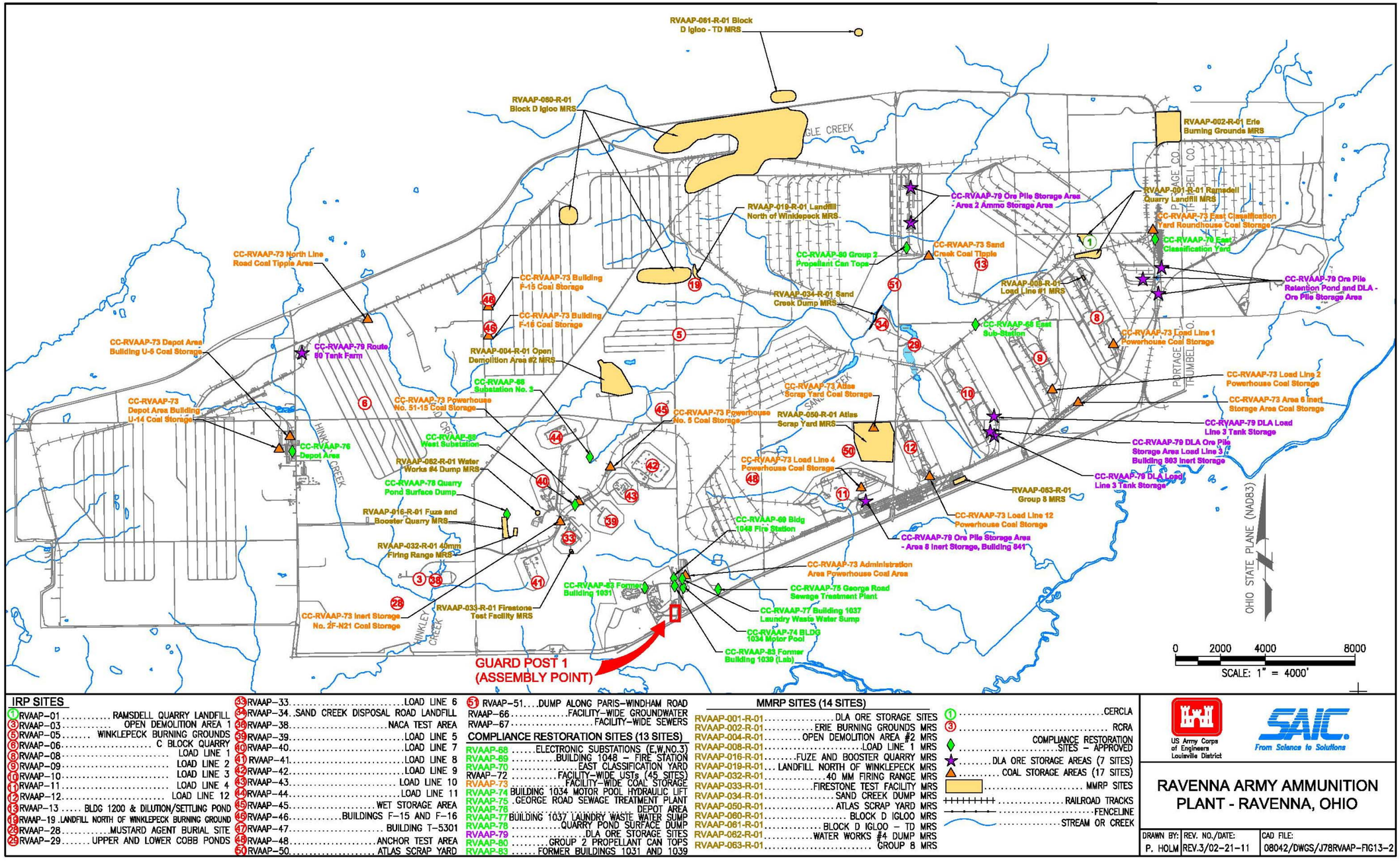


Robinson Memorial Hospital
6847 N. Chestnut Street
Ravenna, Ohio
(330) 297-0811

Directions: West on State Route 5. Stay straight onto OH-59 West. Turn Right onto OH-14/OH-44. Turn Left onto North Chestnut St.

Figure 13-1. Route Map and Directions to Pre-Notified Medical Facility

THIS PAGE INTENTIONALLY LEFT BLANK.



IRP SITES

1 RVAAP-01 ..... RAMSDELL QUARRY LANDFILL
3 RVAAP-03 ..... OPEN DEMOLITION AREA 1
5 RVAAP-05 ..... WINKLEPECK BURNING GROUNDS
6 RVAAP-06 ..... C BLOCK QUARRY
8 RVAAP-08 ..... LOAD LINE 1
9 RVAAP-09 ..... LOAD LINE 2
10 RVAAP-10 ..... LOAD LINE 3
11 RVAAP-11 ..... LOAD LINE 4
12 RVAAP-12 ..... LOAD LINE 12
13 RVAAP-13 ..... BLDG 1200 & DILUTION/SETTLING POND
19 RVAAP-19 .LANDFILL NORTH OF WINKLEPECK BURNING GROUND
26 RVAAP-28 ..... MUSTARD AGENT BURIAL SITE
29 RVAAP-29 ..... UPPER AND LOWER COBB PONDS
33 RVAAP-33 ..... LOAD LINE 6
34 RVAAP-34 ..SAND CREEK DISPOSAL ROAD LANDFILL
36 RVAAP-38 ..... NACA TEST AREA
39 RVAAP-39 ..... LOAD LINE 5
40 RVAAP-40 ..... LOAD LINE 7
41 RVAAP-41 ..... LOAD LINE 8
42 RVAAP-42 ..... LOAD LINE 9
43 RVAAP-43 ..... LOAD LINE 10
44 RVAAP-44 ..... LOAD LINE 11
45 RVAAP-45 ..... WET STORAGE AREA
46 RVAAP-46 ..... BUILDINGS F-15 AND F-16
47 RVAAP-47 ..... BUILDING T-5301
48 RVAAP-48 ..... ANCHOR TEST AREA
50 RVAAP-50 ..... ATLAS SCRAP YARD
51 RVAAP-51 ...DUMP ALONG PARIS-WINDHAM ROAD
RVAAP-66 ..... FACILITY-WIDE GROUNDWATER
RVAAP-67 ..... FACILITY-WIDE SEWERS

COMPLIANCE RESTORATION SITES (13 SITES)

RVAAP-68 ..... ELECTRONIC SUBSTATIONS (E,W,NO.3)
RVAAP-69 ..... BUILDING 1048 – FIRE STATION
RVAAP-70 ..... EAST CLASSIFICATION YARD
RVAAP-72 ..... FACILITY-WIDE USTs (45 SITES)
RVAAP-73 ..... FACILITY-WIDE COAL STORAGE
RVAAP-74 BUILDING 1034 MOTOR POOL HYDRAULIC LIFT
RVAAP-75 .GEORGE ROAD SEWAGE TREATMENT PLANT
RVAAP-76 ..... DEPOT AREA
RVAAP-77 BUILDING 1037 LAUNDRY WASTE WATER SUMP
RVAAP-78 ..... QUARRY POND SURFACE DUMP
RVAAP-79 ..... DLA ORE STORAGE SITES
RVAAP-80 ..... GROUP 2 PROPELLANT CAN TOPS
RVAAP-83 ..... FORMER BUILDINGS 1031 AND 1039

MMRP SITES (14 SITES)

RVAAP-001-R-01 ..... DLA ORE STORAGE SITES
RVAAP-002-R-01 ..... ERIE BURNING GROUNDS MRS
RVAAP-004-R-01 ..... OPEN DEMOLITION AREA #2 MRS
RVAAP-008-R-01 ..... LOAD LINE 1 MRS
RVAAP-016-R-01 ..... FUZE AND BOOSTER QUARRY MRS
RVAAP-019-R-01 ... LANDFILL NORTH OF WINKLEPECK MRS
RVAAP-032-R-01 ..... 40 MM FIRING RANGE MRS
RVAAP-033-R-01 ..... FIRESTONE TEST FACILITY MRS
RVAAP-034-R-01 ..... SAND CREEK DUMP MRS
RVAAP-050-R-01 ..... ATLAS SCRAP YARD MRS
RVAAP-060-R-01 ..... BLOCK D IGLOO MRS
RVAAP-061-R-01 ..... BLOCK D IGLOO – TD MRS
RVAAP-062-R-01 ..... WATER WORKS #4 DUMP MRS
RVAAP-063-R-01 ..... GROUP 8 MRS

1 ..... CERCLA
3 ..... RCRA
COMPLIANCE RESTORATION SITES – APPROVED
..... DLA ORE STORAGE AREAS (7 SITES)
..... COAL STORAGE AREAS (17 SITES)
..... MMRP SITES
..... RAILROAD TRACKS
..... FENCELINE
..... STREAM OR CREEK

US Army Corps of Engineers Louisville District

SAIC. From Science to Solutions

RAVENNA ARMY AMMUNITION PLANT - RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
P. HOLM	REV.3/02-21-11	08042/DWGS/J78RVAAP-FIG13-2

Figure 13-2. RVAAP Facility-Wide Assembly Area

THIS PAGE INTENTIONALLY LEFT BLANK.

14.0 LOGS, REPORTS, AND RECORD KEEPING

A system of reports and logs will be used to document activities related to site health and safety. The Field Operations Manager and SSHO will generate a brief weekly summary of health and safety issues and resolutions. These reports will include injuries, accidents, near accidents, interpretations of this FWSHP or regulations, interactions with auditors/regulators/USACE personnel, and any off-normal events. These reports will be limited to one page or less.

In addition to the weekly reports, the following documents will be generated and submitted to the USACE Project Manager:

- Training logs will contain information covered and the signatures of the trainer and those attending. These logs will contain documentation of pre-entry (project start) training, routine ("tailgate") safety briefings, and visitor training.

- Daily safety inspection logs will contain the dates of inspections, identity of the person doing the inspection, the examined areas/activities/equipment, any deficiencies, and any corrective actions taken.

- Equipment maintenance logs will contain the dates and types of routine maintenance performed on-site equipment.

- The Field Operations Manager will add all employees/visitors to the on-site access roster that is maintained by the RVAAP O&M Contractor. The roster includes the names of all personnel who will perform on-site work or visit the site and certification of required training. It will not contain the names of delivery or similar personnel.

- Environmental and personal exposure monitoring/sampling results will be maintained in a log that will contain monitoring data, location and time of monitoring, types of work being done, calibration records, and the identities of personnel performing monitoring.

Samples of reporting forms are included in Appendix A but any similar or equivalent forms may be used.

THIS PAGE INTENTIONALLY LEFT BLANK.

15.0 REFERENCES

ACGIH (American Conference of Governmental Industrial Hygienists) 2010. *2010 (Threshold Limit Values) TLVs® and Biological Exposure Indices (BEIs) and Guide to Occupational Exposure Values.*

CDC (Center for Disease Control) 2006. West Nile Virus: What You Need To Know. http://www.cdc.gov/ncidod/dvbid/westnile/wnv_factsheet.htm. September 2006.

e2M (engineering-environmental Management) 2008. *Site Inspection Report for the Ravenna Army Ammunition Plant, Ohio, Military Munitions Response Program, Site Inspection Munitions Response Sites*. DACA-63-03-D0009. Final. May 2008.

International Occupational Heath and Safety Information Center 2008. International Chemical Safety Cards. December 2007.

NIOSH (National Institute of Occupational Safety and Health)/OSHA/United States Coast Guard/United States Environmental Protection Agency 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.* October 1985.

NIOSH 2005. *NIOSH Pocket Guide to Chemical Hazards*. September 2005.

Ohio EPA (Ohio Environmental Protection Agency) 2004. *Director's Final Findings and Orders for the Ravenna Army Ammunition Plant*. June 2004.

USACE (United States Army Corps of Engineers) 2004a. *Facility-Wide Groundwater Monitoring Program for the Ravenna Army Ammunition Plant, Ravenna, Ohio*. Contract No. GS-10F-0350M. Deliver Order No. DACA27-03-F-0047. September 2004.

USACE 2004b. *Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities* USACE Engineering Pamphlet EP 75-1-2. August 2004.

USACE 2007. *Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste and Ordnance and Explosive Waste Activities*. ER-385-1-92. May 2007.

USACE 2008. *USACE Safety and Health Requirements Manual*. EM 385-1-1. September 2008.

THIS PAGE INTENTIONALLY LEFT BLANK.

APPENDIX A

REPORTING FORMS

DAILY SAFETY INSPECTION

PROJECT:_____ Page 1 of 2

N	Y	NA	Item
			Daily safety briefing conducted
			Emergency numbers and route to hospital posted
			FWSHP and project-specific Addenda on-site, available to employees, and complete
			Required exposure monitoring conducted and documented
			Monitoring instruments (PID, OVA, CGI) calibrated daily against known standard and documented
			First aid kit available and inspected weekly
			Personnel wearing PPE required by SSHP for fieldwork (at least safety shoes or boots, safety glasses with side shields, and nitrile or similar gloves to handle potentially contaminated material)
			Personnel using buddy system (maintain visual or verbal contact and able to render aid)
			If temperature >70°F: heat stress training conducted, cool fluids available, pulse rates of personnel wearing Tyvek® are being monitored, work/rest cycle in SSHP being followed
			If temperature <40°F: cold stress training conducted, controls in SSHP implemented
			Personnel using appropriate biological hazard controls (See SSHP)
			Drill rig operating manual on-site
			Drill rigs inspected weekly and documented
			Personnel near drill rig or other overhead hazards wearing hardhats
			Each of two drill rig emergency shutdown devices tested daily
			Employees excluded from under lifted loads
			Unnecessary personnel excluded from hazardous areas, specifically near heavy equipment
			Radius of exclusion zone around drill rig at least equal to mast height
			Personnel wearing hearing protection when within 25 ft of drill rigs, generators, or other noisy equipment
			Containers of flammable liquids closed and labeled properly
			Fully charged fire extinguisher available 25 to 50 ft from flammables storage area and inspected monthly
			Personnel exiting potentially contaminated areas washing hands before eating
			Personnel using steam washer wearing faceshield, hearing protection, heavy duty waterproof gloves, Saranax or rainsuit

DAILY SAFETY INSPECTION

PROJECT:_____ Page 2 of 2

N	Y	NA	Item
			Portable electrical equipment plugged to a GFCI
			Electrical wiring covered by insulation or enclosure
			Three wire, UL approved, extension cords used
			Housekeeping adequate (walkways clear of loose, sharp or dangerous objects and trip hazards, work areas clear of objects that might fall on employees)
			Walking/working surfaces safe (not slippery, no unguarded holes, no trip hazards)
			Excavations deeper than 5 ft shored or sloped (if personnel will enter) and in compliance with SSHP
			Moving (rotating) machinery guarded to prevent employee contact
			Fall protection provided for work at elevations greater than 4 ft
			All containers of hazardous material labeled to indicate contents and hazards
			MSDSs for hazardous materials on-site
			All vehicles equipped with two-way radios and cellular phones
			15-min eyewash (accessible and full) within 100 ft of areas where corrosive sample preservatives are poured
			Potable and non-potable water labeled
			Chainsaws have anti kick-back protection, personnel wearing cut resistant gloves, protective chaps
			Visitor access controlled
			Site hazards and controls consistent with SSHP
			Site hazard controls appropriate and sufficient

Actions taken to correct or control any "N" responses

_____

Name Signature Date

DAILY HEALTH AND SAFETY SUMMARY PROJECT NAME: PROJECT NO:
NAME: DATE: M Tu W Th F Sa Su TIME:
TASKS PERFORMED:
OFF-NORMAL EVENTS:

THIS PAGE INTENTIONALLY LEFT BLANK.

TAILGATE SAFETY MEETING LOG PROJECT NAME: PROJECT NO:		
DATE: M Tu W Th F Sa Su TIME:		
WEATHER:		
WORKING CONDITIONS:		
PPE:		
ITEMS DISCUSSED:		
THE FOLLOWING INDIVIDUALS ATTENDED THE DAILY TAILGATE SAFETY MEETING (SIGNATURES)		

_____

SITE SAFETY AND HEALTH OFFICER

THIS PAGE INTENTIONALLY LEFT BLANK.

HEALTH AND SAFETY MONITORING LOG

PROJECT NAME: **PROJECT NO:**

DATE	INSTRUMENT/NO.	RESULTS	TIME	REMARKS	NAME

THIS PAGE INTENTIONALLY LEFT BLANK.

(For Safety Staff only)	REPORT NO.	EROC CODE	UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT *(For Use of this Form See Help Menu and USACE Suppl to AR 385-40)*	REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC	☐ FATAL ☐ OTHER		☐	

2. PERSONAL DATA

a. Name *(Last, First, MI)*	b. AGE	c. SEX ☐ MALE ☐ FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE

f. JOB SERIES/TITLE	g. DUTY STATUS AT TIME OF ACCIDENT	h. EMPLOYMENT STATUS AT TIME OF ACCIDENT
	☐ ON DUTY ☐ TDY ☐ OFF DUTY	☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER ☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL ☐ TEMPORARY ☐ STUDENT ☐ OTHER *(Specify)* _____

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*	b. TIME OF ACCIDENT *(Military time)* hrs	c. EXACT LOCATION OF ACCIDENT	d. CONTRACTOR'S NAME (1) PRIME: (2) SUBCONTRACTOR:

e. CONTRACT NUMBER	f. TYPE OF CONTRACT	g. HAZARDOUS/TOXIC WASTE ACTIVITY
_____ ☐ CIVIL WORKS ☐ MILITARY ☐ OTHER *(Specify)* _____	☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER *(Specify)* _____	☐ SUPERFUND ☐ DERP ☐ IRP ☐ OTHER *(Specify)* _____

4. CONSTRUCTION ACTIVITIES ONLY *(Fill in line and corresponding code number in box from list - see help menu)*

a. CONSTRUCTION ACTIVITY	(CODE) #	b. TYPE OF CONSTRUCTION EQUIPMENT	(CODE) #

5. INJURY/ILLNESS INFORMATION *(Include name on line and corresponding code number in box for items e, f & g - see help menu)*

a. SEVERITY OF ILLNESS/INJURY	(CODE) #	b. ESTIMATED DAYS LOST	c. ESTIMATED DAYS HOSPITALIZED	d. ESTIMATED DAYS RESTRICTED DUTY

e. BODY PART AFFECTED	(CODE) #	g. TYPE AND SOURCE OF INJURY/ILLNESS	(CODE) #
PRIMARY _____		TYPE _____	
SECONDARY _____		SOURCE _____	
f. NATURE OF ILLNESS/INJURY _____			

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see help menu)*

a. ACTIVITY AT TIME OF ACCIDENT	(CODE) #	b. PERSONAL FLOATATION DEVICE USED?
		☐ YES ☐ NO ☐ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE	b. TYPE OF COLLISION	c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
☐ PICKUP/VAN ☐ AUTOMOBILE ☐ TRUCK ☐ OTHER *(Specify)* _____	☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END ☐ BROADSIDE ☐ ROLL OVER ☐ BACKING ☐ OTHER *(Specify)* _____	(1) FRONT SEAT			
		(2) REAR SEAT			

8. PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM	b. OWNERSHIP	c. $ AMOUNT OF DAMAGE
(1)		
(2)		
(3)		

9. VESSEL/FLOATING PLANT ACCIDENT *(Fill in line and correspondence code number in box from list - see help menu)*

a. TYPE OF VESSEL/FLOATING PLANT	(CODE) #	b. TYPE OF COLLISION/MISHAP	(CODE) #

10. ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

ENG FORM 3394, MAR 99 Version 2 EDITION OF SEP 89 IS OBSOLETE. Page 1 of 4 pages (Proponent: CESO)

11. CAUSAL FACTOR(S) *(Read Instruction Before Completing)*		
a. (Explain YES answers in item 13)	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐

a. *(CONTINUED)*	YES	NO
CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as, noise, radiation, etc., contribute to accident?	☐	☐
OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐	☐
SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	☐	☐
DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident	☐	☐

b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?

☐ YES *(If yes, attach a copy.)* ☐ NO

12. TRAINING		
a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? ☐ YES ☐ NO	b. TYPE OF TRAINING. ☐ CLASSROOM ☐ ON JOB	c. DATE OF MOST RECENT FORMAL TRAINING. (Month) (Day) (Year)

13. **FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES** *(See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)*

a. DIRECT CAUSE

b. INDIRECT CAUSE(S)

14. **ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).**

DESCRIBE FULLY:

15. **DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.**

a. BEGINNING (Month/Day/Year)	b. ANTICIPATED COMPLETION (Month/Day/Year)		
c. SIGNATURE AND TITLE OF SUPERVISOR COMPLETING REPORT CORPS _____ CONTRACTOR _____	d. DATE *(Mo/Da/Yr)*	e. ORGANIZATION IDENTIFIER *(Div, Br, Sect)*	f. OFFICE SYMBOL

16. **MANAGEMENT REVIEW** *(1st)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

17. **MANAGEMENT REVIEW** *(2nd - Chief Operations, Construction, Engineering, etc.)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

18. **SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW**

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE

19. **COMMAND APPROVAL**

COMMENTS

COMMANDER SIGNATURE	DATE

Page 2 of 4 pages

*U.S. GOVERNMENT PRINTING OFFICE: 1993-0-791-757

10.	ACCIDENT DESCRIPTION *(Continuation)*

13a.	DIRECT CAUSE *(Continuation)*

13b.	INDIRECT CAUSES *(Continuation)*

14.	ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S) *(Continuation)*

DRAFT FACILITY-WIDE SAMPLING AND ANALYSIS PLAN AND
FACILTY-WIDE SAFETY AND HEALTH PLAN FOR ENVIRONMENTAL INVESTIGATIONS
RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO
COMMENT RESPONSE TABLE
REV. 4, FEBRUARY 23, 2011

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
Todd R. Fisher, Ohio EPA, NEDO, DERR – Comments on the FW Sampling and Analysis Plan					
O-1	Page ES-7 Figure ES-2	Figure ES-2 in the SAP and Figures 1-1 and 13-2 in the SHP	Some of the MRS boundaries may have changed since this map was last updated.	Please check with USACE to confirm that the map being used or modified is the most current addition.	**Amended Response 18-Feb-2011** Clarification. Per discussion with USACE, SAIC has included the most current version of MRS locations and boundaries. MRS boundaries may be updated after completion of the MMRP RI work. However, SAIC did make minor revisions to this map in response to USACE comments in December 2010. The December 2010 version has replaced the November 2010 version in the Draft document. Per comment resolution discussion with RVAAP stakeholders on 8-Feb-2011 and with USACE on 16-Feb-2011, Figure ES-2 has been revised to remove RVAAP-16 Fuze and Booster Landfill Quarry/Ponds from the list of IRP Sites in the legend of the map. The 2011 IAP does not include RVAAP-16 in the list of active IRP sites. The symbol (diamond) and label for the northern portion of CR Site RVAAP-80: Group 2 Propellant Can Tops has also been removed from the map. In addition, Figures 1-1 and 13-2 in the FWSHP have been updated accordingly.
O-2	Page 2-4 Lines 12-14	Page 2-4, Section 2.2.2.	The text states that "locally, a buried glacial valley filled with sand and gravel potentially exists in the central portion of the facility, oriented in a southwest-northeast direction.	Please clarify whether or not bedrock outcrops exist in the area of the buried valley.	Agree. Text has been revised as follows: "Locally, a pre-glacial buried ~~glacial~~

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
			The presumed depth of the valley ranges from 30.5 to 60.7 m (100 to 200 ft)." The March 2001 FWSAP states that "bedrock outcrops have been documented in the same area, so the existence of a buried valley in this location cannot be confirmed." There is no mention of these bedrock outcrops in this current document.		valley potentially exists in the central portion of the facility, oriented in a southwest-northeast direction. This valley is filled with glacial outwash consisting of poorly sorted clay, till, gravel, and silty sand. The presumed ~~depth~~ thickness of glacial deposits ~~of~~ within the valley ranges from 30.5 to 60.7 m (100 to 200 ft). However bedrock outcrops have been documented in the same area, so the existence of a buried valley cannot be confirmed (Winslow et al, 1966)." Also the following text has been inserted at the beginning of Section 2.2.3.1 line 26 for further clarification: "Bedrock at RVAAP is overlain by deposits of the Wisconsin-aged Lavery Till in the western portion of the facility and the younger Hiram Till and associated outwash deposits in the eastern two-thirds of the facility. Unconsolidated glacial deposits vary considerably in their character and thickness across RVAAP, from zero in some of the eastern portions of the facility to an estimated 150 ft (46 m) in the south-central portion." The following reference will be added to Section 13 of the FWFSP: Winslow, J.D., and G.W. White, 1966. *Geology and Ground-water Resources of Portage County, Ohio*. Geological Survey Professional Paper 511. 1966.

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
O-3	Pages 2-6 and 2-7, Figures 2-2 and 2-3	Pages 2-6 and 2-7, Figures 2-2 and 2-3	These figures were created in 2004. USACE has recently generated several bedrock maps which take into account additional data points since 2004.	Please obtain additional bedrock maps from USACE and evaluate whether or not they should be included in this document.	Clarification. Per discussion with USACE, no new bedrock geologic maps have been generated by USACE. A presentation presented to RVAAP stakeholders in December 2010, included references to the existing USGS Professional Paper 511 bedrock geologic map for Portage County and the stratigraphic column from Kammer 1982; however, these slides, initially prepared by USACE in 2007, did not include any changes relating to the 2004 Portage Environmental, Inc. maps included in this document. No changes are suggested.
O-4	Page 2-9, Section Headings	Page 2-9, Section Headings	The section headings on this page refer to "Unconsolidated Sediment" and "Bedrock Sediment."	Please replace the word "Sediment" with "Deposits"	Agree. Section headings have been revised as suggested.
O-5	Pages 2-13 and 2-15, Figures 2-4 and 2-5	Pages 2-13 and 2-15, Figures 2-4 and 2-5	USACE has recently generated several potentiometric surface maps of the unconsolidated aquifer and bedrock aquifers.	Please obtain additional potentiometric maps from USACE and evaluate whether or not they should be included in this document.	Agree. Potentiometric surface maps have been replaced with updated maps dated January 2010.
O-6	Page 2-22, Lines 3 – 8	Page 2-22, Section 2.3	The text mentions several historical groundwater investigations that were conducted which concluded that no migration of contamination to groundwater has occurred. The text does not mention the 1997 Ohio EPA residential well investigation where 25 wells were sampled and analyzed. The results showed that the wells were not impacted by RVAAP operations.	Please provide mention of the 1997 residential well survey that the Ohio EPA conducted in the text.	Agree. Text has been revised, beginning in line 21, as follows: "...Treatment Plant. In 1997, Ohio EPA conducted a residential well investigation of twenty-five nearby wells. The results indicated that the wells were not impacted by RVAAP operations."
O-7	Page 2-17, Lines 38-43	Page 2-17, Section 2.2.4.4	The text states that only two groundwater production wells remain in operation and that all other production wells were permanently abandoned in 1992. This statement appears to be incorrect. For example, a non-utilized production well still	Please provide additional research into existing production wells at the site and provide updates to this document.	Agree. Per discussion with Jim McGee (Vista Sciences, Inc.), three production wells remain in existence – a non-utilized well at former building T-5301, and two wells in operation at the RVAAP Administration Area (one

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
			exists at the location of former building T-5301.		serving Building 1034 and the other serving Buildings 1037,1038, and F6 [main gate]). A fourth non-utilized former production well exists at NACA Test Area as discovered during a 1999 RI field investigation. All other former production wells were plugged and abandoned in 1992. In addition, discussions with Katie Tait, OHARNG, indicate Camp Ravenna has recently installed two wells (one north of Building 1067 and the other in the vicinity of Building 1068) that are currently in use for drinking water. The following revisions are suggested to the final paragraph on page 2-17: "…All but four remaining process production wells were permanently abandoned in 1992. Currently, ~~only~~ two of the four remaining groundwater production wells remain in production. These wells, located in the ~~central portion~~ Administration Area of the facility, provide sanitary water to the remaining personnel. As of 2010, an additional two wells had been installed by OHARNG to provide drinking water for personnel."
O-8	Page 3-3, lines 20 – 23	Page 3-3, Section 3-4	The text states that the Contractor Health and Safety Officer, in coordination with Site Health and Safety Officer (SHSO), has the authority to halt fieldwork if health and/or safety issues arise that are not immediately resolvable in accordance with the FWSHP	Please clarify and make any appropriate changes to the text.	Clarification. All employees have stop work authority in the case of unsafe working conditions. No changes are suggested to this portion of the document because the section addresses specific roles and responsibilities

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
			and the investigation-specific SSHP agenda. Is the Contractor Health and Safety Officer the only individual with the authority to stop work at an AOC if unsafe conditions arise? Do other site workers have "Stop Work" authority?		(Project Manager, Field Manager, SHSO). However, FWSHP revisions to address this comment have been made in response to comment O-29.
O-9	Page 4-4 Lines 38-40	Page 4-4, 5th Bullet	The text states that the facility is not accessible to the public. This is incorrect. Each year, several controlled public deer hunts are conducted by OHARNG. What about trappers and wood collecting permits?	Please make the appropriate changes to the text.	**Amended Response 18-Feb-2011** Agree. Sentence has been revised as follows: "Currently, ~~the facility is not accessible to the~~ public access to the facility is controlled and may include annual controlled deer hunts, wildlife trapping, firewood permits, and occasional guided public tours."
O-10	Page 5-10 and 5-11, Section 5.4.2.2.1	Page 5-10, Section 5.4.2.2	The text indicates that PVC casing and screens should be used for constructing monitoring wells at RVAAP. Bis(2-ethylhexyl)phthalate has been detected in groundwater at nearly all the existing AOCs at RVAAP. Is PVC contributing to Bis(2-ethylhexyl)phthalate detects in these wells?	Please elaborate.	**Amended Response 18-Feb-2011** Clarification. Bix-2-ethylhexylphthalate (DEHP) is a common plasticizer that may be found in PVC, gloves, tubing, etc. The more flexible the material, the more likely that DEHP is a significant component. It is unclear which potential sources (gloves, tubing, well materials) might be contributing to detected concentrations of DEHP at RVAAP. The following text change has been made in Section 5.4.2.2, beginning in line 35: "…investigation-specific addenda to this FSFSP. PVC is the standard material used in well construction at RVAAP; however, selection of

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
					materials for well construction should consider the type and purpose of the investigation and the types of contaminants likely to be present. Well construction materials other than PVC (e.g., stainless steel) may be deemed more appropriate under certain circumstances. Materials to be used in well construction will be identified in investigation-specific addenda to this FWFSP."
O-11	Page 5-12 Line 4	Page 5-12, 1st Bullet	The text states that bentonite will be use for the "creation of an annular seal during monitoring well construction between the lower granular filter pack and the upper grout seal"	Please change the text to "creation of an annular seal during monitoring well construction between the granular filter pack and the grout seal".	Agreed. Text has been changed according to recommendation.
O-12	Page 5-21 Lines 3 – 16	Page 5-21, Section 5.4.2.3	The text states that current revisions of the TGM for Hydrological Investigations and Groundwater Monitoring (Ohio EPA, 2009), USACE Monitoring Well Design, Installation, and Documentation at Hazardous and/or Toxic Waste Sites (USACE, 1994) and ASTM D5092-04e1 (ASTM, 2004) will be reference for proper installation of monitoring wells. Do any contradictions exist between any of these reference documents? Which document will take precedent over another if a contradiction is found?	Please review the three existing documents to see if they are consistent with each other. If there is a contradiction found between any of these documents, please explain how you will resolve this when making decisions regarding monitoring well installations.	Clarification. Some differences do exist between the Ohio EPA and USACE guidance documents (e.g., Ohio EPA recommends use of a tremie for placement of bentonite in wells deeper than 30 ft, while USACE discourages use of a tremie in placing bentonite seals). The following text has been inserted beginning in line 10 on page 5-21: "Any relevant discrepancies among these references will be addressed in an investigation-specific addendum to this FWFSP, depending on the type and purpose of the investigation."
O-13	Pages 5-23 through 5-25, Figures 5-5, 5-6, and 5-7.	Pages 5-23 through 5-25, Figures 5-5, 5-6, and 5-7.	Figures 5-5, 5-6, and 5-7 show current examples of monitoring well construction at RVAAP. However, none of the figures listed are called out anywhere in the text. Also, Figures 5-6 and 5-7 have identical figure	Please make the appropriate changes to the text.	Clarification. Figures call-outs are located on page 5-21, line 14 (Section 5.4.2.3). Agreed. Figure 5-6 and Figure 5-7

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
			titles "Example of Monitoring Well Completed in Underlying Bedrock with an Above-grade Installation (Overlying Unstable Soil [Overburden] is Contaminated)." Figure 5-6 appears to have uncontaminated overburden.		captions have been revised as follows: Figure 5-6. Example of Monitoring Well Completed in Underlying Bedrock with an Above-grade Installation (Overlying ~~Unstable~~ Soil [Overburden] is Unstable and/or Contaminated) Figure 5-7. Example of Monitoring Well Completed in Underlying Bedrock with an Above-grade Installation (Overlying Unstable and/or Contaminated Soil [Overburden] and Contaminated Bedrock ~~is Contaminated~~) In addition, minor changes were made to Figures 5-6 and 5-7 to correct the illustrations showing proper placement of concrete around the protective casing.
O-14	Page 5-39, Table 5-2	Page 5-38, Table 5-2	The table does not include other parameters (that may prove to be useful) such as RQD, blow counts, and % recovery.	Please provide an explanation for why these parameters are not included in the document.	Clarification. It is agreed that this information may be useful. These parameters were not originally included, as the USACE EM Manual 1110-1-4000 does not specifically call out these parameters in Table 4-1; however, the USACE EM manual does reference the ASTM D5434 standard, which does include these parameters as a routine entry. Table 5-2 has been modified as follows: Added Under Soil Parameters: -Recovery lengths of samples

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
					-Blow counts, if applicable Added Under Rock Parameters: -Rock Quality Designation (fractures, joints) -Percent recovery
O-15	Page 5-52 and 5-53	Page 5-53, Section 5.4.7	There is no mention in this section of Temperature Blanks as a Field Quality Sampling procedure.	Please add temperature blanks to this section.	**Amended Response 23-Feb-2011.** Agree. The following revisions have been made as recommended: Section 5.4.7, 5th paragraph, page 5-53, new text added to end of paragraph: "A temperature blank (or temperature indicator) is a VOA vial or other small sample bottle filled with water and placed in the each cooler. The temperature of this vial is measured upon arrival at the laboratory. The temperature blank is not analyzed and does not provide any measure of induced contamination. It is only provided to evaluate whether samples were adequately cooled during shipment." In addition, the following changes have been in: Section 5.5.2.7, 2nd paragraph, second to last sentence; Section 5.6.2.8, 2nd paragraph, second to last sentence; and Section 5.7.2.5, 2nd paragraph, second to last sentence: "Field blanks will be collected only if these types of contaminant sources are expected to be present in the field. Temperature blanks should be used in coolers to evaluate temperatures during

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
					shipping to the laboratory. All field QC samples will be collected…"
O-16	Page 5-60, lines 4-10	Page 5-60, Section 5.5.2.5.1	Split spoon samplers advanced in non-cohesive soils may require a basket insert in the nose of the spoon in order to achieve good sample recovery.	Please make the appropriate changes to the text.	Agreed. Text has been revised as follows: "When using a split-barrel sampler, this device will be hydraulically pushed to the required depth. Samplers used in non-cohesive soils may require the use of a decontaminated catch basket inserted into the shoe of the sampler in order to obtain recovery. A clean sampling…"
O-17	Page 5-65, pages 5-65 and 5-66	Section 5.6.2.1.3, Pages 5-65 and 5-66	These pages describe Incremental Sampling Method (ISM) for surface soils samples. What about subsurface sampling using ISM? Recently, subsurface soil sampling was conducted at Load Lines 1-4 by Army contractors. The methods employed were developed by USACE personnel and other members of the RVAAP team.	A section should be added to this document providing procedures for ISM at depth.	Clarification. During the April 1, 2010 Technical Workshop, the team determined that subsurface soil ISM procedures would not be included as they are not established; however, the FWFSP would denote that the method exists in general concept. Project-specific addenda would provide procedures on subsurface ISM as the procedure is developed. The notation on subsurface ISM methods is currently included in Section 5.6.2.1.3, 1st paragraph, last two lines. No suggested change to text.
O-18	Pages 5-71 and 5-72	Page 5-63, Section 5.6.1	The Ohio EPA Division of Surface Water (DSW) often utilizes the Dipper and Pond Sampler method to obtain surface water samples in watersheds and rivers throughout Ohio, however, they will collect up to 7 aliquots at each sampling location and combine them into one sample. Also, they are often co-located with sediment samples.	Please evaluate the 7+ aliquot method employed by DSW and make a determination whether to include it in this text.	**Amended Response 21-Feb-2011.** Comment O-18 was rescinded based on Ohio EPA direction received on 18-Feb-2011. Per request, a reference to Ohio EPA Division of Surface Water's Sediment Sampling Guide and Methodologies has been added to Section 5.6.1, end of paragraph as follows:

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
					"Sampling methods for underwater sediments from ponds, lakes, streams, and lagoons (Section 5.6.2.2) should follow guidelines in *Ohio EPA Division of Surface Water Sediment Sampling Guide and Methodologies, Second Edition (Ohio EPA 2001).* Specific procedures for collection of underwater sediments are discussed in Section 5.6.2.2." Ohio EPA 2001 has also been added to Section 13.0 References.
O-19	Pages 8-5 through 8-7		This section discusses IDW field staging requirements. The 90 day clock for hazardous waste starts when the waste has been generated .	Please indicate in the text when the clock starts for 90 day hazardous waste generation.	Agree. Text has been revised as follows: "No more than 55-gal of hazardous waste or 1 qt of acutely hazardous waste can be stored in a satellite accumulation area. The time limit for accumulation of hazardous waste within a satellite accumulation area is indefinite, but preferably less than one year. Hazardous waste satellite accumulation areas must be near the point of hazardous waste generation. … Any hazardous waste containers in a satellite accumulation area must be moved to the designated 90-day storage area within 72 hr of the decision to dispose of them. Known hazardous waste must be disposed of within 90 days of the initial decision to dispose. Waste characterized as hazardous based on the result of analytical data will be designated and labeled as hazardous

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
					waste upon review of validated laboratory analytical and final classification of the waste. Waste characterized as hazardous must be moved to a designated 90-day storage area within 72 hours of the declaration that the waste is hazardous. Hazardous Waste must be disposed within 90 days of the classification. "
O-20	Pages 8-12 through 8-13		This section discusses liquid IDW composite sampling procedures. Do these procedures apply to liquid IDW that may be stratified with the column? (i.e. LNAPL vs. DNAPLs)	Please add to the text that Coliwasa samplers should be used if it is determined or expected that the liquid IDW is stratified.	Agreed. Text has been revised as follows: "The equipment used in liquid IDW sampling will consist of sample containers and disposable or decontaminated sampling equipment (e.g., bailers, pump tubing, and drum thief). Coliwasa samplers should be used if the liquid IDW is determined or expected to be stratified. The handling, storage, and shipment of IDW…"
O-21	Page 5-1 QAPP, lines 6-8		The text states that RVAAP full-suite analysis will typically occur at a frequency of 10%. What about ground water samples? Isn't 100% of ground water samples during an investigation sampled for RVAAP full-suite analysis?	Please clarify.	**Amended Response 18-Feb-2011** Agree. The FWGWMP requires full-suite analysis of groundwater samples during the initial monitoring period (four consecutive quarters) and then sets requirements for additional monitoring. The following changes have been made to the text: The following sentence has been inserted at the end of Section 5.4.5 in the FWFSP: "The Facility-Wide Groundwater Monitoring Program (USACE 2004)

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
					establishes the analytical parameters that are to be monitored for each AOC or for boundary conditions." In addition, the following text has been added in first paragraph of Section 5.0 of the QAPP: "Field duplicate and QA laboratory split samples requirements will be documented in investigation-specific addendum but will typically occur at a frequency of 10%. Analysis of groundwater samples will comply with requirements of the Facility-Wide Groundwater Monitoring Program (USACE 2004). RVAAP full-suite analysis for all other media will typically occur at a frequency of 10%." The following reference has been added to Section 13 of the FWFSP and Section 16 of the QAPP: USACE 2004. *Facility-wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant, Ravenna, Ohio*. September 2004.
Todd R. Fisher, Ohio EPA, NEDO, DERR – *Comments on the FW Safety and Health Plan*					
O-22	Table 3-1, Hazards Inventory	Table 3-1, Hazards Inventory	When sampling surface water and sediment by boat or along shore, there is a potential risk for drowning.	Please add drowning hazard to Table 3-1 Hazards Inventory.	Agree. Drowning hazard has been added to Table 3-1.
O-23	Table 3-2, Activity Hazard Analysis, Pages 3-4;	Table 3-2, Activity Hazard Analysis, Pages 3-4;	Poisonous plants have not been identified under biological hazards.	In parentheses, next to biological hazards under the Hazards column, please add the words "poisonous plants."	Agree. Tables have been revised as recommended.

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
	3-7; 3-9; 3-12; 3-15; 3-18; 3-21; 3-23; 3-26; 3-29; 3-32	3-7; 3-9; 3-12; 3-15; 3-18; 3-21; 3-23; 3-26; 3-29; 3-32			
O-24	Table 3-2, Activity Hazard Analysis, Page 3-5	Table 3-2, Activity Hazard Analysis, Page 3-5	Under the column heading "Actions to Eliminate or Minimize Hazards" for General safety hazards, the text states "clean and organized work areas, keeping walkways and working areas clear.	Please add "(including snow, ice, and standing water)" to the end of the statement.	Agree. Table has been revised as recommended.
O-25	Table 3-2, Activity Hazard Analysis, Page 3-5	Table 3-2, Activity Hazard Analysis, Pages 3-5; 3-8	This table lists vehicle accidents under the "Hazards" column. No mention is made of RVAAP speed limits.	Please add to Actions To Eliminate or Minimize Hazards column, "Observe and maintain posted speed limits for both day and night driving conditions." Please make this change to other sections of the table where it mentions vehicle accidents (i.e., Page 3-8).	Agree. Table has been revised as recommended.
O-26	Table 3-2, Activity Hazard Analysis, Pages 3-21 and 3-23	Table 3-2, Activity Hazard Analysis, Pages 3-22 and 3-24	Surface water sampling or sediment sampling using hand augers, scoops, or sediment samplers places the sampler in close proximity to a body of water. Drowning has been omitted as a possible hazard or risk.	Please add "Drowning" as a hazard in this table where sampling is occurring on a boat or by persons next to water bodies.	Agree. Drowning hazard has been added to the AHA.
O-27	Table 3-2, Activity Hazard Analysis, Page 3-33	Table 3-2, Activity Hazard Analysis, Page 3-33	Exposure to chemicals is listed as a hazard when decontaminating equipment. Some of these chemicals may affect breathing, if inhaled.	Please add, "When using volatile chemicals, work should be performed under conditions of adequate ventilation."	Agree. Table has been revised as recommended.

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
O-28	Page 4-1, line 9	Page 4-1	It may not be clear to the reader what "CIH" is.	Please change the bullet to read "Certified Industrial Hygienist (CIH)."	Agree. Text has been revised as recommended.
O-29	Section 4.0, Pages 4-1 through 4-4	Section 4.0, Pages 4-1 through 4-4	It appears that the Contractor Site Safety and Health Officer is the only one with Stop Work Authority, if unsafe work conditions develop. Does anyone else have Stop Work Authority?	Please explain.	Clarification. All employees have stop work authority in the case of unsafe working conditions. The following statement has been added to the bulleted list provided for each responsible party. "Exercise Stop Work Authority if unsafe work conditions develop."
O-30	Section 5.1, Page 5-1, Lines 16 - 19	Section 5.1, Page 5-1	The text states that the "40-yr Hazardous Waste Site Work course is required for hazardous, toxic, and radioactive activities in the exclusion (contamination) zone, contamination reduction (buffer) zone, or other hazardous areas on-site." This should include areas of sample preparation and packaging (i.e. Building 1036).	Please add " including areas of sample preparation and packaging" to the text.	Agree. Text has been revised as suggested.
O-31	Section 6.2, Types of Equipment, Lines 8 and 9	Section 6.2, Types of Equipment	The text states Level C Equipment includes full-face respirator and air-purifying cartridges capable of filtering out organic vapors, acid gasses, and radionuclides. Under what conditions would a half-faced respirator be permitted to be used if the person wearing one has been quantitatively fit tested and approved to wear one when using the appropriate cartridges?	Please clarify.	Clarification. According to OSHA, full-face respirators are more protective than half-face respirators. Both types of respirators protect breathing against particulates, organic vapors, acid gasses, and radionuclides. The full-face respirator additionally protects the face and eyes from irritants and contaminants whereas the half-face design does not. However, it is recognized under certain conditions, a half-face respirator in conjunction with protective eyewear may be deemed adequately protective (e.g., particulate hazards only). Section 6.2, 1st paragraph, 1st bullet, 1st sub-bullet has been revised as follows:

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
					• Level C Protective Equipment - Full-face respirator and air-purifying cartridges capable of filtering out organic vapors, acid gasses, and radionuclides. A half-face respirator with appropriate protective eyewear (e.g., goggles and faceshield) may be deemed protective under certain conditions, but such a determination may only be made by the Contractor CIH and SSHO in accordance with the Contractor's health and safety procedures and policies, approved by USACE, and documented in the project-specific SSHP addendum or field change order. Half-face respirators may only be used in environments where contaminants are not an exposure hazard to the eyes or exposed skin;"
O-32	Section 11.5, Site Communication, Page 11-3, Lines 10 and 11	Section 11.5, Site Communication, Page 11-3	The text states that "if phone service is not immediately available on the site, the crew will be equipped with a cellular phone." What if the cellular phone reception is sporadic and not dependable.?	Please add "If cell phone reception cannot be obtained at the site, available RVAAP hand-held radios should be used."	Agree. Text has been revised as suggested.

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
O-33	Section 13.1, Potential Emergencies	Section 13.1, Potential Emergencies, Page 13-2	There is no mention of detonations (MEC). Should detonations be included as credible potential emergencies for investigative site work?	Please explain.	**Amended Response 18-Feb-2011** Per comment response discussions with RVAAP stakeholders on 7-Feb-2011, a new Section 13.1.4 addressing unplanned/unscheduled detonation events has been added as follows: **Section 13.1.4 Unplanned Detonations** Environmental investigations conducted at RVAAP within munitions response sites, or other areas suspected to contain MEC, will follow the avoidance protocol presented in Section 10.16, which includes response actions and notification requirements for discovery of MEC. Awareness of planned or scheduled detonation events at RVAAP are part of the Army coordination responsibility of the Contractor Project Manager, Field Operations Manager, and SSHO who will communicate these planned activities to field personnel as part of project and daily safety briefings. In the event of an unplanned detonation, site personnel will evacuate the area immediately and notify security personnel at Guard Post 1 to initiate the appropriate civil and military emergency response actions. The Field Manager, SSHO, or other knowledgeable employees will remain in the evacuation area to provide security personnel with relevant information when they arrive. First aid/

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
					CPR-trained individuals on-site will provide first aid to any injured persons as discussed in Section 13.1.3 pending release of the injured person to emergency medical staff.
O-34	Section 13.1.2, Spills	Section 13.1, Potential Emergencies, Page 13-2,	There is no mention of Ohio EPA's Spill Hotline number. All spills of reportable quantities should be reported to Ohio EPA spill hotline.	Please include Ohio EPA's Spill hotline number.	Agree. Text has been revised to include Ohio EPA's Spill hotline number (1-800-282-9378).
O-35	Table 13.2, Page 13-2	Table 13.2, Page 13-3	Ohio EPA's Spill Hotline Number has been omitted from this table.	Please include Ohio EPA's Spill hotline number.	Agree. Table has been revised to include Ohio EPA's Spill hotline number (1-800-282-9378).
O-36	Page A-2	Page A-2	"N," "Y," and "N/A" are missing as column headings on the inspection form.	Please add "N," "Y," and "N/A" as column headings to this form.	Agree. Table has been revised to include N, Y, and N/A column headings.
Additional Recommended Changes					
Additional Change 1	FWFSP, Page 8-4	Page 8-4, 3rd Bullet	NA	NA	Based on recent updated IDW requirements from RVAAP, the following bullet has been added beginning on line 15: • Drum labels will be photographed when affixed to the container. Photographs will be provided to the RVAAP Operating Contractor. New photographs will be collected and submitted whenever drum status is updated (i.e. pending analysis, final classification).
Additional Comments to Responses – OHANRG (Katie Tait)					
CR-1	Response to comment O-9		"Currently, public access to the facility is controlled and is limited to several public deer hunts each year, limited trapping and wood collecting, and occasional guided	Suggested text revision: "Currently, public access to the facility is controlled and may include annual controlled deer	Agree. Please see 18-Feb-2011 amended response to Comment O-9.

Comment No.	Page or Sheet	New Page or Sheet	Comment	Recommendation	Response
			public tours." This statement is true but needs reworded as it sounds like we are limited to what type of public access we have or allow. Also, what is wood-collecting?	hunts, wildlife trapping, firewood permits, and occasional guided public tours."	
Additional Comments to Responses – USACE (Mark Nichter)					
A-1	Response to comment O-10		SAIC's response suggests that stainless steel wells "may" be deemed more appropriate at the facility where bis(2-ethylhexyl)phthalate is identified as a contaminant of concern. Please note that the issue of using stainless steel wells should be very flexible because this constituent is typically identified as a COPC in a large percentage of the wells at the facility. In most cases this is due to the constituent concentration being identified at the laboratory reporting limit (RL), which is higher than the actual estimated value (below the RL and above the DL). The RL is higher than the applicable screening value; thereby, making it a COPC.		Agree. Please see 18-Feb-2011 amended response to Comment O-10.
A-2	Response to comment O-21		Page 3-10 (Future Wells section) of the approved FWGWMP Plan specifies that at least 4 quarterly groundwater sampling events will be conducted at future (new) wells. Please change the response to 4 consecutive quarters.		Agree. Please see 18-Feb-2011 amended response to Comment O-21.
A-3	Response to comment O-31		Clarify position on half-face respirators. "Half-face respirators can only be worn in environments where the contaminants are not toxic to the eyes or facial area."		Agree. Please see 18-Feb-2011 amended response to Comment O-31.
Additional Comments to Responses – USACE (Kathy Krantz)					
A-4	Response to comment O-15		In the O-15 response it indicates that temperature blanks may be used in coolers. Suggest this be reworded to "will" or "should".		Agree. Please see 23-Feb-2011 amended response to Comment O-15.