Final

Site Inspection and Remedial Investigation Work Plan Addendum at Compliance Restoration Sites CC RVAAP-71 Barn No. 5 Petroleum Release and CC RVAAP-83 Former Buildings 1031 and 1039 Revision 1

Ravenna Army Ammunition Plant
Ravenna, Ohio

June 7, 2013

Contract No.: W912QR-04-D-0039
Delivery Order: 0004

Prepared for:

U.S. Army Corps of Engineers, Louisville District
600 Martin Luther King Jr. Place
Louisville, Kentucky 40202-2267

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	6-7-2013
2. REPORT TYPE	Technical
3. DATES COVERED *(From - To)*	June 2013
4. TITLE AND SUBTITLE	Final Site Inspection and Remedial Investigation Work Plan Addendum at Compliance Restoration Sites CC RVAAP-71 Barn No. 5 Petroleum Release and CC RVAAP-83 Former Buildings 1031 and 1039 Revision 1 Ravenna Army Ammunition Plant, Ravenna, Ohio
5a. CONTRACT NUMBER	W912QR-04-D-0039
5b. GRANT NUMBER	N/A
5c. PROGRAM ELEMENT NUMBER	N/A
6. AUTHOR(S)	Easterday, Al
5d. PROJECT NUMBER	5161.004
5e. TASK NUMBER	Delivery Order No. 0004
5f. WORK UNIT NUMBER	N/A
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	ECC 33 Boston Post Road West, Suite 420 Marlborough, Massachusetts 01752
8. PERFORMING ORGANIZATION REPORT NUMBER	N/A
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)	U.S. Army Corps of Engineers – Louisville District 600 Martin Luther King Jr. Place Louisville, Kentucky 40202-0059
10. SPONSOR/MONITOR'S ACRONYM(S)	USACE
11. SPONSOR/MONITOR'S REPORT NUMBER(S)	N/A

12. DISTRIBUTION / AVAILABILITY STATEMENT

Reference distribution page.

13. SUPPLEMENTARY NOTES

None.

14. ABSTRACT

The Final Site Inspection and Remedial Investigation Work Plan Addendum at Compliance Restoration Sites CC RVAAP-71 Barn No. 5 Petroleum Release and CC RVAAP-83 Former Buildings 1031 and 1039 is a work plan that presents the Site Inspection activities at CC RVAAP-71 Barn No. 5 Petroleum Release and CC RVAAP-83 Former Building 1039 at the Ravenna Army Ammunition Plant (RVAAP) in Ravenna, Ohio. This Work Plan includes a Sampling and Analysis Plan, a Quality Assurance Project Plan, and a Site Safety and Health Plan which are addenda to the respective facility-wide plans.

15. SUBJECT TERMS

SI, Compliance Restoration, site inspection, CC RVAAP-71, CC RVAAP-83

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			Al Easterday
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Ohio EPA
40 years and moving forward

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Scott J. Nally, Director

July 1, 2013

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Mr. Mark Patterson
Facility Manager
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44266

Re: Ravenna Army Ammunition Plant, Site Inspection and Remedial Investigation Work Plan Addendum at Compliance Restoration Sites CC-RVAAP-71 and CC-RVAAP-83, Portage/Trumbull Counties, Ohio EPA ID # 267-000859-162

Dear Mr. Patterson:

The Ohio Environmental Protection Agency (Ohio EPA) has reviewed the May 6, 2013 response to Ohio EPA's May 14, 2013 Notice of Deficiency for the Site Inspection and Remedial Investigation Work Plan Addendum at Compliance Restoration Sites CC-RVAAP-71 and CC-RVAAP-83. The document was received by Ohio EPA on June 10, 2013 and was prepared for the Army Corps of Engineers, Louisville District, by ECC, under contract number W912QR-08-D-008.

The report is approved. If you have any questions, please feel free to contact me at (330) 963-1160.

Sincerely,

Nancy Zikmanis

Nancy Zikmanis, CHMM
Environmental Supervisor
Division of Environmental Response and Revitalization

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CONTRACTOR'S STATEMENT OF INDEPENDENT TECHNICAL REVIEW

ECC has completed the *Final Site Inspection and Remedial Investigation Work Plan Addendum at Compliance Restoration Sites CC RVAAP-71 Barn No. 5 Petroleum Release and CC RVAAP-83 Former Buildings 1031 and 1039, Revision 0, Ravenna Army Ammunitions 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 this project. During the independent technical review, compliance with established policy principals and procedures, utilizing justified and valid assumptions was verified. This included review of data quality objectives; technical assumptions, methods, procedures, and materials 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 the law and existing United States Corps of Engineers policy.

Willard A. Murray

______________________________ June 4, 2013 ________________________

Willard Murray, Ph.D, P.E. — Date

Senior Engineer

______________________________ June 4, 2013 ________________________

Curt Varner, P.E. — Date

Senior Engineer

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Site Inspection and Remedial Investigation Work Plan Addendum at Compliance Restoration Sites CC RVAAP-71 Barn No. 5 Petroleum Release and CC RVAAP-83 Former Buildings 1031 and 1039 Revision 1

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CC RVAAP-83 Former Building 1031 and 1039
Revision 1
Ravenna Army Ammunition Plant
Ravenna, Ohio

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Ohio EPA – NEDO = Ohio Environmental Protection Agency Northeast District Office
ARNG = Army National Guard
OHARNG = Ohio Army National Guard
RVAAP = Ravenna Army Ammunition Plant
USACE = United States Army Corps of Engineers
REIMS = Ravenna Environmental Information Management System
ECC = Environmental Chemical Corporation

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ACRONYMS AND ABBREVIATIONS

ADR	Automated Data Review
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
ARNGD	Army National Guard Directorate
ASTM	American Society for Testing and Materials
BGS	Below Ground Surface
BRACD	Base Realignment and Closure Division
BUSTR	Bureau of Underground Storage Tank Regulations
CD	Compact Disc
CERCLA	Comprehensive Environmental, Response, Compensation, and Liability Act
CIH	Certified Industrial Hygienist
CR	Compliance Restoration
CRJMTC	Camp Ravenna Join Military Training Center
COR	Contracting Officer Representative
CSP	Certified Safety Professional
CUG	Clean-Up Goal
dbh	Diameter at Breast Height
DFFO	Director's Final Findings and Orders
DLA	Defense Logistics Agency
DMM	Discarded Military Munitions
DO	Delivery Order
DOT	Department of Transportation
DoD	Department of Defense
DU	Decision Unit
EDD	Electronic Data Deliverable
EDMS	Electronic Data Management System
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
FS	Feasibility Study
FSP	Field Sampling Plan
FWCUG	Facility-Wide Clean-Up Goal
FWSAP	Facility-Wide Sampling and Analysis Plan
FWSHP	Facility-Wide Safety and Health Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HI	Hazard Index
HQ	Hazard Quotient
HRR	Historical Records Review
HTRW	Hazardous, Toxic, and Radioactive Waste
IDW	Investigation-Derived Waste
IRP	Installation Restoration Program
IS	Incremental Sampling
ISM	Incremental Sampling Methodology
MARCS	Multi-Agency Radio Communication System
MC	Munitions Constituent
MD	Munitions Debris

ACRONYMS AND ABBREVIATIONS (CONTINUED)

MEC	Munitions and Explosives of Concern
Ohio EPA	Ohio Environmental Protection Agency
OHPO	Ohio Historic Preservation Office
OSHA	Occupational Safety and Health Administration
PBA	Performance-Based Acquisition
PCB	Polychlorinated Biphenyl
PMP	Project Management Plan
POL	Petroleum, oil, and lubricants
PWS	Performance Work Statement
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RDX	Hexahydro-1,3,5-trinitro-1,3,5-trazine
RI	Remedial Investigation
RSD	Relative Standard Deviation
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SI	Site Inspection
SSHP	Site Safety and Health Plan
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
TNT	2,4,6-trinitrotoluene
USACE	United States Army Corps of Engineers
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WP	Work Plan

EXECUTIVE SUMMARY

Under a modification to an existing contract, ECC was contracted by the United States Army Corps of Engineers (USACE) Louisville District to complete a Site Inspection (SI) at two Compliance Restoration (CR) sites at the Ravenna Army Ammunition Plant (RVAAP), in Ravenna, Ohio, under Contract Number W912QR-04-D-0039, Delivery Order (DO) Number 0004, Modification Number 1.

The contract modification directs ECC to complete an SI at CR sites, CC RVAAP-71 Barn No. 5 Petroleum Release and CC RVAAP-83 Former Buildings 1031 and 1039. Please note that CC RVAAP-83 is comprised of two sites: the Former Building 1031 Hospital and the Former Building 1039 Laboratory. Former Building 1031 Hospital received a No Further Action (NFA) designation as part of the approved and Final May 2012 Final Historical Records Review (HRR) Report; therefore, no additional investigation activities are required at Building 1031 and it is not included in this Work Plan Addendum.

This Addendum to the Final Site Inspection and Remedial Investigation Work Plan (Work Plan) at CR Sites incorporates the following CR sites into the Site Inspection portions of the Work Plan:

- CC RVAAP-71 Barn No. 5 Petroleum Release

- CC RVAAP-83 Former Building 1039 (Former Laboratory Building)

This Work Plan (WP) Addendum provides the technical approaches and field activities to be completed for the SIs at these two CR sites.

The WP Addendum includes the following components as appendices: Appendix A is the Sampling and Analysis Plan (SAP), which includes the site-specific sampling and analysis plan for activities proposed at each of the two CR sites listed above; Appendix B is the Quality Assurance Project Plan (QAPP); Appendix C is the Site Safety and Health Plan (SSHP); and Appendix D is the Comment Response Table and Regulatory Correspondence. The SAP, QAPP, and SSHP are addenda to the existing RVAAP Facility-Wide Sampling and Analysis Plan (FWSAP) (SAIC 2011a) and Facility-Wide Safety and Health Plan (FWSHP) (SAIC 2011b). These plan addenda present the site-specific procedures and information required to execute the SIs, including details of the field sampling, types of samples to be collected, methods of collection, laboratory analyses, quality assurance and quality control, and safety and health details that will be employed in executing this work.

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1.0 BACKGROUND

1.1 Project Background and Summary

ECC is submitting this Work Plan (WP) Addendum to the United States Army Corps of Engineers (USACE) Louisville District in accordance with the Performance Work Statement (PWS), Contract Number W912QR-04-D-0039, Delivery Order (DO) Number 0004 under a firm-fixed price Performance-Based Acquisition (PBA) to provide environmental investigation and remediation services at 14 Compliance Restoration (CR) sites at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio (Figure 1-1). The DO was issued by the USACE, Louisville District on August 15, 2011. Modification No. 1 was issued by the USACE, Louisville District, on August 6, 2012 to execute a Site Inspection (SI) at the CC RVAAP-71 Barn No. 5 Petroleum Release and at CC RVAAP-83 Former Buildings 1031 and 1039. This WP Addendum incorporates the SI tasks into the WP for these two Compliance Restoration (CR) sites.

An SI will be conducted at these two CR sites based on the May 2012 Final Historical Records Review (HRR) Report, which recommended additional investigations be conducted at CC RVAAP-71 Barn No. 5 Petroleum Release and at CC RVAAP-83 Former Building 1039 Laboratory. Note that according to the Final HRR, no further investigation at CC RVAAP-83 Former Building 1031 Hospital was recommended. Site CC RVAAP-83 Former Building 1031 Hospital received a No Further Action (NFA) designation, and therefore, no additional inspection or investigation work for Former Building 1031 Hospital is included in this WP Addendum.

This WP Addendum contains addenda to the Facility-Wide Sampling and Analysis Plan for Environmental Investigations (FWSAP) (SAIC 2011a). The FWSAP also contains the Facility-Wide Quality Assurance Project Plan (QAPP). ECC's QAPP is an addendum to the FWQAPP and is presented in Appendix B of this WP Addendum. In addition, the WP Addendum includes the Site Safety and Health Plan (SSHP) in Appendix C, which is an addendum to the Facility-Wide Safety and Health Plan (SAIC 2011b).

Planning and performance of all elements of this PBA will be in accordance with the requirements of the Ohio Environmental Protection Agency (Ohio EPA) Director's Final Findings and Orders (DFFO) for the RVAAP, dated June 10, 2004 (Ohio EPA 2004). The following elements of work are included in ECC's PBA delivery order:

- Historical Records Reviews
- Feasibility Studies
- Non-Time Critical Removal Actions
- Site Inspections

- Remedial Investigations

This WP Addendum includes only the tasks and actions required for conducting SIs at the subject two CR sites included in ECC's PBA DO and subsequent contract modification, which have been awarded to ECC. The two CR sites addressed in this WP Addendum and the actions proposed at each site are summarized in Table 1-1. The locations of the two CR sites are presented in Figure 1-2 and the topographic map showing these two CR sites is provided in Figure 1-3. An HRR was conducted by ECC in 2011 for CC RVAAP-71 and CC RVAAP-83; the final report was submitted in May 2012 (ECC, 2012a). The Ohio EPA issued their approval letter for the final HRR Report on May 22, 2012. Further investigations were recommended for sites CC RVAPP-71 Barn No. 5 Petroleum Release and CC RVAAP-83 Former Building 1039 Laboratory, based on the findings and conclusions of the May 2012 Final HRR Report.

Table 1-1: Summary of Site Inspections

CR Number	CR Site Name	Activity
CC RVAAP-71	Barn No. 5 Petroleum Release Site	Site Inspection
CC RVAAP-83	Former Building 1039 Laboratory	Site Inspection

1.2 Work Plan Organization

This WP Addendum includes the following appendices for SI activities to be conducted at the two CR sites:

- Appendix A - Sampling and Analysis Plan (SAP),
- Appendix B - Quality Assurance Project Plan (QAPP),
- Appendix C - Site Safety and Health Plan (SSHP), and
- Appendix D - Comment Response Table and Regulatory Correspondence.

It is noted that certain sections contained in the original WP could also have been retained verbatim in corresponding sections of this WP Addendum. Rather than repeating sections of text from the parent document only sections requiring revisions were included in the addendum. Sections where redundant text would have been inserted are identified, and the reader is referred instead to the WP for additional details.

This document organization follows the Ravenna Army Ammunition Plant Submission Format Guidelines, Version 20 (Vista 2012).

1.3 General Facility Description

When the RVAAP Installation Restoration Program (IRP) began in 1989, the RVAAP was identified as a 21,419-acre installation. The property boundary was resurveyed by the Ohio Army National Guard (OHARNG) over a two-year period (2002 and 2003), and the actual total acreage of the property was found to be 21,683 acres. As of February 2006, 20,403 acres of the former 21,683-acre RVAAP have been transferred to the National Guard Bureau (NGB) and subsequently licensed to the OHARNG for use as a military training site, the Camp Ravenna Joint Military Training Center (Camp Ravenna). The current RVAAP consists of 1,280 acres in various parcels throughout the OHARNG Camp Ravenna.

Camp Ravenna is located in northeastern Ohio within Portage County and Trumbull County, 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. The RVAAP portions of the property are solely located within Portage County. 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 (see Figure 1-1). 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.

The entire 21,683-acre parcel was an industrial facility that was federal government-owned and contractor-operated when the RVAAP was operational (Camp Ravenna did not exist at that time). The RVAAP IRP encompasses investigation and cleanup of past activities over the entire 21,683 acres of the former RVAAP; therefore, references to the RVAAP in this document indicate the historical extent of the RVAAP, which is inclusive of the combined acreages of the current Camp Ravenna and the 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 waste water, 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 fuses, 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 the RVAAP included sites that were used for the burning, demolition, and testing of munitions. These burning and demolition ground consisted of large parcels of open space or abandoned quarries. Other types of sites present at the RVAAP include landfills, an aircraft fuel tank testing facility, material storage areas, and various general industrial support and maintenance facilities.

2.0 PROJECT DESCRIPTION

This WP Addendum describes specific work to be completed to conduct SIs at the two subject CR sites, including site-specific sampling and analysis procedures for subsurface soil sampling, in order to assess the presence, nature, and extent of contamination at the following sites:

- CC RVAAP-71 Barn No. 5 Petroleum Release, and

- CC RVAAP-83 Former Building 1039 Laboratory.

These CR sites, identified for an SI under this WP Addendum, are the subject of an HRR (ECC, 2012a). The QAPP is provided in Appendix B and is an addendum to the Facility-Wide QAPP (SAIC 2011a).

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3.0 PROJECT ACTIVITIES

The project activities associated with executing this WP Addendum are to conduct SIs and subsequent SI reporting. This WP Addendum includes all project activities, and contains addenda to the Final FWSAP, QAPP, and SSHP (SAIC 2011a).

3.1 Premobilization

Prior to the field investigation, a series of pre-mobilization activities will be undertaken to ensure that all applicable requirements are met. These will include providing the necessary notifications to the Ohio Army National Guard, RVAAP Facility Manager, Ohio EPA, the operating contractor, and other stakeholders. These notifications include obtaining access to Camp Ravenna from the Army and Ohio Army National Guard in accordance with the Army's current access procedure and requesting the Army provide notification to the Ohio EPA of sample collection in accordance with Section XIII Sampling and Data Availability, paragraph number 28 of the 2004 Director's Final Findings and Orders. In addition, all necessary approvals as well as subcontracts and purchase orders for field services and other necessary services will be in place. Utility clearance will be coordinated with the RVAAP Facility Manager, Ohio Army National Guard and the operating contractor.

3.1.1 Utility Clearance

Prior to intrusive sampling, subsurface utilities identified as part of the pre-mobilization will be reviewed during a site walk.

Work around all marked utilities will be conducted with utmost precaution to ensure that no utility lines will be damaged. In case an unmarked utility line is exposed during remediation activities, ECC will stop work and notify the RVAAP Facility Manager. Work will resume only after ECC gets a clearance from the RVAAP Facility Manager. After intrusive sampling locations are marked, ECC will coordinate any utility clearance with the Ravenna operating contractor and the Ohio Army National Guard.

3.1.2 Pre-Field Work Meetings

Pre-field work meetings will be held prior to commencing investigational efforts. These meetings will communicate project expectations and requirements to ensure that all stakeholders understand their roles, responsibilities, and interactions with others. These meetings will be conducted by the ECC Project Manager and/or Assistant Project Manager.

3.2 Mobilization and Site Preparation

Sampling personnel will be mobilized once during the implementation of this project. All applicable requirements will be met prior to commencing work activities. Mobilization and site preparation will include, but will not be limited to, the following:

- Verify utility layout,
- Coordinate site security,
- Set up controlled access to the job site,
- Review the job safety analysis with field crews for those activities to be conducted,
- Establish any environmental monitoring operations in accordance with the SSHP addendum to the FWSHP,
- Ensure that all necessary equipment is on site and ready for use, and
- Set up an equipment staging area.

3.2.1 Temporary Facilities

Temporary facilities, including office space, sanitary facilities, and hand wash stations will be placed at locations designated by the RVAAP Facilities Manager if located on RVAAP areas of responsibility. If any of these temporary facilities are located on Camp Ravenna property (OHARNG property) coordination with the OHARNG is required and approval from the OHARNG will be obtained. Communications will include both cell phones and handheld radios. Signs and barricades will be used to identify sampling areas.

3.2.2 Site Security

Site security for the protection of the general public, site workers and equipment, and materials will be established in accordance with the SSHP (Appendix C of this WP Addendum). Names of personnel and any subcontractors who will be working at the RVAAP will be submitted to the RVAAP Security Staff at least one week in advance. The roster will be updated/maintained on a weekly basis. All personnel approved for entry to the RVAAP will be required to provide government issued identification (i.e., driver’s license, passport, etc.) in order to enter. Post 1 (Main Gate) is the main entrance to the RVAAP site. In addition, the OHARNG will be notified a minimum of one week prior to the beginning of all field activities. Any personnel working within any of the working areas will also be required to provide documentation of their 40-hour Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) Training and their current 8-hour OSHA HAZWOPER Refresher Training.

3.2.3 Decontamination

A temporary decontamination area will be constructed to facilitate decontamination of sampling equipment and other associated equipment and personnel. The location and layout of the field decontamination area will be determined by the ECC Project Manager and the Site Safety and Health Officer (SSHO). An additional decontamination area will be located in Building 1036 (or another location determined by the RVAAP Facility Manager) and will be used to decontaminate soil sampling equipment. All sampling equipment will be decontaminated in accordance with the procedures outlined in Section 5.6.2.9 of the FWSAP. Any exceptions to these procedures are detailed in the SAP (Appendix A). If the toxicity characteristic leaching procedure (TCLP) results of the drum contents indicate that drum removal and over-packing need to be done by heavy equipment, decontamination of equipment will be conducted per US EPA Region 4 Field Equipment Cleaning and Decontamination. Decontamination wastes will be managed and disposed of in accordance with Section 6.0 Disposition of Investigation-Derived Waste of the Final Site Inspection and Remedial Investigation Work Plan at Compliance Restoration Sites (ECC 2012b) and Section 8.0 of the Facility-Wide Sampling and Analysis Plan for Field Investigations (SAIC 2011).

3.3 Field Work

Initially, ECC will conduct vegetation removal to allow access to the site, if needed. Mid-level geologists, environmental scientists, and field technicians will conduct the field effort. All clearing of vegetation will be coordinated with the OHARNG prior to removal.

Fieldwork will consist of collecting incremental sampling methodology (ISM) samples as well as composite and/or discrete grab samples from two CR sites to complete the SIs. From each soil decision unit (DU), subsurface ISM soil samples will be collected from the 1 – 4 ft bgs and the 4 - 7 ft bgs intervals. Vertical profile ISM samples will be collected in accordance with the RVAAP FWSAP (SAIC 2011a) and the SAP (presented in Appendix A of this WP Addendum). One or more borings will be advanced to 7 - 13 ft bgs (or refusal) to collect a composite sample to complete an evaluation of the unrestricted/residential use scenario at each site.

The analytes to be collected will be based upon site-specific HRR report recommendations, any past characterization data, or ECC’s evaluation of the site use. The SI sampling approach is a phased sampling effort. Subsurface soils will be sampled from the 0 - 7 ft bgs depth. If contamination is identified in the 4 - 7 ft bgs interval above criteria, then an ISM sample will be collected from the 7 - 13 ft bgs interval. One or more discrete samples from 7 - 13 ft bgs will be collected from both sites during the mobilization when the 0 - 7 ft bgs samples are being collected.

Detailed field investigation activities are to be completed as presented in the SAP (Appendix A of this WP Addendum). The SAP Appendix A provides the field investigation details for the SI sites.

ECC will characterize and properly dispose of Investigation-Derived Waste (IDW) at approved off-site waste disposal facilities in compliance with applicable Federal, state, and local rules, laws and regulations. ECC will maintain applicable waste characterization and disposal records, and produce a waste disposal report for submittal to and approval by the Ohio EPA. Disposal of IDW will be coordinated with the RVAAP Facility Manager and the OHARNG.

All the SI data collected will be used to prepare an SI report. The collected data will be used to complete the various SI report components, as presented in Section 3.8, Reporting.

In the event that a drum or drums are discovered during the investigation at any of the CR sties, the drum area will be flagged off for safety and TCLP sampling will be conducted beneath the drum and in the vicinity of the drum to determine whether the drums have leaked any contaminant. The protocol for drum sampling and characterization for IDW, as per the FWSAP (SAIC 2011a) will be followed. The contents of the drum will also be sampled to determine the type proper off-site disposal. If any soil staining is present, the soil will be sampled within the boundaries of the stained area to delineate the area of potential soil impact associated with the drum leak. Surface (0 to 1 ft bgs) and subsurface soil (1 to 3 ft bgs) samples will be collected using a hand auger.

If the TCLP results indicate that drum removal by hand is acceptable, then an area immediately adjacent to the drums will be covered with 1-inch plywood and 0.6-mil plastic and the drum and their contents will be placed into a new overpack drum and staged on site. If the soil results in the vicinity of the drum indicate the soil has been impacted. The soil will be excavated, drummed, characterized and properly disposed of off-site. A work plan for the removal of the drum(s) would be generated and submitted for review by Army and Ohio EPA stakeholders prior to executing a drum removal action.

3.4 Schedule

The Project Schedule, which includes both CR sites described herein, is provided in the Project Management Plan for 2011 Performance-Based Acquisition for Environmental Investigation and Remediation at Ravenna Army Ammunition Plant Ravenna, Ohio (ECC 2011). Once the WP Addendum is finalized, the field sampling activities will be scheduled and coordinated with the project stakeholders. It is anticipated that the field work for this work plan will be conducted in the summer of 2013.

3.5 Analytical Work

The contract laboratory will analyze the Incremental Sampling Method (ISM) samples for one or more of the following parameters: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), target analyte list (TAL) metals (including mercury), explosives, propellants, and other compounds as appropriate in accordance with the QAPP (Appendix B), which is an addendum to the FWQAPP (SAIC 2011a). Additionally, the work will be conducted with the following enumerations:

- Vertical ISM samples will be collected to characterize the areal and vertical extent of DU contamination.

The contract laboratories selected have been Environmental Laboratory Accreditation Program (ELAP) certified by an accrediting body to perform Department of Defense (DoD) work under the DoD Quality Systems Manual (QSM) for Environmental Laboratories. One of the following laboratories will be used for analyses; TestAmerica Laboratories, Inc., CT Laboratories, RTI Laboratories, or ALS Laboratories.

Details of the field investigation are presented in the SAP Appendix A. Table 3-1 presents the specific laboratory analysis for each media to be sampled at the SI sites.

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Table 3-1: Summary of Analytical Sampling for the Site Inspection Activities at Two Compliance Restoration Sites

Compliance Restoration Site ID	Sample Method(s)			VOC(1)	SVOC(2)	PAH(3)	PCB(4)	Explosives(5)	Propel-lants(6)	Herbi-cides(7)	BTEX(8)/ MTBE(9)	TPH DRO/GRO(10)	TAL Metals(11)	Full Suite(12)	Matrix			
	IS16	Discrete16	Composite17												Surface Soil(13)	Subsurface Soil(14)	Sediment	Surface Water
SITE INSPECTION SITES																		
CC RVAAP-71 Barn No. 5 Petroleum Release																		
Barn No. 5 Petroleum Release	SB			X	X						X	X				X		
CC RVAAP-83 Building 1039 Laboratory																		
Building 1039 - Laboratory	SB	SB	DSB	X	X			X	X				X			X		

Notes:

1. VOC – Volatile organic compounds – EPA Method SW-846, 8260B/5035 (only collected as a discrete sample)
2. SVOC – Semi-volatile organic compounds – EPA Method SW-846, 8270C/3540C
3. PAH – Polycyclic aromatic hydrocarbons – EPA Method SW-846, 8270C/3540C
4. PCB – Polychlorinated biphyenls – EPA Method SW846, 8082/3540C
5. Explosive Derivatives – EPA Method SW-846, 8330B
6. Propellant Compounds – EPA Methods SW846, 8330 Modified (Nitroguanidine) and EPA Method 353.2 Modified (Nitrocellulose)
7. Herbicides – EPA Method SW-846 8151/3520C
8. BTEX – Benzene, toluene, ethylbenzene, and xylenes - EPA Method SW-846, 8260B/5035 (only collected as a discrete sample)
9. MTBE – Methyl tertiary-butyl ether EPA Method SW-846, 8260B/5035 (only collected as a discrete sample)
10. TPH – Total Petroleum Hydrocarbons – Diesel Range Organics (DRO)/Gasoline Range Organics (GRO)-EPA Method SW-846, 8015B Modified. DRO analysis only for Site CC RVAAP-74.
11. Target Analyte List (TAL) Metals – EPA Method SW-846, 6010B/6020/7471A
12. RVAAP Full Suite (as defined in FWQAPP Section 5.4.5) samples will be collected at a frequency of 10%.
13. Surface Soil – Is defined as soils between 0 and 1 ft bgs.
14. Subsurface Soil – Is defined as soils below 1 ft bgs.
15. ACM = Asbestos-containing material – EPA Method 600R-94/134
16. Nature and extent
17. Risk and extent

SS = Surface Soil Sample

SB = Subsurface Soil Sample

SD = Sediment Sample

SW = Surface Water Sample

DSB = Deep Subsurface Soil Sample. This sample will be collected at one boring from the 7-13 ft interval

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3.6 Data Management / Data Validation

Electronic data submitted by the sub-contract laboratory will be error-free and in complete agreement with the hardcopy data. Data files will be delivered by email, web portal, and/or a high density Compact Disc (CD) accompanying the hardcopy data reports. Sample data will be provided in electronic data deliverable (EDD) format compatible with ECC Electronic Data Management System (EDMS).

Working with the sub-contract lab, analytical data will be verified according to the DoD QSM Version 4.1 requirements via ECC EDMS. EDMS will provide verified EDDs formatted for USACE Automated Data Review (ADR). Data verification will comply with the procedures outlined in the FWSAP (SAIC 2011a). The completed data validation report (prepared by a separate USACE contractor) will be included as an appendix to the final report.

3.7 Surveying and Mapping

Significant or newly discovered points of interest, not already located in the HRR, related to each of the SI sites included in this WP Addendum will be located according to the requirements of the PWS and the FWSAP, as follows:

- Horizontal control - accuracy will be within 1 meter
- Vertical control - estimated from the facility 2-foot contour interval topographic map

All new sample locations will be surveyed in the field.

3.8 Reporting

ECC will prepare SI reports for the corresponding CR sites included in this WP Addendum that include a detailed summary of the activities conducted at each of the two CR sites, the findings, investigation results, and the conclusions/recommendations for each site.

ECC proposes that one SI report be generated for these two CR sites, which will minimize the number of deliverables and streamline the review process.

The SI report will include the following sections:

- Introduction
- Environmental Setting
- Site Description
- Site History
- Operational History
- Waste Characteristics
- Exposure Pathways (Groundwater, Surface Water, Soil, and Air)
- Sample Results
- Summary and Conclusions
- Recommendations
- References

3.9 Site Logistics and Coordination

During any week in which ECC personnel (including ECC subcontractors) are performing site work at the RVAAP, a representative will attend the weekly contractor meeting. These meetings are designed to facilitate coordination of various contractor activities occurring at the RVAAP and with those of Army or OHARNG activities. All on-site personnel of both ECC and our subcontractors will have completed 40-hour HAZWOPER training and be current with associated 8-hour OSHA HAZWOPER refresher training. ECC and its subcontractors will coordinate its field activities with other subcontractors, the Army, and the OHARNG. All on-site ECC personnel and associated subcontractors will submit their current copy of HAZWOPER certification to the RVAAP Base Realignment and Closure Division (BRACD) Facility Manager's Office.

Although site work is not anticipated to be conducted during weekends, certain circumstances (subcontractor availability, completion of a scheduled task) may require that work be conducted during weekend hours. If this is necessary, the OHARNG will be notified at the earliest possible time, and all weekend work will be coordinated.

In order to ensure the security and orderly operation of the RVAAP/Camp Ravenna, ECC will follow procedures established by the RVAAP/Camp Ravenna, and the facility caretaker contractor regarding access to the facility of contractors, consultants, or visitors. ECC will notify the facility caretaker contractor at least 24 hours ahead of any deliveries to the RVAAP/Camp Ravenna.

Post 1 (Main Gate) is the main point of contact for emergencies which occur on the Base. Personnel associated with this project will adhere to posted speed limits or default to 35 mph during daylight hours and 25 mph during nighttime hours. Smoking will be permitted in designated areas of the RVAAP/Camp Ravenna and food will be consumed only in designated areas. Communication among ECC personnel will be primarily by cell phones, with radios as backup.

ECC will remove all non-hazardous trash generated at the RVAAP/Camp Ravenna during its work. Any manifests for removal of non-RCRA (Resource Conservation and Recovery Act) hazardous waste will be coordinated with and signed by the RVAAP Facility Manager, Mark Patterson.

3.10 Project Resources

Army Furnished Resources - The Army is providing specified resources to ECC for investigation and remediation purposes, including:

- Access to Army-maintained records, reports, applicable USACE environmental sampling data, analyses, and information in their current format, i.e., paper copy, electronic, tape, disc, compact disks.
- Access to DoD and Army policy and guidance documents.
- Access and use of the facility sampling building, Bldg. 1036, in coordination with other contractors or Army personnel, and as per policies of the facility-operating contractor.

Contractor Furnished Resources - ECC will provide required expertise, knowledge, equipment and tools needed to meet or exceed the government's objectives delineated in the PWS for this project in accordance with established industry standards.

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4.0 ENVIRONMENTAL PROTECTION PLAN

No change to the October 2012 Final SI/RI Work Plan at Compliance Restoration Sites text with addition of the two SI sites. Refer to Section 4.0 of the October 2012 Final SI/RI Work Plan.

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5.0 PROJECT DOCUMENTATION AND SAMPLE QUALITY ASSURANCE/QUALITY CONTROL

No change to the October 2012 Final SI/RI Work Plan at Compliance Restoration Sites text with addition of the two SI sites. Refer to Section 5.0 of the October 2012 Final SI/RI Work Plan.

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6.0 DISPOSITION OF INVESTIGATION-DERIVED WASTE

No change to the October 2012 Final SI/RI Work Plan at Compliance Restoration Sites text with addition of the two SI sites. Refer to Section 6.0 of the October 2012 Final SI/RI Work Plan.

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7.0 CLEAN-UP LEVELS: BACKGROUND CONCENTRATIONS

No change to the October 2012 Final SI/RI Work Plan at Compliance Restoration Sites text with addition of the two SI sites. Refer to Section 7.0 of the October 2012 Final SI/RI Work Plan.

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8.0 DELIVERABLES

No change to the October 2012 Final SI/RI Work Plan at Compliance Restoration Sites text with addition of the two SI sites. Refer to Section 8.0 of the October 2012 Final SI/RI Work Plan.

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9.0 REFERENCES

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USACE. 2007. *U.S. Army Corps of Engineers. Safety and Health Requirements for Munitions and Explosives of Concern (MEC) Operations.* Engineer Regulation (ER) 385-1-95. March 30.

FIGURES

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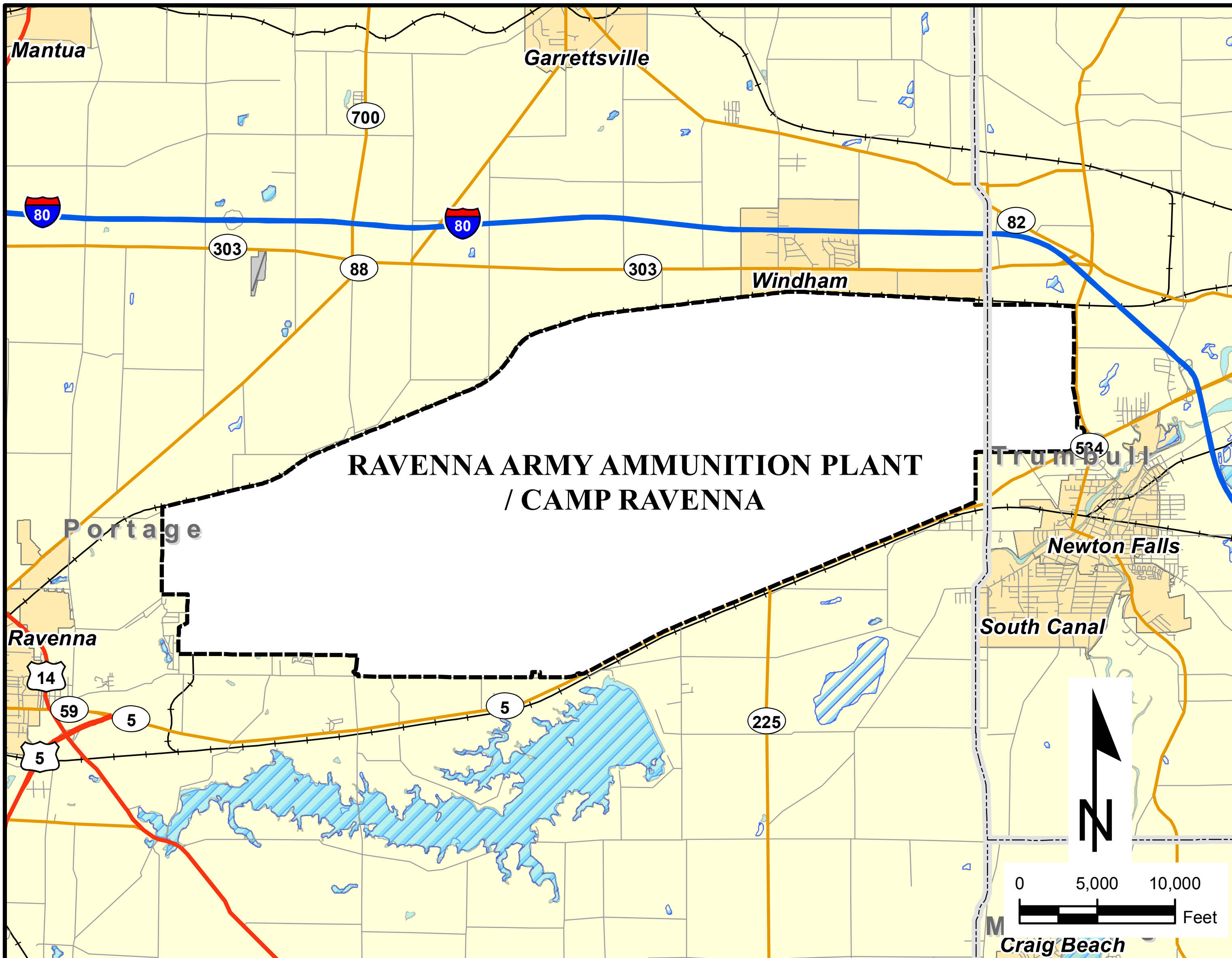

NOTES & SOURCES

Map Coordinates: WGS 84, UTM Zone 17N in Meters

ECC

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

Figure 1-1

General Location and Orientation of RVAAP/Camp Ravenna

RVAAP/CAMP RAVENNA
RAVENNA, OHIO

ECC GIS Server: F:\Projects\Ravenna 030113\MapDocuments\SIWP_7183\SIWP7183_Fig1-1_Ravenna_Loc.mxd

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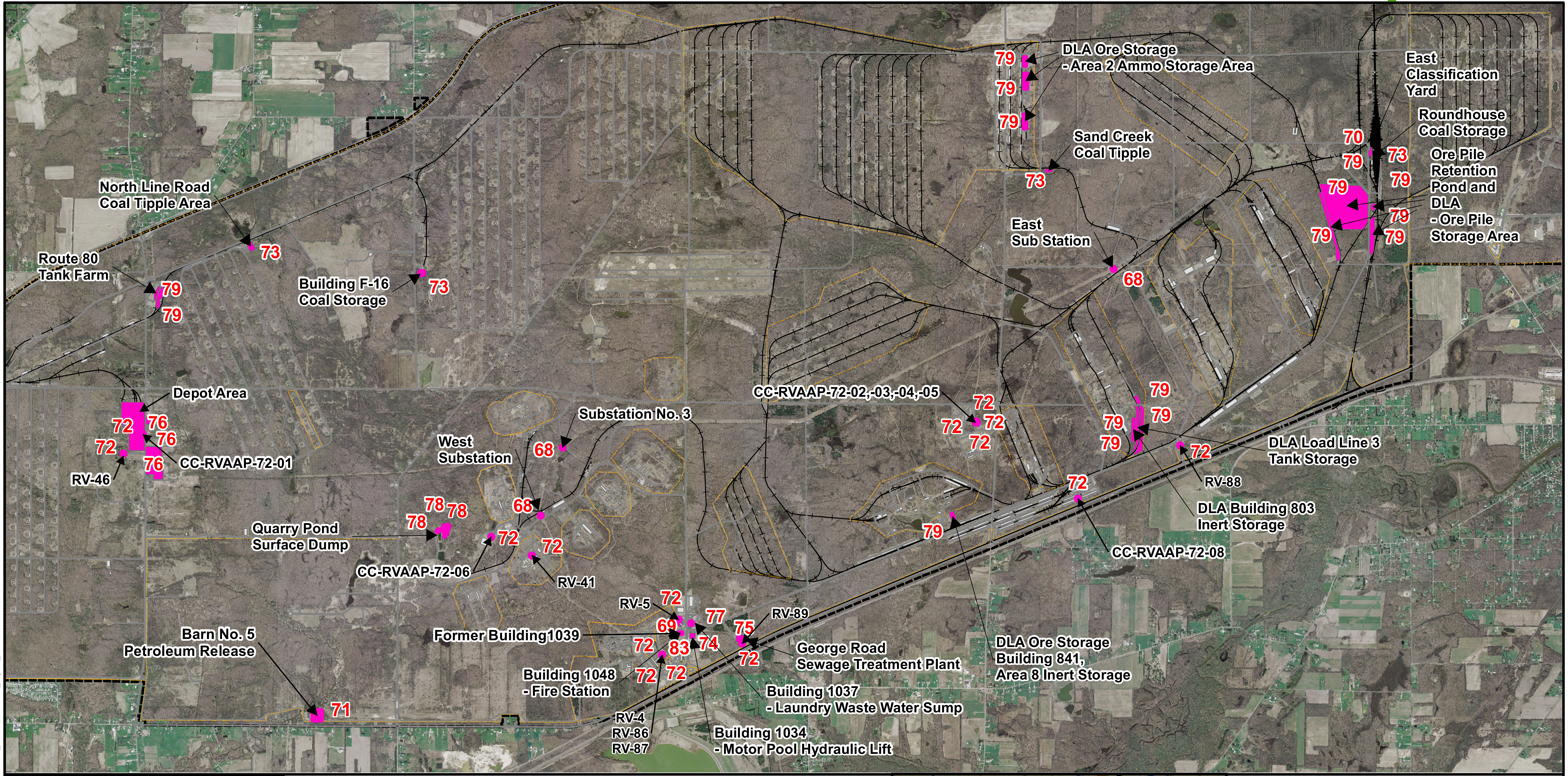


CR Site No.	CR Site Name
CC RVAAP-68	Electric Substations (East, West, No. 3)
CC RVAAP-69	Building 1048 - Fire Station
CC RVAAP-70	East Classification Yard
CC RVAAP-71	Barn No. 5 Petroleum Release
CC RVAAP-72	Facility-Wide Underground Storage Tanks (USTs)
CC RVAAP-73	Facility-Wide Coal Storage
CC RVAAP-74	Building 1034 - Motor Pool Hydraulic Lift
CC RVAAP-75	George Road Sew age Treatment Plant
CC RVAAP-76	Depot Area
CC RVAAP-77	Building 1037 - Laundry Waste Water Sump
CC RVAAP-78	Quarry Pond Surface Dump
CC RVAAP-79	DLA Ore Storage Site - Main Ore Storage Yard
CC RVAAP-83	Former Building 1039

Legend

- AOC
- Fence Line
- Road
- Railroad
- Building
- CRJMTC Property Line
- 73 CR Site

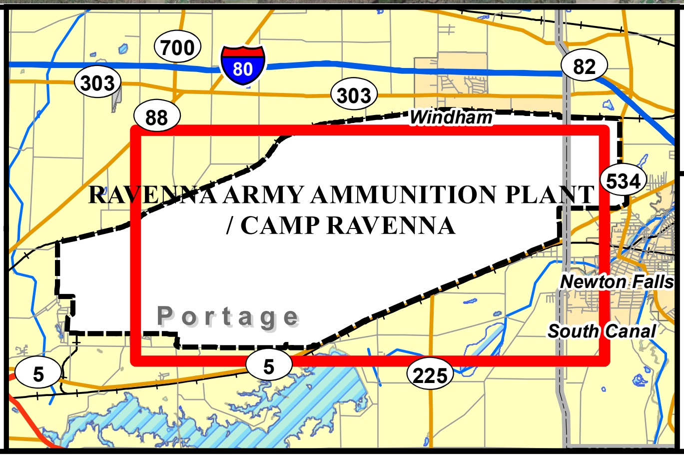
N

0 1,500 3,000 Feet

1 inch = 3,000 feet

NOTES & SOURCES

1. Map Coordinates: WGS 84, UTM Zone 17N in Meters
2. CR = Compliance Restoration
3. CRJMTC = Camp Ravenna Joint Military Training Center
4. UST site locations are approximate.



U.S. ARMY ENGINEER DISTRICT
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Figure 1-2

Location of Compliance Restoration Sites

RVAAP/CAMP RAVENNA
RAVENNA, OHIO

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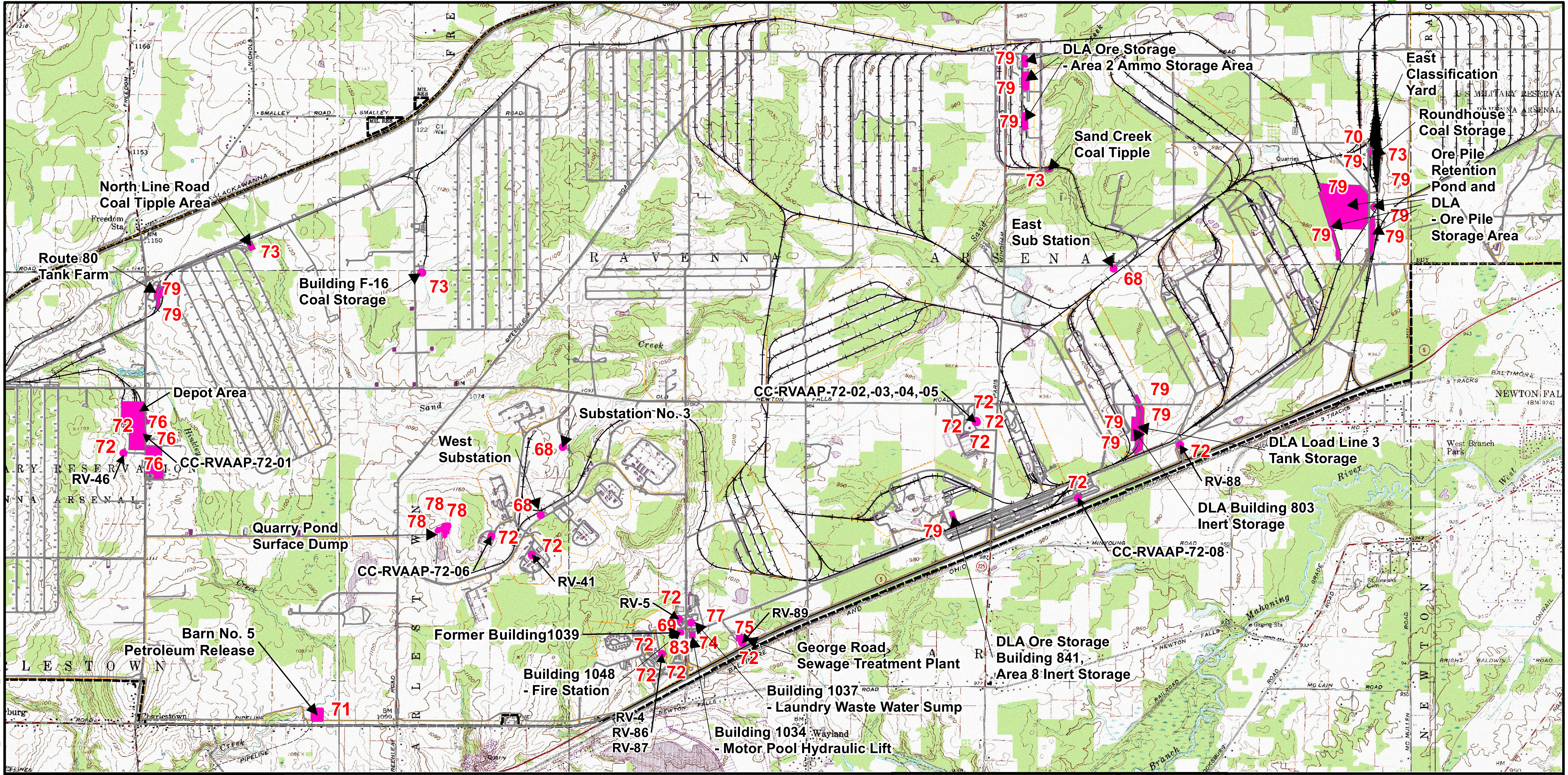

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CC RVAAP-77	Building 1037 - Laundry Waste Water Sump
CC RVAAP-78	Quarry Pond Surface Dump
CC RVAAP-79	DLA Ore Storage Site - Main Ore Storage Yard
CC RVAAP-83	Former Building 1039

Legend

- AOC
- Fence Line
- Road
- Railroad
- Building
- CRJMTC Property Line
- 73 CR Site

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1 inch = 3,000 feet

NOTES & SOURCES

1. Map Coordinates: WGS 84, UTM Zone 17N in Meters
2. CR = Compliance Restoration
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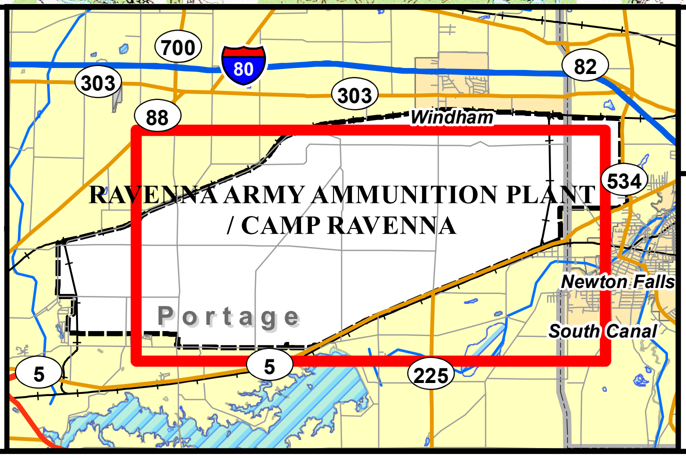

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Figure 1-3

Topographic Map of Compliance Restoration Sites

RVAAP/CAMP RAVENNA
RAVENNA, OHIO

ECC GIS Server: F:\Projects\Ravenna 030113\MapDocuments\SWP_7183\SWP7183_Fig1-3_DRG.mxd

Final
Sampling and Analysis Plan Addendum
for Site Inspections at Compliance Restoration Sites
CC RVAAP-71 Barn No. 5 Petroleum Release
and CC RVAAP-83 Former Buildings 1031 and 1039
Revision 1
Ravenna Army Ammunition Plant
Ravenna, Ohio

Contract No.: W912QR-04-D-0039
Delivery Order: 0004

Prepared for:

U.S. Army Corps of Engineers, Louisville District
600 Dr. Martin Luther King Jr. Place
Louisville, Kentucky 40202-2267

Prepared by:

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Marlborough, MA 01752

June 7, 2013

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ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
CR	Compliance Restoration
BGS	Below Ground Surface
BUSTR	Bureau of Underground Storage Tank Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CUG	Clean-Up Goal
DLA	Defense Logistics Agency
DFFO	Director's Final Findings and Orders
DQO	Data Quality Objective
DU	Decision Unit
ECC	Environmental Chemical Corporation
EM	Electromagnetic
FSP	Field Sampling Plan
FWCUG	Facility-Wide Clean-Up Goal
FWSAP	Facility-Wide Sampling and Analysis Plan
FWSHP	Facility-Wide Safety and Health Plan
GPS	Global Positioning System
HI	Hazard Index
HQ	Hazard Quotient
HRR	Historical Records Review
IDW	Investigation Derived Waste
IS	Incremental Sample
ISM	Incremental Sampling Method
MEC	Munitions and Explosives of Concern
NACA	National Advisory Committee on Aeronautics
NAD	North American Datum
NEDO	Northeast District Office
NERO	Northeast Regional Office
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PBA	Performance-Based Acquisition
PMP	Project Management Plan
PPE	Personal Protective Equipment
PWS	Performance Work Statement
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RI	Remedial Investigation
RSL	Regional Screening Levels
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation

ACRONYMS AND ABBREVIATIONS (CONTINUED)

SAP	Sampling and Analysis Plan
SI	Site Inspection
TAL	Target Analyze List
USCS	Unified Soil Classification System
US EPA	United States Environmental Protection Agency
UST	Underground Storage tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WBG	Winklepeck Burning Grounds

1.0 PROJECT DESCRIPTION

1.1 Introduction

Environmental Chemical Corporation (ECC) is submitting this Sampling and Analysis Plan (SAP) Addendum to the United States Army Corps of Engineers (USACE) Louisville District in accordance with the Performance Work Statement (PWS), Contract No. W912QR-04-D-0039, delivery Order 0004, Modification No. 1, under a firm-fixed price Performance-Based Acquisition (PBA) to provide Site Inspection (SI) services at two Compliance Restoration (CR) Sites at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. The Delivery Order was issued by the United States Army Corps of Engineers, Louisville District on August 15, 2011. Modification No. 1 was issued by the USACE, Louisville District on August 6, 2012 to execute a Site Inspection (SI) at the CC RVAAP-71 Barn No. 5 Petroleum Release and at CC RVAAP-83 Former Buildings 1031 and 1039. Former Building 1031 (Hospital) has received a No Further Action (NFA) designation and therefore is not discussed further in this document.

This Addendum to the SAP (Appendix A of the Draft Work Plan Addendum) presents to the Facility-Wide Sampling and Analysis Plan (FWSAP) for RVAAP (SAIC 2011a). This SAP describes the sampling and analysis procedures for conducting Site Inspections (SIs) for the two CR sites, referenced above, as well as the Quality Assurance Project Plan (QAPP), which is provided as Appendix B of the WP Addendum. The site-specific work to be performed to conduct the SIs for the corresponding SI sites, as listed in Table 1-1, is described in Appendix A.

The two CR sites to be addressed in this SAP Addendum and the actions proposed at each are summarized in Table 1-1:

Table 1-1: Proposed Action Summary

CR Site Number	CR Name	Proposed Action
CC RVAAP-71	Barn No. 5 Petroleum Release	Site Inspection
CC RVAAP-83	Former Building 1039 Laboratory	Site Inspection

The following sections include the site-specific field sampling activities at each site listed in Table 1-1. The medium addressed in this SAP Addendum is subsurface soil. Groundwater sampling and analysis are being addressed under a separate facility-wide contract and not included in this SAP. Site-specific media to be sampled, sampling methods, frequency of sampling, and the analysis to be performed are detailed in Appendix A of this SAP Addendum.

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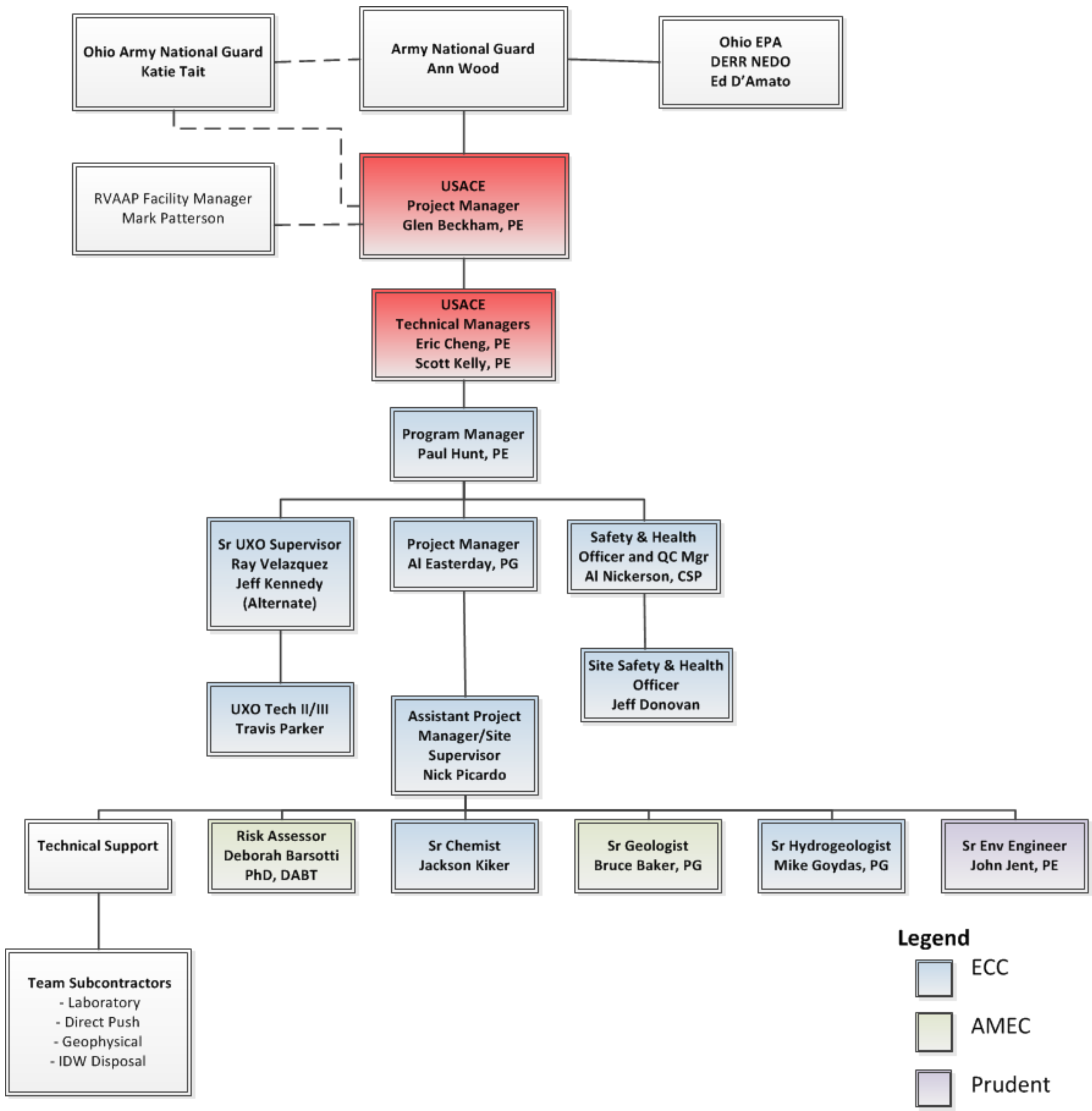
2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The overall project organization and responsibilities for the 2011 PBA for Environmental Investigation and Remediation at the two subject Compliance Restoration Sites at RVAAP are presented in the Project Management Plan (PMP) (ECC 2012). Key personnel and subcontractors implementing this SAP Addendum are listed in Figure 2-1. Details on the Project Organization and responsibilities are provided in the PMP (ECC 2012).

Figure 2-1: Project Organizational Chart



3.0 PROJECT SCOPE AND OBJECTIVES

The following sections describe the site-specific field sampling program at each of the two CR sites included in this SAP Addendum.

3.1 Scope and Objectives

The primary scope of this SAP Addendum is to provide site-specific elements for environmental sampling and analysis during the performance of SIs at two CR sites conducted at RVAAP under this PBA Modification No. 1. The primary objectives presented in this SAP Addendum are to outline the sampling and analysis procedures required to obtain data of sufficient quality, representativeness, and quantity so that all SIs are completed during the following field activities:

- Conduct subsurface soil sampling in support of a SI to assess the presence, nature, and extent of contamination at the following CR sites:
    - CC RVAAP-71 Barn No. 5 Petroleum Release
    - CC RVAAP-83 Former Building 1039 Laboratory

Investigation-specific objectives have been developed using the data quality objective (DQO) approach presented in the FWSAP. The general DQOs and investigative approach for this SAP Addendum are discussed in Section 3.2. CR site-specific sampling objectives and designs are presented in Appendix A, detailing the analysis, methods, quantities, and locations of samples to be collected to accomplish these objectives.

3.2 Sampling and Analysis Plan Data Quality Objectives

3.2.1 General Investigation Decision Rules

The general decision rules applied to the investigation activities for all CR sites are presented for each media in the following sections. Each CR site is proceeding through the CERCLA process individually. Each CR site varies in regard to historic use, previous investigations, and data gaps. Therefore, the general decision rules are applied to each CR site individually to develop a specific sample design. Decision rules used to guide remediation decisions are provided in Section 4.2.6 of the FWSAP.

Sampling methods used during previous investigations at RVAAP have included both Incremental Sampling (IS) Methods (ISMs) and/or discrete sampling methods. In both cases, sample locations were biased to areas with the greatest likelihood of contamination (e.g., adjacent to production buildings or within sediment accumulation areas, such as ditches). In order to maintain consistency and avoid mixing of sample types in risk management decisions, the former sampling methods (IS and/or discrete) employed at each CR site are continued in this SAP Addendum. Appendix A provides the specific sample designs for the SI CR.

Subsurface soil ISM or discrete samples will be collected from 1 - 4 ft bgs and 4 - 7 ft bgs. One or more borings will be advanced to the 7 - 13 ft bgs (or refusal) to collect a discrete sample to complete an evaluation of the unrestricted (residential) land use scenario. The analytes to be collected will be based upon site-specific HRR report recommendations, any past characterization data, or ECC's evaluation of the site use.

The SI sampling approach is a phased sampling effort. Subsurface soils will be sampled from the 1 - 7 ft bgs depth. If contamination at concentrations above cleanup criteria is identified in the 4 - 7 ft bgs interval, then an ISM sample will be collected from the 7 - 13 ft bgs interval. One or more discrete samples from 7-13 ft bgs will be collected from each site during the mobilization when the 1 - 7 ft bgs samples are being collected.

3.2.2 Selection of Sampling Locations

The selection of sampling locations and subsequent sampling and analysis for the RVAAP field investigations will focus on the following:

- Determining the presence of contamination;
- Determining the nature and extent of contamination.

For this SAP Addendum, determination of the nature and extent of contamination will be accomplished by comparing existing analytical data (where available) and collected data to chemical-specific screening criteria.

Process history, topography, geology, and other information specific to each individual CR site will be used to identify locations where residual contamination would most probably remain. . ISM collection procedures are detailed in Section 4.2.2.2 of this SAP. Sections 5.5, 5.6, and 5.7 in the FWSAP contain procedures for the various preferred sampling methods. Site-specific sampling locations are detailed in Appendix A.

3.2.3 Decision Units

Under this SAP Addendum, CR sites will be divided into Decision Unit (DUs). Each CR site may contain one or more DUs. Each DU is considered an area within which one IS sample is collected. A DU is designed to provide a statistical average chemical concentration over the selected area of the IS sample area (i.e., Decision Unit). Within the boundary of the DU area vertical IS subsurface soil samples will be collected to further characterize the areal and vertical extent of contamination. The location and size of each DU within a specific CR site will be based on site history, known or suspected chemicals of concern (COC), and physical features of the CR site. Appendix A provides site-specific information on the number, size, and location of DUs within each CR site.

For the SI CR sites that are the subject of this SAP Addendum, information from the HRR will be used to determine initial sample locations. All sampling results will be compared to the chemical-specific screening criteria listed as the facility-wide clean-up goals (FWCUGs), as provided in the FWSAP (SAIC 2011a).

The chemical-specific FWCUGs at the 10^{-6} cancer risk level and non-carcinogenic risk Hazard Quotient (HQ) using the 0.1 risk value are the specific screening criteria used in this SAP. The FWCUGs were used to determine which analytes and which areas must be evaluated to assess nature and extent of contamination. The use of the FWCUGs is consistent with guidance in USACE's Final RVAAP Position Paper for the Application and Use of Facility-Wide Human Health Cleanup Goals (USACE 2009b). The FWCUGs at these risk levels were developed in the Draft FWCUG Report for multiple receptors. In order to ensure the nature and extent of contamination is defined to the most restrictive receptor/land use, the screening criterion for each chemical in each medium was the FWCUG with the least value for any of the receptors at these risk levels. It is assumed that the presence of concentrations at or less than their background value indicates the absence of contamination. If the screening criterion for an inorganic chemical was less than the background value, then the background value was used as the screening criterion for determining exceedances that need to be further investigated. The use of the term "exceedance" within this SAP Addendum refers to a sample result that is greater than the screening criteria presented in Table 4-2 in the FWSAP.

If a sample result exceeds the screening criteria defined above, it will be compared to 10 times the FWCUG (representing a Hazard Index (HI) of 1.0 or a Target Risk of 10^{-5} for the same receptor [from the Draft FWCUG Report]). This comparison will be performed to facilitate the identification of potential source areas or "hot spots".

3.2.4 Determination of CR Site-Specific Chemicals of Potential Concern

Upon completion of data collection activities conducted at CR sites covered under this SAP Addendum, all available chemical data will be evaluated to determine chemicals of potential concern (COPC) for each CR site. The process for determining CR site-specific COPCs will follow the procedures described in Section 2.0 of USACE's Final RVAAP Position Paper for the Application and Use of Facility-Wide Human Health Cleanup Goals (USACE 2009b), including the development of CR site-specific Clean-Up Goals (CUGs) for additional chemicals if necessary.

3.2.5 Chemical Parameters to be Analyzed

The chemical parameters to be analyzed and the frequency at which samples will be collected at each specific CR site are presented in Appendix A.

3.2.6 Media-Specific Decision Points

The following sections discuss the decision points specific to each environmental media being investigated under this SAP Addendum.

3.2.6.1 Surface Soil

Surface soil will not be collected at these CRs sites included in this SAP Addendum.

3.2.6.2 Subsurface Soil

The subsurface soil at each DU will be adequately characterized through the placement of shallow borings at up to 10 locations throughout the DU. As described in Section 3.0 of this SAP, ISM soil samples will be collected to a depth of 7 ft bgs and an additional discrete subsurface sample will be collected at each of the site locations at a depth of 13 ft bgs in order to determine the suitability for unrestricted (residential) land use of the property.

The following three subsurface sample intervals will be collected at each boring location:

1 - 4 ft bgs (ISM)
4 - 7 ft bgs (ISM)
7 - 13 ft bgs (Discrete)

The maximum sampling depth for subsurface soil samples will be 13 ft bgs.

ECC will collect subsurface soil samples initially at two intervals at each boring location from 1 - 4 ft bgs and 4 - 7 ft bgs. In the event that soil impacts are reported at both intervals or in the second interval at 4 - 7 ft bgs, the 7 - 13 ft bgs interval samples will be analyzed for the required parameters.

In the event a new chemical is detected in any of the samples submitted for analysis and a screening criterion does not exist, the chemical concentration will be compared to the USEPA nationwide regional screening levels (RSLs). This approach is consistent with the use of RSLs to initially evaluate data and identify COPCs that require development of site-specific CUGs. Subsurface sampling procedures are provided in Sections 4.2.2.2 through 4.2.2.5 in this SAP.

3.2.6.3 Surface Water and Wet Sediment

Surface water and sediment samples will not be collected at these two CR Sites included in this SAP Addendum.

3.2.7 Site - Specific Data Quality Objectives and Investigation Activities

CR site-specific DQOs and planned investigation activities are presented in Appendix A. The appendix includes CR site descriptions highlighting sampling results greater than screening criteria (if available). Appendix A also details the types and locations of samples to be collected at each of the CR sites.

Table 3.1, located in the SI/RI WP Addendum, provides summary of media analytical sampling for the site inspection activities at the two CR sites, which are detailed in this SAP Addendum.

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4.0 FIELD ACTIVITIES

All field activities and sampling procedures will be accomplished in accordance with Section 5.0 of the FWSAP (see Sections 4.3 and 4.4). Where changes or unique elements not addressed in the FWSAP have been identified, they are provided here. Field instruments (e.g. photoionization detector, flame ionization detector and X-ray fluorescence) will not be used for the measurement of chemical concentrations or biased sample collection during the implementation of this SAP, unless it is determined that chemical concentration measurements are needed for the protection of workers' health and safety.

4.1 Incremental Sampling Method

ISM will be used to investigate and characterize the nature and extent of contamination at the majority of the CR sites covered under this SAP Addendum.

Subsurface IS samples will be collected as described in Section 5.6.2.1.3 of the FWSAP. The area comprised by each DU is dependent upon the area of the CR site, the planned use, and physical features of the CR site. A minimum volume of one (1) kilogram (kg) of soil must be collected per DU.

Sub-surface ISM samples will be collected from 1 - 4 ft bgs and 4 - 7 ft bgs. One or more borings will be advanced to the 7 - 13 ft bgs (or refusal) to collect a discrete sample to complete an evaluation of the unrestricted/residential use scenario. The analytes to be collected will be based upon site-specific HRR report recommendations, any past characterization data, or ECC's evaluation of the site use.

The SI sampling approach is a phased sampling effort. Subsurface soils will be sampled from the 1 - 7 ft bgs depth. If contamination is identified in the 4 - 7 ft bgs interval above clean-up criteria, then an ISM sample will be collected from the 7 - 13 ft interval. In order to evaluate each of the sites included in this SI/RI WP Addendum for Unrestricted/Residential Use scenario as per the *Final Guidance Document for the Evaluation of Land Use Controls at RVAAP* (USACE 2011), one additional discrete composite sample will be collected from 7 - 13 ft bgs from each site.

ISM will not be utilized for VOC analysis. The specific location of the discrete sample will be biased toward the area most likely to contain volatile compounds, or if no such area is observed, the location will be randomly chosen. Soil portions designated for VOC analysis will be placed directly in the sample container and will not be composited or further processed in the field.

4.1.2 Subsurface Soil Sampling Procedures

Subsurface soil will be collected using direct push technology (e.g., Geoprobe) to a maximum sampling depth of 13 ft bgs, or refusal. In the event that the sample location cannot be accessed with the drill rig or Geoprobe, subsurface soil will be collected using a bucket hand auger. The procedures for hydraulic direct-push sampling are discussed in Section 5.5.2.5.3 of the FWSAP.

4.1.3 ISM Subsurface Soil Sampling Procedures

ISM subsurface soil samples will be comprised of at least five sample sub-samples obtained from the designated depths (1 - 4 ft bgs, and 4 - 7 ft bgs). All IS sample sub-samples collected from the same sample interval from the five (or more) soil borings will be composited to create the depth specific IS subsurface sample. Sufficient soil will be collected from each soil boring sample interval to generate the minimum 1-kg required for an IS sample. If required, additional co-located soil borings will be advanced to generate the 1-kg depth specific IS sample.

4.1.4 Vertical Incremental Sampling

From at least five of the borings used to collect sub-surface IS samples within a DU, a vertical IS sample will be collected. The purpose of a vertical IS sample is to further characterize the areal extent of contamination at a DU. A vertical IS sample is collected by running a Teflon® coated trowel, spoon, or other Teflon® coated sampling equipment up the length of the collected 0 - 7 foot soil core to obtain a minimum of 1 kg of soil equally distributed along the length of 0 - 7 foot core. This method is a means to collect the more than 30 soil aliquots necessary for an IS sample in a systemic and unbiased manner.

4.2 Composite Subsurface Soil Sampling

At each of the CR sites, a minimum of one subsurface soil sample (identified as a Deep Soil Boring [DSB] in Appendix A sampling summary tables) will be collected from the 7 - 13 ft bgs interval. The purpose of the DSB sample is to evaluate each of the CR sites for Unrestricted/Residential Use scenario as a land use per the *Final Guidance Document for the Evaluation of Land Use Controls at RVAAP* (USACE, 2011. Composite samples will be collected in accordance with Section 5.5.2.5 of the FWSAP, as modified in this section. When collecting composite subsurface soil sample, VOC samples will be collected prior to the compositing process. No samples for VOC analysis will be collected from composited or homogenized sample volumes. An equal quantity of soil from the 7 - 13 ft bgs soil interval will be collected by running a trowel or other disposable sampling device up the collected soil coring and placed into a decontaminated or dedicated stainless steel bowl or directly into a pre-cleaned wide mouth sample jar. The total quantity of the composite samples selected for compositing will be sufficient to perform all required laboratory analyses. If soil is placed into the bowl, it will initially be split into quarters, and each quarter will be mixed thoroughly in the center in the bowl using a stainless steel spoon. All four quarters will be mixed together until the single composite sample has a consistent physical appearance. Upon completion of the compositing process, the sample will be divided in half and the containers filled by scooping sample material alternately from each half.

4.3 Wet Sediment

Wet sediment samples will not be collected at CC RVAAP-71 and CC RVAAP-83 under the SAP Addendum.

4.4 Surface Water

Surface water samples will not be collected at CC RVAAP-71 and CC RVAAP-83 under the SAP Addendum.

4.5 Sample Collection and Laboratory Analysis

For discrete sample locations, geotechnical logging, including estimates of Unified Soil Classification System (USCS) classification, will be performed for all soil samples and for all vertical IS subsurface samples. For IS samples, each IS aliquot will not be logged and described separately; instead, a general description will be developed for the entire DU, noting any variances.

4.6 Sample Container Preservation Techniques

Sample container and preservation technique requirements will follow those prescribed in Table 5-1 through Table 5-4 of the QAPP.

4.7 Field QC Sampling Procedures

QA/QC samples will be collected in accordance with Section 5.4.7 of the FWSAP during the implementation of this SAP. QC duplicate samples will be collected at a frequency of 10% (1 per 10 environmental samples) for each medium (soil, surface water, and wet sediment). Matrix spike/matrix spike duplicate samples will be collected at a rate of 5% (1 per 20) of the total samples per medium. QA split samples will be submitted to the USACE contract laboratory for independent analyses at the discretion of the USACE. Duplicate and QA split samples will be derived from the same discrete sampling station or from within the selected DU, and submitted for the same analyses as the environmental samples blind to the contract laboratory. IS field duplicates and QA split samples will be collected from a unique set of at least five (subsurface soil) sample aliquots. One rinsate blank will be collected for surface soil/sediment equipment per field cycle. Trip blanks will accompany all shipments containing VOCs.

One source blank will be collected from the potable water source, which will be used for all potable wash and rinse water for equipment decontamination during the implementation of this SAP. One source blank will also be collected from the deionized/distilled American Society of Testing and Materials (ASTM) Type I water source used. The source blanks will be analyzed for the RVAAP full suite of analyses. Sections 5.5.2.7 and 5.5.2.8 of the FWSAP summarize the QA/QC sampling requirements for surface soil and subsurface soil and sediment, respectively. Quantities of QA/QC samples are presented in Table 2-1 of the QAPP.

4.8 Decontamination Procedures

Non-dedicated equipment used for surface soil, subsurface soil, or wet sediment sampling shall be decontaminated as described in Sections 5.5.2.8 and 5.6.2.9 of the FWSAP. All non-dedicated equipment will be decontaminated at the completion of sampling activities at each sampling location, with the exception of subsurface equipment, which will be decontaminated after each use during borehole interval sampling. A final decontamination inspection of any equipment leaving RVAAP at the end of field activities will be conducted to ensure proper decontamination.

4.9 Site Survey

Following sampling activities, the horizontal coordinates of all sampling locations and the corners of DUs will be determined to within 1 m (3 ft). For discrete soil sampling stations, the ground elevations will be determined at the point of collection to within 0.06 m (0.2 ft). The ground elevation for the DU will be determined from one point within the area.

All locations will be conveyed in Ohio State Plane Coordinates (NAD83). The vertical datum for all elevations will be 1929 National Geodetic Vertical Datum. All coordinates and elevations will be recorded on the boring logs upon receipt of quality assured survey results. In addition, electronic results will be provided to USACE and RVAAP in ASCII format.

5.0 SAMPLE CHAIN OF CUSTODY/DOCUMENTATION

5.1 Field Logbook

All field logbook information will follow structures identified in Section 6.1 of the FWSAP.

5.2 Photographs

Information regarding the documentation of photographs during CR site-specific investigations is presented in Section 5.4.2.4.2 of the FWSAP. Representative photographs will be taken of the investigative measures during the fieldwork and any significant observations that are made during the field effort. Photographs will be suitable for presentation in a public forum, as well as for documenting scientific information. Attempts will be made when taking photographs to document sampling points to include two or more permanent reference points to facilitate relocating.

5.3 Sample Identification System

The sample identification system that will be used to identify samples collected during the implementation of this SAP is outlined in Section 6.3 and 6.4 of the FWSAP and illustrated in Figure 5-1.

Figure 5-1: Location/Sample Identification Naming Conventions

Sampling Location Identification: XXXmm-NNN(n)					
XXX	=	Area Designator	Examples		
			CBL	-	C-Block Quarry
			LL9	-	Load 9
			B12	-	Building 1200
			LL10	-	Load Line 10
			LNW	-	Landfill North of WBG
			LL11	-	Load Line 11
			ULCP	-	Upper and Lower Cobbs Ponds
			LL12	-	Load Line 12
			LL6	-	Load Line 6
			F15	-	Buildings F-15 and F-16
			NTA	-	NACA Test Area
			ATA	-	Anchor Test Area
			LL5	-	Load Line 5
			ASY	-	Atlas Scrap Yard
			LL7	-	Load Line 7
			WSA	-	Wet Storage Area
			LL8	-	Load Line 8

mm	=	Sample Location Type	Examples MW - Groundwater Monitoring Well SB - Soil Boring SW - Surface Water Location SD - Sediment Sample Location SS - Surface Soil Location TR - Trench Location SP - Seep Sample WP - Groundwater Well Point
NNN(n)	=	Sequential Sample Location Number Unique, sequential number for each sample location beginning with the following number from the last number used from previous investigation stations and extending into any subsequent investigative phases	Examples 004 012 099 107
(n) Special identifier- Optional use (as needed) to identify special sample matrices or sample location characteristics. For example: Use a D to identify the well as an adjacent deep zone/aquifer well (004D) Use a B to identify the well as a background location (012B) Use an A to identify an abandoned well (099A) Use a M to identify an ISM (107M)			
Sample Identification: XXXmm-NNN(n)-####-tt			
###	=	Sequential Sample Number [must be unique for entire project site/CR SITES]	Examples 0001 0002 0003
tt	=	Sample Type	Examples GW (unfiltered) - Groundwater Sample GF (filtered) - Groundwater Sample SO - Soil Sample SW - Surface Water Sample SD - Sediment Sample PR - Free Product Sample SP - Seep Sample TB - Trip Blank FB - Field Blank ER - Equipment Rinsate

5.4 Sample Documentation

All sample label, logbook, field record, and field form information will follow structures identified in Section 6.0 of the FWSAP.

5.5 Documentation Procedures

Documentation and tracking of samples and field information will follow the series of steps identified in Section 6.5 of the FWSAP.

5.6 Corrections to Documentation

Any corrections to documentation will follow guidance established in Section 6.6 of the FWSAP.

5.7 Monthly Reports

Monthly reports are submitted as part of implementation of ECC's PBA. This monthly report will be submitted on the 10th day of each month to both the USACE and Ohio EPA. The content of the reports will have content similar to that specified in Section 6.7 of the FWSAP.

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6.0 SAMPLE PACKAGING AND SHIPPING REQUIREMENTS

Sample packaging and shipping shall generally follow Section 7.0 of the FWSAP.

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7.0 INVESTIGATION DERIVED WASTE

All IDW, including auger cuttings, residual sample material, personal protective equipment (PPE), disposable sampling equipment, and decontamination fluids, will be properly handled, labeled, characterized, and managed in accordance with Section 8.0 of the FWSAP. At the conclusion of field activities for the project, a letter report will be submitted to Ohio EPA, USACE, and RVAAP Facility Manager documenting the characterization and classification of the wastes. Upon approval of the IDW classification report, all solid and liquid IDW will be removed from the site and disposed of by a licensed waste disposal contractor. All shipments of IDW off-site will be coordinated through the RVAAP Facility Manager.

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8.0 REFERENCES

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APPENDIX A

SITE INSPECTION SITES

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A.5 CC RVAAP-71 Barn No. 5 Petroleum Release

SITE DESCRIPTION

The Barn No. 5 Petroleum Release site is located in the western portion of RVAAP along the southern property fence line (Figure A.5-1). The fence runs between South Patrol Road, which is a dirt and gravel road within RVAAP property lines, and old State Route 5, which is currently named Newton Falls Road. Newton Falls Road is a two lane paved road lying to the south of CC RVAAP-71. The RVAAP property line is located in the center of Newton Falls Road. The fence line lies roughly 150 ft within the RVAAP property line in this area.

The site is considered to be approximately 0.6 acres, including the footprint of Barn No. 5 and the land between the barn and the fence line in the vicinity of Post No. 6. The Barn No. 5 footprint is directly north of Post No. 6 where access to RVAAP was formerly allowed through the fence from old State Route 5. Hinkley Creek, which lies 350 ft northwest of the former Barn No. 5 site, flows to the southwest under South Patrol Road (Figure A.5-1).

A letter dated May 13, 1964 (Appendix E of HRR) documents the release of approximately 20 barrels (840 gallons) of gasoline from a break in an underground pipeline with subsequent release to the ground surface inside of the fence. The pipeline runs parallel to the RVAAP fence line at this location. Based on the 1964 letter, excavation was completed in order to repair the pipeline on the same day as the reported release. Historical drawings show the 12.5-foot pipeline easement on RVAAP property at the release location that is also depicted on Figure A.5-1. The pipeline depth is unknown.

The site is undeveloped, covered with tall grassy vegetation, and no buildings exist on this CR site. This site is currently used by the OHARNG for training and is designated as part of Training Area D. Future OHARNG land use is projected as Unrestricted Guard Use.

PREVIOUS INVESTIGATIONS

No previous on-site investigations have been conducted at the CC RVAAP-71 Barn No. 5 Petroleum Release site. A Historical Records Review (HRR) was conducted in 2011 (ECC, 2012). Based on the site inspection conducted on November 3, 2011, there is no visual evidence of a gasoline release, such as staining, residue, odor, or stressed vegetation evident.

No documented evidence of impact from former and current military operations at this site was found during the HRR. No documented evidence of military munitions being used at CC RVAAP-71 Barn No. 5 Petroleum Release was found during the HRR. No documented evidence of operations involving hazardous, toxic, and radioactive waste (HTRW) at CC RVAAP-71 Barn No. 5 Petroleum Release was found during the HRR. A review of RVAAP

UST documents from the Ohio State Fire Marshal's Office conducted by ECC in October 2011 did not identify the presence of ASTs or USTs in the vicinity of the site.

The Final HRR Report (ECC, 2012) stated there was no documented evidence of the presence of hazardous, toxic, or radioactive waste at CC RVAAP-71 Barn No. 5 Petroleum Release other than the letter dated May 13, 1964 which documents that "a yellow liquid was coming out of the ground inside of our south fence near Barn No. 5" (Craver 1964). The "yellow liquid" is later identified in the letter as "SOHIO gasoline."

The site is identified as "Barn No. 5 Petroleum Release" due to its proximity to the only existing site feature, Barn No. 5, at the time of the release. However, it should be noted that the release did not occur from, or around, the footprint of Barn No 5. As stated above and in the Final HRR Report (ECC, 2012), no documented evidence of impact from former military operations was found, which includes any activities at Barn No. 5. The petroleum release occurred from an underground pipeline and therefore, the approximate area of the petroleum release from the pipeline will be the focus of the characterization activities.

CHARACTERIZATION ACTIVITIES

The SI characterization activities are focused on the area of the petroleum release as shown in Figure A.5-1.

Based on evidence found during the HRR, the site is considered to be the area approximately 0.6 acre including the Barn No. 5 building footprint and the area inside the fence near Barn No. 5 where a buried pipeline, located outside the installation fence, released approximately 20 barrels (840 gallons) of SOHIO gasoline to ground surface during an isolated event. No further documentation of hazardous material use, disposal, or releases at Barn No. 5 was discovered during the HRR. Therefore, it is unlikely that the former barn footprint is associated with contamination. Residual contamination associated with the historic pipeline release is considered unlikely due to the volatile nature of gasoline constituents, which were released 47 years ago, and characteristics of the silty clay soil, which would limit the leaching potential of the contaminants to groundwater, which is estimated to be approximately 12-ft bgs. Due to the distance from the gasoline release to Hinkley Creek of approximately 350 ft, in conjunction with the excavation activities that immediately followed the release, it is considered unlikely that surface water has been affected by this historical release. The analytical results of the one sediment sample collected in October 1999 along the banks of Hinkley Creek (approximately 450 feet northwest of the site) indicated that no VOCs or SVOCs were detected above instrument detection limits. Lead, a constituent of gasoline, was reported at a concentration of 11.6 mg/kg in the sediment sample; however, the reported concentration is below the Facility-Wide Background criteria of 27.4 mg/kg for lead (ECC 2012).

The HHR Report identified only one incident identified that was associated with Barn No. 5 Petroleum Release: the historic release of approximately 840 gallons of SOHIO gasoline. Due to the relatively small volume of the release in conjunction with the age (47 years ago), the volatile nature of gasoline constituents, and potential soil contaminant that might migrate into groundwater, additional investigation of the soils is recommended at CC RVAAP-71 Barn No. 5 Petroleum Release (ECC 2012).

The objective of this SAP for the Barn No. 5 Petroleum Release is to confirm the presence or absence of hazardous materials at concentrations greater than screening criteria in subsurface soil due to the petroleum release from the pipeline. Incremental Sampling (IS) of subsurface soil will be conducted. The area of interest discussed above constitutes one Decision Unit (DU). Two subsurface IS samples will be collected at intervals 1 - 4 ft bgs and 4 - 7 ft bgs at each soil boring location. The subsurface IS will be composed of horizontal and vertical IS, with the horizontal IS corresponding to the depth intervals listed above, and the vertical IS corresponding to the entire subsurface interval (1 - 7 ft bgs) at each subsurface IS location. In addition, one or more borings (referred to as "DSB" sample in the sample summary table) will be advanced to the 7 - 13 ft bgs (or refusal) to collect a composite sample to complete an evaluation of the unrestricted/residential use scenario.

One DU (designated DU01) is planned for the Barn No. 5 Petroleum Release (Figure A.5-2). Within DU01, IS samples will be collected as presented in Table A.5-1.

Table A.5-1 presents the areas of interest to be sampled and summarizes the medium to be sampled, sample collection methods, the number of samples to be collected, and the rationale behind the proposed sampling activities. MS/MSD samples will be collected at a frequency of 5%. Field Duplicate samples will be collected at a frequency of 10%.

Table A.5-1: Barn No. 5 Petroleum Release Area Sampling Summary

CC RVAAP-71 Barn No. 5 Petroleum Release		Sample Type			Decision Units[1] Barn No. 5 Petroleum Release	Analysis				Use Type
Medium	Soil interval	IS	D	C	01	VOC/ MTBE	SVOC	TPH/ DRO/ GRO	Lead	
SB	1-4' and 4-7'	x			2	2	2	2	2	N
SB Vertical Profile	1-7'	x			14	14	14	14	14	N
DSB	7-13’			x	1	1	1	1	1	E
Number of Soil Borings					14					

Note: Sample numbers do not include quality control samples. See Appendix B of the SI/RI Work Plan for details.
1) "01" under the Decision Unit header represents Decision Unit (DU) number one, which will be represented as DU01
N = Nature and Extent
E = Risk and Extent
SB = Subsurface soil
DSB = Deep soil boring
IS = Incremental sample
D = Discrete sample
C = Vertical composite sample

Legend

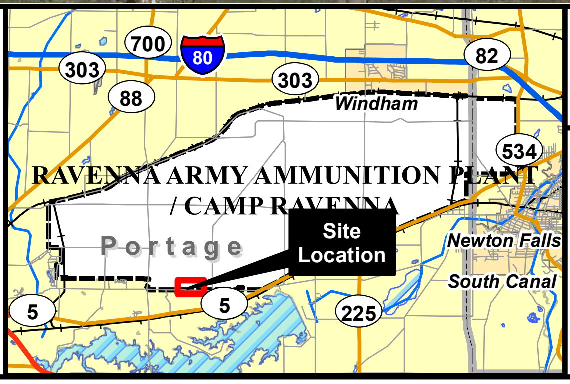
- Fence Line
- Decision Unit
- Facility Property Line
- Creek and Stream
- Flow Direction
- Post No. 6
- Pipeline (Approx)
- Pipeline Easement (Approx)
- Former Barn No. 5 Footprint

N

0 100 200 Feet

NOTES & SOURCES

1. Map Coordinates: WGS 84, UTM Zone 17N in Meters
2. Base map data from SAIC. Aerial photograph from USGS.



U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

Figure A.5-1
CC RVAAP-71
Barn No. 5 Petroleum Release
Site Features

RVAAP/CAMP RAVENNA
RAVENNA, OHIO

ECC GIS Server F:\Projects\Ravenna 030113\MapDocuments\SIWP_7183\SIWP7183_FigA5-1_71Site.mxd

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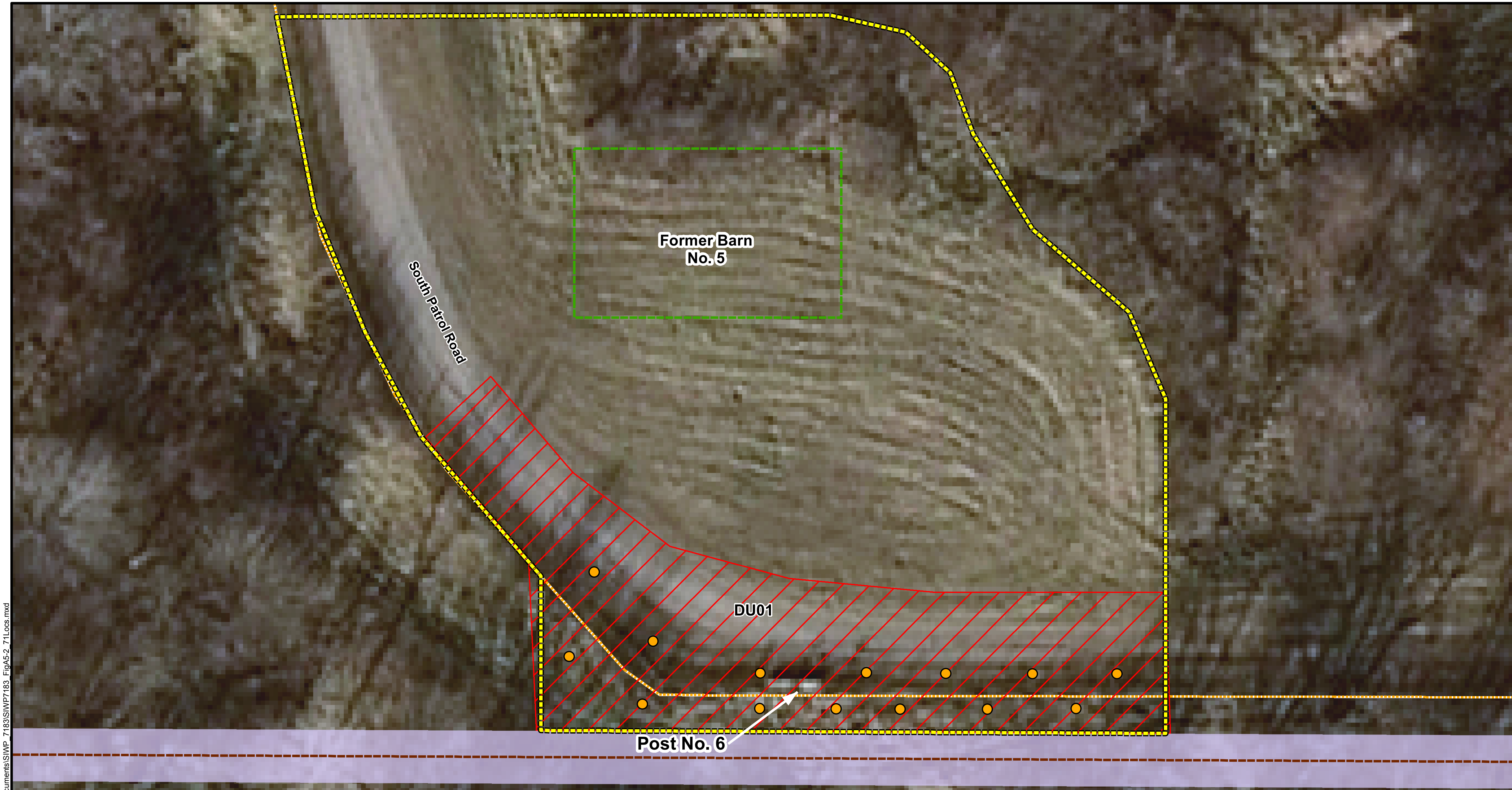

Legend

- Direct-Push Boring Location
- Fence Line
- CC RVAAP-71 Site Area (Approx)
- Pipeline (Approx)
- Pipeline Easement (Approx)
- Decision Unit
- Former Barn No. 5 Footprint

N

0 10 20 Feet

NOTES & SOURCES

1. Map Coordinates: WGS 84, UTM Zone 17N in Meters
2. Base map data from SAIC. Aerial photograph from USGS.

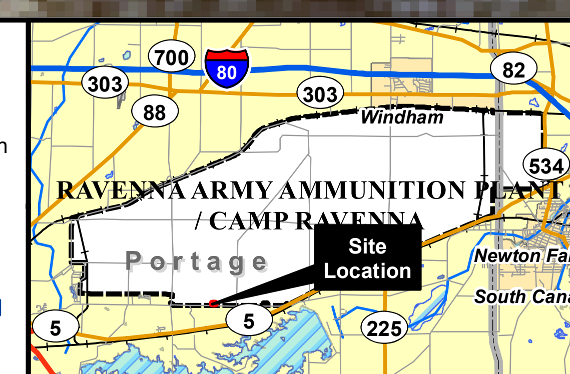

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Figure A.5-2
CC RVAAP-71
Barn No. 5 Petroleum Release
Proposed Sampling Locations
RVAAP/CAMP RAVENNA
RAVENNA, OHIO

ECC GIS Server F:\Projects\Ravenna 030113\MapDocuments\SIWP_7183\SIWP7183_FigA5-2_71Locs.mxd

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A.6 CC RVAAP–83 Former Building 1039 Laboratory

SITE DESCRIPTION

Former Building 1039 is located in the former Administration Area of the installation, which is centered in the southern central portion of RVAAP. The Former Building 1039 laboratory footprint is located on the southwest corner of the intersection of South Service Road and George Road (Figure A.6-1). Nearby buildings include Building 1037 (office space) and Building 1034 (maintenance equipment storage).

The CC RVAAP-83 Former Building 1039 site is defined as the footprint of the former building and a 30-ft buffer area around the perimeter of the building footprint. The building footprint of this one story building is approximately 6,100 square ft and rectangle-shaped with dimensions of 121 ft by 51 ft.

The building was demolished in 2006/2007. The building footprint was backfilled with clean soil and graded and seeded as part of demolition activities. The surrounding area is grass-covered and no water bodies are present on the site. Following demolition, unpainted and uncontaminated brick and concrete were crushed and recycled off-site, and the basement was filled with clean soil.

Former Building 1039 was built in 1942 and housed the installation's main laboratory and photo lab. Quality control/quality assurance samples from load lines were analyzed in the laboratory. The structure contained three powder test rooms for the routine analyses of lead azide, mercury fulminate, and percussion element mixes. During operations, the building contained and operated a photography laboratory, a chemistry laboratory, and a medical x-ray facility. The photo laboratory was historically used for large-scale photo development activities until its closure in the early 1970s.

Site-related constituents (SRCs) of concern are related to the former generation of x-ray acid/silver mix solutions, and the laboratory analysis of powder test room materials (lead azide, mercury fulminate), percussion element mixes, paints, shellac, metals, fuels, and tapes or adhesives (RVAAP 2011).

Based on personal interviews conducted by ECC in 2011 for the HRR, a sump was reported to have once existed on the south exterior wall of the Former Building 1039 laboratory. The sump was used to collect discharge from the building to settle out contaminants prior to discharge to the George Road Treatment System. The sump was reported to have been constructed of lead-lined concrete approximately 6 ft in depth with dimensions of 6 ft by 6 ft. The sump was filled with sawdust to collect settled material.

Based on information gathered during the HRR, the following areas of interest have been identified at the Former Building 1039 laboratory:

- Area of former sump and drainage area

PREVIOUS INVESTIGATIONS

In May 2006, LES performed Expray tests prior to demolition activities at Former Building 1039. Expray is an aerosol-based field test kit for the detection and identification of Group A explosives (e.g. TNT [2,4,6-trinitrotoluene] and TNB [trinitrobenzene]), Group B explosives (e.g. RDX [cyclotrimethylene trinitramine] and HMS [Cyclotetramethylene tetranitramine]), and compounds containing inorganic nitrates that are used in improvised explosives (e.g. ANFO [ammonium nitrate/fuel oil]). Expray is often used as a pre-blast detection tool. As reported in the Final Completion Report by LES (LES 2007b), of the 46 tests performed at Former Building 1039, there were five separate positive results, in the following locations:

- Room 1- (HMS/RDX) (1 positive);
- Room 4 - (TNT) (2 positive);
- Lab Room - (HMS/RDX) (1 positive);
- Room 9 - (HMS/RDX) (1 positive).

Three photos of Expray test results from Former Building 1039 tests, one negative and two positive, are presented in the Week #1 Weekly Report included in the Final Completion Report by LES (LES 2007b). The positive results were from a test performed on the basement wall near the ground and a portion of wall near a faucet fixture on the first floor. The negative result was from a test performed on a portion of wall in the basement at eye level. The drain lines within Former Building 1039 were cleared of potential explosive residue by explosive flashings by the demolition contractor as part of the demolition activities due to the positive Expray results.

The material used for fill at Former Building 1039 was reported to be top soil provided from an off-site source that was used to fill the top 2 ft of the basement area of the building. This fill material was sampled in February 2007 for a full analytical suite prior to being used. The reported results were below instrument detection limits with the exception of metals (total of 18), which were below their respective Ohio EPA Generic Direct-Contact Soil Standard Summary criteria (LES 2007b). It was documented in the LES Final Completion Report that 14 loads of backfill material from Load Line 9 was used to fill the basement of Former Building 1039 to within 2 ft of the ground surface

An HRR was conducted by ECC in November 2011. No documented evidence of impact from former and/or current military operations at this site was found during the HRR. No documented evidence of military munitions at Former Building 1039 was found during the HRR. No documented evidence of operations involving HTRW at Former Building 1039, nor the presence of ASTs or USTs, was found during the HRR. No documented evidence of the presence of containerized hazardous, toxic and radioactive waste at Former Building 1039 was found during the HRR.

During the HRR, ECC examined design drawings for Former Building 1039. However, none of the drawings verified the existence of a sump, nor did they include any details about a sump at Former Building 1039. The sump has only been described by individuals interviewed by ECC in 2011. Aside from information provided by interviewees, no other documented evidence of a sump was discovered during the HRR.

ECC found no records that documented demolition of the reported sump, and no drawings were found to confirm its location. The LES Final Completion Report (LES, 2007b) does not mention the sump area nor demolition or abandonment of the sump. Since the reported sump was used to collect discharge from the building's floor drains and sink traps and discharged to the sewer system, it is a potential source of environmental contamination.

No evidence or documentation of a hazardous, toxic, or radioactive release, surface or subsurface, around Former Building 1039 was discovered during the Final HRR (ECC, 2012). As stated in the May 2012 Final HRR, the drain lines within Former Building 1039 were cleared of potential explosive reside by explosive flashings by the demolition contractor as part of the pre-demolition decontamination activities. Other decontamination activities included removal and filtering for asbestos-containing material of standing water found in the basement. Backfill materials were tested and approved prior to use. Therefore, the characterization activities will focus on the area of the sump reported by the two interviewees to have been used to settle out solids from waste water prior to discharge to the sewer system.

CHARACTERIZATION ACTIVITIES

The objective of this SAP for the Former Building 1039 laboratory sump is to confirm the presence or absence of hazardous materials at concentrations greater than screening criteria in subsurface soil. If the sump is present, as part of the SI effort, ECC will identify the extent of the area of the former sump and the associated drainage system. This area will consist of one DU as shown on Figure A.6-2.

Within this DU, two subsurface IS will be collected at intervals 1 - 4 ft bgs and 4 - 7 ft bgs as shown in Table A.6-1. The subsurface IS will be composed of horizontal and vertical IS, with the horizontal IS corresponding to the depth intervals listed above, and the vertical IS corresponding to the entire subsurface interval (1 - 7 ft bgs) at each subsurface IS location.

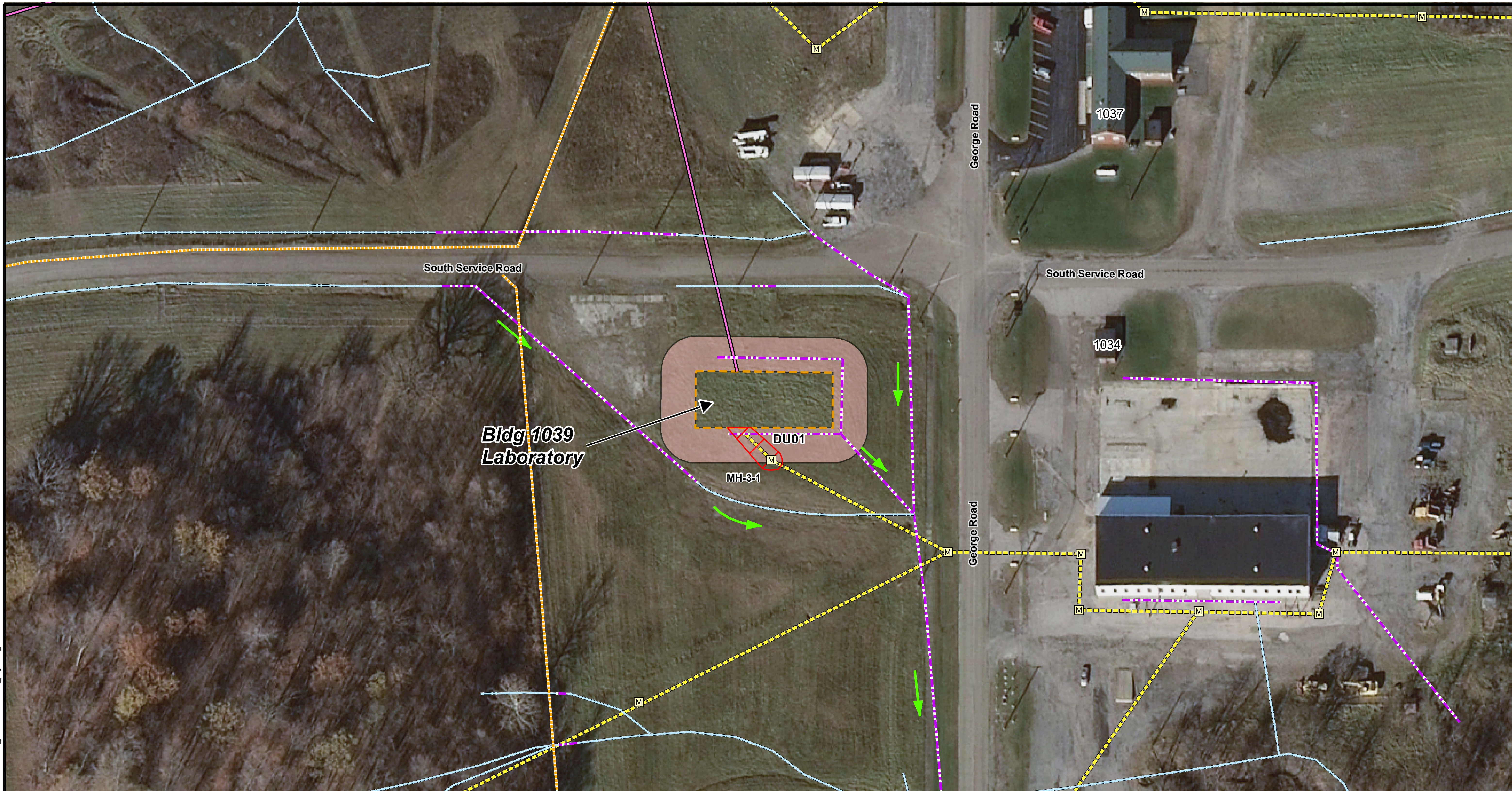
In addition, one or more borings (referred to a “DSB” sample in the sample summary tables) will be advanced to the 7 - 13 ft bgs (or refusal) to collect a composite sample to complete an evaluation of the unrestricted/residential use scenario.

Table A.6-1 also summarizes the medium to be sampled, sample collection methods, the number of samples to be collected, and the rationale behind the proposed sampling activities. MS/MSD samples will be collected at a frequency of 5%. Field Duplicate samples will be collected at a frequency of 10%. Figure A.2-2 presents the proposed sample locations.

Table A.6-1: Former Building 1039 Laboratory Sump Sampling Summary

CC RVAAP-83 Former Building 1039 Laboratory		**Sample Type**			**Decision Units[1]**	**Analysis**					**Use Type**
					Waste Water Sump						
Medium	Soil interval	IS	D	C	01	VOCs	SVOCs	TAL Metals	Explosives	Propellants	
SB	1-4' and 4-7'	x			2	2	2	2	2	2	N
SB Vertical Profile	1-7'	x			8	8	8	8	8	8	N
DSB	7-13'			x	1	1	1	1	1	1	E
Number of Soil Borings					8						

Note: Sample numbers do not include quality control samples. See Appendix B of the Work Plan for details.
1) "01" under the Decision Unit header represents Decision Unit (DU) number one, which will be represented as DU01
N = Nature and Extent
E = Risk and Extent
SB = Subsurface soil
DSB = Deep soil boring
IS = Incremental sample
D = Discrete sample
C = Vertical composite sample



Legend

- Fence Line
- Former Building
- 30-ft Buffer
- Decision Unit
- Manhole
- Drainage Ditch
- Underground Drainage Pipe
- Sewer Line
- Former Steam Line
- Drainage Flow

N

0 40 80
Feet

NOTES & SOURCES

1. Map Coordinates: WGS 84, UTM Zone 17N in Meters Aerial photograph from USGS.
2. Sewer/Manhole/ Drainage Ditch/Former Steam Line from utilities drawing, Accession No. 1000.2A.

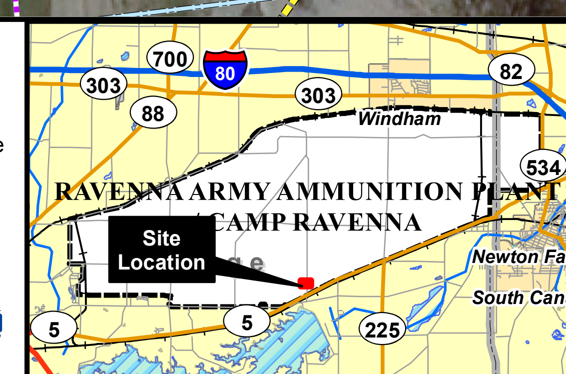


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Figure A.6-1
CC RVAAP-83
Former Building 1039 Laboratory
Site Map
RVAAP/CAMP RAVENNA
RAVENNA, OHIO

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Legend

- Direct-Push Boring Location
- Former Building
- 30-ft Buffer
- Decision Unit
- Manhole
- Drainage Ditch
- Underground Drainage Pipe
- Sewer Line
- Former Steam Line
- Drainage Flow

N

0 10 20 Feet

NOTES & SOURCES

1. Map Coordinates: WGS 84, UTM Zone 17N in Meters Aerial photograph from USGS.
2. Sewer/Manhole/ Drainage Ditch/Former Steam Line from utilities drawing, Accession No. 1000.2A.

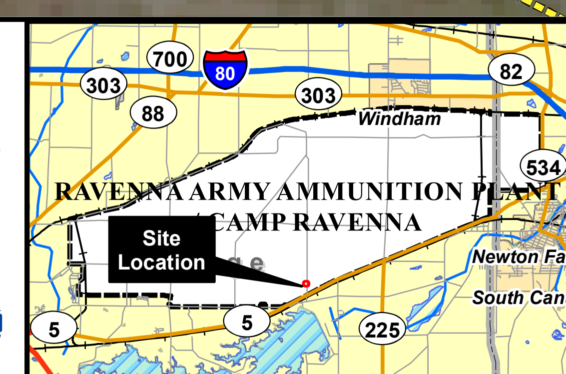

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Figure A.6-2
CC RVAAP-83
Former Building 1039 Laboratory
Proposed Sampling Locations
RVAAP/CAMP RAVENNA
RAVENNA, OHIO

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Final
Quality Assurance Project Plan Addendum
for Site Inspections at Compliance Restoration Sites
CC RVAAP-71 Barn No. 5 Petroleum Release and
CC RVAAP-83 Former Building 1031 and 1039
Revision 1
Ravenna Army Ammunition Plant
Ravenna, Ohio

Contract No.: W912QR-04-D-0039
Delivery Order: 0004

Prepared for:

U.S. Army Corps of Engineers, Louisville District
600 Dr. Martin Luther King Jr. Place
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June 7, 2013

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TABLE OF CONTENTS

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

ADR	Automated Data Review
A-E	Architect-Engineer
ASTM	American Society for Testing and Materials
CoC	Chain of Custody
COR	Contracting Officers Representative
CX	Center of Expertise
D	Day
DoD	Department of Defense
DQO	Data Quality Objective
DRO	Diesel Range Organics
ECC	Environmental Chemical Corporation
EDD	Electronic Data Deliverable
EDMS	Environmental Data Management System
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
ERPIMS	Environmental Restoration Program Information Management System
ERIS	Environmental Restoration Information System
FSP	Field Sampling Plan
FWCUG	Facility-Wide Clean-Up Goals
FWQAPP	Facility-Wide Quality Assurance Project Plan
FWSAP	Facility-Wide Sampling and Analysis Plan
g	gram
GRO	Gasoline Range Organics
Hg	Mercury
HNO_3	Nitric acid
HTRW	Hazardous, Toxic, and Radioactive Waste
ICP	Inductively Coupled Plasma
IDW	Investigation-Derived Waste
IS	Incremental Sampling
L	Liter
LCS	Laboratory Control Samples
MDL	Method Definition Limit
MeOH	Methanol
ml	Milliliter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MRL	Method Reporting Level
PAH	Polycyclic Aromatic Hydrocarbon
PBA	Performance-Based Acquisition
PCB	Polychlorinated Biphenyl
oz	ounce
QA	Quality Assurance
QAPP	Quality Assurance Project Plan

ACRONYMS AND ABBREVIATIONS (CONTINUED)

QC	Quality Control
QSM	Quality Systems Manual
REIMS	Restoration Environmental Information Management System
RI	Remedial Investigation
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SI	Site Inspection
SOP	Standard Operating Procedure
SVOC	Semi-Volatile Organic Compound
SW	Solid Waste
TAL	Target Analyze List
TBD	To Be Determined
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
USACE	United States Army Corps of Engineers
US EPA	United States Environmental Protection Agency
V	Version
VOC	Volatile Organic Compound

1.0 INTRODUCTION

Environmental Chemical Corporation (ECC) has prepared a Quality Assurance Project Plan (QAPP) Addendum for this the Site Inspection and Remedial Investigation Work Plan Addendum. The QAPP Addendum is Appendix B of the Site Inspection (SI) and Remedial Investigation (RI) Work Plan Addendum. ECC's QAPP is an Addendum to the 2011 Facility-Wide Sampling and Analysis Plan (SAIC 2011), which includes a Facility-Wide Quality Assurance Project Plan (FWQAPP). The FWQAPP provides the standardized analytical methods, data reporting, and validation methods to be used at RVAAP, and each Contractor is required to develop a project-specific QAPP to address variations to, adherence with, and any supplemental information to the FWQAPP. ECC's QAPP Addendum presents, within each section of the QAPP Addendum, how ECC's project scope of work adheres to the FWQAPP or presents any project-specific variation to the FWQAPP.

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2.0 PROJECT DESCRIPTION

This QAPP Addendum addresses supplemental project-specific information and tiers under the FWQAPP for RVAAP (SAIC 2011). Each QAPP Addendum section documents adherence to the FWQAPP or presents further project-specific requirements.

2.1 Site History/Background Information

The general site history and background for the RVAAP is provided in Section 1.0 of the SI/RI Work Plan Addendum.

2.2 Past Data Collection Activity/Current Status

Compliance restoration (CR) site-specific background and history information is included in an Addendum to the Sampling and Analysis Plan (SAP) Appendix A of the SI/RI Work Plan.

2.3 Project Objectives and Scope

This information is contained in Section 3.0 of the SAP.

2.4 Sample Network Design and Rationale

General information regarding the sample network design and rationale is provided in Section 3.0 of the SAP, with information specific to each site presented in SAP Appendix A.

2.5 Parameters To Be Tested And Frequency

Sample matrix types, analytical parameters, and analytical methods are discussed in the SAP Appendix A Addendum (for specific SI sites). All tested matrices will use the analytical methods presented in the FWQAPP with some updates presented in Table 2-1, and quality control (QC) samples will be collected and analyzed for each CR site at the frequency of 10% for field duplicates, 5% for MS/MSD, and 10% for RVAAP full-suite samples. These sampling and analysis requirements are summarized in Table 2-1 of this QAPP Addendum, in conjunction with anticipated sample numbers, quality assurance (QA) sample frequencies, and field QC sample frequencies. As the incremental sampling (IS) sub-surface samples may not be analyzed if IS surface samples do not exceed criteria, field QC samples and RVAAP full-suite samples will primarily be collected from the surface interval. The overall QC and RVAAP full-suite frequencies will be planned for but may not be achieved by this approach.

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Table 2-1: Sampling and Analytical Requirements

Parameter	Methods	Field Samples[a]				Field Duplicates Samples[b]	Site Source Water[c]	Trip Blanks[e]	Total A-E Samples	USACE QA Split Samples[f]	USACE Trip Blanks[e]
		Discrete	Composite	IS	Total						
Solid and Dry Sediment Chemical Analysis[d]											
Metals (TAL and Hg)	SW-846, 6010B/6020/ 7471A	-	1	10	11	1	-	-	12	1	-
Chromium (VI)	7196A/3060A	-	-	-	-	-	-	-	-	-	-
Semi-volatile Organics	SW-846, 8270C/3540C	-	2	26	28	3	-	-	31	3	-
Mercury	SW-846, 7471A	-	-	-	-	-	-	-	-	-	-
Explosives	SW-846, 8330B	-	1	10	11	1	-	-	12	1	-
Volatile Organics	SW-846, 8260B/5035[h]	-	2	26	28	3	-	TBD	31	3	TBD
PCBs	SW-846, 8082/3540C	-	-	-	-	-	-	-	-	-	-
Nitroguanidine	SW-846, 8330 Mod.	-	1	10	11	1	-	-	12	-	-
Nitrocellulose	EPA 353.2 Mod[g]	-	1	10	11	1	-	-	12	-	-
Polycyclic Aromatic Hydrocarbons	SW-846, 8270C/3540C	-	-	-	-	-	-	-	-	-	-
TPH GRO/DRO[i]	SW-846, 8015B Mod	-	1	16	17	2		TBD	19	2	TBD
Herbicides	8151	-	-	-	-	-	-	-	-	-	-
Asbestos	EPA/600/R-93/116	-	-	-	-	-	-	-	-	-	-

Table 2-1: Sampling and Analytical Requirements (continued)

Parameter	Methods	Field Samples[a]			Field Duplicates Samples[b]	Site Source Water[c]	Trip Blanks[e]	Total A-E Samples	USACE QA Split Samples[f]	USACE Trip Blanks[e]
		Discrete	IS	Total						
Wet Sediment[d]										
Metals (TAL and Hg)	SW-846, 6010B/6020/ 7471A	-	-	-	-	-	-	-	-	-
Mercury	SW-846, 7471A	-	-	-	-	-	-	-	-	-
Semi-volatile Organics	SW-846, 8270C/3540C/3550B	-	-	-	-	-	-	-	-	-
Explosives	SW-846, 8330B	-	-	-	-	-	-	-	-	-
Volatile Organics	SW-846, 8260B/5035	-	-	-	-	-	-	-	-	-
PCBs	SW-846, 8082/3540C	-	-	-	-	-	-	-	-	-
Nitroguanidine	SW-846, 8330 Mod.	-	-	-	-	-	-	-	-	-
Nitrocellulose	EPA 353.2 Mod.[g]	-	-	-	-	-	-	-	-	-

Table 2-1: Sampling and Analytical Requirements (continued)

Parameter	Methods	Field Samples[a]			Field Duplicates Samples[b]	Site Source Water[c]	Trip Blanks[e]	Total A-E Samples	USACE QA Split Samples[f]	USACE Trip Blanks[e]
		Discrete	IS	Total						
Surface Water										
Metals (TAL and Hg)	SW-846, 6010B/6020/7470A	-	-	-	-	-	-	-	-	-
Semi-volatile Organics	SW-846, 8270C/3520C	-	-	-	-	-	-	-	-	-
Explosives	SW-846, 8330B	-	-	-	-	-	-	-	-	-
Asbestos	EPA 600R-94/134	-	-	-	-	-	-	-	-	-
Volatile Organics	SW-846, 8260B/5030B	-	-	-	-	-	-	-	-	-
TPH DRO/GRO[i]	SW-846, 8015B Mod	-	-	-	-	-	-	-	-	-
Pesticides	SW846, 8081A/3520C	-	-	-	-	-	-	-	-	-
PCBs	SW846, 8082/3520C	-	-	-	-	-	-	-	-	-
Nitroguanidine	SW846, 8330 Mod.	-	-	-	-	-	-	-	-	-
Nitrocellulose	EPA 353.2 Mod.[g]	-	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons	SW-846, 8270C/3520C	-	-	-	-	-	-	-	-	-
Herbicides	SW-846 8151/3520C	-	-	-	-	-	-	-	-	-

Table 2-1: Sampling and Analytical Requirements (continued)

Parameter	Methods	Field Samples[a]			Field Duplicates Samples[b]	Site Source Water[c]	Trip Blanks[e]	Total A-E Samples	USACE QA Split Samples[f]	USACE Trip Blanks[e]
		Discrete	IS	Total						
Source Water										
Metals (TAL and Hg)	SW-846, 6010B/6020/7470A	-	-	-	-	-	-	-	-	-
Chromium (VI)	7196A	-	-	-	-	-		-		
Semi-volatile Organics	SW-846, 8270C/3520C	-	-	-	-	-	-	-	-	-
Explosives	SW-846, 8330B	-	-	-	-	-	-	-	-	-
Asbestos	EPA 600R-94/134	-	-	-	-	-	-	-	-	-
Volatile Organics	SW-846, 8260B/5030B	-	-	-	-	-	TBD	-	-	-
TPH DRO/GRO[i]	SW-846, 8015B Mod	-	-	-	-	-	TBD	-	-	-
Pesticides	SW846, 8081A/3520C	-	-	-	-	-	-	-	-	-
PCBs	SW846, 8082/3520C	-	-	-	-	-	-	-	-	-
Nitroguanidine	SW846, 8330 Mod.	-	-	-	-	-	-	-	-	-
Nitrocellulose	EPA 353.2 Mod.[g]	-	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons	SW-846, 8270C/3520C	-	-	-	-	-	-	-	-	-
Herbicides	SW-846 8151/3520C	-	-	-	-	-	TBD	-	-	-

Table 2-1: Sampling and Analytical Requirements (continued)

Parameter	Methods	Field Samples[a]			Field Duplicates Samples[b]	Site Source Water[c]	Trip Blanks[e]	Total A-E Samples	USACE QA Split Samples[f]	USACE Trip Blanks[e]
		Discrete	IS	Total						
Liquid IDW Samples										
TCLP VOC	SW-846, 1311, 8260	-	-	TBD	-	-	-	-	-	-
TCLP SVOCs	SW-846, 1311, 8270	-	-	TBD	-	-	-	-	-	-
TCLP Pesticides	SW-846, 1311, 8081	-	-	TBD	-	-	-	-	-	-
TCLP Herbicides	SW-846, 1311, 8151	-	-	TBD	-	-	-	-	-	-
TCLP Metals	SW-846, 1311, 6010, 7470	-	-	TBD	-	-	-	-	-	-
Total Sulfide	SW846, 9030B/9034	-	-	TBD	-	-	-	-	-	-
Total Cyanide	SW-846, 9012A	-	-	TBD	-	-	-	-	-	-
pH	EPA 150.1	-	-	TBD	-	-	-	-	-	-
Ignitability	SW-846 1010	-	-	TBD	-	-	-	-	-	-

Table 2-1: Sampling and Analytical Requirements (continued)

Parameter	Methods	Field Samples[a]			Field Duplicates Samples[b]	Site Source Water[c]	Trip Blanks[e]	Total A-E Samples	USACE QA Split Samples[f]	USACE Trip Blanks[e]
		Discrete	IS	Total						
Solid IDW Samples										
TCLP VOC	SW-846, 1311, 8260	-	-	TBD	-	-	-	-	-	-
TCLP SVOCs	SW-846, 1311, 8270	-	-	TBD	-	-	-	-	-	-
TCLP Pesticides	SW-846, 1311, 8081	-	-	TBD	-	-	-	-	-	-
TCLP Herbicides	SW-846, 1311, 8151	-	-	TBD	-	-	-	-	-	-
TCLP Metals	SW-846, 1311, 6010, 7470	-	-	TBD	-	-	-	-	-	-
Total Sulfide	SW846, 9030B/9034	-	-	TBD	-	-	-	-	-	-
Total Cyanide	SW-846, 9012A			TBD		-	-	-	-	-
Nitrate, Nitrite	EPA 353.2	-	-	TBD	-	-	-	-	-	-
pH	EPA 150.1	-	-	TBD	-	-	-	-	-	-
Ignitability	SW-846, 1010	-	-	TBD	-	-	-	-	-	-

Notes:
a - Matrix spike/matrix spike duplicate samples will be collected at a rate of 5%(1 per 20) of total samples per media. RVAAP Full suite (as defined in FWQAPP Section 5.4.5) samples will be collected at a frequency of 10%.
b - Duplicate samples are collected at a frequency of 10% of IS and discrete samples per compliance restoration site.
c - Source waters will be collected from the potable water source and from the ASTM (de-ionized) water supply lot for the project. The source water sample quantities are included under the surface water subheading.
d - Rinsate samples for soil samples will be collected at a frequency of one rinsate sample per field cycle.
e - One trip blank will be collected for each shipping. container (e.g., cooler) that contains soil or water samples for VOC analysis.
f - USACE QA Split Samples will be collected at a frequency of 10%.
g - Previously accepted method but not listed in FWQAPP.
h - VOC analysis for select sites reports only BTEX/MTBE
i - DRO only at CC RVAAP-74 Motor Pool Hydraulic Lift
h - Chromium (VI) samples collected with analysis pending excedences in total chromium results
A-E = Architect Engineer (ECC)
ASTM = American Society of Testing and Materials
DRO = Diesel Range Organics
EPA = Environmental Protection Agency
GRO = Gasoline Range Organics
IS = Incremental Sampling (sample)
N/A = not applicable/not required
PCB = polychlorinated biphenyl
QA = Quality Assurance
SVOC = Semi-Volatile Organic Compounds
SW = Solid Waste
TAL = Target Analyte List
TBD = To Be Determined
TCLP = Toxicity Characteristic Leaching Procedure
TPH = Total Petroleum Hydrocarbons
USACE = U.S. Army Corps of Engineers
VOC = Volatile Organic Compound

3.0 PROJECT ORGANIZATION

The functional project organization and responsibilities are described in Section 2.0 of the SAP.

Analytical support for this work will be provided by TestAmerica Laboratory of Canton, Ohio and West Sacramento, California, or CT Laboratories of Baraboo, Wisconsin, or RTI Laboratories of Livonia, Michigan, or ALS Laboratories of Rockchester, NY and EMSL Analytical, Inc., which are Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) certified laboratories.

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4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

4.1 Data Quality Objectives

Data quality objective (DQO) summaries for this investigation will follow Tables 4-1 and 4-2 in the FWQAPP (SAIC 2011). All QC parameters stated in the specific U.S. Environmental Protection Agency (USEPA) SW-846 methods will be adhered to for each chemical listed. Laboratories are required to comply with all methods as written; recommendations are considered requirements with the exception of the matrix spike levels, which will be per the laboratory DoD Environmental Laboratory Accreditation Program (ELAP) certified SOP method spike levels. Concurrence with the DoD Quality System Manual (QSM) for Environmental Laboratories (DoD 2010) and the Louisville QSM Supplement is expected. Currently the laboratory is certified for DoD ELAP certified per DoD QSM Version (V) 4.1, but will perform analysis in compliance with DoD QSM Version V4.2 requirements as necessary. Any significant discrepancies between guidance documents will be brought to ECC's attention by the contract laboratory for resolution in accordance with the projects goals and data quality objectives.

The contract laboratory will deliver to ECC an electronic data deliverable (EDD) that is convertible to automated data review (ADR) compatible EDD format for the ECC database. The contract laboratory must identify variances to the established library prior to any analysis being performed. No variances to the DoD QSM for Environmental Laboratories and the Louisville QSM Supplement are anticipated.

4.2 Level of Quality Control Effort

QC efforts will follow Section 4.2 of the FWQAPP. Field QC measurements will include field source water blanks, trip blanks, field duplicates, and equipment rinsate blanks. Laboratory QC measurements will include method blanks, laboratory control samples (LCSs), laboratory duplicates, and matrix spike/matrix spike duplicate (MS/MSD) samples. Laboratory QC spikes will include target analytes. LCS measurements will include the standard mid-level analyte concentration, plus a QC/method reporting level (MRL) low-level concentration. It is recognized that the laboratory will routinely perform and monitor the QC/MRL; however, guidance check limits will be utilized, as advisory and corrective action will not be required for individual analyte variances. The QC/MRL will be successfully analyzed at the beginning of the analytical sequences as required by the QSM. Additionally, the lab will analyze the QC/MRL sample at the close of the analytical sequence.

4.3 Accuracy, Precision, and Sensitivity Of Analysis

Accuracy and precision goals identified in Section 4.3 and Table 4-1 and Table 4-2 of the FWQAPP will be used for this investigation. Some of the analytical method numbers for laboratory analysis have been updated; refer to Table 2-1 of this QAPP Addendum for details regarding the method numbers. Quality objectives related to individual method QC protocol will also follow requirements given in the DoD QSM for Environmental Laboratories and the Louisville QSM Supplement.

Laboratories will make all reasonable attempts to meet the program and project reporting levels in Tables 4-3 through 4-9 of the FWQAPP for each individual sample analysis or to quantitatively meet the Facility-Wide Clean-Up Goals (FWCUG). When samples require dilution, both the minimum dilution and quantified dilution must be reported. All samples will be screened to determine optimum dilution ranges. Dilution runs will be performed to quantify high target analyte concentrations within the upper half of the calibration range, thus reducing the degree of dilution as much as possible. In addition, a five times less diluted run will then be performed to report other target analyte reporting levels as low as possible without destroying analytical detectors and instrumentation. If there are matrix interferences, non-target analyte, or high target analyte concentrations that preclude analysis of an undiluted sample, the laboratory project manager will contact ECC, forward analytical and chromatographic information from diluted runs, and obtain direction on how to proceed.

4.4 Completeness, Representativeness, and Comparability

Completeness, representativeness, and comparability goals identified in Section 4.4 and Tables 4-1 and 4-2 of the FWQAPP will be followed for this project.

5.0 SAMPLING PROCEDURES

Sampling procedures are described in Section 5.0 of the FWFSP (SAIC 2011a).

Tables 5-1 through 5-4 summarize sample container, preservation, and holding time requirements for the soil, wet sediment, water matrices, and investigation-derived waste (IDW) for this investigation.

As noted in the FWQAPP, additional sample volumes will be provided, when necessary, for the express purpose of performing associated laboratory QC (MS/MSD). These laboratory QC samples will be designated by the field personnel and identified for the laboratory on respective chain of custody (CoC) documentation.

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Table 5-1: Container Requirements for Soil and Sediment Samples

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
Volatile Organic Compounds	Encore or EasyDraw Syringe into 40-ml glass vial with Teflon Septum	15 grams	Cool, 4°C (Encore) and/or de-ionized water/MeOH	14 day (analysis) (Encore - 48 hrs)
IS Sample	1 or more 16oz glass jars	> 1 kilogram	Cool, 4°C	Varies per analysis
Semi-volatile Organic Compounds	4 oz glass	30 grams	Cool, 4°C	14 day (extraction) 40 d (analysis)
Pesticide Compounds	4 oz glass	30 grams	Cool, 4°C	14 day (extraction) 40 d (analysis)
TPH-GRO	Encore or EasyDraw Syringe into 40-ml glass vial with Teflon Septum	5 grams	Cool, 4°C (Encore) and/or de-ionized water /MeOH	14 day (analysis) (Encore - 48 hrs)
TPH-DRO	4 oz glass	30 grams	Cool, 4°C	14 day (extraction) 40 d (analysis)
PCB	4 oz glass	30 grams	Cool, 4°C	14 day (extraction) 40 d (analysis)
Herbicides	4 oz glass	30 grams	Cool, 4°C	14 day (extraction) 40 d (analysis)
PAH Compounds	4 oz glass	30 grams	Cool, 4°C	14 day (extraction) 40 d (analysis)
Explosive Compounds	2 oz glass	10 grams	Cool, 4°C	14 day (extraction) 40 d (analysis)
Nitroguanidine	2 oz glass	10 grams	Cool, 4°C	14 day (extraction) 40 d (analysis)
Nitrocellulose	2 oz glass	10 grams	Cool, 4°C	14 day (extraction) 40 d (analysis)
Metals (TAL)	2 oz glass or plastic	20 grams	Cool, 4°C	180 day; Mercury @ 28 d
Chromium (VI)	2 oz glass or plastic	20 grams	Cool, 4°C	30 day
Asbestos	2 oz plastic or glass, plastic bag	1 ounce	None	None

Notes: IS sample into 16-oz glass jars. Other containers are listed for discrete samples
°C = Degrees Celsius
IS = Incremental Sampling
PCB = Polychlorinated Biphenyl
PAH = Polycyclic Aromatic Hydrocarbon.
TPH-DRO = Total Petroleum Hydrocarbons – Diesel Range Organics
TAL = target analyte list
TPH-GRO = Total Petroleum Hydrocarbons – Gasoline Range Organics
MeOH = methanol
oz = ounce

Table 5-2: Container Requirements for Aqueous Samples

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
Volatile Organic Compounds	(3) 40ml Glass Vial	(2) 40 ml	HCl to pH <2 Cool, 4°C	14 day
Semi-volatile Organic Compounds	(2) 1 L Amber Glass	1 L	Cool, 4°C	7 day (extraction) 40 day (analysis)
Pesticide Compounds	(2) 1 L Amber Glass	1 L	Cool, 4°C	7 day (extraction) 40 day (analysis)
PCBs	(2) 1 L Amber Glass	1 L	Cool, 4°C	7 day (extraction) 40 day (analysis)
Herbicides	(2) 1 L Amber Glass	1 L	Cool, 4°C	7 day (extraction) 40 day (analysis)
TPH	(2) 1 L Amber Glass	1 L	Cool, 4°C	7 day (extraction) 40 day (analysis)
PAH Compounds	(2) 1 L Amber Glass	1 L	Cool, 4°C	7 day (extraction) 40 day (analysis)
Explosive Compounds	(2) 1 L Amber Glass	1 L	Cool, 4°C	7 day (extraction) 40 day (analysis)
Nitroguanidine	500 ml Amber Glass	10 ml	Cool, 4°C	14 day (extraction) 40 day (analysis)
Nitrocellulose	500 ml Amber Glass	100 ml	Cool, 4°C	14 day (extraction) 40 day (analysis)
Metals (TAL)	1 L HNO_3 Poly	300 ml	HNO_3 to pH <2 Cool, 4°C	180 day; (Hg 28 day)
Chromium (VI)	1 L Poly	300 ml	Cool, 4°C	24-hours

Notes:
PAH = Polycyclic Aromatic Hydrocarbon
TAL = target analyte list
HCl = Hydrochloric acid
Hg = Mercury
HNO_3 = Nitric acid
TAL = Target Analyte List
TPH = Total Petroleum Hydrocarbons
PCB = Polychlorinated Biphyenls
^0C = degree Celsius
L = Liter
ml = milliliter

Table 5-3: Container Requirements for IDW Liquid Samples

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
TCLP VOC	3 -40 mL glass vials with Teflon®-lined septum(no headspace)	80 ml	Cool, 4°C	7 day
TCLP SVOCs	2 - 1L amber glass bottle with Teflon®- lined lid	1000 ml	Cool, 4°C	7 day (extraction) 40 day (analysis)
TCLP Pesticides	2 - 1L amber glass bottle with Teflon®- lined lid	1000 ml	Cool, 4°C	7 day (extraction) 40 day (analysis)
TCLP Herbicides	2 - 1L amber glass bottle with Teflon®- lined lid	1000 ml	Cool, 4°C	7 day (extraction) 40 day (analysis)
TCLP Metals	1- 1L polybottle	500 ml	Cool, 4°C	7 day (extraction) 180 day; Hg @ 28 day
Sulfide	500 ml glass	500 ml	Zinc acetate + NaOH to pH >9 Cool, 4°C	7 day
pH	100 ml polybottle	100 ml	Cool, 4°C	Immediate
Ignitability	500 ml polybottle	200 ml	Cool, 4°C	14 day

Notes:
IDW = Investigation-Derived Waste
L = Liters
NAOH = Sodium Hydroxide
Hg = Mercury
TCLP = Toxicity Characteristic Leaching Procedure
VOC =Volatile Organic Compounds
SVOC= Semi-volatile Organic Compounds
TPH = Total Petroleum Hydrocarbon
^{0}C = degree Celsius
ml = milliliter

Table 5-4: Container Requirements for IDW Soil Samples

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
TCLP VOC	1 - 4 oz glass jar with Teflon-septa cap (no headspace)	20 grams	Cool, 4°C	7 day
TCLP SVOCs, Pesticides, Herbicides, Metals	1 - 16 oz glass jar with Teflon-lined cap	200 grams	Cool, 4°C	7 day (extraction) 40 day (analysis) metals 180 day Mercury – 28 day
Nitrate, Nitrite	wide mouth jar with Teflon-lined cap	50 grams	Cool, 4°C	48 hours
pH	wide mouth jar with Teflon-lined cap	50 grams	Cool, 4°C	Immediate
Ignitability	wide mouth jar with Teflon-lined cap	100 grams	Cool, 4°C	none
Cyanide	wide mouth jar with Teflon-lined cap	50 grams	Cool, 4°C	14 day
Sulfide	wide mouth jar with Teflon-lined cap	50 grams	Cool, 4°C	7 day

Notes:
IDW = Investigation-Derived Waste
oz = ounce
°C = Celsius
TCLP = Toxicity Characteristic Leaching Procedure
VOC =Volatile Organic Compounds
SVOC = Semi-volatile Organic Compounds

6.0 SAMPLE CUSTODY

Sample custody procedures will follow those identified in Section 6.0 of the FWQAPP (SAIC 2011).

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7.0 CALIBRATION PROCEDURES AND FREQUENCY

7.1 Field Instruments/Equipment

Field instruments and equipment calibrations will follow procedures described in Section 7.1 of the FWQAPP.

7.2 Laboratory Instruments

Calibration of laboratory equipment will follow procedures identified in Section 7.2 of the FWQAPP, the contract laboratory QAPP, laboratory-specific standard operating procedures (SOPs), and corporate and facility-specific operating procedures.

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8.0 ANALYTICAL PROCEDURES

8.1 Laboratory Analysis

Analytical methods, parameters, and quantitation or detection limits are those listed in Tables 4-3 through 4-9 of the FWQAPP (SAIC 2011). The SW-846 method references found in the FWQAPP have been revised to the Update III methods, as appropriate, and will be performed in accordance with the method requirements of DoD QSM V4.2 and the laboratory's DoD ELAP certification. Laboratory analysis procedures are provided in Section 8.0 of the FWQAPP.

The contract laboratory facilities will at all times maintain a safe and contaminant free environment for the analysis of samples. The laboratories will demonstrate, through instrument blanks and analytical method blanks, that the laboratory environment and procedures ensure sample representativeness.

The contract laboratory facilities will also implement all reasonable procedures to maintain project reporting levels for all sample analyses. Where contaminant and sample matrix analytical interferences impact the laboratory's ability to obtain project reporting levels, the laboratory will institute sample clean-up processes, minimize dilutions, adjust instrument operational parameters, or propose alternative analytical methods or procedures. Elevated reporting levels will be kept to a minimum throughout the execution of this work. When samples require dilution, both the minimum dilution and quantified dilution must be reported. The contract laboratory will screen all samples to determine optimum dilution ranges. Dilution runs will be performed to quantify high target analyte concentrations within the upper half of the calibration range, thus reducing the degree of dilution as much as possible. In addition, a five times less diluted run will then be performed to report other target analyte reporting levels as low as possible without destroying analytical detectors and instrumentation. If there are matrix interferences, non-target analyte, or high target analyte concentrations that preclude analysis of an undiluted sample, the laboratory project manager will contact ECC and forward analytical and chromatographic information from diluted runs, and obtain direction on how to proceed.

8.2 Field Screening Analytical Protocols

Procedures for instrument calibration, calibration frequency, and field analysis are identified in Section 8.0 of the FWQAPP.

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9.0 INTERNAL QUALITY CONTROL CHECK

9.1 Field Sample Collection

Field QC sample types, numbers, and frequencies are identified in Section 4.7 in the SAP. In general, field duplicates will be collected at a frequency of 10%. Field equipment rinsate samples will be collected at a frequency for soil samples of one rinsate sample for site constituents of concern per field cycle. Equipment rinsate samples pertain only to samples collected using reusable, decontaminated equipment. This will constitute a process check for the effectiveness of the decontamination procedure. Two site source water samples (one potable water source and one deionized water source) will be collected for the combined field effort.

9.2 Field Measurement

Refer to Section 5.0 of the FWFSP for details regarding field measurements.

9.3 Laboratory Analysis

Analytical QC procedures will follow those identified in the referenced U.S. Environmental Protection Agency (US EPA) methodologies. These will include method blanks, Laboratory Control Sample (LCS), Matrix Spike/Matrix Spike Duplicate (MS/MSD), laboratory duplicate analysis, calibration standards, internal standards, surrogate standards, and calibration check standards, as required in Section 9.0 of the FWQAPP and the DoD QSM.

The contract laboratory facilities will conform to their QAPP and implement their established SOPs to perform the various analytical methods required by the project. Quality Control (QC) frequencies will follow those identified in Section 9.0 of the FWQAPP.

Analyses will also be consistent with direction provided by the FWQAPP, DoD Quality Systems Manual (QSM) V4.2 for Environmental Laboratories, and the Louisville QSM Supplement. The following are clarifications to this guidance relative to this project:

- The Quality Control/Method Detector Limit (QC/MDL) check will be performed quarterly, until criteria can be established. After performance criteria are determined, the frequency of this QC check may be reduced to biannually or annually per instrument.

- Pre and post method reporting limit checks will be analyzed per FWQAPP guidance.

- For metals analysis, MS/MSD samples will be used to access laboratory precision per the DoD QSM instead of laboratory replicate sample analysis.

- LCSs will contain all project target compounds. The marginal exceedances should not exceed the number allowed by the QSM.

- For methods that have multi-responders (i.e., aroclors and pesticides) within the same analytical process, the laboratory will not include all analytes within the matrix spiking mixture. A representative analyte will be employed for the MS evaluation.

- Inductively coupled plasma initial calibration curves will be confirmed through the analysis of a blank and three standards, and this documentation will be reported as part of the analytical data package.

- Inductively coupled plasma (ICP) serial dilution will be performed on a per batch basis. If the serial dilution falls outside acceptance criteria, a post-digestion spike analyses will be performed.

- Sediment samples having moisture levels that preclude soxhlet extraction processes will be extracted by sonication methods.

10.0 DATA REDUCTION, VALIDATION, AND REPORTING

10.1 Data Reduction

Data reduction will follow the established protocols defined in Section 10.0 of the FWQAPP. Sample collection and field measurements will follow the established protocols defined in the FWSAP and this FSP. Laboratory data reduction will follow the contract laboratory QAPP guidance and will conform to general direction provided by the FWQAPP, the DoD QSM V4.2 for Environmental Laboratories, and the Louisville QSM Supplement.

10.2 Data Verification/Validation

Project data verification and validation will follow direction provided in the FWQAPP Section 10.0 and diagramed in Figure 10-1. Protocol for analytical data verification and validation has been updated to the following references:

- DoD QSM for Environmental Laboratories, 2010 (for method performance);
- DoD QSM for Environmental Laboratories, 2009 (for verification measurement quality objectives);
- Louisville QSM Supplement (USACE 2002);
- United States EPA (USEPA) National Functional Guidelines for Organic Data Review, EPA-540/R-99/008, October 1999; and
- USEPA National Functional Guidelines for Inorganic Data Review, EPA-540-R-04-004, October 2004 (USEPA 2004).

All data will be reviewed and verified by ECC, in accordance with the FWQAPP, using ECC's automated electronic verification software and manual methods. Ten percent of the data will be validated by an independent data validation subcontractor, Louisville District following the direction provided in Section 10 and Figure 10-1 of the FWQAPP, as directed by the COR. The independent data validator will be a USACE Louisville District subcontractor.

10.3 Data Reporting

Data reports will follow the established protocols defined in Section 10.3 in the FWQAPP. Electric Data Deliverables (EDDs) for ECC will be provided by the contract laboratory in a modified Environmental Restoration Program Information Management System (ERPIMS) EDD format compatible with ECC's Electronic Data Management System (EDMS), which will process and verify the data using an automated data review, based on the FWQAPP measurement quality objectives based on the DoD QSM V4.1 (FWQAPP requirements), supplemented with manual checks of the laboratory report. Any EDMS EDDs found to contain errors will be re-submitted by ECC to the contract laboratory. The ECC EDMS will be used to generate an EDD that is USACE Automated Data Review (ADR) compatible. The RVAAP Library ADR file will be checked for consistency with ECC EDMS evaluation criteria and amended as necessary. All ADR EDDs provided will be processed by ECC prior to delivery to USACE and errors corrected. ECC EDMS will also be used to generate ERIS EDDs for submission to the US Army ERIS database. This data management process will eliminate errors by having the contract laboratory submit one EDD, and then ECC will reformat the data into other required electronic submission formats, ADR, Environmental Restoration Information System (ERIS), and Restoration Environmental Information Management System (REIMS).

10.4 Data Quality Assessment

Data quality will be assessed using the procedures provided in Section 10.4 of the FWQAPP. ECC's EDMS will generate the Quality Control Summary Report.

11.0 PERFORMACE AND SYSTEM AUDITS

11.1 Field Audits

One field surveillance for the investigation will be performed by ECC. This surveillance will encompass the performance of sampling of any environmental medium.

USACE, USEPA Region 5, or Ohio EPA audits may be conducted at the discretion of the respective agency.

11.2 Laboratory Audits

Routine USACE Hazardous, Toxic, and Radioactive Waste (HTRW) Center of Expertise (CX) on-site laboratory audits may be conducted by USACE, while audits by USEPA Region 5 or Ohio EPA may be conducted at the discretion of the respective agency.

Internal performance and systems audits will be conducted by the contract laboratory's QA staff, as defined in their QAPP.

More information regarding laboratory audits can be found in Section 11.2 of the FWQAPP.

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12.0 PREVENTATIVE MAINTENANCE PROCEDURES

Maintenance of all field and laboratory sampling and analytical equipment will follow direction provided in Section 12.0 of the FWQAPP. Routine and preventive maintenance for all laboratory instruments and equipment will follow the direction of the contract laboratory QAPP.

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13.0 SPECIFIC ROUTINE PROCEDURES TO ASSES DATA PRECISION, ACCURACY, AND COMPLETENESS

Field and laboratory data will be assessed as outlined in Sections 13.1 and 13.2, respectively, of the FWQAPP.

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14.0 CORRECTIVE ACTIONS

Field and laboratory activity corrective action protocol will follow directions provided in Sections 14.1 and 14.2, respectively, of the FWQAPP. Laboratory corrective actions will also follow the procedures in the contract laboratory QAPP.

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15.0 QUALITY ASSURANCE REPORTS

Procedures and reports will follow the protocol identified in Section 15.0 of the FWQAPP and those directed by the contract laboratory QAPP.

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16.0 REFERENCES

U.S. Department of Defense (DoD), 2010. *Quality Systems Manual for Environmental Laboratories,* Environmental Data Quality Workgroup, Final Version 4.2. Final. October.

DoD, 2009. *Quality Systems Manual for Environmental Laboratories,* Environmental Data Quality Workgroup, Final Version 4.1. April.

SAIC, 2011. *Facility-Wide Sampling and Analysis Plan for Environmental Investigations, Revision 0*. Final. February 24.

United States Army Corp of Engineers (USACE), 2002. *Louisville Chemistry Guideline,* Samir A. Mansey, Environmental Chemistry Branch, Revision 5. June.

U.S. Environmental Protection Agency (USEPA), 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*, EPA-540/R-99/008. Final. October.

USEPA, 2004. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA-540-R-04-004. Final. October.

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Final
Site Safety and Health Plan Addendum for
Site Inspections
at Compliance Restoration Sites
CC RVAAP-71 and CC RVAAP-83
Revision 1
Ravenna Army Ammunition Plant
Ravenna, Ohio

Contract No.: W912QR-04-D-0039
Delivery Order: 0004

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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Material
AHA	Activity Hazard Analysis
ANSI	American National Standard Institute
AST	Above Ground Storage Tank
ASTM	American Society for Testing and Materials
BGS	Below Ground Surface
BLS	Bureau of Labor Statistics
BUSTR	Bureau of Underground Storage Tank Regulations
CFR	Code of Federal Regulation
CHP	Certified Health Physicist
CIH	Certified Industrial Hygienist
CM	Construction Manager
COC	Contaminant of Concern
COR	Contracting Officer's Representative
CPR	Cardiopulmonary Resuscitation
CR	Compliance Restoration
CSP	Certified Safety Professional
DFW	Definable Features of Work
DLA	Defense Logistics Agency
ECC	Environmental Chemical Corporation
ECCOSLIP	Safety/Quality Incident Form
EOD	Explosive Ordnance Disposal
EMR	Experience Modification Rate
EPA	Environmental Protection Agency
ESQ	Environment Safety and Quality
FS	Feasibility Study
FSP	Field Sampling Plan
FWSHP	Facility-Wide Safety and Health Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HRR	Historical Records Review
IAP	Installation Action Plan
IRP	Installation Restoration Plan
LES	Lakeshore Engineering Services
MEC	Munitions and Explosives of Concern
MRDQSM	Munitions Response Division Quality and Safety Manager
MRS	Munitions Response Site
MSDS	Material Safety Data Sheet
NAICS	North American Industry Classification System
NPDES	National Pollutant Discharge Elimination System
NTCRA	Non-Time Critical Removal Action
OHARNG	Ohio Army National Guard

ACRONYMS AND ABBREVIATIONS (CONTINUED)

OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PHSM	Project Health and Safety Manager
PM	Project Manager
PPE	Personal Protective Equipment
PWS	Performance Work Statement
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCM	Quality Control Manager
QCS	Quality Control Supervisor
RDX	Research Department Explosive
RI	Remedial Investigation
RIR	Recordable Incident Rate
RRD	Range Related Debris
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SI	Site Inspection
SRC	Site Related Constituent
SOP	Standard Operating Procedure
SOW	Statement of work
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SVOC	Semi-volatile Organic Compound
TAL	Target Analyte List
TPH	Total Petroleum Hydrocarbon
TNT	Trinitrotoluene
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Command
USEPA	U.S. Environmental Protection Agency
UST	Underground Storage tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound

1.0 INTRODUCTION

The Ravenna Army Ammunition Plant (RVAAP) Facility-Wide Safety and Health Plan (FWSHP) (USACE 2011) and this Site Safety and Health Plan (SSHP) Addendum, which is an addendum to the 2011 FWSHP, collectively set forth the specific procedures required to protect Environmental Chemical Corporation (ECC) personnel and ECC subcontractors involved with field activities at the 14 Compliance Restoration (CR) sites included in ECC's task order contract (Contract Number W91QR-04-D-0039, Delivery Order 0004) Performance Work Statement (PWS) dated May 3, 2011. These plans are driven by requirements contained in U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM 385-1-1) dated September 2008; Occupational Safety and Health Administration (OSHA) standards (including 29 Code of Federal Regulations [CFR] 1910 and 29 CFR 1926); and the RVAAP FWSHP. All field personnel are required to comply with the requirements of these programs and plans.

The FWSHP addresses program issues, hazards, and hazard controls common to the entire installation. This SSHP, an addendum to the FWSHP, serves as a lower tier document that addresses the hazards and controls specific to environmental investigation activities (e.g., Site Inspections [SI])at the 2 CR sites (CC RVAAP-71 and CC RVAAP-83) at RVAAP under ECC's task order with the USACE. Copies of the FWSHP and this SSHP will be present at the work site during all fieldwork. Planned site activities consist of environmental investigations that consist of SIs at the following sites;

Site Inspections
CC RVAAP-71 Barn No. 5 Petroleum Release
CC RVAAP-83 Former Building 1039 Laboratory

These SI tasks include sampling subsurface soils.

The investigation work tasks will be completed in Level D personal protective equipment (PPE), plus chemical resistant gloves when handling potentially contaminated materials. If one of several action levels is exceeded or the potential for increased risk becomes apparent during the inspection and investigation tasks, protective procedures, including protective clothing, will be upgraded, as necessary, by the Site Safety and Health Officer (SSHO).

1.1 Purpose

This SSHP has been developed based on known and anticipated hazards that may arise during performance of the PWS and ECC's Technical Approach as detailed in the technical proposal. At least one copy of the SSHP will be kept in a readily-accessible on-site location (e.g., field office trailer and/or field vehicles(s)) during all field activities. The SSHP consists of several components that together define the Safety and Health Program for the Environmental Investigation and Remediation Services at 2 CR sites located at RVAAP in Ravenna, Ohio.

1.2 Application

The requirements established by this SSHP are mandatory and apply to all ECC employees, its subcontractors, and any other personnel (i.e., client, visitors) entering designated work areas at the project site during active field operations. All project-assigned personnel are required to sign off on the SSHP using the Compliance Agreement Form (Appendix A) after receiving safety orientation training on this plan and before working at the sites. In addition, ECC shall make a copy of this plan available, if requested, to any authorized personnel who must enter the work area. Documentation of all project sign-offs shall be kept on-site at all times, and copies relinquished upon request.

1.3 Revisions

Changes in the PWS, field changes, or unanticipated site conditions may require SSHP modification and approval in order to retain field safety compliance with contract requirements and OSHA regulations. All changes to the SSHP shall be prepared and/or reviewed by ECC's SSHO, and submitted to the ECC Project Health and Safety Manager (PHSM) and the Project Manager (PM). The revisions will also be submitted to the Contracting Officer's Representative (COR) for acceptance, if required.

2.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

This section presents a brief description of the project including site description, PWS, key personnel, and phases of work.

Contractor:	ECC
Contract number:	W912QR-04-D-0039
Project Name:	Environmental Investigation and Remediation Services 14 CR Sites, RVAAP

2.1 Site History and Description of Work

When the RVAAP Installation Restoration Plan (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 Army National Guard Directorate (ARNGD) 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 C.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 C.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. Refer to Figure C.1 for a Project Site Location Map.

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 Areas of Concern (AOC) 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 CR sites include explosives, propellants, metals, and waste oils. Other types of CR sites present at RVAAP include landfills, an aircraft fuel tank testing facility, and various general industrial support and maintenance facilities.

The focus of ECC's field efforts will take place at the following 2 CR sites.

CC RVAAP-71 Barn No. 5 Petroleum Release

Primary Objective – Achieve approved SI by 19 September 2013. **Performance Standard** - Army approval through the COR and Ohio EPA concurrence (i.e., receipt of Ohio EPA documentation confirming Final SI Report approval).

CC RVAAP-83 Former Building 1039

Primary Objective – Achieve approved SI by 19 September 2013. **Performance Standard** - Army approval through the COR and Ohio EPA concurrence (i.e., receipt of Ohio EPA documentation confirming Final SI Report approval).

2.2 Compliance Restoration Site Operational History/Description

CC RVAAP-71 Barn No. 5 Petroleum Release

The site location is a vacant property along the southern property fence line in close proximity to former Post No. 6. There is a documented release on 13 May 1964 of approximately 20 barrels of gasoline to the ground surface inside of the south fence near Barn No. 5. The release occurred from a buried Standard Oil of Ohio (SOHIO) pipeline.

CC RVAAP-83 Former Building 1039

Former Building 1039 was the former Laboratory Building.

Building 1039 - Former Laboratory Building

The former Laboratory Building measured approximately 16,500 square feet. The structure contained three powder test rooms for the routine analyses of lead azide, mercury fulminate, and percussion element mixes. The laboratory was used for the testing of Load Line materials. During operations, the building contained and operated a photography laboratory, a chemistry laboratory, and a medical x- ray facility. The laboratory building was demolished by Lakeshore Engineering Services, Inc. (LES) between May 2006 and July 2007. Following demolition, all unpainted and uncontaminated brick and concrete was crushed and recycled off-site. The basement of Building 1039 was filled with approved clean soil, and was then seeded with approved grass seed. Potential SRCs for the sanitary system at the former Laboratory Building are VOCs, SVOCs, TAL metals, explosives and propellants.

2.3 Potential Contaminants of Concern By Site

Table 2-1: Potential Contaminants of Concern by Site

Compliance Restoration Site	Potential Contaminants of Concern
CC RVAAP-71 Barn No. 5 Petroleum Release	Gasoline
CC RVAAP-83 Former Building 1039	VOCs, SVOCs, TAL Metals, ACM, Explosives, Propellants

Notes:
No. = Number
VOC = Volatile Organic Compound
SVOC = Semi-Volatile Organic Compound
ACM = Asbestos-Containing Material
TAL = Target Analyte List

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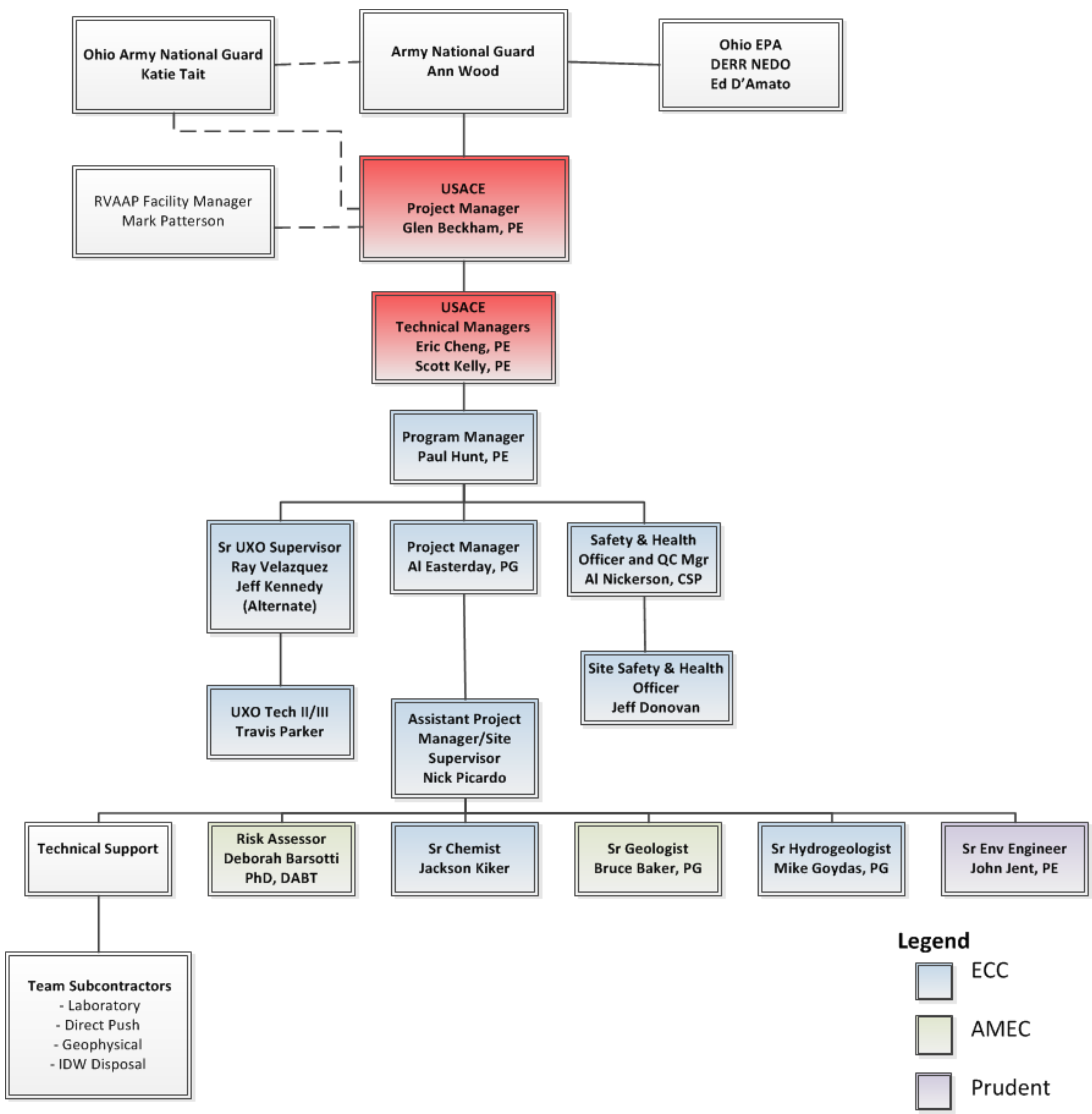
3.0 STAFF ORGANIZATION, RESPONSIBILITIES, AND LINES OF AUTHORITY

ECC has full responsibility for the implementation of the SSHP. It is also ECC's policy that all ECC subcontractors are responsible for implementing the SSHP as well. ECC holds our subcontractors responsible for performing all aspects of their field work in accordance with the approved SSHP. Personnel responsibilities for project safety and the lines of authority of these safety personnel are described below in Figure C.2 which is the Project Organization Chart.

Figure C.2: Project Organization Chart



3.1 Key Personnel

Table 3-1 lists key personnel for this project.

Table 3-1: Key Personnel

Name	Title	Address	Phone Number & Email
BRAC			
William O'Donnell	BRAC Office Program Manager	BRAC - Assistant Chief of Staff Installation Management 2530 Crystal Drive Arlington, Virginia 22202	T : (702) 601-1570 E : william.odonnell@us.army.mil
Ravenna Army Ammunition Plant			
Mark Patterson	Facility Manager	Ravenna Army Ammunition Plant Building 1037 8451 State Route 5 Ravenna, Ohio 44266	T : (330) 358-7312 F : (330) 358-7314 E : mark.c.patterson@us.army.mil
U.S. Army Environmental Command			
Mark Eldridge	Project Manager	USAEC 2450 Connell Road Fort Sam Houston, Texas 78234	T : (210) 424-8857 E : mark.h.eldridge@us.army.mil
U.S. Army Corps of Engineers			
Lisa Bisig	Contracting Officer	Louisville District Corps of Engineers Attn: CELRL-PM 600 Martin Luther King Jr. Place Louisville, KY 40202	T : (502) 315-6190 E : lisa.r.bisig@usace.army.mil
Chris Karem	Contracting Officer's Representative	Louisville District Corps of Engineers Attn: CELRL-PM 600 Martin Luther King Jr. Place Louisville, KY 40202	T : (502) 315-6285 E : christopher.r.karem@usace.army.mil
Shelton Poole	Contracting Officer's Representative	Louisville District Corps of Engineers Attn: CELRL-PM 600 Martin Luther King Jr. Place Louisville, KY 40202	T : (502) 315-6290 E : shelton.m.poole@usace.army.mil
Glen Beckham	Project Manager	Louisville District Corps of Engineers Attn: CELRL-PM 600 Martin Luther King Jr. Place Louisville, KY 40202	T : (502) 315-6799 F : (502) 315-6039 E : glen.beckham@usace.army.mil
Stephanie Craig	Contract Specialist	Louisville District Corps of Engineers Attn: CELRL-PM 600 Martin Luther King Jr. Place Louisville, KY 40202	T : (502) 315-6204 F : (502) 315-6195 E : stephanie.m.craig@usace.army.mil
T. Scott Kelly	Technical Manager	Louisville District Corps of Engineers Attn: CELRL-PM 600 Martin Luther King Jr. Place	T : (502) 315-3815 F : (502) 315-6309 E : timothy.s.kelly@usace.army.mil

Name	Title	Address	Phone Number & Email
		Louisville, KY 40202	
Eric Cheng	Technical Manager	Louisville District Corps of Engineers Attn: CELRL-PM 600 Martin Luther King Jr. Place Louisville, KY 40202	T : (502) 315-7443 F : (502) 315-6309 E : eric.s.cheng@usace.army.mil
Mark Nichter	Technical Manager	Louisville District Corps of Engineers Attn: CELRL-PM 600 Martin Luther King Jr. Place Louisville, KY 40202	T : (502) 315-6375 F : (502) 315-6309 E : mark.w.nichter@usace.army.mil
National Guard Bureau			
Ann Wood	Cleanup Program Manager	National Guard Bureau ARNGD-AR-EI 111 S. George Mason Drive Arlington, VA 22206	T : (703) 607-7991 E : ann.wood@us.army.mil
Ohio EPA			
Eileen Mohr	Facility Coordinator	Ohio EPA Northeast District Office 2110 E. Aurora Road Twinsburg, OH 44087	T : (330) 963-1221 F : (330) 487-0769 E : eileen.mohr@epa.ohio.gov
Ed D'Amato	Site Coordinator	Ohio EPA Northeast District Office 2110 E. Aurora Road Twinsburg, OH 44087	T : (330) 963-1170 F : (330) 487-0769 E : ed.damato@epa.ohio.gov
Ohio Army National Guard			
Katie Tait	Environmental Specialist	Ohio Army National Guard 1438 State Route 534 SW Newton Falls, OH 44444	T : (614) 336-6136 F : (614) 336-6135 E : kathryn.s.tait@us.army.mil
ECC			
Paul Hunt	Program Manager	ECC 33 Boston Post Road West Suite 420 Marlborough, MA 01752	T : (508) 229-2270 F : (508) 229-7737 E : phunt@ecc.net
Al Easterday	Project Manager	ECC 33 Boston Post Road West Suite 420 Marlborough, MA 01752	T : (508) 229-2270 F : (508) 229-7737 C : (508) 726-0284 E : aeasterday@ecc.net
Nick Picardo	Assistant Project Manager	ECC 33 Boston Post Road West Suite 420 Marlborough, MA 01752	T : (508) 229-2270 F : (508) 229-7737 C : (774) 279-5421 E : npicardo@ecc.net
Mike McSherry	Senior Health and Safety Officer and QC Program Manager	ECC 1125 Route 22 West Bridgewater, NJ 08807	T : (908) 595-1777 F : (908) 595-1776 C : (215) 776-0108 E : mmcsherry@ecc.net
Al Nickerson	Senior Health and Safety Officer and QC Manager	ECC 1600 Falmouth Road Suite 40 Centerville, MA 02632	T : (508) 771-1636 F : (508) 775-1864 C : (774) 836-6185 E : anickerson@ecc.net
Jackson Kiker	Senior Chemist	ECC 33 Boston Post Road West	T : (508) 229-2270 F : (508) 229-7737

Name	Title	Address	Phone Number & Email
		Suite 420 Marlborough, MA 01752	E : jkiker@ecc.net
Mike Goydas	Senior Hydrogeologist	ECC 1600 Falmouth Road Suite 40 Centerville, MA 02632	T : (508) 771-1636 F : (508) 775-1864 E : mgoydas@ecc.net
AMEC			
Bruce Baker	Senior Geologist/AMEC Resource Manager	AMEC 46850 Magellan Drive Novi, Michigan 48374	T : (248) 926-4008 F : (248) 926-4009 C : (248) 318-8261 E : BWBaker@amec.com
Anita Emery-DeVisser	Project Manager	AMEC 46850 Magellan Drive Novi, Michigan 48374	T : (248) 926-4008 F : (248) 926-4009 C : (810) 623-3398 E : anita.devisser@amec.com
Deborah A. Barsotti	Senior Risk Assessor/ Toxicology	AMEC 200 American Metro Blvd Suite 113 Hamilton, NJ 08619	T : (609) 689-2829 C : (609) 631-2902 E : dbarsotti@amec.com
Prudent Technologies, Inc.			
John Jent	Senior Environmental Engineer/Prudent Resource Manager	Prudent Technologies, Inc. 3303 Trinity Road Louisville, KY 40206	T : (502) 439-8005 C : (502) 439-8005 E : jpjent@PrudentWeb.com
Tomas Hernandez	Project Manager	Prudent Technologies, Inc. 4242 Medical Drive Suite 5250 San Antonio, TX 78229	T : (210) 822-9588 C : (210) 385-2011 E : thernandez@PrudentWeb.com

3.2 Health and Safety Responsibilities

The following sections describe the key personnel involved in this project and their responsibilities. To achieve the goals of the SSHP, each individual must fulfill their responsibilities and comply with the health and safety requirements. Failure to do so could result in disciplinary actions being taken against the individual(s).

All intrusive field activities or those requiring the operation of heavy earth moving equipment, including drilling rigs, shall not be conducted without the presence of the SSHO or designated Competent Person being on-site. All field activities shall be performed in accordance with the appropriate Activity Hazard Analysis (AHA) as presented in Table 3-2 of the Facility-Wide Safety and Health Plan for Environmental Investigations, Revision 0 (SAIC 2011a). Additional site-specific AHAs pertinent to field activities to be performed under the SI/RI Work Plan Addendum shall be included in Appendix B of this SSHP. Field sampling efforts (i.e., subsurface soils) as well as surveying and site reconnaissance will not necessitate the full time presence of the designated SSHO. The team leader will be designated as having safety responsibilities for this activity only. The team leader will coordinate with the SSHO and review the AHA(s), personal protective equipment (PPE) requirements, and any other safety-related topics prior to the implementation of field activities. Pre-task analysis (AHA, Daily Safety Tailgate Meeting, Job Safety Analysis) will be conducted prior to doing any field work.

3.2.1 ECC Project Manager and Assistant Project Manager

Reports through ECC's Program Manager

The Project Manager, Al Easterday, and Assistant Project Manager, Nicholas Picardo, represent ECC in all aspects of work under the contract and are responsible for the following:

- Providing leadership by setting an example for all site personnel through actions and words regarding the importance of proper health and safety practices and holding project staff accountable for safety performance;
- Ensuring an adequate project budget is available to implement the SSHP;
- Ensuring that subcontractor Statements of Work (SOW) include appropriate safety provisions and expectations;
- Conducting general safety inspections during site visits;
- Participating in the investigation of unplanned events, high loss potential incidents, and accidents;
- Ensuring that unplanned events, high loss potential incidents, and accidents are properly reported to ECC's Environmental Safety and Quality (ESQ) reporting network;
- Notifying the ESQ Manager of any changes in the PWS or site conditions; and,
- Ensuring that the SSHP is updated to address new hazards.

3.2.2 ECC Project Health and Safety Manager

Reports to the Corporate Health and Safety/ESQ Program Manager

The PHSM, Mike McSherry, Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP), will oversee the overall project health and safety program structure and implementation. Corporately, Mr. McSherry reports through ECC's Corporate ESQ Program Manager, Rich Gioscia, CIH, CSP, Construction Quality Management (CQM) who is the ECC Vice President of ESQ. The PHSM is responsible for the following:

- Preparing or Reviewing and signing the SSHP prior to submittal, and approving any modifications;
- Developing and/or reviewing AHAs prepared for the project;
- Approving the appointment of the SSHO and ensuring that the SSHO has the appropriate training and competencies to perform all expected duties;

- Being available on a 24-hour basis for consultation with the SSHO during on-site emergencies or as needed;
- Providing on-site consultation as needed to ensure the SSHP is fully implemented;
- Conducting general safety inspections during site visits and at least once per quarter;
- Participating in the investigation of unplanned events, high loss potential incidents, and accidents;
- Evaluating air monitoring data and recommending changes to engineering controls, work practices, and PPE; and,
- Assisting in development of on-site training, which will be provided by the SSHO.

3.2.3 Project Quality Control Supervisor

Reports to Project Manager and ECC's Corporate Construction Quality Control Manager (QCM)

Based on the frequency and duration of the scheduled field construction activities ECC has designated Jeff Donovan as the Project Quality Control Supervisor (QCS). In addition, ECC has identified Mike McSherry as the alternate QCS. The QCS implements the project specific Quality Control Plan (i.e., QAPP, Field Sampling Plan [FSP]).

The QCS will be responsible for:

- Conducting and/or documenting daily site safety and health inspections; inspections must be documented in the daily Quality Control (QC) log;
- Attending and conducting QC meetings and training sessions;
- Assuring all personnel on site are trained on the provisions of the safety and health plans, as well as other necessary work plans;
- Reviewing project submittals;
- Reporting equipment malfunctions and deficiencies to the PM and SSHO;
- Providing QC reports to USACE; and
- Ensuring the scope of work and specifications are followed and met.

3.2.4 Site Safety and Health Officer

The SSHO reports to the Senior Project Manager at the project level and to the PHSM / ESQ Manager at the corporate level. For this project the SSHO will have co-lateral functional responsibilities for both safety and quality control.

The designated SSHO, Mr. Jeff Donovan, implements the task-specific SSHP. Furthermore, Mr. McSherry has been designated as the alternate SSHO during intrusive field activities. In accordance with USACE EM 385-1-1, the SSHO must have completed the 30-hour OSHA construction safety course (or an equivalent course meeting the 30-hour training objectives); 24 hours of construction safety coursework every 4 years; and at least 5 years' experience in construction industry safety or 3 years' experience plus a CSP or degree in safety and health. The SSHO will be responsible for:

- Serving as the general site Competent Person (no work will be done unless the SSHO or a suitable Competent Person is on site);
- Mr. Donovan has been identified as the Competent Person for excavation/trenching activities;
- Overseeing compliance with the SSHP procedures and OSHA regulations through informal daily inspections;
- Developing (or assisting subcontractors with the development of) project-specific AHAs before work begins;
- Reporting to the site on a full-time basis for the duration of intrusive field activities;
- Serving as a member of the QC staff on matters relating to safety and health;
- Stopping work if unacceptable safety and health conditions exist, and taking necessary action to re-establish and maintain safe working conditions;
- Consulting and coordinating modifications to the SSHP with the PHSM and ECC Senior Project Manager;
- Ensuring all site personnel and visitors are properly trained in site hazards;
- Verifying that a designated competent / qualified person is on-site prior to permitting specific task activities from commencing;
- Conducting air monitoring and preparing air monitoring reports; and,
- Maintaining all required safety and health records (e.g., OSHA 300 Logs, incident/accident reports, training certificates and qualifications, equipment checklists, safety plans, air monitoring data and reports) throughout the life of the project.

3.2.5 Field Personnel

Field personnel report to Site Manager/Supervisor/Team Leader

Field personnel are responsible for understanding and abiding by the SSHP and performing work in a safe and responsible manner. Specific responsibilities include the following:

- Acting in a responsible manner at all times in order to prevent incidents, injury, and exposure to themselves and co-workers;
- Reporting all incidents, including near misses, and hazards to the SSHO;
- Attending and participating in all daily safety tailgate meetings;
- Following the instructions and directions of the SSHO;
- Utilizing the PPE provided;
- Following all field safety procedures for safe work practices;

- Performing tasks as instructed (unless the individual feels unqualified to perform the task(s) safely); and,
- Reporting any personal condition that could affect safety (e.g., fatigue, drowsiness, illness, impairment by medications, influence by drugs or alcohol, emotional stress).

3.2.6 Subcontractors

Subcontractors report to the Site Manager/Supervisor. Subcontractors that perform work for ECC under this SSHP are responsible for the health and safety of their employees. The presence of an SSHO and the implementation of the SSHP do not relieve subcontractors of their responsibilities as employers. Specific responsibilities of subcontractors include:

- Complying with the requirements of their SOW;
- Development of AHAs for their work activities;
- Maintaining a safe and healthy work environment;
- Complying with contract requirements, laws, regulations, and EM 385-1-1;
- Reviewing the SSHP to ensure that the health and safety requirements of their specific tasks are satisfied;
- Performing all work in accordance with the SSHP requirements;
- Providing trained and experienced workers for the specific work activities;
- Participating in the Daily Safety Tailgate Meetings;
- Identifying additional training needs for unique tasks;
- Enforcing company- and project-specific rules and procedures during work activities;
- Reporting all incidents and participating in the investigations;
- Participating in routine site inspection activities;
- Ensuring all equipment brought to the site is in a "new or like new" condition, routinely inspected, and maintained in safe working order; and,
- Setting a positive safety example for all project staff.

3.2.7 Site Visitors

Site visitors will be responsible for the following:

- Participating in a site briefing and signing the visitor log at site entry point,
- Following all site rules and instructions,
- Being escorted at all times unless otherwise approved by the SSHO, and,
- Wearing appropriate PPE.

3.3 Lines of Authority

The SSHO has a technical and administrative reporting relationship to the PHSM and MRDQSM, respectively, who reports directly to the ECC Vice President for ESQ and ECC Vice President for Munitions Response Division, respectively. The reporting relationship provides for access to safety and health expertise as well as an independent reporting and line of communication. The SSHO has a functional reporting relationship to the Project Manager, providing the Project Manager and team with a resource for safety and health support for the project.

Additionally, the SSHO has a functional reporting relationship to the Project Manager and their team. The SSHO will perform daily and weekly health and safety inspections and provide general support to the Project Manager for health and safety issues.

3.4 Competent Persons

The SSHO serves as the project's general competent person per EM 385-1-1 01.A.17 and 29 CFR 1926.20(b) (2). Competent Persons for specific activities are designated in the AHAs for those activities. Specific activities that require a Competent Person will only be performed when the Competent Person is on site.

3.5 Disciplinary Procedures

All employees are required to comply with SSHP policies and procedures. ECC reserves the right to discipline or terminate (when justified) employees at its sole discretion for serious safety infractions. Discipline will be in accordance with the Disciplinary Policy described in Section 6.14 of the ECC Employee Handbook. ECC expects that all subcontractors will exercise proper discipline or terminate its employees at its sole discretion when justified. ECC retains the right to deny access to the site to any individual not compliant with safety requirements, in accordance with our subcontract agreement.

3.6 Manager and Supervisor Accountability

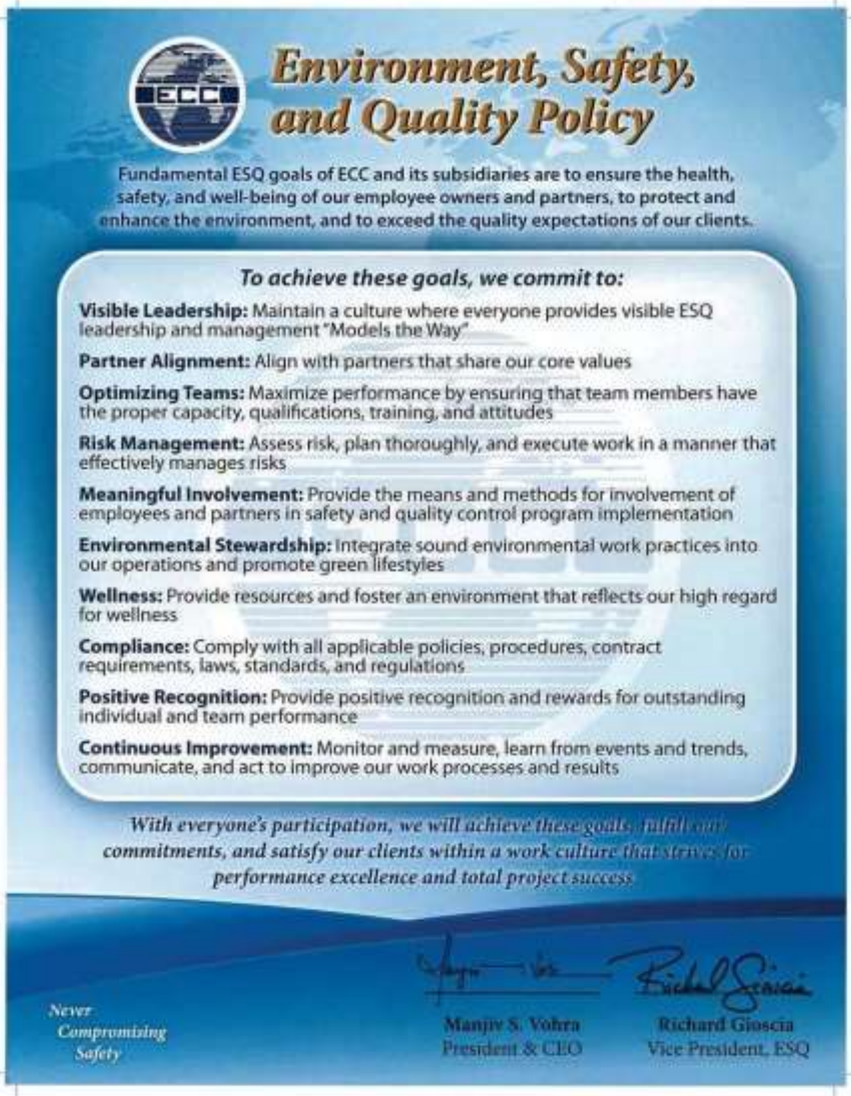
ECC managers and supervisors are accountable for providing a safe work environment through proper staffing, training, equipment availability, and by setting a leadership example for safety. Annual performance reviews and incentive plans for managers and supervisors include assessments of project safety performance as well as the individual's demonstrated attitude toward safety.

3.7 ECC Corporate ESQ Policy

The ECC Corporate ESQ policy statement is presented in Figure C.3. This statement will be posted at the job site on the safety and health bulletin board and in other applicable locations.

The safety goal for this project is the execution of work tasks without incidents involving personal injury, significant property damage, reportable environmental releases, or quality defects requiring re-work.

Figure C.3: ESQ Policy Statement



Objectives to meet this goal include:

- Conduct client kickoff meeting before the start of the project;
- Hold subcontractor pre-construction meetings before work begins;
- Implement the three-phase quality control (QC) system;
- Conduct site orientation, including review of this SSHP with all project participants;
- Use only trained and qualified workers;
- Generate AHAs for all major definable features of work (DFW) and train workers in AHA content;
- Perform daily work-site inspections;
- Conduct daily Plan-of-the-Day and Daily Safety Tailgate Meetings;
- Conduct inspections by qualified Safety and Health personnel; and
- Employee participation activities such as milestone recognition, ECCOSLIPs (form used to report safety/quality incidents), and establishing of a safety committee by the on-site team.

3.8 Contractor Safety Information

As shown in the following table, ECC has an excellent safety record. ECC's experience modification rate (EMR) is less than 1.0, indicative of fewer injuries and claims compared to other remedial construction companies. The OSHA recordable incident rate (RIR) is also less than the 3.6 average (2010 Bureau of Labor Statistics [BLS]) for other remediation service companies in North American Industry Classification System (NAICS) 562910.

Table 3-2: ECC Safety Experience Rates

Year	EMR	RIR
2012	0.66	0.50
2011	0.68	0.50
2010	0.64	0.50
2009	0.65	0.70
2008	0.62	0.00
2007	0.71	0.50
2006	0.70	0.20

A copy of ECC's OSHA Form 300A for calendar year 2012 is available on request.

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4.0 TRAINING

All ECC and subcontractor project personnel will have the requisite training and/or certifications required to be assigned to the project and implement all assigned tasks safely. On-site workers that have the possibility of exposure to site contaminants on hazardous waste remediation sites, will be required to have OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) training or certification. The requirement for this project will be that all field personnel will meet OSHA 1910.120 training and medical clearance requirements.

4.1 Project Meetings and Training Requirements

The training listed in Table 4-1 will be provided to project personnel as noted. In addition to the topics listed below, the SSHO may identify additional topics and work tasks to be included in the training requirements. These special requirements may be noted on project AHAs requiring additional training. All required training will be documented and this documentation maintained on-site.

Table 4-1: Project Meetings and Training Requirements

Topic	Description	Personnel
General Training		
AHAs	Activity-specific hazards, controls, and training requirements for a specific phase or activity, prior to commencement of activity.	Workers, supervisors, and oversight personnel engaged in the activity
HAZWOPER – General Training	40-Hour OSHA HAZWOPER initial training for general site employees, and 3 days of Supervised on-the-job training for site workers.	Workers, supervisors, and oversight personnel working on-site who must enter the exclusion zone or whose work exposes them to health or safety hazards related to hazardous waste or contaminated media.
HAZWOPER Supervisor Training	8-Hours of training for supervising activities on hazardous waste sites.	Supervisors at HAZWOPER sites
HAZWOPER Refresher	8-Hours of annual refresher training for workers on hazardous waste sites.	Workers, supervisors, and oversight personnel working on-site who must enter the exclusion zone or whose work exposes them to health or safety hazards related to hazardous waste or contaminated media.
Emergency Action Plan	Roles, responsibilities, recognition of emergency conditions, reporting and notification, evacuation, and other procedures.	All project personnel, with detailed information on procedures for workers with special responsibilities

Table 4-1: Project Meetings and Training Requirements (Continued)

Topic	Description	Personnel
General Training		
Hazard Communication	Requirements for MSDSs and labels; hazards of site materials and controls; signs and symptoms of exposure; location of and access to Hazardous Materials and their MSDSs.	All project personnel potentially exposed to hazardous materials
MEC Awareness	Suspected site ordnance, MEC identification, safety and health hazards, and operating procedures hazards.	All project personnel potentially exposed to MEC
Fire Extinguisher	General education on selection, distribution, and proper use of fire extinguishers.	Personnel designated as Fire Watch (other personnel as deemed necessary)
OSHA 30-hour construction or equivalent	Common hazards, controls, and OSHA requirements for construction activities.	SSHO
Daily Safety Briefing	Review of Plan-of-the-Day and daily hazards; presentation of a specific topic; refresher training on various issues; and changes in hazards, controls, or procedures.	All field workers, supervisors, and field oversight personnel
Weekly Safety Meeting	Incidents, modifications to SSHP, upcoming work, new hazards, etc.	All field workers, supervisors, and field oversight personnel
First aid/ Cardiopulmonary resuscitation (CPR)	Red Cross, National Safety Council or other authorized course, with current refresher.	At least two project assigned personnel
Forklifts	Hazards and operation procedures, including machine-specific safe operating procedures.	Forklift operators
Other heavy equipment operations	Qualified by Construction Manager, Supervisor or Equipment Supervisor as documented on ECC Equipment Operator Qualifications Form	Equipment operators
Power tools (e.g., chain saws, chippers)	Hazards; proper use and maintenance of tools as described in operations manual. Power-operated tool users certified by manufacturer.	Project personnel using power tools

Notes:
MSDS – Material Safety Data Sheet

4.2 Visitor Indoctrination Policy

All site visitors will be required to review the daily tailgate safety issues and sign the visitor's log. At a minimum, all visitors must be informed of the anticipated hazards, PPE requirements, designated work zones, escort procedures, and emergency procedures.

5.0 PERSONAL PROTECTVE EQUIPMENT

The purpose of PPE and clothing is to protect individuals from chemical and physical hazards.

5.1 Basic Requirements

The basic requirements for PPE at the project sites include American National Standard Institute (ANSI) approved hard hats, ANSI approved safety glasses (high impact, with side protection), and ANSI approved safety-toe footwear, long trousers and short sleeved shirts. Hand protection will consist, at a minimum, of nitrile gloves whenever there is a possibility of contact with contaminated soil and leather work gloves when working with hand and portable power tools, or handling materials and equipment with sharp edges or caught-between hazards.

5.2 Hazard Assessments

Specific work tasks with unique hazards and/or PPE requirements must be evaluated or reevaluated prior to beginning work. PPE requirements, based on this assessment, will be included in Section 3.0 of the SSHP or in the AHA for the specific task. All workers must be trained in the requirements of the SSHP and the applicable AHAs prior to beginning work. The required PPE may be changed by the SSHO, based on the results of air monitoring, or on task-specific needs. Downgrades will require the approval of the PHSM unless otherwise permissible by the SSHP.

5.3 Personal Protective Equipment Inspection and Care

Inspection and care of PPE are covered in the ECC Corporate SOP HS-6.1 (Appendix C).

5.4 Respiratory Protection Program

ECC does not anticipate the need for respiratory protection for the field crews involved in intrusive field activities (i.e., sampling, auguring, test pitting, excavation, direct-push investigation). However, if based on initial field observation and real-time dust monitoring results, during excavation and soil mixing activities, it is determined that engineering controls are not adequate, respiratory protection may be required. If respiratory protection is deemed necessary, ECC shall implement and maintain a site-specific Respiratory Protection Program to supplement ECC SOP ESQ-6.2 for its employees and subcontractors and train them on its contents. The program will be administered by the SSHO.

Table 5-1 lists the minimum standards for most types of PPE to be used on the project.

Table 5-1: Minimum PPE for All Work

PPE	Requirement
Footwear	Protective safety footwear (steel or composite toe) boots (minimum height of 6 inches) will be worn by all workers on the project. Boots must have ANSI Z-41/ASTM F2412-05 & F2413-05 approval.
Head Protection	Hard hats will be worn by all employees at all times in designated areas of the project site. Hard hats must meet the requirements of ANSI Z-89. Based on the known hazards within the main process treatment plant use of hard hats is optional during routine O&M activities. Hard hats are mandatory during carbon change, change-out of pumps or piping, or whenever ECC subcontractors are onsite to perform task-specific activities. Hard hats will also be worn during access into vaults.
Eye Protection	Protective safety glasses approved for High Impact (ANSI Z87+) will be worn by all site workers at all times, in designated areas of the project site. In addition, safety goggles and/or face shields may be required for certain tasks, based on the discretion of the SSHO. Workers performing welding and cutting with torches or arc-welding equipment shall wear the proper shaded lenses in face shields and/or goggles. All eye protection must meet ANSI Z-87 requirements.
Hearing Protection	Protective ear plugs or muffs shall be worn when workers are exposed to potentially damaging noise including jack hammers, power saws and grinders, and combustion engines without mufflers.
Gloves	All workers shall use appropriate hand protection to guard against abrasion, laceration, puncture, hot materials and surfaces, cold weather, cryogenic materials, and hazardous chemicals and biological agents. Hand protection will consist of nitrile gloves whenever there is a possibility of contact with soils, sediments, and groundwater where potential exists for contact with contamination. Leather work gloves when working with hand and portable power tools, or handling materials and equipment with sharp edges or caught-between hazards.
Clothing	Workers shall wear clothing that protects their skin from damage – shirts and long pants at a minimum. Workers exposed to welding operations, chemicals, abrasive blasting, wet concrete, asbestos, and other hazardous contaminants will wear appropriate clothing for the hazard. Workers using power tools or operating equipment shall not wear very loose or flowing clothing that may get caught in the equipment.
High Visibility Vest	All employees will wear an ANSI Type 2 (or equivalent, per the SSHO), retro-reflective safety vest at all times while working on the project near heavy equipment operations or vehicular traffic.

Other PPE will be identified in the AHAs for specific phases of work.

6.0 MEDICAL SURVEILLANCE

6.1 Medical Surveillance Requirements

General requirements for hazardous waste operations: All field personnel (and management personnel on-site) will have a current medical exam clearance (physician's written opinion) in accordance with OSHA standards prior to entering regulated work areas. Complete results of each individual's medical examination results are maintained by the company's medical provider and will not to be kept on-site. However, the SSHO will verify that the appropriate employees medical screenings are complete, documented, and the records (i.e., medical clearance form) are available at the work site.

6.2 On-Site First Aid Support

The SSHO will be trained in First Aid, CPR, and blood borne pathogens. On-site first aid kits must meet the requirements of OSHA 1910.266 and American National Standard Institute (ANSI Z308.1). First aid kits will be assigned to each field crew.

6.3 Hospital and Emergency Route

Emergency contact information is contained in Table 13-1. Local hospital emergency rooms must be notified of the potential types of injuries and the contaminants involved. An emergency egress route map is provided in Figure C.4. A hospital route map is provided in Figure C.5.

6.4 Medical Transport of Employees and Case Management

For non-emergency injuries, a local clinic will be identified with the assistance of the Corporate Medical Consultant, Dr. Peter Greaney or the WorkCare Occupational Health Nurse. These individuals will be contacted prior to transporting the injured worker to the clinic. The WorkCare provider will attempt to contact the clinic ahead of the arrival of the patient to establish oversight of case management. When there are two or more people on-site, an employee with minor injury may be transported by car after first aid treatment is given. The SSHO or other project management personnel will transport the injured person to the facility. 911 will be called for severe injuries.

Injured employees that require medical treatment or are taken to a doctor, hospital, clinic, etc., will not be allowed to resume work without a written return to work statement from the treating physician. This statement shall supply a medical diagnosis of the problem, the date of return to work, and work limitations. Should a return to work statement such as "light duty" be given, the treating physician will be contacted to determine the specific limitation. ECC will make an assessment of work the employee normally performs whether or not the limitation interferes with the employee's normal work.

Whenever there are questions on the appropriateness of the diagnosis or prescribed course of treatment, WorkCare will be contacted to arrange for a second opinion.

7.0 EXPOSURE MONITORING / AIR SAMPLING PROGRAM

Assessment of airborne chemical concentrations will be performed, as appropriate, to ensure that exposures do not exceed acceptable levels. Action levels, with appropriate responses, have been established for this monitoring. In addition to the specified monitoring, the SSHO may perform or require additional monitoring, such as organic vapor monitoring, in the field laboratory or equipment decontamination area or personnel exposure monitoring for specific chemicals. The deployment of monitoring equipment will depend on the activities being conducted and the potential exposures. All personal exposure monitoring records will be maintained in accordance with 29 Code of Federal Regulations 1910.20. The minimum monitoring requirements and action levels are presented in Table 7-1.

Fieldwork is not expected to pose airborne exposure hazards for the following reasons:

- With the exception of sampling equipment decontamination, which will be performed in a well-ventilated building, work will be performed in open areas with natural ventilation.
- Prior site sampling indicated that contaminant concentrations are unlikely to pose an occupational health hazard.
- The most probable contaminants (metals, explosives, and propellants) are materials with relatively low vapor pressures.

Air monitoring of the breathing zone using a photoionization detector, or equivalent, is planned during sampling activities. The SSHO will examine site conditions and will contact the Health and Safety Manager and initiate additional monitoring if there is any indication of potential airborne exposure.

Table 7-1: Monitoring Requirements and Action Limits

Hazard or Measured Parameter	Area	Interval	Limit	Action	Tasks
Airborne organics	Breathing zone (14 inches) in front of employee's shoulder	From 1 to 5 ft below ground surface and if site conditions, such as discolored soil or chemical odor, indicate that monitoring is necessary.	<5 ppm >5 ppm	Level D (<5 ppm) Level B (>5 ppm) Withdraw and evaluate Evaluate need for PPE upgrade Identify contaminants Notify PM and H&S Manager.	Soil and subsurface soil sampling (hand auger and direct push), sediment sampling, and surface water sampling
Noise	All	Any area where noise level is increased or there is doubt about noise levels	≥85 dBA and any area perceived as noisy	Require the use of hearing protection	Hearing protection will be worn within the exclusion zone, around direct push rigs, or other motorized equipment
Visible airborne dust	All	Continuously	Visible dust generation	Stop work; use dust suppression techniques such as wetting the surface	All

8.0 HEAT/COLD STRESS MONITORING

General requirements for heat and cold stress monitoring are contained in the FWSHP. ECC's SOP on Cold Stress Monitoring and Heat Stress Monitoring are provided in Appendix C.

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9.0 STANDARD OPERATION SAFETY PROCEDURES

9.1 General Site Rules

The following site rules are applicable to all ECC projects:

- Eat, drink, use gum or tobacco products, or apply cosmetics in designated areas only;
- Do not smoke within site areas or near sources of ignition; areas shall be marked where smoking is permitted;
- Wash hands, face, and any exposed skin during decontamination, before eating, drinking or using tobacco products, and at the end of each shift;
- Participate in Daily Safety Tailgate Meetings;
- Continually observe work location and be alert to changes that may affect safety;
- Avoid direct contact with contamination by not purposefully walking, touching, or contacting any obviously contaminated surfaces;
- Immediately report incidents, accidents, near misses, or unusual situations to SSHO;
- Use PPE provided and as instructed by the SSHO;
- Avoid hand-to-mouth or hand-to-face activities;
- Instruments and safety equipment/vehicles and construction equipment shall be inspected prior to use;
- Minimize the number of personnel in a work area to reduce potential exposures;
- Work within physical and mental limits;
- Take adequate rest breaks and replace body fluids (water and electrolyte) continuously;
- At all times follow the instructions of the SSHO, Team Leader or designee;
- Do not deviate from the SSHP or the instruction of the SSHO or Team Leader;
- Avoid rushing and/or taking short cuts;
- Handle and dispose all waste generated from decontamination procedures per contract requirements; no waste shall be disposed without the direction of the Senior/Project Manager;
- Conduct visual checks on machinery and equipment prior to use, and complete the daily inspection form;
- Take precautions to prevent spillage and splashing; contain spilled liquid if possible;
- Alert your senses to potentially dangerous situations (e.g., strong, irritating, or nauseating odors);
- Familiarize yourself with the physical characteristics of the sites;
- Dispose of all wastes generated during activities as directed by the SSHO, Team Leader or designee.

Conformance with these site rules is mandatory for continued project participation.

9.2 ECC Corporate Standard Operating Procedures

Please see Appendix C for the following Standard Operating Procedures:

- Air Monitoring Program
- Cold Stress Monitoring Program
- Heat Stress Monitoring Program
- Site Control Program
- Excavation
- Fall Prevention and Protection
- Hazard Communication
- Electrical Safety
- Biological Hazards
- Equipment Decontamination
- Personal Protective Equipment

10.0 SITE CONTROL MEASURES

Site control measures are described in the FWSHP. No formal site control is expected to be necessary for this work, as the work areas are remote and bystanders are not anticipated. The RVAAP installation is not open to the public, and only authorized personnel are allowed in the project site area. 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 FWSHP.

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11.0 PERSONNEL HYGIENE AND DECONTAMINATION

Personal hygiene and decontamination requirements are described in Section 12.0 of the FWSHP (USACE 2011).

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12.0 EQUIPMENT DECONTAMINATION

Equipment Decontamination is performed in accordance with ECC's Standard Operating Procedures as referenced in Section 9.0 Standard Operation Safety Procedures as well as Appendix C of this SSHP.

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13.0 EMERGENCY PROCEDURES AND EQUIPMENT

Emergency contacts, telephone numbers, directions to the nearest medical facility, and general procedures can be found in the FWSHP Section 12.0. Emergency phone numbers and the hospital route map are also included in this section. The SSHO will remain in charge of all ECC and subcontractor personnel during emergency activities. The staging building (Building 1036) will serve as the assembly point if it becomes necessary to evacuate one or more sampling locations (Figure C.4).

13.1 Emergency Phone Numbers

Listed below are emergency groups and their telephone numbers. Cellular telephones and two-way radios will be present in the field and available for use. Mid-American Security police will be contacted first for any emergency service.

Table 13-1: Emergency Phone Numbers

Emergency Group	Phone Number
RVAAP Guard Post 1 (Main Gate)	330-358-2017
Police (Mid-American Security)	330-338-7406
Emergency Medical Service	330-872-5050
Hospital	330-297-0811/2449
Fire Department (City of Ravenna)	330-297-5738
Hazardous Materials Response	330-358-7406/7409
USACE Project Manager (Glen Beckham)	502-315-6799
USACE Technical Manager (Eric Cheng)	502-315-7443
USACE Safety Officer (Matt Burg)	502-315-7061

13.2 Procedures and Equipment

At least one person (i.e., project manager or site supervisor) 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 Site Supervisor. For the purposes of this requirement, a team is any individual not having a line of sight or within normal voice range of another individual having means of communication with the Project Manager or Site Supervisor.

In the event of medical emergency, Robinson Memorial Hospital is located approximately 10 miles from the site at 6847 North Chestnut Street in Ravenna, Ohio (Figure C.5). It can be reached by taking PA Street 1 (Paris-Windham Road) towards Highway 5 West/Ravenna Warren Road approximately 7.2 miles west, turn right at Cleveland East Liverpool Road/Highway 14 North/Highway 44 North approximately 2.4 miles, turn left at North Chestnut Street/Ravenna Painesville Road. Please see Figure C.4 for an emergency egress route map and Figure C.5 for a hospital route map.

In the event of an accident or incident, the SSHO will first notify RVAAP security personnel, who will, in turn, contact the proper authorities. The field supervisor should then notify the U.S. Army Project Manager immediately according to the requirements of EM 385-1-1. The required Accident Report (ENG Form 3394) must be completed and submitted to the U.S. Army Project Manager within two days, in accordance with the FWSHP.

14.0 LOGS, REPORTS, AND RECORD KEEPING

ECC will adhere to the documenting activities related to daily logs, reporting, and record keeping requirements as described in the FWSHP. The SSHO will lead the daily tailgate meetings. Please see Appendix A Reporting Forms for a copy of ECC's Daily Tailgate Meeting Sign-In Sheet.

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15.0 REFERENCES

Prudent Technologies, Inc. (Prudent). 2011. *Final Historical Records Review Report for 2010 Preliminary Assessment Compliance Restoration Sites CC-RVAAP-78 Quarry Pond Surface Dump and CC-RVAAP-80 Group 2 Propellant Can Tops.* April.

Science Applications International Corporation (SAIC). 2011a. *Final Facility-Wide Safety and Health Plan for Environmental Investigations and the Ravenna Army Ammunition Plant.* March.

SAIC. 2011b. *Final Historical Records Review Report for the 2010 Phase I Remedial Investigation Services at Compliance Restoration Sites (9 Areas of Concern).* December.

U.S. Army Corps of Engineers (USACE). 2008. *Safety and Health Manual*, EM-385-1-1, Sept 15, 2008.

USACE. 2011. *Facility-Wide Safety and Health Plan for Environmental Investigations at the Ravenna Army Ammunition Plant*, Ravenna, Ohio, W912QR-08-D-0008, Delivery 12 Order No. 0016, February 24, 2011.

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FIGURES

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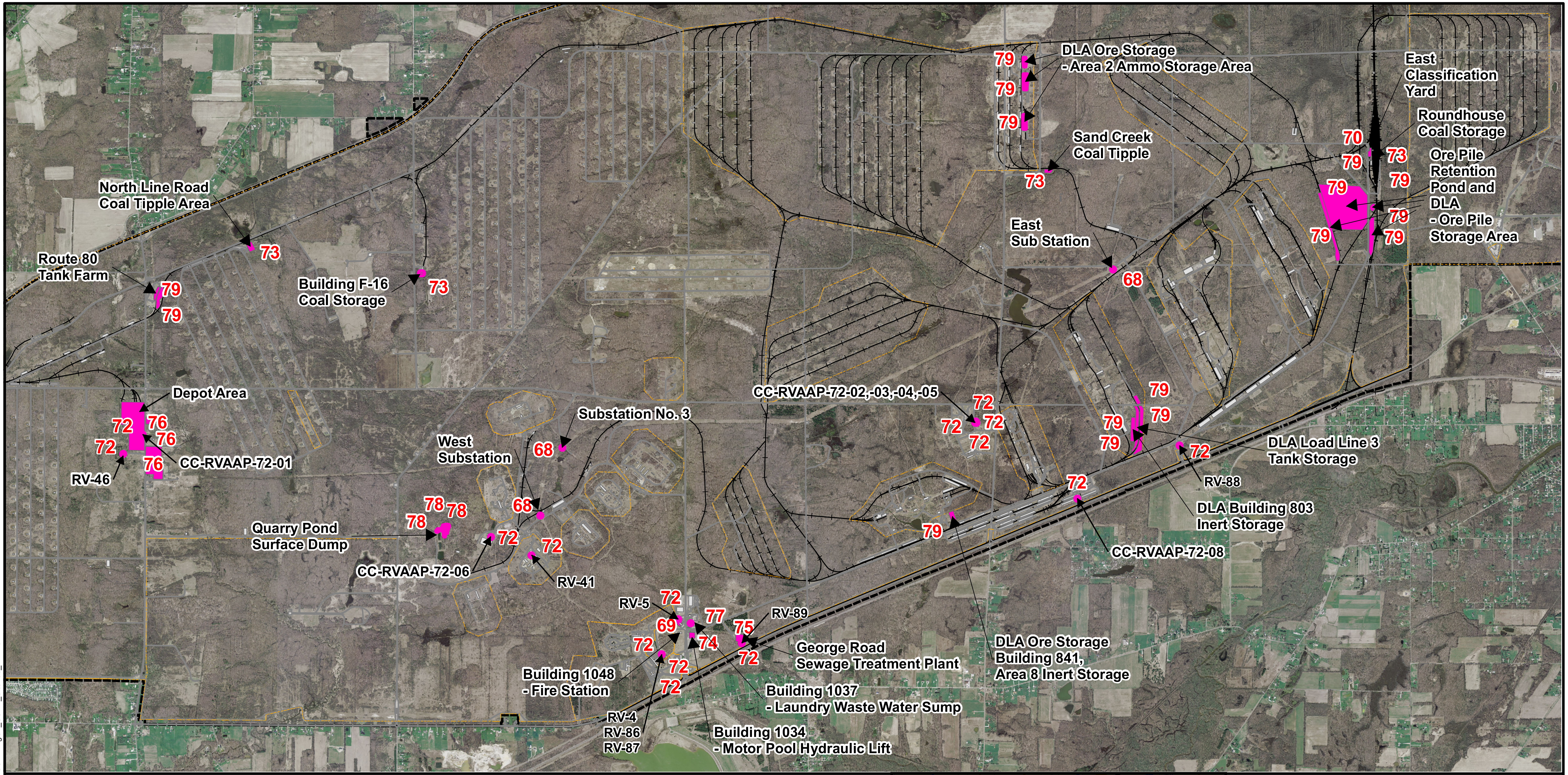


CR Site No.	CR Site Name
CC RVAAP-68	Electric Substations (East, West, No. 3)
CC RVAAP-69	Building 1048 – Fire Station
CC RVAAP-70	East Classification Yard
CC RVAAP-72	Facility-Wide Underground Storage Tanks (USTs)
CC RVAAP-73	Facility Wide Coal Storage
CC RVAAP-74	Building 1034-Motor Pool Hydraulic Lift
CC RVAAP-75	George Road Sewage Treatment Plant
CC RVAAP-76	Depot Area
CC RVAAP-77	Building 1037-Laundry Waste Water Sump
CC RVAAP-78	Quarry Pond Surface Dump
CC RVAAP-79	DLA Ore Storage Site – Main Ore Storage Yard and Remaining Sites

Legend

- AOC
- Fence Line
- Road
- Railroad
- Building
- CRJMTC Property Line
- 73 CR Site

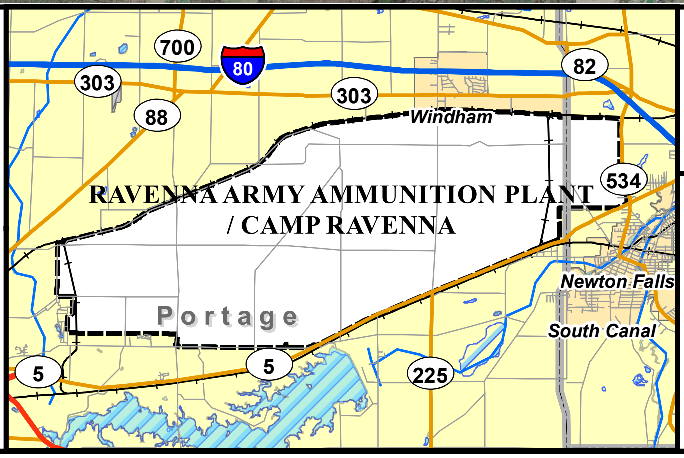
N

0 1,500 3,000 Feet

1 inch = 3,000 feet

NOTES & SOURCES

1. Map Coordinates: WGS 84, UTM Zone 17N in Meters
2. CR = Compliance Restoration
3. CRJMTC = Camp Ravenna Joint Military Training Center
4. UST site locations are approximate.



U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

Figure C.1
Site Location Map
Site Safety and Health Plan

RVAAP/CAMP RAVENNA
RAVENNA, OHIO

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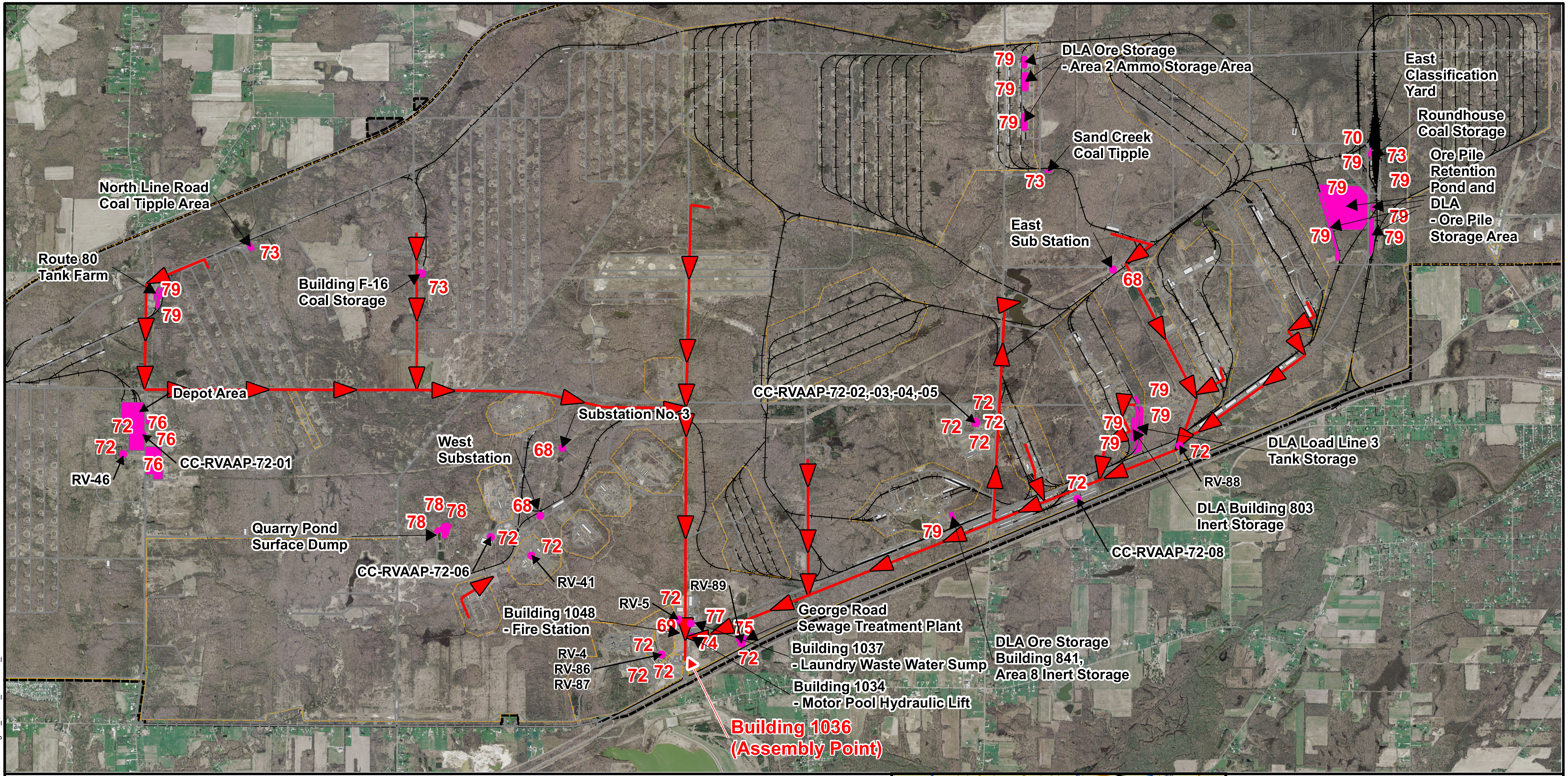

CR Site No.	CR Site Name
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CC RVAAP-75	George Road Sewage Treatment Plant
CC RVAAP-76	Depot Area
CC RVAAP-77	Building 1037-Laundry Waste Water Sump
CC RVAAP-78	Quarry Pond Surface Dump
CC RVAAP-79	DLA Ore Storage Site – Main Ore Storage Yard and Remaining Sites

Legend

- Emergency Egress Route
- AOC
- Fence Line
- Road
- Railroad
- Building
- CRJMTC Property Line
- 73 CR Site

NOTES & SOURCES

1. Map Coordinates: WGS 84, UTM Zone 17N in Meters
2. CR = Compliance Restoration
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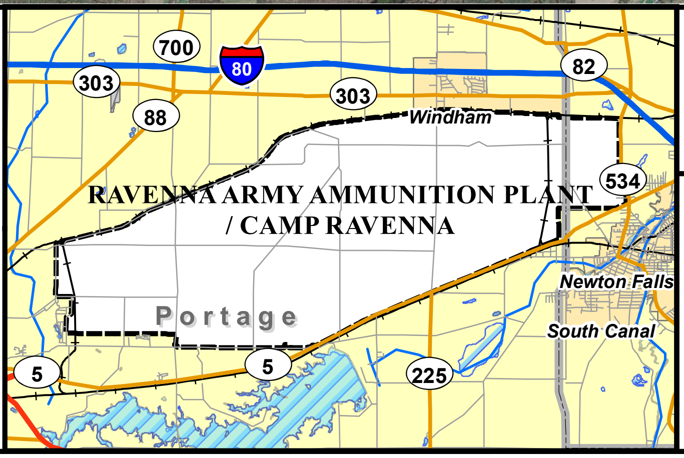
4. UST site locations are approximate.

N

0 1,500 3,000 Feet

1 inch = 3,000 feet



U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

Figure C.4
Emergency Egress Route

Site Safety and Health Plan
RVAAP/CAMP RAVENNA
RAVENNA, OHIO

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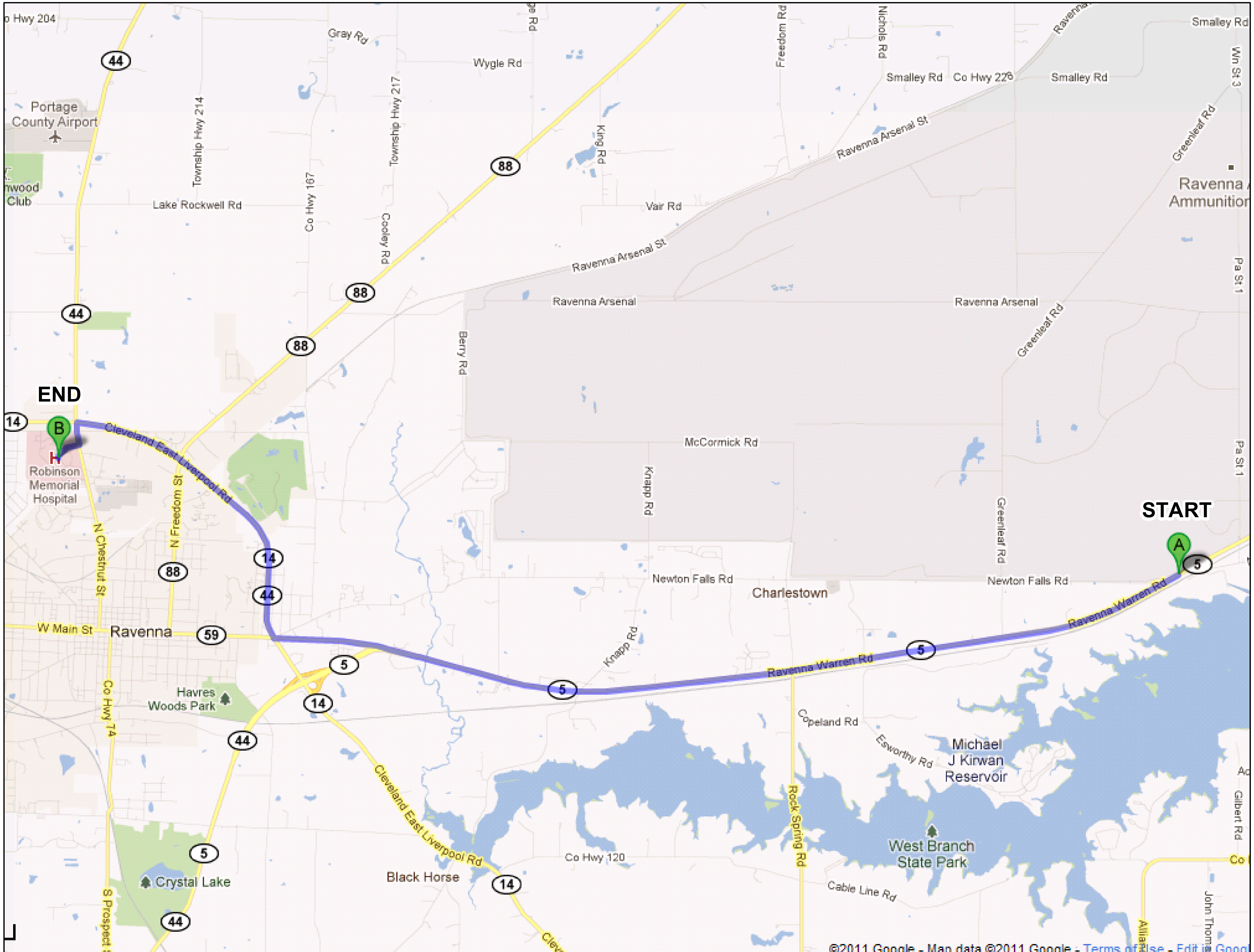

DIRECTIONS TO:
ROBINSON MEMORIAL HOSPITAL
6847 North Chestnut St
Ravenna, OH 44266
(330) 297-0811

1. Exit CRJMTC by taking a RIGHT onto OH-5W/ Ravenna Warren Rd.
2. Head SW on OH-5W/ Ravenna Warren Rd (Go 6.7 mi)
3. Turn RIGHT onto OH-14 W/ OH-44 N/Cleveland East Liverpool Rd (Go 2.4 mi)
4. Turn LEFT onto N Chestnut St/Ravenna Painsville Rd (Go 0.2 mi)
5. Destination will be on the RIGHT.

TITLE

Figure C.5
Hospital Route
to Robinson Memorial Hospital

Site Safety and Health Plan
Ravenna Army Ammunition Plant

0 200 400 Feet

N

ECC
Marlborough, Massachusetts

GIS Server
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FigC5_SSHP_HospitalRoute.mxd
October 2011 DWN BY: CG CHKD BY: GC

FIGURE
C.5

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APPENDIX A

REPORTING FORMS

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	Environmental Chemical Corporation	SITE HEALTH AND SAFETY PLAN COMPLIANCE AGREEMENT

Project:

I have received information and training on the contents of the Site Safety and Health Plan including operations to be performed, site hazards, safety requirements, use of personal protective clothing and equipment, monitoring requirements, site control, decontamination procedures, and actions to take in the event of a site emergency. Copies of this plan are available for my review.

I have reviewed the plan, understand its requirements, and agree to comply with all of its provisions. I understand that failure to comply with these requirements could result in disciplinary action.

Signature	**Position**	**Employer**	**Date**

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Vision Integrity Results	ECC	DAILY SAFETY MEETING SIGN-IN SHEET

Date: ____________ Project Name/Location: ________________________________

Company: ____________ Person Conducting Briefing: ________________________________

1. AWARENESS (e.g., special EHS concerns, pollution prevention, recent incidents, etc.):

2. OTHER ISSUES (HASP changes, new AHAs, attendee comments, etc.):

3. DISCUSSION OF DAILY ACTIVITIES/TASKS AND SAFETY MEASURES TO BE USED:

4. ATTENDEES (Print Name):

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.
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29.	30.

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Environmental Chemical Corporation	SITE H/S INSPECTION FORM

Site Information:

Project Name:	Date of Inspection:
Company(s):	Type of Inspection: ☐ Weekly ☐ Monthly ☐ Quarterly
Tasks or Activities Observed:	

Persons Conducting Inspection:

Name	Company	Name	Company

A. General Workplace Conditions

Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No
Walking/Working Surfaces		
Aisles and Passageways		
Platforms/Scaffolding		
Ladders		
Stairs		
Exits/Egress		
Roadways		
Excavations/Trenches		
Ventilation		
Lighting		
Noise Exposure		
Ergonomics		
Potable Water		
Sanitation Facilities		
Temperature Extremes		

B. Hazardous Materials Use & Storage

Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No
MSDSs Available		
Material Labeling		
Storage Conditions		
Storage Containers Condition		
Chemical Storage Compatibility		
Compressed Gas Storage & Use		
Waste Storage/Disposal		

C. *Motor Vehicles & Power Equipment*		
Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No
Seatbelts & Back-up Alarms		
Dozer Equipment		
Scraper Equipment		
Road Grader Equipment		
Excavators		
Water Trucks		
Front End Loader/Backhoe Equip.		
Cranes/ Hoists & Rigging		
Forklifts		
Other Heavy Equipment		

D. Hazard Controls		
Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No
General Site Controls		
Work Zone Delineation		
Lockout Systems		
Accident Prevention Signs and Tags		
Barricades		
Hole Covers		
Electrical Grounding & GFCI Use		

E. Emergency Systems		
Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No
Emergency Instructions		
Fire Protection		
Eye Wash and Showers		
First Aid Kits/Stations		
Emergency Rescue Equipment		

F. Protective Equipment Use & Compliance		
Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No
Eye Protection		
Ear Protection		
Respiratory Protection		
Head Protection		
Hand Protection		
Foot Protection		
Body Protection		
Fall Protection		

	Environmental Chemical Corporation	SITE H/S INSPECTION FORM Page 3 of 4

G. Hand/Power Tools and Power Systems

Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No
Hand Tools Condition		
Portable Power Tools Condition		
Welding/Burning Equip. Condition		
Power Tools Guarding		
Electrical Power Generator		
Pneumatic Power Generator		

H. Remediation Waste Management

Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No
Waste Properly Categorized		
Cross Contamination Minimized		
Containers in Good Condition		
Waste Storage		
Staging/Stockpiling of Soil/Debris		
Decontamination Water		

I. Project Environmental Programs

Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No
Dust Control		
Odor Control		
Oil and Spill Prevention		
Stormwater/Erosion Control Activities		

J. Environmental Management System

Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No
Pollution Prevention		
Recycling		
Paper Conservation		
HS Continual Improvement		
Employee Participation		

K. Other Environmental Safety and Health Conditions or Work Practices

Category	Observations (N/A if Not Applicable)	Action required ☐ Yes ☐ No

	Environmental Chemical Corporation	SITE H/S INSPECTION FORM

Site Information:

Project Name:	Date of Inspection:
Company(s):	Type of Inspection: ☐ Weekly ☐ Monthly ☐ Quarterly

Summary and Recommendations

Finding Number and Hazard Classification (#/Classification)*	Findings and Recommended Corrective Action	Date Corrected	Corrected or Verified by

*Classify as Major or Minor – Major findings indicate that a potential or imminent hazard to people, property, or the environment exist

APPENDIX B

ACTIVITY HAZARD ANALYSES

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Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

Activity/Work Task: **Direct Push Subsurface Investigation**	Overall Risk Assessment Code (RAC) (Use highest code)					**L**
Project Location: **Ravenna Army Ammunition Plant, Ravenna, Ohio**	**Risk Assessment Code (RAC) Matrix**					
Contract Number: **W912QR-04-D-0039, DO No.: 0004**	**Severity**	**Probability**				
Date Prepared: **15 June 2012**		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): **Jeff Donovan, SSHO**	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): **Mike McSherry, CIH, CSP**	Marginal	**H**	**M**	**M**	**L**	**L**
	Negligible	**M**	**L**	**L**	**L**	**L**
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)					
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				**RAC Chart**	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				**E = Extremely High Risk** **H = High Risk**	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				**M = Moderate Risk** **L = Low Risk**	

JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS Consider People, Equipment, Materials and Environment *(Note: Standard PPE required for this activity includes Hard Hat, Safety glasses with side protection, and safety-toe footwear. Additional PPE requirements are listed in this column depending on the hazard. This constitutes the Workplace Hazard Assessment per 29 CFR 1910.132. Additional assessments and PPE selection when needed will be documented on a daily briefing sign-in form and signed by the SSHS in accordance with ECC SOP ESQ 6.1. Hazard assessment and respirator selection for inhalation hazards are documented in the site Respiratory Protection Plan if respirators are part of PPE.)*	RAC
Direct Push Equipment Operation	Exposure to Contaminants of Concern (COC)	▪ All personnel assigned to Geoprobe operations will operate inside a designated EZ. All PPE will be removed properly prior to exiting the CRZ. All equipment and hand tools will be decontaminated in accordance with the established procedure. ▪ Initial air monitoring shall be conducted at each boring location. Results shall be compared to the established action levels.	L
	Cuts & laceration – cutting of acetate sample tubes	▪ Cutting of acetate liners: A cutting device, designed for cutting acetate liners (procured through Geoprobe) shall be used or use safety utility knife with snub–nose blades with the user wearing Kevlar gloves under leather gloves.	L
	Struck by – Geoprobe equipment, drill mast, rod sections	▪ Only qualified equipment operators shall be permitted to operate DPT equipment ▪ All non-essential personnel shall remain a safe distance from the drilling equipment	L

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

		▪ While locating drilling equipment personnel shall remain out of the travel path.	
	Exposure to excessive noise levels	▪ Operators and all support personnel working adjacent to or proximate to the DPT equipment shall wear hearing protection while DPT is in operation	**L**
	Lifting Strains & Sprains	▪ No individual employee is permitted to lift any object that weighs over 50 pounds. Proper lifting techniques shall be used. Multiple employees or the use of mechanical lifting are for lifting objects over the 50-pound limit. Materials shall be inspected for sharp edges prior to being handled, and avoid pinch point hazards.	**L**
	Improper Use / Damaged Drilling Equipment	▪ Only qualified personnel shall be permitted to operate equipment. ▪ The equipment shall be inspected daily using an inspection form specific for the equipment in use. ▪ Equipment must have functioning safety devices as installed by the manufacturer. Deficiencies in equipment shall be corrected prior to operating. Equipment found to be unsafe shall not be used. ▪ Fire extinguishers of the appropriate size will be available on the equipment. ▪ All equipment shall have back up enunciators.	**L**
	Electrocution	▪ All underground utilities and overhead power lines will be clearly identified and marked in the field prior to performing drilling operations. ▪ GFCI's shall be used on all power tools, extension cords, and all equipment connected to temporary power supplies. ▪ Extension cords, power tools, and lighting equipment shall be inspected before each use, protected from damage, and kept out of wet areas.	**L**
Stop work and notify your supervisor if you are not sure how to perform your task safely!	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
1. Geoprobe drilling equipment 2. Air monitoring equipment (Multi-RAE Plus or equivalent) 3. Hand tools Support Zone • Cell phone or Radio communication • Eyewash station • Fire extinguishers • First aid kit, • drinking water • 911 Air horn	• Only qualified operators permitted to operate drilling equipment. Qualifications and competency reviewed by Supervisor. • Initial Safety Orientation • Daily Safety Tailgate Meetings • Emergency Response Plan • First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) Competent Person: Jeff Donovan - SSHO GeoProbe Operator - TBD	• Daily inspection of mechanized equipment by operator • Daily inspection of hand and power tools with replacement of damaged items. • Air /monitoring equipment to be inspected/calibrated daily

• Spill containment supplies • Air Monitoring equipment, if needed • Emergency decontamination supplies **PPE: Level D (hardhat, steel toe boots, work gloves, orange safety vest, safety glasses, and hearing protection). Chemical resistant gloves (i.e., nitrile) shall be worn during the handling of core sections and acetate tubes.**		

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

Activity/Work Task: **Environmental Sampling**	Overall Risk Assessment Code (RAC) (Use highest code)					**L**
Project Location: **Ravenna Army Ammunition Plant, Ravenna, Ohio**	**Risk Assessment Code (RAC) Matrix**					
Contract Number: **W912QR-04-D-0039, DO No.:0004**	**Severity**	**Probability**				
Date Prepared: **15 June 2012**		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): **Jeff Donovan, SSHO**	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): **Mike McSherry, CIH, CSP**	Marginal	**H**	**M**	**M**	**L**	**L**
	Negligible	**M**	**L**	**L**	**L**	**L**
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)					
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				**RAC Chart**	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				**E = Extremely High Risk** **H = High Risk**	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				**M = Moderate Risk** **L = Low Risk**	

JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS Consider People, Equipment, Materials and Environment *(Note: Standard PPE required for this activity includes Hard Hat, Safety glasses with side protection, and safety-toe footwear. Additional PPE requirements are listed in this column depending on the hazard. This constitutes the Workplace Hazard Assessment per 29 CFR 1910.132. Additional assessments and PPE selection when needed will be documented on a daily briefing sign-in form and signed by the SSHS in accordance with ECC SOP ESQ 6.1. Hazard assessment and respirator selection for inhalation hazards are documented in the site Respiratory Protection Plan if respirators are part of PPE.)*	RAC
Preparation of sample containers	Cuts & lacerations	▪ Inspect all sample container boxes for damage ▪ Broken or damaged sample containers should be handled carefully with leather work gloves and disposed of appropriately ▪ Any broken glass sample containers should be cleaned up with a broom and dust pan to avoid contact with broken glass	L
Sampling of soils / sediment from designated sample points	Exposure to contaminated soils	▪ Wear level "D" PPE including chemical resistant gloves ▪	L
	Pinch points (handling hand / power tools)	▪ Selection of the proper and safest tool should be considered ▪ Recognizing potential pinch points and avoiding them during sampling ▪ Wear leather work gloves to protect hands from possible pinch point areas.	L

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

	Lifting strains & sprains	▪ Use proper manual lifting techniques when transporting sample coolers ▪ Do not manually lift objects that are in excess of 50-lbs. Utilize a co-worker or mechanical means to lift items over 50-lbs.	L
Sampling of Groundwater Monitoring Wells	Trips	▪ Make sure that all sampling equipment (i.e., hoses, pumps, generator, misc tools) is positioned out of the travel path to avoid trip hazards	L
	Exposure to stinging insects	▪ Inspect all well covers for possible insect nests; if insect nests are identified flush area with water; schedule sampling during morning or late afternoon.	L
	Chemical exposure / Hazardous Atmosphere	▪ Perform real-time air monitoring prior to removing well cover and after cover is removed; if elevated VOC's or LEL exists discontinue activity and allow the well vault to vent. Do not work in the area if action levels are exceeded ▪ Wear level "D" PPE with chemical resistant gloves during sampling; if a splash hazard exists wear a face shield, eye goggles, and disposable coveralls	L
	Exposure to excessive noise levels	▪ All personnel shall wear hearing protection when working adjacent to noise emitting equipment (i.e., portable generators)	L
	Lifting Strains & Sprains	▪ No individual employee is permitted to lift any object that weighs over 50 pounds. Proper lifting techniques shall be used. Multiple employees or the use of mechanical lifting are for lifting objects over the 50-pound limit. Materials shall be inspected for sharp edges prior to being handled, and avoid pinch point hazards.	L
	Electrocution	▪ GFCI's shall be used on all power tools, extension cords, and all equipment connected to temporary power supplies. ▪ Extension cords, power tools, and lighting equipment shall be inspected before each use, protected from damage, and kept out of wet areas.	L
	Fire	▪ If using a portable generator have a fire extinguisher and spill kit readily available and allow 5 minutes cool down period prior to refueling	L
Stop work and notify your supervisor if you are not sure how to perform your task safely!	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
1. Glass and plastic sample containers 2. Hand sampling tools 3. Sample pumps 4. Portable generator <u>Support Zone</u> • Cell phone or Radio communication • Eyewash station • Fire extinguishers	• Only qualified operators permitted to operate drilling equipment. Qualifications and competency reviewed by Supervisor. • Initial Safety Orientation • Daily Safety Tailgate Meetings • Emergency Response Plan • First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite)	• Daily inspection of equipment by operator • Daily inspection of hand and power tools with replacement of damaged items. • Air /monitoring equipment to be inspected/calibrated daily

• First aid kit, • drinking water • 911 Air horn • Spill containment supplies • Air Monitoring equipment, if needed • Emergency decontamination supplies **PPE: Level D (hardhat, steel toe boots, work gloves, orange safety vest, safety glasses, and hearing protection). Chemical resistant gloves (i.e., nitrile) shall be worn during the handling of core sections and acetate tubes.**	Competent Person: Jeff Donovan, SSHO	

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

Activity/Work Task: **Equipment Decontamination**	Overall Risk Assessment Code (RAC) (Use highest code): **L**
Project Location: **Ravenna Army Ammunition Plant, Ravenna, Ohio**	
Contract Number: **W912QR-04-D-0039, DO No.: 0004**	
Date Prepared: **15 June 2012**	
Prepared by (Name/Title): **Jeff Donovan, SSHO**	
Reviewed by (Name/Title): **Mike McSherry, CIH, CSP**	
Notes: (Field Notes, Review Comments, etc.)	

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

	RAC Chart
"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS Consider People, Equipment, Materials and Environment *(Note: Standard PPE required for this activity includes Hard Hat, Safety glasses with side protection, and safety-toe footwear. Additional PPE requirements are listed in this column depending on the hazard. This constitutes the Workplace Hazard Assessment per 29 CFR 1910.132. Additional assessments and PPE selection when needed will be documented on a daily briefing sign-in form and signed by the SSHS in accordance with ECC SOP ESQ 6.1. Hazard assessment and respirator selection for inhalation hazards are documented in the site Respiratory Protection Plan if respirators are part of PPE.)*	RAC
Decontamination of equipment (use of pressure washer / hand tools)	Slip and Trip Hazards	General Safety: To minimize potential hazards all personnel shall attend site orientation prior to start of work activities in addition to daily Safety Tailgate meetings to familiarize themselves to hazards, emergency procedures and equipment, operational aspects & equipment use, and change(s) in site/work conditions. Daily housekeeping will be implemented at the end of each workday. Equipment vehicles must be set up with a fire extinguisher (min 10:BC & a FA Kit w/ eye wash). Drinking water must be stored in a cooler clearly marked "Food & Drink Only – No Samples" • Practice good housekeeping. • Use care when walking on surface tarp, especially when wet. • Clean all spills immediately. • Proper PPE to include shoes which allow for good footing.	L

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

		• Be aware of physical hazards – watch for uneven ground, rocks, dirt clods, etc.	
	Overhead Hazards	• Wear ANSI approved hard hat. • Maintain minimum of 10ft. from overhead utilities. This distance will increase as the voltage of the power lines increase.	**L**
	Manual Lifting/Backs/Ergonomic	• Train/Utilize correct lift techniques. • Personnel will not lift more than 50 lb. • Use Buddy System. • Position equipment as to eliminate over stretching/ergonomic concerns.	**L**
	Splash hazards (eyes / face)	• Avoid direct exposure to potential eye hazards. • Wear ANSI approved safety glasses at all times. • Utilize face shield/goggles if potential for flying debris/splash hazards.	**L**
	Laceration / Contusion	• When using high pressure washer follow manufacturer's safe operating instructions • Chemical-resistant gloves shall be used when handling pressure washer • Work area shall be limited to only essential personnel and pressure wand will never be pointed in the direction of fellow workers • Metatarsal and chin protection shall be worn when using a high-pressure washer • Always disengage pressure from equipment prior to working on equipment and/or disconnecting hose / gun.	**L**
	Severe Weather	• Shut down operations during severe electrical storms, heavy rain, high wind and evacuate site/take cover. • Train employees on Emergencies Response. • Monitor weather systems.	**L**
	Noise	• Wear hearing protective devices (ear muffs/plugs) inside the exclusion zone, when using or near high noise producing equipment, or when directed by ECC's SSHS in response to noise monitoring. • Ensure adequate maintenance on thermal/heavy equipment.	**L**
	Struck By/Against Heavy Equipment	• Maintain radio/verbal communication. • Eye contact with operators will be made before approaching trucks. • Equipment will not be approached on blind sides. • Personnel will understand and review hand signals. • All machines will be equipped with backup alarms and lighting. • Always set emergency brake on equipment. • Equipment will properly Locked Out prior to decontamination (i.e., key removed from ignition) • Engage all equipment-supplied safety equipment (i.e., locking arms, chocks) on equipment parts that are suspended. DO NOT place yourself between unprotected/unsecured parts of the equipment	**L**
	Exposure (dermal) to Contaminants of Concern	• Modified level "D" shall be used when decontaminating heavy equipment and drilling rods using pressure washers and gross decon.	**L**

Stop work and notify your supervisor if you are not sure how to perform your task safely!	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***
Equipment to be Used	**Training Requirements/Competent or Qualified Personnel name(s)**	**Inspection Requirements**
1. Pressure Washer 2. Hand Tools <u>Support Zone</u> • Cell phone or Radio communication • Eyewash station • Fire extinguishers • First aid kit, • drinking water • 911 Air horn • Spill containment supplies • Air Monitoring equipment, if needed • Emergency decontamination supplies **PPE: Modified Level D (Face shield, hardhat, steel toe boots, chemical gloves, orange safety vest, safety glasses (face shield if needed) and hearing protection as needed)**	• Initial Safety Orientation • Daily Safety Tailgate Meetings • First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) • Emergency Response Plan Competent Person: Jeff Donovan, SSHO	Daily inspection of electrical and hand tools with replacement of damaged items.

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

Activity/Work Task: **MEC/UXO Detection & Avoidance**	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Project Location: **Ravenna Army Ammunition Plant, Ravenna, Ohio**	**Risk Assessment Code (RAC) Matrix**					
Contract Number: **W912QR-04-D-0039, DO No.: 0004**	**Severity**	**Probability**				
Date Prepared: **15 June 2012**		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): **Jeff Donovan, SSHO**	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): **Mike McSherry, CIH, CSP**	Marginal	**H**	**M**	**M**	**L**	**L**
	Negligible	**M**	**L**	**L**	**L**	**L**
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)					
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				**RAC Chart**	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				**E = Extremely High Risk** **H = High Risk**	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				**M = Moderate Risk** **L = Low Risk**	

JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS Consider People, Equipment, Materials and Environment *(Note: Standard PPE required for this activity includes Hard Hat, Safety glasses with side protection, and safety-toe footwear. Additional PPE requirements are listed in this column depending on the hazard. This constitutes the Workplace Hazard Assessment per 29 CFR 1910.132. Additional assessments and PPE selection when needed will be documented on a daily briefing sign-in form and signed by the SSHS in accordance with ECC SOP ESQ 6.1. Hazard assessment and respirator selection for inhalation hazards are documented in the site Respiratory Protection Plan if respirators are part of PPE.)*	RAC
MEC/UXO Detection & Avoidance **NOTE: These operations are only to be performed under the supervision of qualified UXO Technicians with detection equipment operators. The intention of this activity is to locate possible MEC / UXO within the work zone prior to intrusive activities and avoid the area once identified.**	Contact with MEC/UXO	• Only authorized personnel shall be within the work area being screened for MEC/UXO. • The field team shall be briefed by the UXO Safety Officer prior to working in areas were MEC / UXO potentially exists • If MEC / UXO is identified by the UXOSO, all personnel shall follow the 3R's (Recognize, Retreat, and Report) • At no time shall MEC / UX be handled by the project team members	**M**
	Excessive Noise Exposure	• If using a head set, reduce the volume level of detection equipment before donning headset.	**L**
	Slips, trips, and falls	• Wear work boots with lug soles. • Maintain awareness of hazards associated with uneven or wet terrain.	**L**

	Biological Hazards	• All participants will be trained in recognition and avoidance of poisonous plants. • If snakes are encountered, the SSHS or UXOSO will be notified. • All personnel shall be issued DEET to address possible ticks & chiggers. Individuals will be urged to perform a body check at the end of the workday for ticks. • Care will be taken to avoid disturbing bee/wasp/hornet nesting areas. • If stinging insects are encountered, a long-range aerosol spray will be used to eliminate them. Application of aerosol shall be planned in the AM or late PM part of the day. • Any individuals working on this task with a known insect sting allergy MUST notify all task participants of the location of the Epinephrine Pen to be used in the event of anaphylactic shock.	**M**
	Heat Stress	• Implementation of the ECC SOP ESQ-8.4 & ESQ-8.5 and EM 385-1-1, Section 6.I • Rest/work cycles, intake of fluids, and temperature monitoring (external environmental & internal body). • Proper work clothing	**M**
	Repetitive Stress Injury	• Stretch affected muscle groups • Shift detection equipment from one arm to the other when fatigued. Or utilize manufacturers accessories for limiting impact to limbs • Take breaks when necessary.	**L**
Stop work and notify your supervisor if you are not sure how to perform your task safely!	Stop work and notify your supervisor if you are not sure how to perform your task safely!	Stop work and notify your supervisor if you are not sure how to perform your task safely!	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
MEC Detector (i.e., metal detector)and related navigation and/or data-recording equipment Support Zone Cell phone or Radio communication Eyewash station Fire extinguishers First aid kit, drinking water 911 Air horn Spill containment supplies Air Monitoring equipment, if needed Emergency decontamination supplies PPE: Level D (hardhat, composite toe boots, work gloves, orange safety vest, safety glasses, and hearing protection as needed)	• Ensure non-UXO personnel and MEC detection personnel observe general MEC hazards and understand the requirement to be escorted by qualified UXO Technicians when they are within an exclusion zone. • Ensure MEC detection personnel are qualified on the specific MEC detection equipment to be used. • MEC Detection Equipment Refresher • General and local MEC hazards and precautions • Ensure UXO Technicians are qualified and assigned positions per DDESB guidance. First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) Initial Safety Orientation Daily Safety Tailgate Meetings Emergency Response Plan	Prior to use, ensure equipment is operational, calibrated according to operating manuals, and performing in accordance with required standards Competent Person: Travis Steele, UXO Technician III

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

Activity/Work Task: **Mobilization and Site Preparation**	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Project Location: **Ravenna Army Ammunition Plant, Ravenna, Ohio**	**Risk Assessment Code (RAC) Matrix**					
Contract Number: **W912QR-04-D-0039, DO No.: 0004**	**Severity**	**Probability**				
Date Prepared: **14 June 2012**		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): **Jeff Donovan, SSHO**	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): **Mike McSherry, CIH, CSP**	Marginal	**H**	**M**	**M**	**L**	**L**
	Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)	
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

JOB STEPS	**POTENTIAL SAFETY / HEALTH HAZARDS**	**RECOMMENDED CONTROLS** **Consider People, Equipment, Materials and Environment** *(Note: Standard PPE required for this activity includes Hard Hat, Safety glasses with side protection, and safety-toe footwear. Additional PPE requirements are listed in this column depending on the hazard. This constitutes the Workplace Hazard Assessment per 29 CFR 1910.132. Additional assessments and PPE selection when needed will be documented on a daily briefing sign-in form and signed by the SSHS in accordance with ECC SOP ESQ 6.1. Hazard assessment and respirator selection for inhalation hazards are documented in the site Respiratory Protection Plan if respirators are part of PPE.)*	**RAC**
Utility survey & mark outs – including all underground and overhead utility lines	Slips & Trips	• General Safety - To minimize potential hazards all personnel shall attend site orientation prior to start of work activities in addition to daily Safety Tailgate meetings to familiarize themselves to hazards, emergency procedures, operational aspects & heavy equipment use, and change(s) in site work conditions. Daily housekeeping will be implemented during and at the ends of each workday. Equipment vehicles must be set up with a fire extinguisher (min 10:BC & a FA Kit). Drinking water must be stored in a cooler clearly marked "Food & Drink Only – No Samples" • A site reconnaissance shall be performed to determine conditions of the site for walking and vehicle/equipment access including any restricted or limited access areas. • Personnel shall don the designated PPE including ANSI work shoes, safety glasses, and hard hat.	L

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

	Back Strain or Sprain	• Use proper lifting techniques, move heavy objects with wheelbarrow/carts, seek assistance if items weigh over 50 pounds.	**L**
	Contact with stinging or biting insects	• Personnel shall wear light colored clothing and apply insect repellent (i.e., DEET) to outer pants legs; Body checks should be performed at the end of the work day. • Any individual who has a known or has a potential for allergic reaction to insect stings shall notify the SSHS and an Epi-Pen shall be readily available.	**M**
	Contact with poisonous plants (e.g. poison ivy)	• Inspect area for known plants before starting field activities • Wear long sleeve shirts, tuck sleeves and pant legs. If there is heavy growth, wear disposable coveralls and use barrier cream, e.g. Ivy Block. • Have TecNu or other poison ivy cleanser on hand, and wash immediately after contact.	**M**
Receipt and placement equipment vehicle: Spotting of equipment vehicle	Struck-by moving truck	• Spotter shall be used for deliveries of equipment and shall stay in line-of-sight of driver at all times.	**L**
	Caught in / between or under equipment / vehicle	• Use a spotter to coordinate activities of driver and person setting cribbing, tie-downs, chains. • Keep hands out of pinch points. • Wear leather work gloves	**L**
	Contact with Overhead Utility Lines – Electrocution, Fires	• Personnel must not work closer than 10 ft from the overhead power line (up to 50 kV) – for all equipment except cranes • Before work begins, survey the site for overhead power lines. LOOK UP! Never allow equipment or personnel to get closer than 10 feet to an overhead power line. This minimum distance must be increased as the voltage increases. If work must be conducted closer to utilities than guidelines allow, or for placement of insulation, the utility company must be contacted. • An observer/spotter shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. This shall be the ONLY job the observer is performing when an observer is required. • Keep all personnel well away from the equipment whenever it is close to power lines	**L**
Installation of temporary work zones - construction fencing Installation of erosion controls	Struck-by hand tools	• Wear leather gloves, safety-glasses, hard hats, safety-toe footwear. Keep hands out of pinch points. • Use post driver, not sledge hammer for placing fence posts, tape top of fence post or install mushroom caps to reduce potential for scrapes.	**L**
	Sprains/strains Struck-By (hand tools)	• Use two people to carry heavy loads of fencing/posts. Do not lift and carry more than comfortable weight for individual, 50 lbs. max.	**L**
Establishment of work zones, decontamination stations for personnel and equipment	Slips/trips/falls	• Wear high traction safety-toe footwear. • Keep loads manageable to not obstruct vision.	**L**
	Scrapes and cuts	• Wear safety glasses, gloves and long sleeves.	**L**
	Contact with poisonous plants (e.g. poison ivy)	• Inspect area before starting • Wear long sleeve shirts, tuck sleeves and pant legs. If there is heavy growth, wear disposable coveralls and use barrier cream, e.g. Ivy Block.	**M**

		• Have Tecnu or other poison ivy cleanser on hand, and wash immediately after contact.	
	Contact with stinging or biting insects	• Personnel shall wear light colored clothing and apply insect repellent (i.e., DEET) to outer pants legs; Body checks should be performed at the end of the work day. • Any individual who has a known or has a potential for allergic reaction to insect stings shall notify the SSHS and an Epi-Pen shall be readily available.	**M**
	Struck by moving equipment	• Personnel will stay out of equipment swing areas and pinch-points.	**L**
	Fire/explosion of gasoline	• Allow equipment to cool before refueling, and eliminate other sources of ignition. • Use only approved NFPA safety cans for gasoline. • Cleanup spills immediately.	**L**
	Heat Stress	• Implement rest/work cycles, ingestion of fluids, and core body temperature monitoring. Follow ECC SOP ESQ-8.5 • Evaluate weather conditions as to heat stress while wearing protective clothing while decontaminating equipment.	**L**
	Sprains/strains Struck-By (hand tools)	• Use two people to carry heavy loads of fencing/posts. Do not lift and carry more than comfortable weight for individual, 50 lbs. max.	**L**
Stop work and notify your supervisor if you are not sure how to perform your task safely!	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
1. Excavator/backhoe 2. Rough-terrain forklift 3. Hand tools Support Zone • Cell phone or Radio communication • Eyewash station • Fire extinguishers • First aid kit, • drinking water • 911 Air horn • Spill containment supplies • Air Monitoring equipment, if needed • Emergency decontamination supplies **PPE: Level D (hardhat, steel toe boots, work gloves, orange safety vest, safety glasses, and hearing protection as needed)**	• Only qualified operators permitted to operate mobile equipment. • Operators of forklifts will have recent certification / training in safe forklift operation (20 CFR 1910, Subpart N – Powered Industrial Trucks) • First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) • Initial Safety Orientation • Daily Safety Tailgate Meetings • Emergency Response Plan **Competent Person:** Jeff Donovan, SSHO	• Equipment - Receipt and inspected by supervisor. • Daily equipment inspection by operator • Weekly inspection of Fire Extinguishers and First Aid Kits. • Daily inspection of hand and power tools with replacement of damaged items.

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

Activity/Work Task: **Site Clearing & Chipping**	Overall Risk Assessment Code (RAC) (Use highest code): **M**
Project Location: **Ravenna Army Ammunition Plant, Ravenna, Ohio**	
Contract Number: **W912QR-04-D-0039, DO No.: 0004**	
Date Prepared: **14 June 2012**	
Prepared by (Name/Title): **Jeff Donovan, SSHO**	
Reviewed by (Name/Title): **Mike McSherry, CIH, CSP**	
Notes: (Field Notes, Review Comments, etc.)	

Risk Assessment Code (RAC) Matrix

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

	RAC Chart
"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS Consider People, Equipment, Materials and Environment *(Note: Standard PPE required for this activity includes Hard Hat, Safety glasses with side protection, and safety-toe footwear. Additional PPE requirements are listed in this column depending on the hazard. This constitutes the Workplace Hazard Assessment per 29 CFR 1910.132. Additional assessments and PPE selection when needed will be documented on a daily briefing sign-in form and signed by the SSHS in accordance with ECC SOP ESQ 6.1. Hazard assessment and respirator selection for inhalation hazards are documented in the site Respiratory Protection Plan if respirators are part of PPE.)*	RAC
Remove and Clear Smaller Trees and Brush	Severe Cuts and Lacerations from Chainsaws and Brush Hogs.	• Do not walk with chain engaged. • Do not use chainsaws above shoulder. Do not use brush-cutters above waist. • Hold equipment with both hands during cutting operations. • The engine shall be started and operated only when all co-workers are clear of the saw. • The operator will shut off chain saw when carrying it over slippery surfaces. • Shoulder harness required for use with brush-cutter. • Wear ANSI approved hard hats, safety glasses and safety-toe footwear. Use of face shields, chaps, leather gloves and hearing protection will be mandatory for this activity.	**M**
	Struck by Flying Debris	• Do not operate brush cutter without the debris shield in place and tightly secured.	**L**

		• Do not operate the brush cutter without the safety clip in place. • Wear safety glasses with side shields and full face polycarbonate shield.	
	Burns from Hot Exhausts Fire/Explosion of Gasoline	• Wear long sleeves and leather gloves. • Keep hands away from hot exhaust and engines. • Allow equipment to cool before refueling, and eliminate other sources of ignition. • Use only approved safety cans for gasoline/bar oil. • Cleanup spills immediately.	**L**
	Scrapes and Cuts	• Wear safety glasses, gloves and long sleeves.	**L**
	Back and/or Leg Strain	• Maintain manageable loads and stretch prior to work. • Utilize manufacturers harnesses or other attachments to reduce potential stress to the limbs and back.	**L**
	Repetitive Stress Injury	• Switch equipment from one side to the other if possible. Take break or switch team positions if musculoskeletal fatigue is noticed.	**L**
	Excessive Noise Exposure	• Wear hearing protective devices (Ear muffs/plugs) when working with or near high noise producing equipment, or when directed by ECC SSHS in response to noise monitoring. • If equipment is to be used on a continual basis a sound level survey shall be performed to verify correct nosier reducing PPE is being used..	**L**
	Severe Weather Conditions	• SSHS shall monitor the forecast weather conditions prior to start of work each day. • Shut down operations during severe storms, heavy rain, high wind, and lightning episodes. Evacuate the project site and take shelter at the designated shelter location. • All personnel shall be trained on the project Emergencies Response procedures.	**L**
	Heat Stress	• Implement rest/work cycles, ingestion of fluids, and core body temperature monitoring. Follow ECC SOP ESQ-8.5 • Evaluate weather conditions as to heat stress while wearing protective clothing while decontaminating equipment.	**L**
Chipping Trees & Tree Limbs	Struck by (Debris)	• The chipper shall be free of obstructions prior to startup. • Inspect equipment prior to use and verify that emergency shut-of device is functioning properly • All personnel shall be clear of the chipper exhaust chute prior to starting. • Wear safety glasses with side shields while chipping. • Stand to the side of the feed area and avoid the discharge area. • Carefully inspect feed material and remove any non-vegetative material. • Brush chippers shall be fed from the side of the centerline, and the operator shall immediately turn away from the feed table when the brush is taken into the rotor; chippers shall be fed from the curbside whenever possible.	**M**
	Caught In or Between Moving Machinery Parts	• No loose clothing, gauntlet-type gloves, rings or watches shall be worn by employees operating chippers. • Keep all body parts away from throat and discharge of chipper. • Chippers shall be equipped with mechanical infeed system or shall have a flexible anti-kickback device installed in the infeed hopper for the purpose of protecting the operator and other persons in the machine area from the hazards of flying chips and debris.	**M**

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

		• Mechanical infeed systems shall have a quick stop and reversing device on the infeed on disk-type tree or brush chippers. The activating mechanism for the quick stop and reversing device shall be located across the top, along each side of, and as close to the feed end of the infeed hopper as possible and within easy reach of the operator. • The feed chute or feed table of the chopper shall have sufficient height on its side members to prevent operator contact with the blades or knives during normal operations. • Push sticks – of materials which can be consumed by brush chipper - shall be used, if necessary. • Shut down machinery and lock out to remove jams or make repairs.	
Stop work and notify your supervisor if you are not sure how to perform your task safely!	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
1. Heavy equipment 2. Chain saws 3. Brushcutters 4. Chipper Support Zone • Cell phone or Radio communication • Eyewash station • Fire extinguishers • First aid kit, • drinking water • 911 Air horn • Spill containment supplies • Air Monitoring equipment, if needed • Emergency decontamination supplies **PPE: Level D (hardhat, steel toe boots, work gloves, orange safety vest, hearing protection, and safety glasses). Individual(s) using chain saw will also wear chaps and a face shield.**	• Users trained in accordance with manufacturer's training recommendations and operators manuals. • Experience and competency of tree fellers to be verified by Site Superintendent and SSHS. • Chipper shall be operated by authorized personnel only. • Only qualified operators permitted to operate mobile equipment. • Initial Safety Orientation • First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) • Initial Safety Orientation • Daily Safety Tailgate Meetings • Emergency Response Plan Competent Person: Jeff Donovan - SSHO	• Equipment – Receipt and inspected by Site Superintendent. • Daily equipment inspection by operator • Weekly inspection of Fire Extinguishers and First Aid Kits. • Daily inspection of hand and power tools with replacement of damaged items.

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

Activity/Work Task: **Site Restoration and Demobilization**	Overall Risk Assessment Code (RAC) (Use highest code)					**L**
Project Location: **Ravenna Army Ammunition Plant, Ravenna, Ohio**	**Risk Assessment Code (RAC) Matrix**					
Contract Number: **W912QR-04-D-0039, DO No.: 0004**	**Severity**	**Probability**				
Date Prepared: **14 June 2012**		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): **Jeff Donovan, SSHO**	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): **Mike McSherry, CIH, CSP**	Marginal	**H**	**M**	**M**	**L**	**L**
	Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)	
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk** **H = High Risk**
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk** **L = Low Risk**

JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS Consider People, Equipment, Materials and Environment *(Note: Standard PPE required for this activity includes Hard Hat, Safety glasses with side protection, and safety-toe footwear. Additional PPE requirements are listed in this column depending on the hazard. This constitutes the Workplace Hazard Assessment per 29 CFR 1910.132. Additional assessments and PPE selection when needed will be documented on a daily briefing sign-in form and signed by the SSHS in accordance with ECC SOP ESQ 6.1. Hazard assessment and respirator selection for inhalation hazards are documented in the site Respiratory Protection Plan if respirators are part of PPE.)*	RAC
Site Restoration and Demob	Slips & Trips	General Safety: To minimize potential hazards all personnel shall attend site orientation prior to start of work activities in addition to daily Safety Tailgate meetings to familiarize themselves to hazards, emergency procedures and equipment, operational aspects & equipment use, and change(s) in site/work conditions. Daily housekeeping will be implemented at the end of each workday. Equipment vehicles must be set up with a fire extinguisher (min 10:BC & a FA Kit). Drinking water must be stored in a cooler clearly marked "Food & Drink Only – No Samples" • Level-D PPE will be worn inside the established work area. Any PPE upgrade will be in accordance with SSHP guidelines.	L

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

	Lifting Strains & Sprains	• No individual employee is permitted to lift any object that weighs over 50 pounds. Proper lifting techniques shall be used. Multiple employees or the use of mechanical lifting are for lifting objects over the 50-pound limit. Materials shall be inspected for sharp edges prior to being handled, and avoid pinch point hazards.	**L**
	Exposure to excessive Noise levels	• Hearing protection shall be worn around heavy equipment of other noise generating equipment or when noise levels exceed TWA of 85 dBA.	**L**
	Using damaged / malfunctioning power tools	• Prior to use all tools must be inspected. Any damaged or defective tools will tagged and removed from service for repair and/or discarded. • Proper PPE shall be worn when operating power tools. At a minimum, Level "D" will be required.	**L**
	Caught in or between equipment	• Only qualified personnel shall be permitted to operate equipment. Operators will have constant communication with ground support crews and will be aware of activities around their piece of equipment during operation. • Mobile equipment shall be inspected daily. Deficiencies in equipment shall be noted on the inspection form. Equipment found to be unsafe shall not be used. • Fire extinguishers of the appropriate size will be available in the operators of all heavy equipment. • All equipment shall have backing alarms. • All equipment will be properly secured / rigged prior to transportation off site. All rigging equipment shall be inspected prior to use.	**L**
Stop work and notify your supervisor if you are not sure how to perform your task safely!	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
• Excavator • Skid Steer • Hand and Portable power tools <u>Support Zone</u> Cell phone or Radio communication Eyewash station Fire extinguishers First aid kit, drinking water 911 Air horn Spill containment supplies Air Monitoring equipment, if needed Emergency decontamination supplies **PPE: Level D (hardhat, steel toe boots, work gloves, orange safety vest, safety glasses, and hearing protection as needed)**	• Only qualified operators permitted to operate mobile equipment. • Operators of forklifts will have recent certification / training in safe forklift operation (20 CFR 1910, Subpart N – Powered Industrial Trucks) ▪ First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) ▪ Initial Safety Orientation ▪ Daily Safety Tailgate Meetings ▪ Emergency Response Plan Competent Person: Jeff Donovan, SSHO	• Equipment - Receipt and inspected by supervisor. • Daily equipment inspection by operator • Weekly inspection of Fire Extinguishers and First Aid Kits. • Daily inspection of hand and power tools with replacement of damaged items.

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

Activity/Work Task: **Test Pitting / Excavation**	Overall Risk Assessment Code (RAC) (Use highest code)					**L**
Project Location: **Ravenna Army Ammunition Plant, Ravenna, Ohio**	**Risk Assessment Code (RAC) Matrix**					
Contract Number: **W912QR-04-D-0039, DO No.: 0004**	**Severity**	**Probability**				
Date Prepared: **14 June 2012**		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): **Jeff Donovan, SSHO**	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): **Mike McSherry, CIH, CSP**	Marginal	**H**	**M**	**M**	**L**	**L**
	Negligible	**M**	**L**	**L**	**L**	**L**
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)					
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				**RAC Chart**	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				**E = Extremely High Risk** **H = High Risk**	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				**M = Moderate Risk** **L = Low Risk**	

JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS Consider People, Equipment, Materials and Environment *(Note: Standard PPE required for this activity includes Hard Hat, Safety glasses with side protection, and safety-toe footwear. Additional PPE requirements are listed in this column depending on the hazard. This constitutes the Workplace Hazard Assessment per 29 CFR 1910.132. Additional assessments and PPE selection when needed will be documented on a daily briefing sign-in form and signed by the SSHS in accordance with ECC SOP ESQ 6.1. Hazard assessment and respirator selection for inhalation hazards are documented in the site Respiratory Protection Plan if respirators are part of PPE.)*	RAC
Excavation/Trenching of Soils	Caught-In (excavation collapse)	General Safety: To minimize potential hazards all personnel shall attend site orientation prior to start of work activities in addition to daily Safety Tailgate meetings to familiarize themselves to hazards, emergency procedures and equipment, operational aspects & heavy equipment use, and change(s) in site/work conditions. Daily housekeeping will be implemented at the end of each workday. • The provisions of ECC SOP HS-7.6 will be followed. • Obtain Excavation/Trenching Permit as required by client, State, or municipality prior to any excavation/trenching activities. NO ENTRY is permitted into excavations/trenches without approval from the Competent Person. Authorization for entry shall only occur when a proper protective system is in place • If a person must enter an excavation/trench, protective systems such as	**L**

		trench boxes, shoring, sloping, or benching, will be effected in excavations greater than five feet in depth, or if deemed necessary by a Competent Person. • The designated Competent Person shall be present during all excavation / trenching/shoring activities. • The Competent Person will perform daily excavation/trench inspections and document such on the Daily Excavation Inspection Checklist. • The Competent Person will perform a soils analysis and document such on the Soils Analysis Checklist. • Excavated spoils will be staged a minimum of two feet back from the edge of the excavation. • Personnel will keep back a minimum of two feet from the edge of all excavations/trenches – the area will be constantly observed for cracks, fissures, or subsidence, and the minimum approach distance increased accordingly. • Trench boxes will not be moved while personnel are in the excavation/trench. • The space between the trench box and the walls must be backfilled as needed to prevent lateral movement. • In a vertically-walled trench, the trench box must extend at least 6 means inches above the face of the excavation/trench.	
	Falls	• The number of personnel on the ground in the vicinity of excavation/trenching activities shall be limited to those necessary for the job. Workers shall maintain eye contact with equipment operators. • Select and implement the appropriate excavation perimeter protection as specified in US Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1, Section 25 B and Appendix Q). • All excavations/trenches will be backfilled at the end of the workday if possible; otherwise, street plates or other suitable barriers must be used to prevent unauthorized entry. • Any excavation/trench four feet and deeper will be provided with ladders, ramps or other means of egress in such a way as to require no more than 25 feet of lateral travel. The will also be used for ingress.	**L**
	Contact with underground utilities	• **One Call System** shall be notified prior to excavation, with sufficient time allowed for white-lining and utility marking. • Implementation & adherence to ECC SOP HS-7.7 shall be enforced • ECC personnel will "white-line" or otherwise mark the area which is to be excavated, prior to utility marking. • Intrusive soil activities conducted within a five foot "Buffer Zone" (horizontal or vertical, as measured from the outside edge of the utility) of any utility (electric, gas, high pressure, chemical storage tanks, pipelines, sewers, etc.) may require the use of non-aggressive excavation methods such as hand excavation using non-conductive hand tools, use of an air spade, hydro-excavation, or similar means (some jurisdictions require more stringent buffer zones. • Spotter will assist the operator/workers to identify unknown conditions during excavation. • If a previously unknown utility line is identified, uncovered, or disturbed	**L**

		during excavation/trenching activities, the excavation activity shall stop immediately and project management notified. Excavation shall not recommence until the line has been evaluated, identified, and the appropriate utility notified. • Most utilities and marking services utilize the American Public Works Association Uniform Color Code for marking out utilities. All personnel involved in excavation projects will be familiar with this code.	
	Electrocutions / Explosion – Contact with Buried utility lines	• Before work begins, survey the site for overhead power lines. LOOK UP! Never allow equipment or personnel to get closer than 10 feet to an overhead power line. This minimum distance must be increased as the voltage increases. Refer to EM 385-1-1, Section 11.E for specifications. To determine line voltages, the appropriate utility company must be contacted. • If work must be conducted closer to utilities than guidelines allow, or for placement of insulation, the utility company must be contacted. • An observer/spotter shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. This shall be the **ONLY** job the observer is performing when an observer is required. • Keep all personnel well away from the equipment whenever it is close to power lines.	**L**
	Struck-By (heavy equipment)	• All personnel will wear ANSI Type 2 high-visibility traffic safety vests. Operators shall maintain a constant awareness of personnel and equipment in the work areas. • Moving heavy equipment must have properly functioning back-up alarms. • Spotters on the ground will assist operators in manipulating vehicles and equipment into tight or confined spaces. • Moving heavy equipment must have properly functioning back-up alarms. • Getting off or on any equipment while it is in motion is prohibited. • Three points of contact shall be maintained when getting on or off equipment. • Seats will be provided for each occupant of the equipment. • The operator shall use safety belts while equipment is in use. • All original manufacturer-installed safety equipment such as lights, guards, brakes, horn, etc. must be functional at all times. • Whenever equipment is parked, the parking brake shall be set, and wheels chocked when on an incline • Heavy equipment operators shall inform their Supervisor(s) of any prescribed medication that they are taking that would impair their judgment and/or vision • Never walk or work directly in back of or to the side of heavy equipment without the operator's knowledge and approval. • Personnel will stay out of equipment swing areas and pinch-points. • When dumping a load from a bed equipped with a tailgate, a spotter must be positioned a safe distance from the vehicle, such that they can observe the bed to notify the operator if an obstruction occurs.	**L**

Environmental Chemical Corporation
Activity Hazard Analysis (AHA)

	Exposure to chemical contaminants (dermal, respiratory)	• Personnel shall wear modified "D" PPE when accessing the EZ where impacted soils are being excavated. Modified "D" shall include nitrile gloves and disposable booties. • Appropriate dust suppression engineering controls (i.e., misting, water spray) shall be implemented to reduce potential for airborne particulates. • If visible dust is observed ALL intrusive activities shall be discontinued. A PDR, or equivalent monitoring instrument, shall be utilized to monitor particulate levels in the work zone. Results shall be compared to the established action level. The PSHM shall be consulted if results exceed the action level.	**L**
Stop work and notify your supervisor if you are not sure how to perform your task safely!	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	***Stop work and notify your supervisor if you are not sure how to perform your task safely!***	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Earth moving equipment (i.e., excavators, loaders) <u>Support Zone</u> • Cell phone or Radio communication • Eyewash station • Fire extinguishers • First aid kit, • drinking water • 911 Air horn • Spill containment supplies • PDR and Air Monitoring equipment, if needed • Emergency decontamination supplies **PPE: Level D (hardhat, steel toe boots, work gloves, orange safety vest, safety glasses and hearing protection). Modified "D" shall be used when accessing excavations. This shall include nitrile gloves and disposable booties.**	• HEAVY EXCAVATING, EARTHMOVING, AND TRANSPORT EQUIPMENT OPERATIONS: Equipment to be operated and inspected only by qualified, trained operators who have had a practical competency evaluation performed by a qualified supervisor. • UNDERGROUND UTILITIES: Utility color coding; excavation procedures within buffer zones; emergency procedures in the event of utility contact. • Initial Safety Orientation • Daily Safety Tailgate Meetings • Emergency Response Plan • First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) Competent Person: Jeff Donovan, SSHO	Documented daily equipment inspections by operator are to be conducted and recorded on ECC inspection checklist form.

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APPENDIX C

STANDARD OPERATING PROCEDURES

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SOP C.1

AIR MONITORING PROGRAM

1.0 POLICY

Environmental Chemical Corporation's (ECC's) Air Monitoring Program is prepared in accordance with 29 CFR 1910.1000 and 8 CCR 5155 - *Air Contaminants.*

2.0 OBJECTIVE

Airborne contamination at work sites can present a risk to the health and safety of field personnel. The objective of this Standard Operating Procedure (SOP) is to help identify and measure various airborne chemical hazards and can provide critical information necessary for:

- Selecting persona l protective clothing and equipment
- Specifying safe work practices
- Assessing the potential health effects of exposure
- Determining actions to mitigate the hazards

3.0 METHODS

Air monitoring data can be obtained using two different methods.

1. ***Field Monitoring*** - This method involves sampling the air and obtaining instantaneous results (real time) using portable field instruments. These instruments are referred to as "direct reading".

2. ***Air Sampling*** - This method involves collecting air samples for laboratory analysis, usually by sampling a known volume of air through a sample collection device media. Laboratory analysis delays results from hours to weeks.

4.0 REQUIREMENTS

To obtain and interpret useful information, care must be taken to:

Select the appropriate instrument.
Consider the limitations of the instrument selected.
Use the instrument as specified by the manufacturer.
Use only properly calibrated instruments.
Consider any interference that may influence the results.
Take representative samples.

Consider uncertainty and error when making conclusions or interpretations.

5.0 PRINCIPLES OF DATA COLLECTION AND MEASUREMENT

5.1 Types of Data

Field monitoring instruments do not all collect the same type of data. Knowledge of the type of data obtained is important to interpreting the data.

1. *Qualitative Data* - This data identifies whether a hazard (i.e., contaminant) is present.
2. *Quantitative Data* - This data specifies the quantity of concentration of an identified hazard (contaminant) measured.

5.2 Characteristics

1. *Accuracy* - Describes how close measured results are to actual conditions.
2. *Precision* - Describes how close repeated measurements are of the same condition.
3. *Representative* - Describes samples for which the results describe conditions adjacent to where the samples were taken.
4. *Error* - Describes conditions that can affect the accurately and/or precision of data. There are numerous sources of errors that exist whenever a field-monitoring instrument is used. Some sources of error are inherent in the instrument and cannot be altered. Other sources of error are dependent on the use and condition of the instrument.

6.0 CHARACTERISTICS OF AIR MONITORING EQUIPMENT

The following characteristics should be considered when selecting/evaluating an instrument:

6.1 Portability - A portable instrument should be:

1. Able to withstand shock from transportation, moving and handling.
2. Able to withstand damage or interference from environmental conditions (temperature, humidity, heat, weather and dust).
3. Light weight, self-powered (no AC requirement), easy to carry, set up and operate.

6.2 Useful Results

1. Response Time - The interval between sensing and indicating. The shorter the response time, the faster data can be obtained.
2. Direct Reading - The instrument response should be readable with little or no manipulation.

6.3 Selectivity

The ability to identify specific contaminants.

6.4 Sensitivity

The lowest concentration of a contaminant/hazard an instrument can accurately and repeatedly analyze.

6.5 Inherent Safety

1. Instruments that are inherently safe can be used in hazardous environments such as flammable and explosive atmosphere, without adversely interacting with the environment.

   Almost all field monitoring instruments are electrical devices and therefore can provide a source of ignition to a flammable explosive environment. Inherently safe instruments are designed to prevent a potential ignition source from igniting a flammable or explosive atmosphere.
2. The National Fire Protection Association (NFPA) established definitions of hazardous atmospheres and minimum standards for equipment safety, as published in the National Electrical Code (NEC).
3. Controls

   a. Explosion-proof designed to internally contain an explosion.
   b. Intrinsically safe - designed to reduce the potential for arcing among components.
   c. Purged - designed to isolate the ignition source from the atmosphere with an inert gas
4. Certifications - By agreement, several national groups have developed test protocols for attesting equipment as inherently safe (i.e. meeting minimum standards of acceptance). A certified device carries a permanently affixed plate with laboratory type and Classes, Divisions and Groups tested against.

   a. Certification Organizations Factory
      Mutual (FM) Underwriters
      Laboratories (UL)

7.0 FIELD INSTRUMENTS

Portable field instruments can be grouped into four categories based on the type of atmosphere of hazard of interest. Instruments are available to sample and analyze for:

1. Explosive atmospheres - percentage of the lower explosive limit (LEL) or a vapor or gas in air.
2. Oxygen deficient atmosphere - percentage (concentration) of oxygen in air.
3. Toxic atmosphere - Concentration (PPM or mg/m^3) of toxic vapors or gas in air.
4. Radioactive hazards - (see section 30.0).

7.1 Types of Instruments

1. <u>Combustible Gas Indicators (CGI)</u>

CGIs measure the concentration of flammable vapor or gas in air and indicate the results as a percentage of the LEL. Many chemical materials, including solvents and hydrocarbon liquids, produce combustible or flammable vapors or gases. When sufficient gas or vapor has mixed with air, a flammable atmosphere occurs. The lowest concentration of a gas or vapor by volume in air that will burn or ignite is called the Lower Flammable Limit (LFL). The highest concentration of as gas or vapor, by volume that will burn or ignite, is called the Upper Flammable Limit (UFL). Often a distinction can be made between unconfined environments defining explosive atmospheres (LEL, UEL). The range from lower to upper limit is called the flammable or explosive range.

Most CGIs operate on the "hot wire" principle. Gases and vapors sampled by the instruments are burned after passing over a heated platinum filament in the instrument combustion chamber. As the gas or vapor burns, the temperature of the filament increases, changing its resistance. The change in resistance results in an instrument indication.

CGI meters usually indicate in percent (%) LEL. Thus, the meter indicates a potential flammable or explosive environment before exposure in the flammable or explosive range. When an instrument meter indicates past 100% LEL, the ambient atmosphere is readily flammable. For many instruments operated in the flammable range, the meter will rise to 100% LEL and then rapidly return to 0% LEL, indicating saturation of the sensor (atmosphere too rich to burn).

Advantages

- Portable, rugged, simple to operate and fast response.
- Some instruments can switch to read in PPM.
- Extension hoses and probes are available that allow for "remote" sampling.
- Can be continuously operated.

Disadvantages/Limitations

- The reaction is temperature dependent.

- Most CGIs are calibrated to pentane or methane, but not all combustible or flammable gases or vapors give the same response.
- A charcoal pre-filter is required to differentiate between petroleum vapors and combustible gases.
- Oxygen enriched and deficient atmospheres will give false readings.
- Chemical materials, including leaded gasoline, halogens and sulfur compounds, will contaminate the filament and decrease its sensitivity.

Field Application

- Identify flammable or explosive environments
- Identify flammable liquids
- Identify potential hazards associated with confined spaces and poorly ventilated areas.

2. Oxygen Meters

Oxygen meters measure the percent concentration of oxygen (O2) in air. At sea level, ambient air contains approximately 21,0% (20.8%) oxygen. Both oxygen deficient and enriched atmospheres can be hazardous to human physiological functioning. In addition, changes in oxygen concentration can affect the flammability range of materials.

Oxygen meters usually indicate % oxygen in a range from 0-25%.

Ambient air is sampled (pump or diffusion) across an electrochemical sensor. Oxygen diffusing into the sensor establishes an electric current resulting in a needle deflection.

Advantages

- Same as for CGIs

Disadvantages/Limitations

- The meter operation is dependent on the partial pressure of oxygen. A meter calibrated at sea level and used at high elevations will falsely indicate an oxygen deficient atmosphere.
- Oxygen sensors (cells) have a short shelf life (6 months) that can be shortened further by exposure to high concentrations of carbon dioxide (CO_2).

Field Application

- Identify oxygen deficient or enriched atmospheres
- Identify poorly ventilated areas.

3. Combination Instruments

Many units combine a CGI and an Oxygen Meter into one instrument. Some newer models also incorporate a toxic gas sensor (carbon monoxide or hydrogen sulfide). Combination meters use the same technology for gas and vapor detection, as do individual sensing instruments.

Advantages

Single meters allow fast measurement of two interdependent hazards (oxygen deficiency and flammable atmosphere).

Disadvantages/Limitations

Same as for individual instruments.

Field Operations

Combination meters consider "work horse" for many field situations. Combines application for oxygen meters and CGIs.

4. Direct Reading Colorimetric Indicator Tubes

Colorimetric indicator tubes are used to measure the presence and concentration of specific chemical hazards. Individual types of tubes are manufactured for testing for individual chemicals or groups of chemicals. Tubes are calibrated in PPM, % concentration or mg/m^3.

Color indicator tubes consists of a glass tube filled with one or more sections of indicator chemicals. Chemical contaminants in the air react with the indicator chemicals resulting in a color change called a stain.

The length of stain is proportional to the concentration of the contaminant.

Advantages

Portable, lightweight and simple to use following training.

Allows qualitative and semi-quantitative field/measurements for a variety of chemical contaminants or groups of materials. Over 100 types of tubes available.

Relatively rapid response, convenient to use.
Durable and rugged.

Disadvantages/Limitations

Colorimetric indicator tubes should be used with caution because there may be as much as 25% error associated with the results. Indicator tubes are useful as an initial screening device. The sources of error include:

Chemical interference from other material
Limited shelf life
Temperature (high temperature above 85F will limit shelf life)
Variations in volume and flow rate of air sampled
Operator's ability to correctly "read" the length of stain

Colorimetric indicator tubes should be refrigerated during storage.
The pump should be leak tested before use.
The tube should be "read" in good lighting. Avoid fluorescent and mercury vapor lighting.

The leading edge of a stain should be "read".

Field Applications

Determination of presence of a contaminant (present or not present).
Determination of concentration (semi-quantitative) of identified contaminants.
Rapid screening for various suspected field chemical hazards.
Limited confirmation test for materials preliminarily identified by other means.

5. Photo Ionization Detector (PID)

The Photo ionization instrument measures the electric current created by electrons removed from chemical contaminants exposed to an UV source. Air samples are pumped past an UV lamp having a specified energy output.

Advantages

Portable, rugged, easy to use instruments.
Instant warm up time and direct read
(PPM)

Use no flame or fuel source

Useful operating ranges (0-2000 PPM). Interchangeable probe.
Can be calibrated to direct read for individual species.

Disadvantages/Limitations

Significant differences in relative response for many materials. Differentiation of chemical species not practical for most field work. Sensitive to high humidity conditions.
Subject interference by nearby power sources.

UV lamp sources are easily damaged or contaminated.

Field use and interpretation of results requires training and experience.

Field Applications

Provides quantitative measurements for total ionizing materials, several orders of magnitude less than that indicated by a CGI.

Useful for field surveys after identifying no flammable atmosphere hazard. Can detect materials not responsive to a CGI detection.

6. Flame Ionization Detector (FID)

The FID works similar to a Photo ionization instrument except a hydrogen flame provides the source of energy to ionize sample contaminants.

Advantages

Portable and rugged.
Wide operating range.
Fast response.
Audible alarms available.
Responds to most organics.

Field Application

Similar to a Photo ionization instrument.

8.0 INSTRUMENTATION PROGRAM

Air monitoring instruments used for direct-read field sampling application should be selected based on data need and use.

8.1 Types of Monitoring

1. Continuous - In some situations, it may be desirable to monitor for potentially changing hazards throughout the duration of an activity. Instruments used for continuous monitoring may be set up in a specific or carried by field personnel during work. In most applications, an audible alarm is highly desirable when using an instrument for continuous monitoring.

2. Periodic - In most field applications, instruments are operated for short periods of time to collect data. The battery life of instruments can be extended when conducting periodic monitoring.

8.2 Field Applications

Instruments used for field applications should be lightweight, rugged, weather resistant, operable without external power, easy to read and capable of being protected by contamination before use.

1. Site Survey - Site surveying is the process of evaluating the general ambient air condition at a location. For simple situations, the operator may walk the perimeter of the site and then tour the site while taking air samples, continuously evaluating the instrument's response as compared.

2. Hazard Identification and Evaluation

   This type of instrument use includes: Hazard categorization of samples; evaluation of suspected leading containers; hazard assessment of spilled materials.

3. Operations Monitoring - Direct-read instruments can also be used to assess changes in various hazards caused by on-site activities (sampling, drum handling, on-site treatment, spill clean-up, etc).

8.3 Maintenance

Proper maintenance and storage of instruments cannot be over emphasized. After properly selecting an appropriate instrument for field use, proper maintenance and calibration ultimately affects field usability.

1. Instrument maintenance usually includes:

Case, exterior and accessories cleaning after each use.
Alarm and meter checks after each use.
Battery checks under load after each use. Replacement/recharge as needed.
Check general instrument operation (turn on and test) after each use.
Periodic replacement of hoses, filters and sensors as needed.
Periodic manufacturer check-up (cleaning, inspection, calibration, etc.)
Documentation of all repair and maintenance work.

8.4 Calibration

All instruments must be calibrated periodically to verify and ensure accuracy within manufacturer's specifications. The factory calibrates some instruments and "calibration check" by the used, while the user calibrates others.

Calibration refers to sampling a known concentration of a chemical and comparing the instrument response to the expected response. An instrument's response must be within a specified range to be considered calibrated.

In general, calibration procedures shall be conducted before and after each period of us. All calibrations' work should be documented and properly checked or calibrated instruments tagged.

8.5 Field Use

The following general instructions on proper instrument use apply to all field instruments:

All operators must be trained in instrument use.
All instruments must be protected from damage, weather and contamination.
Instruments should be allowed to warm up and be checked before use.
Instruments should be initially cleaned in the field after each use.
Instrument sensors must never be saturated.

9.0 MONITORING AND INTERPRETATION

9.1 Field Application

Because air-monitoring data is useful in identifying and assessing hazards, selecting personal protective equipment and specifying safe work practices, air monitoring is routinely conducted during hazardous waste management operations.

Examples of operations requiring monitoring:

Confined Space Work - Sample before entry and periodically during work for oxygen deficiency, flammable and toxic atmospheres. Use of CGI and specific color indicator tubes.

Tank Cutting/Hot Work - Sample prior to cutting for flammable atmospheres. Use a CGI.

Emergency Response - Sample during hazard assessment phase (i.e. initial scene evaluation, hazard categorization testing, etc.). Use a CGI, specific color indicator tubes and/or a PID.

Handling Unknown Materials - Sample during hazard assessment (container handling, opening and sample testing).

Use a CGI, specific color indicator tubes and/or a PID.

Soil Excavation - Sample to determine the need for further excavation and to assess hazards. Use a CGI, specific color indicator tubes and/or a PID.

Hazard Categorization - Sample during HAZCAT testing. Use a CGI.

9.2 Responsibility

The SSHO, Lead Supervisor or the Project Manager normally performs monitoring.

9.3 Timing/Duration

Monitoring is performed at a variety of different times:

Prior to beginning work to assess a hazard (i.e. flammable or toxic atmosphere). Example - confined space entry, tank cutting, hot work, waste site entry, sampling unknowns, etc.

During the operation to identify any changes in the environment. Example - during tank cleaning, after ventilating an area, while cleaning up a spill, etc.

After an operation is complete to determine satisfactory results. Example - after ventilating and dry icing a tank, after excavating visible contaminated soils, etc.

9.4 Air Monitoring Results

Employees will be informed of field monitoring results ("real time") on a daily basis. All results shall be posted in a conspicuous location as required by OSHA. Air sampling results (lab analysis) shall be forwarded to an ACGIH accredited laboratory. All results from the laboratory shall be posted in a conspicuous location.

ENVIRONMENTAL CHEMICAL CORPORATION

EXPOSURE MONITORING LOG

Type of Monitoring________________________________Date_____________________

Instrument____Serial No.________________

Manufacturer_______________________________________Project__________________

Time	Personnel Location	Results	Comments	Sampler

ENVIRONMENTAL CHEMICAL CORPORATION

CALIBRATION LOG AND INSTRUMENT CHECKLIST

Instrument______________________________Manufacturer____________________________

Serial No.______________________________Calibration Gas__________________________

Project Site_____________________________Calibration Reading______________________

Date/Time______________________________SSHO_________________________________

Instrument Checklist

Items	Yes	No	Not Applicable	Comment
Inspect the instrument: housing, hoses, probe, gaskets, pre-filter, etc., all items clean and in good condition				
Battery check				
Check for system leaks				
Zeroed adjustments				
Alarm check				

	Project: *ECC Project No.*	Ravenna Army Ammunition Plant W912QR-04-D-0039
	Title: CSMP *Date: 6-1-2012* *Revised Date:*	*Cold Stress Monitoring Program* *Approved by: M. McSherry CIH CSP*

SOP C.2

COLD STRESS MONITORING PROGRAM

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to implement cold stress monitoring and preventative measures to control employee cold disorders.

2.0 COLD DISORDERS

Cold injury is classified as either localized, as in frostbite or generalized as in hypothermia. The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness or metal, inadequate clothing, age and general health. Physical conditions that worsen the effect of cold include allergies, vascular disease, excessive smoking and drinking and specific drugs and medicines.

2.1 Hypothermia

Air temperature alone is not enough to judge the cold hazard of a particular environment. Most cases of hypothermia develop in air temperatures between 2-10 C (30-50 degrees F). However, by the time you consider a factor such as the wind-chill, the effective temperature could be significantly lower.

Symptoms of hypothermia include the following: uncontrollable shivering and the sensation of cold, the heartbeat slows and sometimes becomes irregular, pulse weakens and the blood pressure changes. Other symptoms that can be seen before complete collapse are cool skin, slow, irregular breathing, low blood pressure, apparent exhaustion, fatigue, confusion and inappropriate behavior.

Sedative drugs and alcohol increase the risk of hypothermia. Sedative drugs interfere with the transmission of impulses to the brain. Alcohol dilates the blood vessels near the skin surface, which increases heat loss and lowers body temperature.

2.2 Frostbite

Frostbite can occur without hypothermia when extremities do not receive sufficient heat from the central body stores. This can occur because of inadequate circulation and/or because of inadequate insulation. Frostbite occurs when there is freezing of the fluids around the cells of the body tissues. This freezing is from exposure to extremely low temperatures. The condition results in damage to and loss of tissue. The most vulnerable parts of the body are the extremities (nose, cheeks, ears and fingers).

2.2.1. Degrees of Frostbite

First degree: freezing without blistering or peeling;
Second degree: freezing with peeling and blistering;
Third degree: freezing with death of skin tissues and possibly of the deepest tissues.

2.2.2. Symptoms of Frostbite

1. Skin discoloration;
2. Pain may be felt at first, but subsides;
3. Blisters may appear;
4. The affected part is cold and numb.

2.3 Trench Foot

This condition may be caused by long, continuous exposure to cold without freezing, combined with persistent dampness or actual immersion in water. Edema (swelling), tingling, itching, and severe pains occur, and may be followed by blistering, death of skin tissue, and ulceration. When other areas of the body are affected, the condition is known as chilblains.

2.4 Frostnip

This occurs when the face or extremities are exposed to a cold wind, causing the skin to turn white.

3.0 EVALUATING COLD ENVIRONMENTS

Indices for evaluating cold environments include Threshold Limit Values (TLVs) for cold stress and wind-chill index (Table 3-1). The cold stress TLVs are intended to protect workers from the severest effects of cold stress (hypothermia) and cold injury and to describe exposures to cold working conditions under which it is believed that nearly all workers can be repeatedly exposed without adverse health effects.

The TLV objective is to prevent the deep body temperature from falling below 36 degrees C (96.8 degrees F) and to prevent cold injury to body extremities (deep body temperature is the core temperature of the body determined by conventional methods for rectal temperature measurements). For a single, occasional exposure to a cold environment, a drop in core temperature to no lower than 35 degrees C (95 degrees F) should be permitted. In addition to provisions for total body protection, the TLV objective is to protect all parts of the body with emphasis on hands, feet, and head from cold injury.

The wind-chill factor is a cooling effect of any combination of temperature and wind velocity or air movement. Everyone facing exposure to low temperatures and wind should consult the wind-chill index. The wind-chill temperature has no significance other than that expressed - the effect on the body.

The wind-chill index does not take into account the following:

1. The body part exposed to cold;
2. The level of activity with its effect on body heat production;
3. The amount of clothing worn.

Table 3-1 Wind-chill Index

Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)

Estimated Wind Speed (in mph)	Actual Temperature Readings (F) 50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	31	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Wind speed greater than 40 mph have little additional effect	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security				INCREASING DANGER Danger from freezing of exposed flesh within one minute				GREAT DANGER Flesh may freeze within 30 seconds			
	Trench foot and immersion foot may occur at any point on this chart											

Blue, yellow and green hi-lights: Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36^{B}C (96.8^{B}F) per cold stress TLV.

4.0 COLD STRESS PREVENTION

In preventing cold stress one must consider factors relating both to the individual and the environment.

Acclimatization, water and salt replacement, medical screening, continuing medical supervision, proper work clothing, and training and education will contribute to the prevention of cold stress and injury related to working in a cold environment.

Control of the environment involves engineering controls (i.e. heaters, warm air jets, spot heating, heated warming shelters), administrative work practice controls (i.e. rest breaks, assigning extra workers, enforcing frequent intake of warm drinks - no caffeine or alcohol, allowing new employees time to adjust to conditions before they work full-time in cold environments), work-rest schedules, environmental monitoring, and consideration of the wind- chill temperature. The buddy system is highly recommended while conducting work activities in cold environments.

4.1 Engineering Controls

Spot heating should be used to increase temperature at the workplace.
If fine work is to be performed with bare hands for 10 or 20 minutes or more, special provisions should be made to keep the worker's hands warm.
Shield work area if increased air velocity (wind, draft, and ventilating equipment). Unprotected metal chairs should not be used.
Implement heated warm shelters and make available for workers.
At temperatures below -1C (30F), metal handles of tools and control bars should be covered with thermal insulating material.

4.2 Administrative Work Practices Controls

A work-rest schedule to reduce the peak of cold stress.
Enforce frequent intake of warm, sweet caffeine-free, non-alcoholic drinks or soup. Moving work to warmer areas whenever possible.
Assigning extra workers to highly demanding tasks.
Allowing new employees time to adjust to conditions before they work full-time in cold environments
Arranging work to minimize sitting still or standing for long periods of time.

Teaching workers the basic principles of preventing cold stress and emergency response to cold stress.

5.0 A Control Program For Cold Stress

A control program for cold stress should include the following elements:

Medical supervision of workers;
Employee orientation and training on cold stress;
Employee acclimation to cold temperatures.
Work-rest regimens, with heated rest areas and enforced rest breaks;
Scheduled drink breaks for recommended fluids;
Environmental monitoring to determine wind chill;
Reduction of cold stress through engineering and administrative controls, and the use of personal protective equipment.

SOP C.3

HEAT STRESS MONITORING PROGRAM

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to control heat exposure to employees by conducting effective monitoring. The hazards of exposure to hot environments may cause a variety of illnesses including heat rash, muscle cramps, heat exhaustion and heat stroke. Onset of signs and symptoms of exposure can occur rapidly, and may progress to a medical emergency (i.e., heat stroke) without early intervention.

2.0 HEAT STRESS

Heat stress is a hazard during warm weather or when personnel are wearing PPE, that aggravates the heat stress hazard. Heat stress can occur even when temperatures are moderate if the body's physiological processes fail to maintain a normal body temperature. The resulting physical reactions that occur are fatigue, irritability, anxiety, and a decrease in concentration, dexterity, and/or movement. Onset of signs and symptoms of exposure can occur rapidly, and may progress to a medical emergency (i.e. heat stroke) without early intervention. In extreme cases, death can result if the patient is not given immediate treatment.

2.1 Symptoms of Heat Exhaustion

Heat exhaustion occurs when your body cannot sweat enough to cool you off. It generally happens when you are working or exercising in hot weather. Symptoms include:

Fatigue, weakness, dizziness, or nausea
Cool, clammy, pale, red, or flushed skin

2.2 Symptoms of Heat Stroke

Heat exhaustion can sometimes lead to heat stroke. Heat stroke requires emergency treatment. It happens when your body stops sweating but the body temperature continues to rise, often to 105 degrees or higher. Symptoms include the following:

Confusion, delirium, or unconsciousness
Hot, dry, red or flushed skin, even under the armpits

3.0 CONTROL MEASURES

To control the exposure to heat stress during any site activity, the following safety procedures shall be implemented:

- All employees shall be monitored for heat stress; Potable drinking water shall be available at all times; Frequent rest breaks shall be taken;
- A buddy system shall be utilized;
- Shade (i.e., fixed or portable canopy) shall be provided;
- Employees shall be encouraged to eat a normal diet and get proper rest; and
- Employees shall be encouraged to refrain from consuming diuretics, including caffeine from coffee and tea beverages, or any form of alcohol. (Note: Consumption of alcohol is prohibited during work hours).
- To control exposure to heat stress hazard, monitoring shall commence when personnel are required to wear personal protective equipment greater than Level D. The American Conference Government of Governmental Hygienists (ACGIH) has set TLVs for heat extremes (presented in Table 16.1). This table presents levels for fully acclimatized, fully clothed (e.g., lightweight pants and shirt) workers and for workers wearing low permeability personal protective equipment (PPE).

Table 16.1 Heat Threshold Limit Values for Different Work Schedules

W RKLOAD						
Work/Rest Regimen	Light Street Clothing	Light PPE Clothing	Moderate Street Clothing	Moderate PPE Clothing	Heavy Street Clothing	Heavy PPE Clothing
Continuous Work	86° F	80° F	80° F	72° F	77° F	71° F
75% Work 25% Rest each hour	88° F	82° F	82° F	76° F	79° F	73° F
50% Work 50% Rest each hour	90° F	84° F	85° F	79° F	81° F	75° F
25% Work 75% Rest each hour	92° F	86° F	88° F	82° F	86° F	80° F

Note: Light moderate work includes operating heavy equipment. Heavy work includes hand shoveling or other manual labor activities.

4.0 MONITORING

Heat stress monitoring shall begin when ambient conditions exceed 85 °F when working in Level D and 70°F when working in Modified Level C (see Table 16.2). For clear weather conditions (i.e. 100 percent sunshine) ambient temperatures shall be decreased by 5 °F (i.e., 65 °F and 80 °F respectively) to determine when to begin monitoring. Ambient conditions shall be determined by maintaining a properly calibrated outdoor thermometer in the shade at each work station, or by monitoring local weather reports throughout each work shift.

4.1 Heart Rate

Heat stress exposure shall be evaluated by monitoring the heart rate. The radial pulse shall be taken for 30 seconds immediately upon beginning to rest (i.e., at the beginning of a rest break). This rate shall be multiplied by two to determine the heart rate at initial rest. This rate should not exceed 110 beats per minute (bpm). Following three minutes of rest, the heart rate shall be taken again (same procedure). The difference between the initial and third minute heart rate should be greater than 10 bpm.

If the initial rate exceeds 110 bpm OR the difference between the initial and third minute rate is less than 10 bpm, then the work period shall be shortened by 33 percent and the rest period increased by 33 percent.

Table 16.2 Heat Stress Monitoring Frequency

Temperature	Modified Level D	Modified Level C	Level C or B
> 90°F	every 45 minutes	every 30 minutes	every 20 minutes
85-90 °F	every 60 minutes	every 45 minutes	every 30 minutes
80-85 °F	every 90 minutes	every 75 minutes	every 60 minutes
70-80 °F	every 120 minutes	every 105 minutes	every 90 minutes

The SSHO shall be responsible for taking all heart rates. All heart rate monitoring shall be recorded on an Exposure Monitoring Log. Monitoring shall begin at the first rest break. The first rest break shall be taken within the first hour of work when ambient conditions exceed 85°F if working in Level D, and within the first 30 minutes if ambient conditions exceed 70 °F if working in Modified Level C.

4.2 Oral Temperature

Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

If oral temperature exceeds 99.6EF (37.6EC), shorten the next work cycle by one-third without changing the rest period.

If oral temperature still exceeds 99.6EF (37.6EC) at the beginning of the next rest period, shorten the following work cycle by one-third.

Do not permit a worker to wear semipermeable or impermeable garment when his/her oral temperature exceeds 100.6EF (38.1EC)

SOP C.4

SITE CONTROL PROGRAM

1.0 POLICY

ECC's Site Control Program is prepared in accordance with 29 CFR 1910.120 (d), 29 CFR 1926.65 (d), and 8 CCR 5192**.** A site control program shall be part of ECC's site safety and health program.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to minimize potential contamination of workers, protect the public from the site's chemical and physical hazards, and facilitate work activities prior to clean-up activities. Site control shall be established by artificial and/or physical barriers that isolate various hazards from potential targets.

3.0 SITE CONTROL PLANNING

Site control should be established in the planning stage of any job. The degree of site control is dependent on individual site characteristics, and must be flexible.

Variables Affecting Site Control

Chemical and physical hazards
Site characteristics
Work activities
Environmental factors

4.0 SITE CONTROL IMPLEMENTATION

Effective site control is contingent on good organization (equipment, people and tasks).

Procedures/Components

Site map
Site preparation Work
zones Buddy system
Site security
Communication system
Safe work practices
Exposure minimization
Nearest medical facility/route map

5.0 WORK ZONES

To reduce the accidental spread of hazardous substances by workers from the contaminated area to the clean area, work zones must be set up. The establishment of work zones will help to assure that personnel are properly protected against the hazards present where they are working. Uncontrolled hazardous waste substances sites are generally divided into three zones: Exclusion Zone (EZ) Contamination Reduction Zone (CRZ), and the Support Zone (SZ).

5.1 Exclusion Zone

An Exclusion Zone will be established around the immediate work area, and shall be clearly marked by a combination of traffic cones, barricades and/or high visibility barrier tape. The Exclusion Zone shall mark the area where direct handling operations are occurring and where field personnel may be exposed to chemical and physical hazards. The SSHO and the Field Supervisor shall regulate entry into the Exclusion Zone. No person shall enter an Exclusion Zone if they are not wearing the required protective clothing and equipment. All personnel exiting an Exclusion Zone must pass through the Contamination Reduction Zone, following the required decontamination procedure.

The size and shape of the Exclusion Zone shall be based on known and anticipated hazards, type of operation being performed, physical and topographical features, potential for site emergencies affecting surrounding areas, etc. Prior to the beginning of each day's operations, the SSHO shall observe site conditions and determine the location and boundaries of the exclusion zone. This work zone shall be reasonably large enough to accommodate equipment operations (i.e. 25 to 50 feet in all directions, etc.). The SSHO shall re-evaluate the location and boundaries of the Exclusion Zone as frequently as necessary, each day at minimum, to ensure that the Exclusion Zone incorporates all areas as described immediately above.

5.2 Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) is the transition area between the contaminated area and the clean area. This zone is designed to reduce the probability that the clean Support Zone will become contaminated or affected by other site hazards. Decontamination procedures begin at the boundary between the Exclusion Zone and the CRZ, called the hotline.

5.3 Support Zone

The Support Zone is the location of the administrative and other support functions needed to keep the operations in the Exclusion Zone and CRZ running smoothly. Individuals entering the Support Zone shall be free of contamination.

All work zones shall be established daily before beginning operations. Site control requirements shall be reviewed during daily Tailgate Safety Meetings. A copy of the site map showing any adjustments to the work zone boundary shall be attached to the daily Tailgate Safety Meeting form whenever work zones are adjusted based on-site conditions.

6.0 SITE SECURITY

Site security shall be established by clearly marking all work zones at all possible locations of entry by unauthorized personnel in order to minimize and prevent public exposure to hazards created by site activities. In addition, the SSHO as well as ECC employees shall observe for pedestrian and vehicle traffic that may unknowingly enter designated work areas, and take action to stop their unauthorized entry. When necessary, field personnel may be assigned as security in order to warn persons or vehicles of the adjacent operation.

	Project: ECC Project No.	Ravenna Army Ammunition Plant W912QR-04-D-0039
	Title: EX Date: 6-1-2012 Revised Date:	Excavation Approved by: M. McSherry CIH CSP

SOP C.5

EXCAVATION

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish uniform procedures and specify protocols to reduce and eliminate hazards in order to ensure the safety of workers as they perform excavation activities.

2.0 SCOPE AND APPLICATION

This SOP is applicable to all excavation work (including trenches) being performed by ECC employees and ECC subcontractors and their employees.

(Excavation means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.)

(Trench means a narrow excavation made below the surface of the ground. In general, the depth is greater then the width, but the width of a trench, measured at the bottom, is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the form or structure to the side of the excavation to 15 feet or less, measured at the bottom, the excavation is also considered to be a trench.)

3.0 PROCEDURES

The following procedures will be implemented for excavation activities.

3.1 Planning and Notification

Prior to excavation work being performed utilities must be located in accordance with SOP ESQ-7.6 – Underground Utilities. All utility locates shall be performed a minimum of two days in advance of any excavation work being performed.

For work performed in California, maintain a copy of ECC's Cal-OSHA permit on the jobsite. A copy can be obtained from ECCONET by going to the ESQ Page and the ESQ Shared Drive/OSHA. https://ecconet.ecc.net/esq/ShareList.asp?straction=&DirID='55'
In addition, Cal-OSHA requires notification to be given any time a worker descends into an excavation 5 feet or deeper.

Excavation activities should be addressed in a site-specific Activity Hazard Analysis, approved by the ESQ Manager. The AHA or a written Excavation Plan should be as specific as possible as to the method of cave in protection to be used, and the safety requirements of installation and working within the protective system. The AHA or Excavation Plan should also address any fall and perimeter protection requirements; public protection measures; and vehicle and equipment hazards specific to excavation activities.

(Protective system means a method of protecting employees form cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of a adjacent structures. Protective systems include support systems (shoring), sloping and benching systems, shield systems (trench boxes), and other systems that provide the necessary protection.)

3.2 General Requirements

A "Competent Person" must be present during all excavation activities and activities performed in an excavation. (Competent Person means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.)

The Competent Person shall be able to classify soil types, select protective systems and perform daily inspections as needed throughout the shift, frequently evaluating the condition of the excavation and adjacent areas.

The designated Competent Person shall perform all soil classifications, excavation inspections and air monitoring for excavation work. (Note: The air monitoring tasks may be delegated to another person with the requisite skills and training. The Competent Person is responsible to make sure it gets done when it is needed.) Daily inspections shall be to determine the condition of protective systems, evidence of a situation that could cause a cave-in, hazardous atmospheres, or any other hazardous conditions of the excavation,adjacent areas, and protective systems. Daily inspections will be documented on Form ESQ-7.7.01. The Competent Person will take prompt corrective actions to eliminate hazards, up to and including removing personnel from the excavation and terminating the activity until corrections are made.

Subcontractors performing excavation on ECC project sites will be required to designate a Competent Person and to submit the qualifications of the designee to ECC prior to commencing the activity. ECC reserves the right to accept/reject the nominee. Subcontractors shall notify ECC whenever there is a change in personnel fulfilling the Competent Person role.

3.3 Soil Classification

Soil shall be evaluated and classified by the Competent Person. The classifications will in accordance with OSHA 1926 Subpart P, App. A as stable rock, type A, B, or C soil. Classifications shall be made using at least one visual and one manual analysis identified in 1926 Subpart P, App. A.

In layered soil systems, the system shall be classified according to its weakest layer. However, each layer may be classified individually where a more stable layer exists under a weaker layer.

In the event the properties, factors, or conditions affecting classification change, the system shall be reevaluated by the Competent Person. Reclassify as necessary to reflect the changed circumstances.

3.4 Cave-in Protection

Entry into excavations less than 5 feet deep without cave-in protection may be permitted by the Competent Person following an inspection that reveals no safety or health hazard.

Workers shall not enter an excavation 5 feet in depth or greater until protective systems in the form of shoring, shielding, sloping, benching, or other means have been established. For excavations less than 20 feet deep, the system to be used shall be determined by the Competent Person in accordance with 29 CFR 1926 Subpart P. Manufacturer's data and engineer's approval with limitation must be maintained on-site when any engineered shielding or shoring system is used. Note: Benching is not an OSHA- approved option for Type C Soils.

For excavations greater than 20 feet in deep, a site-specific protection designed by a registered professional engineer is required. The design and approvals must be maintained on-site.

Installation and removal of the support system shall be done in a manner that protects the workers from cave-ins, structural collapse, or from being struck by members of the support system.

3.5 Fall and Perimeter Protection

For excavations greater than 6 feet in depth, workers shall not be allowed within 6 feet of the open excavation without proper fall protection established in accordance with OSHA 29CFR1926.501. For fall protection refer to SOP ESQ-5.5.

Where there is a potential for public exposure to the excavation,a secure work zone will be established around the site, including fencing and warning signs. Excavations will be backfilled, covered or barricaded at the end of each day, with a preference on backfilling as soon as possible. Measures will be taken to prevent vehicle and equipment traffic from entering or falling into the excavation. Where the project is covered by USACE EM 385-1-1, a classification and perimeter protection system will be established in accordance with Section 25 B.

Site specific fall and perimeter protection requirements will be included in the AHA or Excavation Plan.

In the event that workers or equipment will be permitted or are required to cross an excavation, walkways/bridges complete with standard guardrails shall be provided.

3.6 Egress

All work performed at depths of 4 feet or greater must have a means of egress (ladder, runway, or an approved escape route) no greater than 25 feet in lateral travel from workers in the excavation. If extension ladders are used, the side-rails shall extend a minimum of 36 inches above the top of the excavation.

3.7 Water

Employees shall not be permitted to work in excavations in which there is accumulated water. In the event that water begins to accumulate, workers shall exit the excavation until adequate precautions, in the form of special support system and water removal to control the level of accumulating water have been established.

3.8 Struck-by Hazard Prevention

To protect workers from falling debris, all equipment, excavated material, and debris shall be stored a minimum of 2 feet from the edge of an excavation. In addition, vibrations from heavy equipment, vehicular traffic, railroads, etc. shall be considered a hazard increasing condition. Steps shall be taken to ensure loose rock and soils will not become a falling hazard by scaling the face of the excavation or by installing barricades to stop and contain the material.

At no time will loads handled by lifting or digging equipment be hoisted, suspended or moved over workers.

3.9 Hazardous/Toxic Atmospheres

Reasonable precautions shall be made to protect employees from hazardous/toxic atmospheres.

In the event that a hazardous/toxic atmosphere could reasonably be expected to exist, such as an excavation in landfill areas or in areas where hazardous/toxic materials are stored nearby, the atmosphere of the excavation shall be tested prior to entry into any excavation. For air monitoring requirements refer to SOP ESQ-7.7.

For an atmosphere containing less than 19.5 percent oxygen and/or other hazardous atmospheres, ventilation shall be provided according to OSHA 1926 Subparts D and E.

To prevent worker exposure to atmospheres containing a concentration of a flammable gas in excess of 5 percent of the lower flammable limit of the gas, adequate ventilation shall be provided.

For all atmospheres in which controls are used to reduce hazardous contaminants to acceptable levels, testing shall be conducted on a routine frequency as the excavation proceeds to ensure the atmosphere remains safe per SOP ESQ-7.7.

3.10 Stability of Adjacent Structures

For all adjacent structures that could impact or be impacted by the excavation, determinations regarding the safety of workers and potential property damage shall be made by a registered professional engineer.

Where the stability of adjoining structures (buildings, walls, etc.) is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures.

For all adjacent structures that pose a hazard to workers, precautions shall be established per OSHA 29CFR1926.651(i).

Sidewalks, pavements and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures. See SOP ESQ-6.6 Underground Utilities.

4.0 Monitoring

The site Safety and Health Supervisor (SSHS) will monitor the processes used on site for all excavation activities. The SSHS will assure that safe work practices outlined in this SOP are followed on site for all excavations. If not the designated Competent Person, the SSHS will review the activities and daily inspection reports of the Competent Person and ensure that copies are maintained.

The ESQ Manager will review conformance with this SOP during regular ESQ surveillance visits.

5.0 Training

Each employee engaged in any excavation activity shall be appropriately trained excavation and trenching operations. Training in the AHA, Excavation Plan, and this SOP will be conducted at the beginning of activities involving excavations greater than 5 feet deep.

The Competent Person is an employer designation, and not a certification. No specific training is required as long as the person's prior training and experience is sufficient to provide the skills necessary to carry out the functions of the position. However, formal training and documentation may be used to support the Competent Person's qualifications and will be maintained on-site. The SSHS will monitor the performance of the Competent Person. If the performance is not adequate to ensure compliance with regulatory requirements and this SOP, the designation will be removed and an alternate named.

6.0 Documentation

Site-specific protective systems will be described in the AHA or Excavation Plan.

Daily inspections of the excavations will be documented on Form ESQ-7.7.01.

Soil Classification will be documented using Form ESQ-7.7.02.

Air Monitoring will be documented in accordance with SOP ESQ-7.7.

7.0 References

US DOL OSHA 29 CFR 1926 Subpart P Excavations
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10930

USACE, EM 385-1-1, Section 25 Excavations http://www.usace.army.mil/publications/eng-manuals/em385-1-1/c-25.pdf

ECC SOP ESQ-5.5 Fall Protection

ECC SOP ESQ-7.6 Underground Utilities

ECC SOP ESQ-8.7 Air Monitoring

<table>
<tr><td rowspan="2"></td><td>Project:

ECC Project No.</td><td>Ravenna Army Ammunition Plant

W912QR-04-D-0039</td></tr>
<tr><td>Title: FPP
Date: 6-1-2012

Revised Date:</td><td>Fall Prevention and Protection
Approved by: M. McSherry CIH CSP</td></tr>
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SOP C.6

FALL PREVENTION AND PROTECTION

1.0 PURPOSE

The purpose of this Standard Operating Procedure is to provide procedures and guidelines for the prevention of falls from elevated work surfaces, and for the mitigation of injuries due to such falls.

2.0 Scope and Application

The requirements in this procedure apply to all ECC activities, except where covered by SOPs ESQ-5.3 Mobile Construction Equipment for elevating work platforms; ESQ-5.6 Ladders and Scaffolds; and ESQ-7.7 Excavation.

On construction sites, fall prevention and protection controls must be implemented when personnel are exposed to falls greater than six feet to the next level or into hazardous machinery or materials. However, consideration should be given to prevention of falls at lower elevations, especially where the risk of falling is increased, such as when platforms are small or irregular, the fall exposure is behind the person, or when the work requires moving along an unprotected edge.

In fixed facilities such as offices and treatment plants during operations and maintenance phases, the requirements apply to fall exposures of four feet, or over hazardous equipment or materials.

3.0 Procedures

3.1 General Policy

It is ECC's policy to require 100% fall protection at elevations above 6 feet in construction applications and 4 feet in general industry applications above the next lower level or above hazardous machinery or materials.

3.2 Hazard Assessments

Good fall prevention and protection starts with identifying the work to be done at elevation, and performing good hazard assessments. Hazard assessments are done at several stages, and should be documented in a variety of ways, with increasing specificity where needed.

<u>Accident Prevention Plan</u>
The APP establishes the general requirements and references this SOP. To the extent possible, the ESQ Manager should ensure the plan identifies specific fall hazards and controls on the project.

Fall Protection Plan

Where unique hazards or controls may be necessary, the ESQ Manager and Project Manager should ensure that a written Fall Protection Plan is incorporated into the APP. This will often need to be a required submittal from the subcontractor. OSHA requires that written fall protection plans be prepared for leading edge work; pre-cast concrete erection work; and residential construction work where conventional fall protection measures are infeasible. These are the only applications where OSHA may accept a written fall protection plan with alternative measures in lieu of conventional methods. (The requirements for an OSHA approved Fall Protection Plan are included in 1926.502(k).)

The USACE EM385-1-1 also requires a written plan for all low-slope built-up roofing work (not roof deck insulation) where the roof has unprotected sides and edges. However, ECC managers might also consider requiring written plans for activities such as but not limited to: steel building erection; tower construction; and roofing work where warning lines and controlled access zones are proposed; and any other activity which may present unique or extensive fall exposures.

Hazard Analysis (AHA)

The Site Health and Safety Supervisor (SHSS) and Site Supervisor or Superintendent should ensure that ECC and subcontractor activities are properly planned; and the specific fall exposures and method for control are spelled out in the AHA before the work begins. The QCSM should ensure that the subcontractor has the specified equipment and training is in place prior to the phase preparatory meeting and again during the initial inspection.

Job Safety Analysis and Daily Safety Briefing

Often tasks come up on construction jobs which were not anticipated at the time the AHAs were developed. The SHSS must work with the Crew Supervisor to plan the tasks so that the proper fall prevention or protection measures are in place. This task should be documented on the JSA form or on the Daily Safety Briefing form.

3.3 Hierarchy of Controls

The focus should be on pre-contract controls, i.e. prevention of falls. Personal fall arrest systems (post- contact control) should be used as a last resort. Controls are summarized in order of preference below:

Fixed Platforms with Guardrails

Platforms must be designed for loads imposed by workers and anticipated tools and equipment. The design load capacities should be documented. Guardrails should meet standard OSHA specifications contained in 1926.502(b). See TI ESQ 5.5.01 Guardrail and Restraint Design Criteria.

Floor Holes

Floor holes not being used should be covered completely. Hole covers should be fastened or inset to avoid being kicked out or easily removed. Hole covers must be labeled: "Caution: Hole Cover."

Restraint Systems

Restraint systems do not allow workers to fall off a side or edge of an elevated work surface. They are not mentioned in the OSHA Fall Protection System, but are an acceptable control of fall hazards. See TI ESQ 5.5.01 Guardrail and Restraint Design Criteria.

Safety Nets
Safety nets are given a higher priority in USACE 385-1-1 than personal fall arrest systems. However, their design, installation and use must be carefully planned and diligently inspected. Contact the Project ESQ Manager where a safety net is proposed for fall protection.

Personal Arrest Systems (PFAS)
PFAS do not prevent falls, but mitigate their impact. As with all PPE, they must be properly selected, inspected before each use, and fit properly; users must be trained in their use and limitations; and they must be used properly and in accordance with manufacturers' instructions. Some considerations for PFAS are discussed in TI ESQ 5.5.02 Personal Fall Arrest Systems. More detailed information may be obtained from the OSHA Fall Protection Standard, paragraph 1926.502(d) and specific equipment manufacturers.

Positioning Devices
A positioning device allows a worker to maintain a stable position on a vertical work surface while allowing the safe use of both hands. A common application is rebar tying and form erection on vertical concrete wall construction. Positioning systems can only prevent falls of 2 feet or less. Where a positioning system that complies with OSHA requirements in 1926.502(e) is used, an additional personal fall arrest system is not required. However, some clients may require an additional PFAS as a back-up to the positioning system.

Controlled Access Zones
Controlled Access Zone (CAZ) is a very specific control methodology in which employees engaged in specified activities may work near an unprotected edge without guardrails, nets or PFAS, but where access to these areas is strictly controlled and CAZ is marked with a control line meeting the requirements of OSHA 1926.502(g). Access beyond the control line must be strictly limited to the employees engaged in the specified activities. CAZ use is only available to leading edge work; pre-cast concrete construction; and overhead bricklaying. The use of CAZ must be described in a written fall protection plan which documents the reasons why conventional methods of fall prevention and protection are not feasible.

Warning Line System
A warning line system is a barrier, meeting requirements in 1926.502(f) which is erected to warn employees engaged in roofing work, that they are approaching an unprotected edge. Employees may work within the warning line system without guardrails, nets or PFAS. Although a written fall protection plan is not required for this application by OSHA, one may be required by EM 385-1-1. The ECC ESQ Manager should ensure the specifics of a warning line system are incorporated into a written plan, AHA or JSA.

Safety Monitoring System

A safety monitoring system is one in which a competent person is responsible for observing, recognizing and warning employees of fall hazards near unprotected edges. Safety monitoring systems may only be used when employees engaged in low slope roofing must work between the edge and the warning line, or are engaged in activities covered by a fall protection plan (leading edge, overhand bricklaying, pre-cast concrete erection) when no other controls are feasible. Safety monitoring systems must meet the requirements of OSHA 1926.502(h).

3.4 System Evaluation and Inspections

3.4.1 Facility Design and Planning

During facility design, or during planning for construction of fixed facilities, the ECC or subcontracted Design Team should incorporate fall protection measures into the design for both the construction and final use stages.

For example, designs should specify as much ground level pre-fabrication as possible, and incorporate platforms, guardrails or personal fall arrest system anchors into structural components prior to erection. Equipment where employees are expected to access hatches, instruments, motors, valves or other items during operations and maintenance should have appropriate platforms and guardrails, and if necessary, attachment points for PFAS and personnel extraction devices.

The ESQ Manager or designee should review the plans for walking/working surfaces and process equipment prior to final approval for construction to ensure that proper platforms and fall protection measures are incorporated.

3.4.2. Personal Fall Arrest Systems

PFAS proposed by subcontractors should be carefully evaluated by the project team prior to acceptance, particularly where the system employs horizontal or vertical lifelines, warning lines, controlled access zones, safety monitors, safety nets, and non-conventional fall prevention and protection methods. The evaluation should consider:

- Completeness
- Design criteria used
- Compliance with OSHA and contractual requirements
- Effectiveness in controlling the hazards
- Qualifications of the person supervising the design, installation and use.

NOTE: Horizontal systems must be designed, installed and used under the supervision of a qualified person. Qualified means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has sucessfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work or the project. In most fall protection system cases, this should be a civil or structural engineer. Appendix C of Subpart M can be used to assist the design, testing and review of fall protection systems.

3.4.3. Inspections

The following inspections will be conducted, where applicable:

- Walking/working surfaces should be inspected during the project initiation or pre-use phase.
- Engineered PFAS should be inspected upon arrival at the site, prior to installation, to ensure all appropriate equipment and hardware is available and in good condition. The HSS or QCSM should perform this inspection for ECC equipment. For subcontractor equipment, the HSS or QCSM should observe the subcontractor inspection.
- The AHA, specifications or fall protection plan should be reviewed with the work crew at the phase preparatory meeting and the equipment should be inspected during the initial inspection Phase. The inspection should cover the manufacturer specifications for hardware, connections, installation criteria, etc.
- Users are required to inspect PFAS on a daily basis.
- The SHSS and QCSM should inspect the activities where fall hazards exist for proper usage of fall protection equipment and conformance with AHAs and plans during normal follow-up inspections. Particular attention should be given to the equipment being used, the location and stability of anchorages, the potential for swing falls, and the proper fall clearance height to ensure effective arrest in a fall situation.
- Competent persons are required to inspect fall protection equipment periodically. For ECC equipment, the SHSS or designee should inspect the equipment on a weekly basis. Subcontractors should be required to submit inspection logs for their equipment at activity initiation and at least semi-annually thereafter. Defective equipment must be removed from service.
- PFAS subjected to arresting falls must be taken out of service. On projects governed by USACE 385-1-1 these components may not be used again. On non-EM 385-1-1 projects, the equipment may be used again if inspected and certified by a competent person, usually the manufacturer.

3.5 Rescue Plans

Rescue plans must be in place for activities where employees use PFAS. The plan should include the
equipment and methods needed to retrieve an employee suspended from a PFAS to avoid injuries associated with suspension trauma. The plan may be incorporated into the AHA. Generally, each employee using a PFAS should be provided with a suspension strap attachment for their harness.

Plans to assist employees to ground level should also be developed for any activity or location where employees must work on elevated platforms.

If it is determined that external emergency services will be required, the HSS should coordinate with the local emergency services unit to determine their rescue capabilities and response time.

3.6 Coordination with Subcontractors

Scopes of work provided to bidding subcontractors should include the requirement to provide fall protection. The requirement for a written fall protection plan should also be incorporated when deemed necessary by the ESQ Manager.

Subcontractors whose employees may be exposed to fall hazards will not be permitted to begin work until an acceptable fall protection plan or AHA covering fall prevention and protection measures is submitted.

Subcontractors must present training certifications for their employees who are exposed to fall hazards and are required to wear personal fall arrest systems, or whose activities are covered by a written fall protection plan. In addition, the subcontractor must identify their competent person who will be responsible for the implementation and monitoring of the subcontractor's fall protection plan.

4.0 Monitoring

In addition to the inspections discussed in Section 3.3.3, conformance with this procedure will be monitored during ESQ Manager surveillances and ECC Corporate Audits.

5.0 Training

Employees potentially exposed to falls from elevations must be trained in accordance with the outline in TI ESQ-5.5.03. Subcontractors must provide a written certification of training, as described in Section 6.0. The latest training certification shall be maintained on site. Retraining will be provided when an affected employee who has already been trained does not have the understanding and skill required to implement effective fall prevention and protection measures. Some reasons retraining may be deemed necessary include:

- Changes in the workplace render previous training obsolete, or
- Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or
- Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indiciate that the employee has not retained the requisite understanding or skill.

6.0 Documentation

Fall protection training must be documented with a written certification record which shall contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted by another employer, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of the actual training.
Training in this procedure shall be documented by a sign-in sheet during orientation or a daily safety briefing.

7.0 References

29 CFR 1926 Subpart M Fall Protection
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10922

29 CFR 1910 Subpart D Walking-Working Surfaces, 1910.23 Guarding Floor and Wall Openings and
Holes
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9715

USACE EM 385-1-1 Safety and Health Requirements Manual
Section 21 Safe Access and Fall Protection
Section 27 Concrete and Masonry Construction and Steel Erection (27.H Roofing)
http://www.usace.army.mil/publications/eng-manuals/em385-1-1/toc.htm

TI ESQ-5.5.01 Guardrails and Restraint Design Criteria

TI ESQ-5.5.02 Personal Fall Arrest Systems

TI ESQ-5.5.03 Fall Protection Training

SOP C.7

HAZARD COMMUNICATION

1.0 Purpose

The purpose of this program is to establish the ECC Hazard Communication Program and provide guidance for implementation at ECC project sites and offices.

2.0 Scope and Application

All ECC sites using or storing hazardous substances are required to conform with this Standard Operating Procedure (SOP), including subcontractors.

This SOP applies to all known hazardous substances in the workplace that ECC employees and their subcontractors may be exposed to under normal conditions of use or in a foreseeable emergency, such as equipment failure or rupture of containers, resulting from workplace operations. Hazardous substances are any materials listed in any one or more of the following lists:

- 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances (OSHA);
- Threshold Limit Values (American Conference of Gov. Industrial Hygienists);
- National Toxicology Program (NTP);
- International Agency for Research on Cancer (IARC);
- Any scientific study providing evidence that a material has physical or health hazards;
- Mixture containing 1% or more of a hazardous susbstance; or
- Mixtures containing 0.1% or more of a carcinogen.

This program does not apply to:

- Hazardous waste (as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976);
- Tobacco and tabacco products;
- Wood and wood products;
- Food additives, drugs, or cosmetics intended for personal consumption by employees while in the work place;
- Consumer products packaged for distribution to and used by, the general public, provided that employee exposure to the product is not significantly greater than the consumer exposure occurring during the principal consumer use of the product.

3.0 Procedures

ECC will communicate the "Hazard Communication Program" to their employees and provide information about chemical hazards and controls through labeling, chemical inventory, Material Safety Data Sheets (MSDSs), and training programs as detailed in this written hazard communication program.

Employees are responsible for reading the MSDS for substances they use.

3.1 Chemical Inventory

Each ECC office and project site containing hazardous chemicals must have a Chemical Inventory list. The inventory shall be placed with the MSDS binder in a conspicuous location at all times. The Site Safety and Health Supervisor (SSHS) is responsible for updating the chemical inventory list whenever a new chemical is brought on-site.

3.2 Material Safety Data Sheets (MSDSs)

An MSDS shall be available for each chemical listed in the inventory. A copy of the MSDS supplied by the manufacturer or distributor of the chemical shall be kept at each ECC project site and office. The project SSHS will be responsible for obtaining an MSDS for all chemicals present at each site or office. These individuals will review incoming MSDSs for new and important health and safety information. Supervisors and employees will be informed of all new MSDSs as soon as possible.

Upon receiving the MSDS from the first shipment of a chemical, the original will be sent to the SSHS. The SSHS will review the MSDS for completeness and place it in the project MSDS binder. If an MSDS is missing, a new MSDS shall be requested from the manufacturer within 7 days. ECC will not accept chemicals from the manufacturer or distributor unless a copy of the MSDS has already been obtained from a previous shipment or the shipment is accompanied by an MSDS.

MSDSs are available to all employees and subcontractors in the work area for review during each work shift. MSDSs are kept in a conspicuous location (ECC job trailer, break trailer) at all times.

3.3 Labeling

ECC will not accept or release hazardous chemicals for use unless the original container is clearly labeled with at least the following information: identity of the hazardous chemical(s); appropriate hazard warning statement; and the name and address of the manufacturer. If the hazardous substance is transferred to a secondary container, the secondary container must be clearly labeled with at least the following information: identity of the hazardous chemical and the appropriate hazard warning statement.

All labels must be legible, in English, and prominently displayed on the container. Labels shall not be defaced or removed unless the container is immediately marked with the required information. Unlabeled chemical containers should be immediately reported to the area supervisor or the SSHS.

The name of the material that appears on the manufacturer's label shall be the same as the name that appears in the area chemical inventory as well as the MSDS. Conformance with this procedure will be assessed during the formal weekly inspections as well as during ESQ Surveillances and Audits.

4.0 Training

Employees will be trained on the hazardous substances in their work area: at the time of their initial assignment; whenever a new hazard is introduced into their area; and whenever ECC or the subcontractor receives an updated MSDS containing new information indicating significant increased risk or changes in the use of personal protective equipment.

Employees will be trained in the following:

- Overview of the Hazard Communication regulation (29 CFR 1910.1200) and the elements of ECC's Hazard Communication Program;
- Operations involving hazardous chemicals in their work area and methods of detecting them;
- Location and availability of the MSDSs and written hazard communication program;
- How to read an MSDS and container labels;
- Physical properties and health effects of hazardous chemicals and measures to be taken by the employee to protect themselves;
- Use of engineering controls, personal protective equipment and work practices to prevent or lessen exposure to hazardous chemicals;
- Emergency and first aid procedures to follow in case of exposure to hazardous chemicals.

For non-routine activities on the site, an Activity Hazard Analysis (AHA) will be developed, and employees will be trained in the hazardous materials to be used or encountered when the AHA is discussed.

5.0 Documentation

Project-specific employee training in the content of this procedure and in the hazardous chemicals used on-site will be documented on the daily Tailgate Safety Meeting form and/or site orientation training attendance sheet.

6.0 References

29 CFR 1910.1200 Hazard Communication, Hazard Communication - 1910.1200

USACE EM 385-1-1. Section 01.B.06
http://www.hq.usace.army.mil/soh/em385/current/SECTION01-V2-final.pdf

SOP C.8

ELECTRICAL SAFETY

1.0 Purpose

The purpose of this procedure is to provide procedures and guidelines for working safely with electrical equipment at ECC worksites and offices.

2.0 Scope and Application

The requirements in this procedure apply to all ECC activities. Requirements for work on or near live parts are limited to equipment less than 600 V.

Any work on live equipment over 600 V will only be done by licensed electricians who have submitted an acceptable procedure, hazard analysis and, for work other than testing and troubleshooting, an electrical work permit authorized by the subcontractor's Supervisor.

3.0 Procedures

The following electrical safety procedures will be implemented where applicable.

3.1 Electrical Service Design Considerations

Permanent electrical service designed by ECC and subcontractors should facilitate safe work practices. Examples include local disconnects or plug attachments at plant equipment and machinery; motor starters and circuit breakers that can accept a lockout device, mounted in cabinets with external switches or deadfronts covering energized parts; low voltage control wiring enclosed separately to allow work and testing without exposing higher voltage live equipment to the extent feasible.

All electrical designs performed by ECC personnel or electrical design subcontractor will be peer- reviewed by a qualified electrical engineer. Safe work practices during installation, testing and operation of the equipment will be part of the review. Specific equipment specifications should be reviewed by the Project ESQ Manager before purchase or submittal to the client.

3.2 General Precautions

The following general precautions will be observed on ECC projects;

Only licensed electricians or journeyman electricians working for a licensed electrical contractor will perform installation, repair, testing or troubleshooting on electrical wiring and equipment in new construction and remodeling projects.

Other workers, such as treatment plant operators, may perform activities restricted to "qualified electrical workers" if specifically trained on the equipment, the hazards involved and the specific test equipment being used. See the definition of "qualified electrical workers" in TI ESQ-5.7.01 Definitions.

- All installations will be designed in accordance with the National Electric Code NFPA 70. Wiring and components will be approved by a nationally recognized testing lab.
- Electrical equipment will be properly marked and labeled.
- Electrical equipment will be guarded or barricaded.
- Portable ladders used when working near electrical installations or using electric power tools will have non-conductive side rails.

- In case of a blown fuse or tripped circuit breakers, do not restore power until a thorough check has been made of the equipment to prevent closing into a fault.

3.3 Temporary Power and Use of Portable Equipment

This section applies to the use of temporary power and portable tools and equipment project sites and in offices.

- Temporary power distribution systems will be installed by licensed electricians and should be installed to minimize the use of extension cords to the extent practical.

- All 120 V temporary and outdoor wiring, and other wiring in locations subject to wet conditions, will be protected by a ground fault circuit interrupter (GFCI).

- GFCIs on project sites will be tested monthly.

- Cords, plugs and receptacles will be inspected daily by users.

- Electric power tools and equipment will be grounded or double insulated. Extension cords will have the grounding plug intact.

- Inspect all power tools and electric flexible cords daily prior to use to ensure insulation and plug connections are intact. Spliced, taped, patched, oil soaked, worn, or frayed electric cords will be tagged "Do Not Use" and removed from site immediately.

- Do not use damaged or defective power tools. Power tools with spliced or taped cords will be tagged "Do Not Use" and removed from site immediately.

- All electric cords will be 12 gauge or higher and rated for outdoor use. Use only hard usage flexible cords (type SJEOOW, SJTOOW, SJTW) or extra hard usage flexible cords (type SEOOW, STOOW, STW)

- Protect all electrical cords from damage (including that caused by foot traffic, vehicles, sharp corners, heat, projections, and pinching). Do not hide extension cords under rugs, or in walls, ceilings or floors.

- Employees' hands should be dry when plugging or unplugging equipment.

- Extension cords are for temporary use – unplug them, wind them and store them properly after each use and at the end of each day.
- Do not attach cords to walls with staples or hang them in a way that may cause damage.

3.4 Overhead Power Lines

Safe distances must be maintained from all overhead power lines.

- All personnel, machinery, and tools must be maintained at least 10 ft. from live power lines up to 50 kV. Distance must be increased with voltage in accordance with the following table from EM 385-1-1:

TABLE 11-1

MIMIMUM CLEARANCE FROM ENERGIZED OVERHEAD ELECTRIC LINES

Nominal system voltage	Minimum rated clearance
0 - 50 kV	10 ft (3 m)
51 – 200 kV	15ft (4.6 m)
201 - 350 kV	20 ft (6 m)
351 - 500 kV	25 ft (7.6 m)
501 - 650 kV	30 ft (9.1 m)
651 – 800 kV	35 ft (10.7 m)
801 – 950 kV	40 ft (12.2 m)
951 - 1100 kV	45 ft (13.7 m)

Consider movement of machines and tools, as well as sway of power lines when establishing work zones.

Use a spotter when the work is required near this safe work boundary.

If work must occur within the boundary, the power lines must be de-energized and grounded, or insulated by the power provider.

3.5 Concealed Wiring

Before making any penetrations into a wall or floor, the following steps must be taken:

Check any drawings that may be available to help identify concealed wiring.

Perform a visual inspection of the area, including above drop ceilings, external perimeter, etc. to try to locate wiring.

For wall penetrations, proceed slowly and make initial penetrations just deep enough to break through to the void space, then do a visual inspection.

For slab cutting or core drilling, engage the facility owner and utility owner in a pre- construction meeting and prepare an AHA before starting work. If the presence or location of wiring in or below the slab is unknown, incorporate precautions such as dielectric gloves and mats, flame resistant clothing, and emergency procedures in the AHA.

3.6 De-energization and Lockout

Work on or near current-carrying parts of electrical equipment must be done only after the equipment is placed in an electrically safe work condition. This is done by:

De-energizing the system to be worked on

Disconnecting the equipment from energized source

If possible, verifying that all blades of the disconnecting means are fully open or that drawout type circuit breakers are withdrawn to the fully disconnected position

- Grounding the equipment, if necessary
- Locking and tagging the disconnecting means in accordance with SOP ESQ-7.3
- Testing the de-energized circuit by a qualified person using a verified test instrument.

Exceptions to this policy are for testing and troubleshooting by a qualified electrical worker, and when shutting down the system creates a greater hazard to the workers or public or when it is infeasible due to equipment design or operational limitations.

Note: “Greater hazard” examples are generally noted as shutting down a ventilation system required to maintain safe atmospheres, interruptions of life support equipment, or deactivation of emergency systems. "Infeasible" may mean that work is required on circuits that form an integral part of a continuous process that would otherwise need to be completely shut down in order to permit work on one circuit or piece of equipment.

3.7 Work On or Near Live Electrical Equipment

3.7.1 Definitions

TI ESQ 5.7.01 contains electrical definitions extracted from the NFPA standard. For additional definitions, see NFPA 70E Article 100.

3.7.2 Electrical Work Permit

If live parts are not placed in an electrically safe work condition (i.e., for the reasons of increased or additional hazards or infeasibility per 130.1), work to be performed shall be considered energized electrical work and shall be performed by written permit only.

Prior to working on or near live electrical parts, an Electrical Work Permit must be issued and approved by the Site Supervisor. Form ESQ-5.7.01 should be used for this purpose. A pre-job briefing which covers the hazards involved, the Electrical Work Permit and the protective measures will be conducted and documented on a Daily Safety Briefing Form or site-specific form.

3.7.3 Hazard Analysis

Appropriate safety-related work practices shall be determined before any person approaches exposed live parts within the Limited Approach Boundary by using both shock hazard analysis and flash hazard analysis.

Shock Hazard Analysis. A shock hazard analysis shall determine the voltage to which personnel will be exposed, boundary requirements, and the personal protective equipment necessary in order to minimize the possibility of electrical shock to personnel.
FPN: See 130.2 for the requirements of conducting a shock hazard analysis.

Flash Hazard Analysis. A flash hazard analysis shall be done in order to protect personnel from the possibility of being injured by an arc flash. The analysis shall determine the Flash Protection Boundary and the personal protective equipment that people within the Flash Protection Boundary shall used to determine the Flash Hazard/Risk Category of the activity, and the need for voltage rated glove and tools. TI ESQ 5.7.02 should be used.

Examples for activities on a thermal treatment unit can be found in TI ESQ-5.7.03

3.7.4 Tools and Personal Protective Equipment

TI ESQ-5.7.02 includes the PPE requirements for Flash protection and the need for V-rated tools.

3.7.5 Procedures

Working on energized electrical equipment, when permitted, should follow these procedures:

Justify why the equipment cannot be de-energized on the Electrical Work Permit approved by the site supervisor;

Hold a pre-job briefing with employees doing the work, or who may be in the general area;

Ensure the person(s) doing the work in the Restricted Approach Boundary are "qualified" to do the work;

Use the required PPE for the Hazard/Risk Category of the work being performed and voltage rated tools where required;

Barricade the area within the Flash Protection Boundary with candlesticks and tape or other methods to keep unqualified people out;

Verify the function of any test equipment being used;

To the extent possible, stand to the side and use your off-hand to operate breakers and starters. However, when wearing a face shield, face the work directly so that an arc does not enter the open side of the shield;

Wear hard hat rated for electrical work, Type I Class G (2,200V). The standard vented ECC hats do not carry this rating.

Insulating shields should be used when practical to cover exposed parts not being worked on.

V-rated rubber gloves should be inspected for leaks before each use. Leather protectors should always be worn over the rubber rated gloves. The rated gloves must be tested and certified every six months.

Ensure Class C fire extinguishers rated for use on electrically-energized fires are present in the work area.

Have rescue personnel positioned outside the flash boundary with insulating stick fitted with a rescue-hook for Hazard Category 2 and above.

3.8 Coordination with Subcontractors

Subcontractors working with or around electrical equipment as 'unqualified' workers should be apprised of the general safety precautions within this SOP during site orientation or daily safety briefings.

Subcontractors doing electrical installation, testing, remodeling and repair work must be informed of the provisions of working on or near live electrical work within this SOP. They should provide their own safety procedures, lockout/tag-out procedures and equipment, and energized electrical work permits.

4.0 Monitoring

The site ESQ designee and task supervisor will monitor the implementation of the electrical safe work procedures. ESQ auditors will review records during project audits.

5.0 Training

Employees will be trained in the general requirements of this SOP during the site orientation or a daily safety meeting.

Only Qualified Persons are permitted to do work on or near live electrical equipment. Qualified persons must be trained precautionary techniques, personal protective equipment, including arc-flash, insulating and shielding materials, and insulated tools and test equipment, the skills and techniques necessary to distinguish exposed energized parts from other parts of electrical equipment, the skills and techniques necessary to determine the nominal voltage of exposed live parts, the approach distances specified in TI ESQ-5.7.02 and the corresponding voltages to which the qualified person will be exposed, the decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely and knowledgeable of the following:

- construction and operation of equipment or a specific work method;

- recognizing and avoiding the electrical hazards that might be present with respect to that equipment or work method;

6.0 Documentation

Training in this procedure shall be documented using a training sign-in sheet, or a Daily Tailgate sign- in sheet.

Work activities on or near exposed live electrical parts are documented using the permit,

Form ESQ- 5.7.01 Electrical Work Permit.

7.0 References

NFPA 70E Standard for Electrical Safety in the Workplace, 2004 Edition.

TI ESQ-5.7.01 Definitions

TI ESQ-5.7.02 Hazard Analysis and Equipment Selection
TI ESQ-5. 7.03 Worked Examples- Thermal Operations

Form ESQ-5. 7.OJ Energized Electrical Work Permit

SOP C.9

BIOLOGICAL HAZARDS

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to provide awareness to employees from potential biological hazards that may exist during work operations. It is important that ECC employees recognize and understand the potential hazards and implement preventative control measures at all times.

2.0 RODENTS

Avoid contact with rodents because they frequently are hosts for Hanta Virus. The Hantavirus is transmitted through the aerosolization of dried rodent excreta. The Hantavirus associated disease begins with one or more symptoms including fever, muscle ache, headache, and cough and progresses rapidly to severe lung disease, often requiring intensive care treatment. To control potential contact with dust that may be carrying the rodent excreta, ECC field team will conduct
a visual survey of each work area to note whether rodents are thriving in the area. The Center for Disease Control in Atlanta, Georgia has established a hotline for inquiries regarding the Hantavirus (800-532-9929).

3.0 SNAKES, SPIDERS, AND FLEAS

Spiders, snakes and fleas exist in cool dark moist areas. The potential for encounters exist when reaching into dark covered places. Suggestions for control include using a long stick to break apart webs or loosen soil from certain areas. A flashlight should also be used when reaching into a dark area. Field personnel shall be aware of their surroundings and avoid contact with all insects.

4.0 RATTLESNAKES AND SCORPIONS

Rattlesnakes and scorpions are indigenous to many parts of the United States. It should be noted that the American Red Cross does not advocate the use of snakebite kits for snakebite injuries. Experience has shown that the victim has a better chance for recovery without permanent damage when the site of the wound is immobilized. The victim should remain calm in order to reduce the circulation of blood through the bite area, as this will delay absorption of venom. It is vital to rush the victim to the closest emergency medical facility (preferably within 30 minutes).

5.0 POISONOUS PLANTS

Poisonous plants such as poison ivy and poison oak grow wild in shady, moist area and at the base of surrounding seedling or adult trees. Some individuals are prone to break out in dermal

(skin) rashes upon contact with the plant oil. A visual site inspection and identification of the plants should be completed prior to each work shift so that all individuals are aware of the potential exposure.

6.0 WARM BLOODED ANIMALS

Warm-blooded animals such as dogs, cats, rats, and prairie dogs, can transmit rabies and tetanus. Rabies can be transmitted when the saliva from an infected animal contacts an open wound or normal body opening, such as the mouth or eye. All animals are assumed to be potentially dangerous.

7.0 TICK-BORNE DISEASES

Tick-borne diseases represent a significant health risk in many parts of the world. Ticks are documented vectors of virus and bacteria for diseases such as Lyme disease. Personnel shall take precautionary measures by wearing proper clothing, use of repellants, use of good work practices, and recognizing symptoms early. Individuals that develop a rash or experience other early symptoms (i.e., fatigue, headache, muscle aches, neck stiffness, fever, and swollen glands) of Lyme disease should promptly see a physician for treatment.

8.0 ANTS, BEES, WASPS, HORNETS, AND YELLOW JACKETS

Nests and hives for ants, bees, wasps, hornets and yellow jackets often occur in ground, trees, brush and overhangs on buildings. An area will be checked for obvious nests and hives before it is cleared. If a nest or hive is detected, the SSHO will be contacted before the nest is disturbed. If necessary a Pest Management consultant will be brought to the respected site to provide recommended procedures for by passing or moving the nest. Workers with identified insect allergies will not be allowed to work in the area of a nest or hive. If simple first aid measures do not alleviate the symptoms of a sting, the victim will be taken to the nearest medical center for treatment.

BIOLOGICAL HAZARDS FACT SHEET
TICKS AND LYME DISEASE

Hazard Identification and Description

Ticks are tiny, parasitic arachnids, living on the blood of primarily mammals and birds and are second only to mosquitoes as vectors of human disease. They are common to wooded areas, living in tall grasses and shrubs where they can climb onto humans as they brush against the grass or shrub. A tick cannot jump or fly. A tick attaches itself with its hypostome, a harpoon-like structure around its mouth. They will generally drop off of skin when full, which can take several days. Ticks can also be passed to humans through contact with animals that have a tick attached to their skin, fur, or feathers.

From left to right: The deer tick (Ixodes scapularis) adult female, adult male, nymph, and larva on a centimeter scale.

Health Effects

Tick bites resemble a mosquito bite, developing a small irritated area varying from person to person. Most ticks do not carry disease and most bites do not cause serious health problems. Although, tick bites can cause deadly diseases such as Lyme disease.

<u>Lyme disease</u> is caused by spirochetes bacterium, *Borrelia burgdorferi,* which is transferred from infected deer ticks and lone star ticks. Symptoms include developing a rash or a ring forming around the bite, accompanied by fatigue, headache, muscle aches, neck stiffness, fever, and swollen glands. Should you experience these symptoms after being bit notify the SSHS promptly for referral to a physician for evaluation. Left untreated, the infection can spread to the joints, heart, and nervous system. Lyme disease is most common in the Northeast, upper Midwest, and along the southern Texas coast.

There are other diseases, including Rocky Mountain Spotted Fever that can be transmitted via ticks. If you develop any of the symptoms described above, seek medical treatment for evaluation.

Prevention Measures

Ticks are prevalent during the warmer months, from late spring to early fall. The first line of defense is the use of an insect repellant, applied at two to three hour intervals. Personnel will take precautionary measures by wearing proper clothing, use of repellants, use of good work practices, and recognizing symptoms early.

General guidelines for prevention of exposure to ticks and tick-borne diseases include:

- Limit work in tick infested areas.
- Wear long sleeves and pants.
- Wear light-colored clothing to allow for easy visibility of ticks on clothing.
- Tuck pant bottoms into socks or boots or tape pant cuff to boot.
- Apply repellants (e.g., permethrin to boots and clothing, DEET to exposed skin).
- Conduct a body check upon return from potentially tick-infested areas.

First Aid and Special Medical Treatment

General first aid for bites should be to wash the area with soap and water, apply a cold/ice pack, apply a hydrocortisone cream or calamine lotion, and take an antihistamine or pain medicine.

Embedded ticks should be removed using the following guidelines:

- Use a fine-tipped tweezers or shield your fingers with rubber gloves.
- Grasp tick as close to the skin surface as possible and pull upward with a steady, even pressure.
- Do not twist or jerk the tick, or squeeze, crush, or puncture the body of the tick.
- After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
- Save the tick for identification in case you become ill.

DO NOT use petroleum jelly, hot matches, nail polish, or other products to assist in tick removal.

BIOLOGICAL HAZARDS FACT SHEET

BEES & WASPS

Hazard Identification and Description

Bees, wasps, hornets, and yellowjackets are often referred to by most people as “bees.” Although they are similar, they can be separated into two groups, bees and wasps, based on looks, characteristics, and feeding. They become hazardous to people when disturbed and they sting.

Bees, which feed on nectar, include honey, bumble, and carpenter bees and have a rounded, not narrow, abdomen and make nests of wax.

Wasps, which feed on insects, include paper wasps, yellowjackets, and hornets, can be identified by their narrow abdomen and make nests of paper. Yellowjackets are often mistaken for bees, due to their yellow and black striped abdomen and the fact that more people are stung by yellowjackets than any other bee or wasp. They are aggressive when feeding and can sting repeatedly; their stingers are not barbed or lost like honey bees.

Health Effects

Stings can be painful, causing localized swelling and itching as a reaction to the venom. In most instances, symptoms will gradually disappear in a few hours. Approximately 1% of the population is allergic to the venom of bees and wasps and may experience the following symptoms, difficulty breathing, dizziness, nausea, and hives. If you experience any of these symptoms after being stung notify the Site Safety and Health Specialist (SSHS) promptly for referral to a physician for evaluation.

Prevention Measures

The most important step to control bees and wasps is to destroy the nest with a bee or wasp killer insecticide. If done improperly, attempting to destroy a nest can agitate bees and wasps and become a greater hazard. If you feel the nest will be a hazard and are unable to safely destroy it, contact the SSHS as a pest management specialist may be needed.

General guidelines for prevention of bee and wasp stings:

- Be aware of your surroundings, listen for buzzing and look for nests.
- Wear light-colored clothing, as they are attracted to dark blue and black.
- Wear long-sleeved shirts, pants, and boots.
- Carry a wasp and hornet killer with a long range spray.
- Insect repellent containing DEET will not deter bee or wasp attacks.
- Spray clothing with products containing permethrin. Permethrin should only be used on clothing; do not apply it directly to skin. Wash treated clothing before wearing it again.
- Do not wear strong perfumes or cosmetics, which can attract bees.

First Aid and Special Medical Treatment

General first aid is to wash the sting with soap and water and if needed apply a cold/ice pack, apply a hydrocortisone cream or calamine lotion, and take an antihistamine.

If the stinger is still attached, it can be removed by using by scraping the skin with a straight edge, such as the side of a knife, credit card, or finger nail. Do not squeeze the stinger with tweezers or your fingers, as it will cause more venom to enter the skin.

Allergic reactions require immediate medical attention. Symptoms of allergic reactions may include one or more of the following:

- Hives, itching and swelling
- Tightness in the chest and difficulty breathing
- Hoarse voice or swelling of the tongue
- Dizziness or drop in blood pressure
- Unconsciousness or cardiac arrest

If you know you are allergic or hypersensitive to stings and are working around bees and wasps, it is recommended that you carry emergency epinephrine injection kits. Consult with a doctor regarding use.

BIOLOGICAL HAZARDS FACT SHEET

MOLD

Hazard Identification and Description

Molds are fungi that grow naturally in warm, damp, or humid conditions and although important to ecosystems can become a health hazard. It grows outdoor and indoor. When mold grows indoors it increases exposure potential and can present problems for people living or working around it. Exposure comes from inhaling or touching mold or mold spores.

Health Effects

Molds can cause allergic reactions, irritate eyes, skin, throat, and lungs, and potentially produce toxic substances (mycotoxins). Reactions can be immediate or delayed. Severe reactions can include fever, shortness of breath, and lung infections in people with lung illnesses.

Prevention Measures

Take all necessary precautions to limit your exposure to mold and spores. Preventing and controlling moisture will reduce the growth of mold. Wet or damp areas or materials that are dried within 24 to 48 hours should stop the growth of mold.

- Fix leaks or water problems as soon as possible.
- Scrub mold off of hard surfaces with detergent and water and dry completely.
- Avoid touching mold with your bare hands. Wear long gloves, extending to the middle of the forearm.
- Wear goggles, those without ventilation holes are recommended.
- The EPA recommends wearing an N-95 respirator while cleaning or working around mold. The same OSHA fit standards apply to the N-95 as other respirators.
- Use ventilation or dehumidifiers if mold is suspected or working in humid environments.

First Aid

Remove yourself from the mold area.
Wash affected area (face, hands) with soapy water.
If conditions persist (irritation, rash, trouble breathing) inform the SSHS and receive medical attention.

Special Medical Treatment

There are no EPA or other federal limits set for mold or mold spore sampling.

BIOLOGICAL HAZARDS FACT SHEET
MOSQUITOES AND WEST NILE VIRUS

Hazard Identification and Description

Mosquitoes are small flying insects, which feed on the blood of mammals and birds by inserting their proboscis, a tubular feeding and sucking organ, into the skin. They breed and are found in wet, swampy areas where they prefer still water to lay their eggs. Not a lot of water is needed for mosquito to lay their eggs; a small puddle or ditch of standing water is enough.

Mosquitoes are prevalent during the warmer months, from late spring to early fall and are most active during dusk and dawn. They are primarily attracted by the carbon dioxide humans and other animals exhale. They are also attracted to various perfumes, detergents, and perspiration.

Health Effects

A mosquito bite can cause itching and swelling with the severity varying from person to person. If not treated correctly, some bites may cause serious illness or even death, including West Nile Virus.

West Nile Virus is a mosquito-borne illness, which does not often show any symptoms. Symptoms usually develop between 3 and 14 days after being bitten. Up to 20 percent of the people who become infected with WNV will display mild symptoms, including fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms typically last a few days. About one 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.

Mild WNV illness improves without treatment and medical attention is not necessary. If symptoms of severe WNV illness are present, such as unusually severe headaches, notify the Site Safety and Health Specialist immediately for medical evaluation.

Prevention Measures

During seasons of the year when mosquitoes are prevalent, the first line of defense is the use of an insect repellant, applied at two to three hour intervals. Personnel will take precautionary measures by wearing proper clothing, use of repellants, use of good work practices, and recognizing symptoms early.

General guidelines for prevention of exposure to mosquito bites include the following.

- Wear long-sleeved shirts.
- Spray exposed skin with an insect repellent containing 15-30% DEET.

- Spray clothing with products containing DEET or permethrin, as mosquitoes may bite through thin clothing. Permethrin should only be used on clothing; do not apply it directly to skin. Wash treated clothing before wearing it again.
- Do not apply repellent to skin that is under clothing.
- Wash treated skin with soap and water after returning indoors.
- Eliminate standing water, which can be breeding grounds for mosquitoes.

First Aid and Special Medical Treatment

General first aid should be to wash the bite with soap and water and if needed apply a cold/ice pack, apply a hydrocortisone cream or calamine lotion, and take an antihistamine or pain medicine.

Allergic reactions require immediate medical attention. Symptoms of allergic reactions may include one or more of the following:

- Hives, itching and swelling
- Tightness in the chest and difficulty breathing
- Hoarse voice or swelling of the tongue
- Dizziness or drop in blood pressure
- Unconsciousness or cardiac arrest

BIOLOGICAL HAZARDS FACT SHEET

POISONOUS PLANTS

Hazard Identification and Description

Poison ivy and poison oak have poisonous sap (urushiol) in their roots, stems, leaves and fruits. The sap is released when the plant is bruised, and is especially hazardous in the early spring and summer when the leaves are tender. The sap may be deposited on the skin by direct contact with the plant or by contact with contaminated objects, such as clothing, shoes, tools, and animals.

Poison ivy grows everywhere in United States except Hawaii and Alaska. In the East, Midwest, and the South, it grows as a vine. In the Northern and Western United States, it grows as a shrub. Each leaf has three leaflets. *(Leaves of three, let it be!)* Leaves are green in the summer and red in the fall. In the late summer and fall, white berries may grow from the stems.

Poison Oak has oak-like fuzzy leaves in clusters of three. It has two distinct kinds: Eastern poison oak (New Jersey to Texas) grows as a low shrub. Western poison oak (Pacific Coast) grows to six-foot-tall clumps or vines up to 30 feet long and may have clusters of yellow berries.

Poison sumac is found in swampy areas in the Northeast, Midwest, and Southwest. The alternating leaves have 7 to 13 leaflets.

Hazardous Plants

Poison Ivy: A woody shrub or vine. The vine climbs by aerial rootlets that cling readily to trees. Three leaflets borne on a single petiole make up the leaf. Each leaflet can be up to four inches long and is a dark waxy, shiny green above and lighter green and fuzzy beneath. The flowers grow like berries on very thin stems. During the summer, the flowers are lost and the leaves turn fire-engine red. All parts of the plant are poisonous.

Poison Oak: In the West, poison oak may grow as a vine or a shrub. In the East, it grows as a shrub. Hair grows on the fruit, trunk and leaves. Leaves have three leaflets like poison ivy. The flowers of poison oak are glossy, white-green and grow like berries. In the fall, poison oak is yellowish red and in the winter it is bare. When bare, poison oak can be distinguished by its three branches. All parts of the plant are poisonous.

Poison Sumac: This plant can be a tree or shrub, it can grow up to 25 feet in height with a trunk up to 6 inches in diameter. It is limited to swampy lands but ranges from Maine to Florida and west to Minnesota, Missouri and Louisiana. The leaves alternate, can be 15 inches or more long made up of 7 to 13 alternating thin oval to pointed leaflets. The whole plant is very poisonous.

Health Effects

Signs and symptoms of poisoning include itching, redness, burning sensation, swelling, blisters, and a rash. Symptoms may develop within a few hours or may take three to five days to develop. If left untreated, the rash may last several weeks.

Prevention Measures

Preventive measures include wearing long-sleeved shirts and long pants, and cloth or leather gloves.

First Aid

Wash infected areas with soap and water. Barrier creams should be applied to exposed skin. Calamine lotion over affected area will also help relieve itching and promote healing. Rubbing alcohol can be used to remove the oily resin up to 30 minutes after exposure.

BIOLOGICAL HAZARDS FACT SHEET

SNAKES

Hazard Identification and Description

All personnel should be aware that site activities have the potential for encountering or disturbing snakes. Areas with heavy undergrowth or shrubs are of special concern. Prompt first aid measures are extremely important. The following provides a general description of the common snakes found through the United States.

Copperhead: Found throughout Copperhead snakes are non-aggressive unless disturbed or threatened. They are moderately large in size with a stout body, and have hourglass markings on its body. Their bite are very painful but not usually life threatening.

Timber Snake (Caneback): The Timber or Caneback Rattle Snake favors wooded areas, rocky hillsides or river valleys. They tend to be non-aggressive unless threatened or disturbed and have a painful, non-life threatening bite.

Cottonmouth (Cottonmouth Moccasin, Water Moccasin, Moccasin): The average adult size Cottonmouth Snake is 20 to 48 inches. It is a dark colored, heavy-bodied snake. Juveniles are brightly colored with reddish brown cross bands on a brown ground color. The dark cross bands contain many dark spots and speckles. The pattern darkens with age so adults retain only a hint of the former banding or are uniform black. The head is thick and distinctly broader than the neck, and when viewed from above the eyes cannot be seen. They can be found in any wetlands or waterways in the state. The cottonmouth occasionally wanders far from water and has been found in bushes and trees.

Eastern Diamondback Rattlesnake (Diamondback, Rattlesnake, Rattler): The average adult Eastern Diamondback Rattlesnake size is 36 to 72 inches. They are a large, heavy bodied snake with a row of large dark diamonds with brown centers and cream borders down its back. The ground color of the body is brownish; the tail ends in a rattle. Diamondbacks are often found in pine flatwoods, longleaf pine and turkey oak and sand pine scrub areas. These habitats contain palmetto thickets and gopher tortoise burrows in which the Diamondback may seek refuge.

Dusky Pygmy Rattlesnake (Pygmy Rattler, Ground Rattler): The average adult size Dusky Pygmy Rattlesnake is 12 to 24 inches. This is a small snake, but very thick for its size. The top of the triangular shaped head is covered with nine (9) large scales. The body color is light to dark gray. A longitudinal row of black or charcoal transverse blotches disrupts a reddish brown strip running down the middle of the back. Dark spots on the side line up with the blotches. The tail is slender and ends in a miniature rattle. The snake is found throughout the state, and is common in lowland pine flatwoods, prairies, around lakes and ponds, and along the borders of many freshwater marshes and cypress swamps.

Eastern Coral Snake (Coral Snake): The average adult size Eastern Coral Snake is 20 to 30 inches. The body is ringed with black, yellow and red; narrow yellow rings separating the wider red and black rings. The rings continue across the belly of the snake. From tip of snout to just behind the eye the head is black. The tail is black and yellow, without any red rings. The snake occurs throughout the state and occupies a variety of habitats, from dry, well-drained flatwoods and scrub areas to low, wet hummocks and the borders of swamps. They are secretive and are usually found under debris and in the ground. Occasionally, they are found in the open, and have been seen climbing the trunks of live oaks.

Health Effects

If an individual is bitten by a snake, the basic rule is - TREAT ALL SNAKEBITES AS POISONOUS. A probability exists that all snakes may be potential carriers of tetanus (lockjaw); if bitten by any snake, whether poisonous or not, seek medical attention immediately.

Prevention Measures

Snake bites mostly occur between April and October when they are most active. Take precautions when moving brush or stationary equipment and walking through tall grass and weeds, including wearing gloves, long pants and boots. Never handle live or dead snakes.

First Aid

If bitten by a snake, seek medical help. In the interim:

- Remain calm, but act swiftly.
- Immobilize the affected area in a position horizontal to the heart, or in a gravity-neutral position.
- Do not attempt to cut open the bite or suck out venom. If venom should seep through any damaged or lacerated tissues in the mouth, it could cause immediate unconsciousness and/or death.
- Do not drink alcohol or use medication. Do not apply hot or cold packs. Do not use a tourniquet such as a belt, necktie, or cord. Do not waste time trying to capture, kill, or bring in the offending snake unless it can be done quickly and safely for use in identification of the proper treatment.

Special Medical Treatment

If bitten, identify and/or kill the snake (if it can be done quickly and safely) and take it to the hospital for identification. This information is valuable to medical personnel when treating snakebites.

BIOLOGICAL HAZARDS FACT SHEET

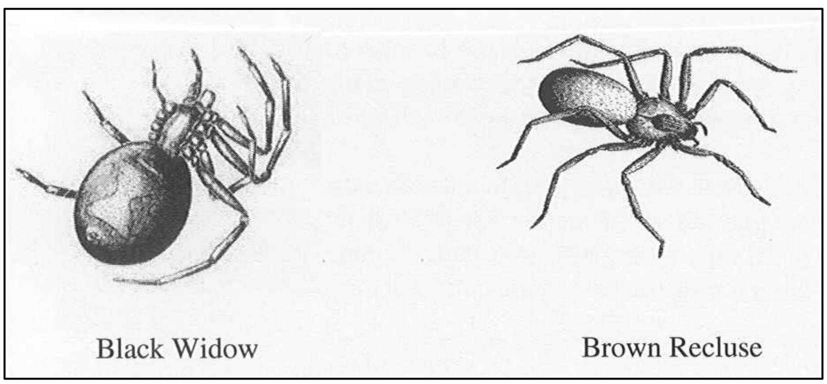
SPIDERS AND SCORPIONS

Hazard Identification and Description

Spiders in the United States are generally harmless, with two notable exceptions, the black widow spider (*Latrodectus mactans*) and the brown recluse or violin spider (*Lox osceles reclusa*). Field workers must exercise caution when lifting covers off manholes or sumps or rummaging through wood, rock, or brush piles, etc. Both the black widow and brown recluse spiders are typically found in these locations.

Black widow spiders spin tangled webs of coarse silk in dark places, usually outdoors. Webs are usually built near the ground normally in trash, rubble piles, under or around houses and outbuildings such as privies, sheds, and garages. Bites are uncommon and serious long-term complications or death is rare.

The brown recluse spider, or violin spider, is about 1 inch long. The most distinguishing mark is the violin like dark patch on their head and thorax with the skinny part of violin pointing toward the abdomen. It is not an aggressive spider, but will attack if trapped or held against the skin. No deaths have been reported in the US from a brown recluse bite.



Scorpions. There are about 18 species of scorpions in Texas with most of them found in the Big Bend area. They have an average size of 2 inches. The color may vary from dark to light.

Health Effects

The black widow spider bite feels like a pinprick or is not even felt. At first, there may be only slight local swelling and two faint red spots surrounded by local redness at the bite. Pain becomes intense in one to three hours and may continue up to 48 hours. Pain usually progresses from the bitten member up or down the arm or leg, finally localizing in the abdomen and back. The abdominal muscles may become rigid and board-like with severe cramps (resembles appendicitis). There may be pain in the muscles and soles of the feet, and eyelids may become swollen. Other symptoms may be nausea, profuse perspiration, tremors, labored breathing and speech, and vomiting. During this time, a feeble pulse, cold clammy skin, unconsciousness, convulsions and even death may result if the victim does not receive medical attention immediately. Additional complications may occur due to the infection of the bite.

Venom from the brown recluse spider usually causes local tissue damage. The most common symptoms of a bite from a brown recluse spider bite include: burning, pain, itching, or redness at the site which is usually delayed and may develop within several hours or days of the bite; a deep blue or purple area around the bite, surrounded by a whitish ring and large red outer ring similar to a "bulls eye"; an ulcer or blister that turns black; headache, body aches; rash; fever; nausea or vomiting. These symptoms of a brown recluse spider bite may resemble other conditions or medical problems.

Although Texas scorpions are not considered deadly, they can inflict a sharp, painful, sting which may produce a local reaction. Individual reactions may vary. The venom is a neurotoxin and anyone stung should be watched closely for adverse or allergic reactions.

Prevention Measures

General guidelines for prevention of spider bites include:

- Apply repellants (e.g., permethrin to boots, clothing, and equipment)
- Wear long sleeves, pants, boots, and gloves
- Eliminate other pests, such as flies, ants and cockroaches, which attract spiders
- Practice good housekeeping and reduce piles of wood, trash, rocks, and debris

First Aid

If bitten, remain calm, collect the spider (if possible) for positive identification, and get medical attention immediately. First aid is of limited help. Application of a mild antiseptic such as iodine or hydrogen peroxide prevents infection.

First Aid: Seek immediate medical attention. In the interim, the following should be done:

- Wash the area well with soap and water.
- Apply a cold or ice pack wrapped in a cloth to reduce swelling and redness.
- Apply an antibiotic lotion or cream to protect against infection.
- Give acetaminophen for pain.
- Elevate the site if the bite occurred on an arm or leg (to help prevent swelling).
- Seek immediate emergency care for further treatment. Hospitalization may be needed.

SOP C.10

EQUIPMENT DECONTAMINATION

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to establish safe, standardized methods for decontaminating equipment during field sampling operations.

2.0 BACKGROUND

An important aspect of quality control is the decontamination of field sampling equipment. It is imperative that sampling devices and equipment be carefully cleaned prior to collecting each sample, between sample collection, and before removal from the site, thereby avoiding cross-contamination. Cross-contamination results in samples which are not representative of the sampled matrix.

Equipment decontamination minimizes the risk of cross-contamination between individual samples and assists in the reduction of possible hazardous material migration to other areas within the site.

3.0 EQUIPMENT REQUIRED

- Plastic drop cloths;
- Scrub brushes in various sizes;
- Disposable dishwashing gloves;
- Potable water (avoid water obtained from the site unless it has been tested for the Constituents of Concern);
- Deionized (DI) water;
- Wash tubs and/or buckets; (one for detergent, one for potable water, and one for DI water);
- Poly squeeze bottles (wash bottles);
- Manually operated pressure sprayers (one for detergent, one for rinse);
- Aluminum foil;
- Plastic wrap;
- Phosphate-free laboratory grade detergent (Alconox or equivalent);
- Dilute hydrochloric or nitric acid;

- Steam cleaner or high-pressure water cleaner; and Gloves - latex or vinyl (powderless); and
- Personal Protective Equipment (PPE) (wear the PPE as prescribed in the Safety and Health Plan, when handling contaminated materials).

4.0 PROCEDURE

4.1 Decontamination of Sampling Equipment Items

All sampling equipment must be carefully cleaned and dried prior to the start of sampling and between each sample collected. The following decontamination sequence will be utilized prior to sampling for all sampling equipment:

- Wash and scrub with a solution of Alconox detergent in water;
- Triple rinse with tap water;
- Rinse with DI water;
- Air dry;
- Rinse with dilute hydrochloric or nitric acid;
- Triple rinse with water;
- Rinse with DI water;
- Air dry; and
- Wrap in plastic for protection.

Sampling equipment will be cleaned following the collection of each sample in the field to avoid cross-contamination. A minimum of three tubs will be used – Detergent tub, Potable water gross rinse, and DI final rinse. Decontamination personnel shall wear PPE in accordance with the Safety and Health Plan. The field decontamination sequence will include the following steps:

- Scrape and then clean with tap water and soap using a brush if necessary to remove particulate matter and surface films. Equipment may be steam cleaned (detergent and high-pressure hot water) as an alternative to brushing. PVC or plastic items should not be steam cleaned;
- Wash equipment thoroughly with a solution of Alconox detergent in water and scrub to remove any particulate matter or surface film;
- Rinse equipment thoroughly with tap water;
- Rinse equipment thoroughly with DI water;
- Allow to air dry; and
- Wrap each item in plastic for protection.

After the equipment is decontaminated between sampling episodes, it will be kept on clean plastic sheeting until needed.

When sampling equipment is used to collect samples containing oil, grease, or other hard to remove materials, it may be necessary to rinse the equipment several times with pesticide-grade acetone, hexane, or petroleum ether to remove the materials before proceeding with the first step. In extreme cases, it may also be necessary to steam clean the field equipment before proceeding with initial decontamination. If the equipment cannot be cleaned utilizing these procedures, it should be discarded.

4.2 Decontamination of 55 Gallon Bulk Sample Drums

Drums and lids will be decontaminated according to the following procedure:

- Wash and scrub the drums with an Alconox detergent solution utilizing a pressure sprayer;
- Triple rinse with water;
- Rinse with DI water; and
- Air-dry in an inverted position.

After drying, the drums will be resealed and taken to the sampling site. The lids will be removed just prior to actual sampling. When the drum is full, the lip of the drum will be wiped clean with paper towels to ensure a good seal when the lid and closing ring are attached. The outside of the drum will be washed down to remove clinging contaminants.

SOP C.11

PERSONAL PROTECTIVE EQUIPMENT

1.0 Purpose

The purpose of this Personal Protective Equipment program is to specify the procedures that will be followed to protect ECC employees and their subcontractors from exposure to work place hazards and the risk of injury through the use of personal protective equipment (PPE).

2.0 Scope and Application

This SOP applies to all ECC personnel, offices, and project sites where PPE is used. Pertinent sections of this SOP also apply to ECC subcontractors and visitors to ECC controlled sites where the use PPE is required in Accident Prevention Plans or Site Safety and Health Plans. This program also satisfies the PPE use requirements for hazardous waste sites as described by 29 CFR 1910.120.

The following sections describe the requirements for selecting, using, and maintaining PPE, including eye and face, head, foot and leg, hand and arm, and full-body protection. Separate programs exist for fall protection, respiratory protection and hearing protection as the need for participation in these programs is established through industrial hygiene monitoring and other regulatory standards.

This SOP is prepared in accordance with 29 CFR 1910 Subpart I – Personal Protective Equipment (1910.132 thru 1910.139) and Appendix B to 29 CFR 1910.120 and 29 CFR 1926.65.

3.0 Procedures

3.1 General

PPE is not a substitute for more effective control methods and its use will be considered only when other means of protection against hazards are not adequate or feasible. It will be used in conjunction with other controls unless no other means of hazard control exist.
PPE will be provided to ECC employees at no charge, with the following limitations:

- Prescription safety glasses will be provided once every two years. ECC reserves the right to select vendor and frame styles.

- Reimbursement for safety-toe footwear will be provided at a maximum rate of $125 per pair, per year.

Subcontractors are expected to provide their employees with appropriate PPE.
Careful consideration will be given to the comfort and proper fit of PPE in order to ensure that the right size is selected and that it will be used.

3.2 Hazard Assessment and Personal Protection Equipment Selection

Hazards for which PPE will be needed will be anticipated to the extent possible in the Accident Prevention Plan or Site-specific Safety and Health Plan (APP/SSHP), prepared by a qualified person. The program ESQ Manager will approve or concur with and sign the Plan. The SSHS will assess the workplace to determine if hazards are present, or are likely to be present that necessitates the use of personal protective equipment (PPE). Care will be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Hazard assessment results will be documented in the Activity Hazard Analysis (AHA). If additional hazards are found that are not covered in the AHA, the SSHS will amend the AHA or identify the hazards and PPE requirements in a Job Safety Analysis (JSA), in the SSHS Logbook, on the Daily Tailgate Safety forms. The name of the person conducting the assessment, findings, and date of evaluation will be noted in the record, and a statement indicating the record as a PPE hazard assessment will be added, along with the SSHS or ESQ Manager signature.

If such hazards are present, or likely to be present, the SSHS will:

- Select the types of PPE that will protect the affected employee from the hazards identified in the hazard assessment;
- Communicate selection decisions to each affected employee;
- Instruct the employee in the proper use and care of the PPE;
- Provide PPE that properly fits each affected employee; and
- With the Supervisor, enforce the proper use of PPE.

The level of protection may be upgraded or downgraded by the Project SSHS as conditions change at the site. Decisions for downgrading PPE requirements will be approved by the ESQ Manager and client representative prior to implementation, unless criteria for such a downgrade are already incorporated into the plan. The SSHS will notify the client representative when PPE requirements are upgraded.

Reasons to upgrade include:
- Change in task that will increase contact or potential contact with hazardous materials;
- Action level is detected during monitoring; and

- Request of the individual employee.

Reasons to downgrade include:
- New information indicated the situation is less hazardous than originally believed;
- Change in site conditions that decreases the hazards; and
- Monitoring or lab analysis supports a decision to downgrade.

When site hazards necessitate the use of protective equipment ensembles, PPE selection will be based on the EPA's "Levels of Protection" criteria as discussed in Task Instruction, *TI ESQ-6.1.01 Levels of Protection.*

3.3 PPE Standards

All personal protective clothing and equipment will be of safe design and construction for the work to be performed and will be maintained in a sanitary and reliable condition. Only those items of protective clothing and equipment that meet NIOSH or ANSI (American National Standards Institute) standards will be procured or accepted for use in the United States. International projects should use equipment approved or certified by host nation organizations. Examples include AU/NZ certifications in Australia, or the bearing the CE Mark in Europe. Newly purchased PPE must conform to the updated ANSI (or international equivalent) standards, as follows:

3.3.1 Eye and Face Protection ANSI Z87.1.

Face protection is not considered eye protection. Generally, where face protection is needed to shield contact with flying debris or chemical splash, suitable eye protection must be worn under the face shield.
The minimum standard for field project site workers and visitors are Z87 (basic impact) safety glasses with side protection. New purchases for site workers should be Z87+ (high impact).
Special eye and face protection will be established in the hazard assessment for the task.
Eye and face protection should follow the guidance in *TI ESQ-6.1.02 Eye and Face Protection Selection.*

3.3.2 Head Protection ANSI Z89.1

General field project site workers will wear Type I (top protection) Class C (conductive/not tested) hardhats. (This designation offers no electrical protection.) ECC logo hardhats may be ordered through Facilities Management in Burlingame.
Electrical workers, and those working in close proximity to live electrical energy, will wear at least Type I Class G (2,200V).
Exceptions to wearing hardhats on project sites will be made by the ESQ Manager through approval of the Accident Prevention Plan/Site-specific Safety and Health Plan

(APP/SSHP) or Activity Hazard Analysis based on a determination that no overhead hazards are expected.

3.3.3 Foot Protection ANSI/ASTM Z41

Safety-toe footwear is required on construction and remediation sites in the US and territories. Footwear for general site workers should be 6" minimum hiker or workboot style with good traction soles. Puncture resistant soles are recommended for landfill and construction sites. Visitors may wear low-cut oxford style safety-toe footwear.
Low-cut athletic shoe type footwear may be permitted on field sites for special applications where good traction and flexibility is required, such as HDPE liner installation and steep-sloped roofing with the approval of the ESQ Manager.
The hazard assessment will determine if special foot protection, such as chemical resistant boots, metatarsal guards, or electrical hazard boots are required.
Foot protection requirements for international work will be determined based on the hazard assessment, availability and cultural factors and will be specified in the APP/SSHP.

3.3.4 Hand Protection

Selection must be based on the performance characteristics of the glove in relation to the tasks to be performed. Leather work gloves (e.g. pigskin drivers gloves) will be standard hand protection for construction activity. Other hand protection will be specified in the hazard analysis.

3.3.5 High Visibility Garments ANSI/ISEA 107-1999

Work on project sites where construction equipment is operating will be required to wear Class 1 garments, at a minimum.
On USACE and NAVFAC sites, or when working at night, or on or adjacent to a road with speed limits under 50 mph, Class 2 garments will be worn.
Where traffic exceeds 50 mph, workers on or adjacent to roads will were Class 3 garments.

3.3.6 Body protection

Coveralls used for protection against site contaminants must be selected with due consideration of health risks of the chemicals versus the added heat stress posed by the garment.

3.3.7 PPE for Clearing

Clearing using brush cutters will be performed with the following PPE:

- Hard Hat
- Safety toe footwear
- Safety glasses
- Impact resistant polycarbonate face shield
- Hearing protection
- Kevlar chaps
- Kevlar sleeves or a heavy denim jacket
- Leather work gloves

Chain saw activities will use the same equipment, except a wire mesh face shield may be used.

3.4 PPE Inspection Program

Each person who is required to wear PPE will inspect their equipment prior to and after each use. Defective or damaged equipment will not be used. Heavily contaminated PPE that cannot be adequately cleaned will be discarded. Stored PPE will be inspected every month to ensure that it has not been damaged and is suitable for use. Workers who wear PPE in the field will take note of the condition of the PPE worn by their co-workers and inform them of any apparent problems, such as, missing equipment, tears in protective clothing, excessive contamination, improper use of PPE, inadequate PPE, etc.

3.5 Care of Equipment

It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. Employees must inspect, clean, and maintain their PPE according to the manufacturers' instructions before and after each use. Supervisors are responsible for ensuring that users properly maintain their PPE in good condition.

Personal protective equipment must not be shared between employees until it has been properly cleaned and sanitized. PPE will be distributed for individual use whenever possible. Where employees provide their own protective equipment, ECC will be responsible to assure its adequacy, including proper maintenance, and sanitation of such equipment.

4.0 Monitoring

The SSHS will inspect the jobsite each day and as frequently as necessary to ensure that PPE has been properly selected and is being used as designed. The SSHS will also inspect PPE stored for emergency use every month. Similar PPE inspections will be conducted by ECC's ESQ Manager during scheduled, quarterly visits of the project site.

5.0 Training

ECC will provide training to each employee who is required by this section to use PPE. As a minimum, the training will consist of the following:

- When PPE is necessary;
- What PPE is necessary;
- How to properly don, doff, adjust, and wear PPE;
- The limitations of the PPE; and,
- The proper care, maintenance, useful life and disposal of the PPE.

Each affected employee will demonstrate an understanding of the training specified in this section, and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE.

Should ECC have reason to believe that any affected employee who has already been trained does not have the understanding and skill required of this section, ECC will retrain that employee. Circumstances where retraining is required include, but are not limited to, situations where:

- Changes in the workplace render previous training obsolete; or
- Changes in the types of PPE to be used render previous training obsolete; or
- Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.

ECC will verify that each affected employee has received and understood the required training through a written certification that contains the name of each employee trained, the date(s) of training, and that identifies the subject of the certification.

6.0 Documentation

Project-specific employee training in the content of this procedure and in the selection, use, limitations, and maintenance of PPE will be documented on the daily Tailgate Safety Meeting form and/or site orientation training attendance sheet. PPE training may also be provided and documented in other company mandated training courses, such as, initial 40 Hazwoper training and 8 Hr. Refresher training.

PPE hazard assessments and selection will be documented in the APP/SSHP, in the AHA, in the SSHS Logbook, or on the Daily Tailgate Meeting document.

7.0 References

29 CFR 1910.132 thru 1910.139.
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10118
29 CFR 1910.120 Appendix B and 29 CFR
1926.65. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p

_id=9767
USACE 385-1-1, Section 5 Personal Protective Equipment. http://www.hq.usace.army.mil/soh/em385/current/SECTION05-V2-final.pdf
TI ESQ-6.1.01 Levels of Protection
TI ESQ-6.1.02 Eye and Face Protection Selection

APPENDIX D

COMMENT RESPONSE TABLE AND REGULATORY CONCURRENCE

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DRAFT SITE INSPECTION AND REMEDIAL INVESTIGATION WORK PLAN ADDENDUM
CC RVAAP-71 AND CC RVAAP-83
RAVENNA ARMY AMMUNITION PLANT, RAVENNA OHIO
COMMENT RESPONSE TABLE
ECC Draft Site Inspection and Remedial Investigation Work Plan Addendum - Submitted 26 February 2013
OhioEPA Comments – Received 8 April 2013

Comment Number	Page No. / Line No.	New Page or Sheet	Comment	Recommendation	Response
Ohio EPA (Nancy Zikmanis)					
1	3-1 / Section 3.1		Please explain or list the "necessary notifications to the Ohio Army National Guard, RVAAP, facility manager Ohio EPA," etc., or refer to the appropriate document (if any) that explains them.		Text has been added to this paragraph to explain and clarify the necessary notifications to various RVAAP stakeholders. The following text has been inserted after the second sentence in Section 3.1 Premobilization: "*These notifications include obtaining access to Camp Ravenna from the Army and Ohio Army National Guard in accordance with the Army's current access procedure and requesting the Army provide notification to the OhioEPA of sample collection in accordance with Section XIII Sampling and Data Availability, paragraph number 28 of the 2004 Director's Final Findings and Orders.*"
2	3-2, 3-3 / Section 3.2.3		Please explain how decontamination wastes will be managed and disposed or refer to the appropriate document that explains this.		The following text has been added after the last sentence in Section 3.2.3 Decontamination: "*Decontamination wastes will be managed and disposed of in accordance with Section 6.0 Disposition of Investigation-Derived Waste of the Final Site Inspection and Remedial Investigation Work Plan at Compliance Restoration Sites (ECC 2012b) and Section 8.0 of the Facility-Wide Sampling and Analysis Plan for Field Investigations (SAIC 2011)*.""
3	3-4 / Section 3.3		Paragraph's 3 and 4 (beginning at Line 586)		Based on the site histories presented in the HRR

Comment Number	Page No. / Line No.	New Page or Sheet	Comment	Recommendation	Response
			do not adequately explain how buried drums and any potential soil contamination from them will be managed. The inadequacies include: • It is not clear whether leaking contents or soils or both will be sampled. • The sampling protocol implies that sampling under a drum would occur before it has been determined whether it is safe to move the drum. This is confusing. • Sampling does not appear to include drum contents. • In the event that drums have leaked, what will determine the extent of contaminated soils to be excavated? • What will happen with the drums and any contaminated soil once loaded onto a pick-up truck is not explained. • It is not explained where drums will be staged and/or accumulated prior to proper disposal. • It is not explained who will be considered the generator if drum contents, releases, or contaminated soil is a hazardous waste, or who will be responsible for following any applicable hazardous waste generator rules. • The document states: "In the event that		report for these two CR sites (CC RVAAP-71 Barn No. 5 Petroleum Release and CC RVAAP-83 Former Building 1039), it is unlike that buried drums will be encountered during the Site Inspection field sampling activities. Note that no drums were observed or identified at CC RVAAP-71 or CC RVAAP-83 during the site visits conducted in 2012 as part of the HRR Report (ECC, May 2012). However, if a drum or drums are discovered, we will follow the protocol for drum sampling and characterization for IDW as per the FWSAP (SAIC, February 2011). The text currently beginning at line 589 to 596 will be deleted. At line 586, the following text will be added to address this comment. : "*In the event that a drum or drums are discovered during the investigation at any of the CR sties, the drum area will be flagged off for safety and TCLP sampling will be conducted beneath the drum and in the vicinity of the drum to determine whether the drums have leaked any contaminant. The contents of the drum will also be sampled to determine the type proper off-site disposal. If any soil staining is present, the soil will be sampled within the boundaries of the stained area to delineate the area of potential soil impact associated with the drum leak. Surface (0 to 1 ft bgs) and subsurface soil (1 to 3 ft bgs) samples will be collected using a hand auger.* *If the TCLP results indicate that drum removal by*

Comment Number	Page No. / Line No.	New Page or Sheet	Comment	Recommendation	Response
			drums of material or rusted drums are discovered during the investigation at any of the CR sites, rusted drums and they contents will be placed into a new or reconditioned 55-gallon drum." If a 55-gallon drum of material is found, a 55-gallon drum will not contain another 55-gallon drum and its contents. It is common practice to use an overpack drum of a larger size for this purpose. Please explain in more detail the handling, sampling, and cradle-to-grave management of any discovered buried drums, contents, and soils contaminated by them. Any appropriate RVAAP documents that explain such procedures should also be referenced.		*hand is acceptable, then an area immediately adjacent to the drums will be covered with 1-inch plywood and 0.6-mil plastic and the drum and their contents will be placed into a new overpack drum and staged on site.* *If the soil results in the vicinity of the drum indicate the soil has been impacted. The soil will be excavated, drummed, characterized and properly disposed of off-site. A work plan for the removal of the drum(s) would be generated and submitted for review by Army and OhioEPA stakeholders prior to executing a drum removal action*"
4	Table A.5-1		Proposed soil analyses for the Barn No. 5 petroleum release (gasoline) do not include lead. The use of tetra ethyl lead in gasoline was ubiquitous during the time the release occurred. Due to the low volatility of tetra ethyl lead, lead should be a constituent of concern for this release. Please revise the document to include analysis of lead in soil samples from the Barn No. 5 Petroleum Release Area.		Lead analysis of soil samples has been included in Table A.5-1 Barn No. 5 Petroleum Release Area Sampling Summary.
5	Site Coordinator		Please change all references in the document from Kevin Palombo as Site Coordinator to Ed		All reference to Kevin Palombo as Site Coordinator have been replaced with Ed D'Amato

Comment Number	Page No. / Line No.	New Page or Sheet	Comment	Recommendation	Response
			D'Amato, (330) 963-1170, ed.damato@epa.ohio.gov.		within the Addendum.
End of Comments					

FINAL SITE INSPECTION AND REMEDIAL INVESTIGATION WORK PLAN ADDENDUM
CC RVAAP-71 AND CC RVAAP-83
RAVENNA ARMY AMMUNITION PLANT, RAVENNA OHIO
COMMENT RESPONSE TABLE
ECC Final Site Inspection and Remedial Investigation Work Plan Addendum - Submitted 7 May 2013
OhioEPA Comments – Received 16 May 2013

Comment Number	Page No. / Line No.	New Page or Sheet	Comment	Recommendation	Response
Ohio EPA (Nancy Zikmanis)					
1	3-4 / Section 3.3		Paragraphs 3 and 4 (beginning at Line 586) do not adequately explain how buried drums and any potential soil contamination from them will be managed. *Any appropriate RVAAP documents that explain such procedures should also be referenced.* Reference to RVAAP documents (specifically the FWSAP) were included in the response table, but not in the document. Please state in Section 3.3 of the Final Site Inspection/Remedial Investigation Work Plan Addendum that the protocol for drum sampling and characterization for IDW, as per the FWSAP (SAIC 2011), will be followed.		As a result of the 31 May 2013 comment clarification meeting (via conference call) held with OhioEPA, ACOE and ECC representatives, the following sentence will be inserted after the first sentence in Section 3.3 Field Work: "*The protocol for drum sampling and characterization for IDW, as per the FWSAP (SAIC 2011a), will be followed.*"
End of Comments					

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Ohio EPA
40 years and moving forward

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Scott J. Nally, Director

July 1, 2013

CERTIFIED MAIL
7012 1010 0002 2260 4473

Mr. Mark Patterson
Facility Manager
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44266

Re: Ravenna Army Ammunition Plant, Site Inspection and Remedial Investigation Work Plan Addendum at Compliance Restoration Sites CC-RVAAP-71 and CC-RVAAP-83, Portage/Trumbull Counties, Ohio EPA ID # 267-000859-162

Dear Mr. Patterson:

The Ohio Environmental Protection Agency (Ohio EPA) has reviewed the May 6, 2013 response to Ohio EPA's May 14, 2013 Notice of Deficiency for the Site Inspection and Remedial Investigation Work Plan Addendum at Compliance Restoration Sites CC-RVAAP-71 and CC-RVAAP-83. The document was received by Ohio EPA on June 10, 2013 and was prepared for the Army Corps of Engineers, Louisville District, by ECC, under contract number W912QR-08-D-008.

The report is approved. If you have any questions, please feel free to contact me at (330) 963-1160.

Sincerely,

Nancy Zikmanis

Nancy Zikmanis, CHMM
Environmental Supervisor
Division of Environmental Response and Revitalization

ED:NZ/kss

cc: Katie Tate, OHNGB
Ann Wood, NGB
Cullen Grasty, USACE Louisville

ec: Todd Fisher, Ohio EPA, NEDO, DERR
Eileen Mohr, Ohio EPA, NEDO, DERR
Justin Burke, Ohio EPA, CO, DERR

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MARK PATTERSON
RAVENNA ARMY AMMUNITION PLANT
8451 STATE ROUTE 5
RAVENAA OH 44266

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