REVISED FINAL
PROJECT WORK PLAN FOR SITE INSPECTIONAT COMPLIANCE RESTORATION SITE CC RVAAP-80 GROUP 2 PROPELLANT CAN TOPS
Revision 0

Former Ravenna Army Ammunition Plant,

Portage and Trumble Counties, Ohio

January 7, 2016

Contract No. W912QR-12-F-0212

Prepared For

U.S. Army Corps of Engineers, Louisville
600 Dr. Martin Luther King, Jr. Place
Louisville, KY 40202

Prepared By

PIKA International, Inc
12723 Capricorn Drive, Suite 500
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14. ABSTRACT

This Project Work Plan has been developed for the U.S. Army Corps of Engineers, Louisville to support the on-site operations for the Site Inspection at the Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops. Former Ravenna Army Ammunition Plant (RVAAP) in Ravenna, Ohio.

15. SUBJECT TERMS

Project Work Plan (PWP), Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP)

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Ohio Environmental Protection Agency

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

February 22, 2016

Mr. Mark Leeper
Army National Guard Directorate
ARNGD-ILE Clean Up
111 South George Mason Drive
Arlington, VA 22204

Re: US Army Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage
267000859160

Subject: Ravenna Army Ammunition Plant, Portage/Trumbull Counties. Approval of the "Revised Final Project Work Plan for Site Inspection at Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops," Dated January 7, 2016. Ohio EPA ID # 267-000859-160

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) has received the "Revised Final Project Work Plan for Site Inspection at Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops" at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. This document was received at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) on January 8, 2016. The report was prepared for the US Army Corps of Engineers (USACE) Louisville District by PIKA International, Inc. under Contract Number W912QR-12-F-0212.

This document was reviewed by personnel from Ohio EPA's DERR, pursuant to the Director's Findings and Orders paragraph 39 (b). Ohio EPA considers the document final and approved.

Ohio EPA also received the "Revised Final Accident Prevention Plan for Site Inspection at Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops" on January 8, 2016 and acknowledges receipt of this document. Ohio EPA does not approve Accident Prevention Plans.

If you have any questions, please call me at (330) 963-1292.

Sincerely,

Kevin M. Palombo
Environmental Specialist
Division of Environmental Response and Revitalization

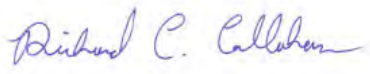
KP/nvr

cc: Katie Tait, OHARNG RTLS
Kevin Sedlak, ARNG
Gregory F. Moore, USACE
Rebecca Haney/Gail Harris, VISTA Sciences Corp.

ec: Bob Princic, Ohio EPA, NEDO, DERR
Rodney Beals, Ohio EPA, NEDO, DERR
Justin Burke, Ohio EPA, CO, DERR

STATEMENT OF INDEPENDENT TECHNICAL REVIEW

PIKA International, Inc. (PIKA) has completed the Revised Final Project Work Plan for Site Inspection at Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops, Revision 0 at the Ravenna Army Ammunition Plant. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy, principles and procedures, utilizing justified and valid assumptions, was verified. This included review of technical assumptions; methods, procedures and materials to be used, and whether the product meets customer's needs consistent with law and existing U.S. Army Corps of Engineers policy.



Reviewed/Approved by: _____ Date: January 2016
Richard Callahan
Project Manager

Reviewed/Approved by: _____ Date: January 2016
Margaret Carte, P.G.
Project Geologist

Reviewed/Approved by: _____ Date: January 2016
Shahrukh Kanga
Principal

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DOCUMENT DISTRIBUTION

Name/Organization	Hard Copies	Electronic Copies
ARNG Cleanup Program Manager	0	1
Camp Ravenna Environmental Office	1	1
Ohio EPA/NEDO/DERR	3	3
PIKA Program Manager	1	1
PIKA Project Manager	2	2
REIMS	0	1
RVAAP Administrative Records Manager	2	2
USACE Project Manager	2	2

ARNGD – Army National Guard Directorate

Ohio EPA/NEDO/DERR – Ohio Environmental Protection Agency Northeast District Office Division of Environmental Response and Revitalization

PIKA – PIKA International Inc.

REIMS – Ravenna Environmental Information Management System

RVAAP – Former Ravenna Army Ammunition Plant

USACE – United States Army Corps of Engineers – Louisville District

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APPENDICES

LIST OF ACRONYMS

AHA	Activity Hazard Analysis
AOC	area of concern
APP	Accident Prevention Plan
ARNG	Army National Guard
ARPA	Archaeological Resources Protection Act of 1979
CELRL	United States Army Corps of Engineers, Louisville District, Louisville, Kentucky
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESHM	Corporate Environmental Safety and Health Manager
CFR	Code of Federal Regulations
CLP	Contract Laboratory Programs
COR	Contracting Officer's Representative
CR	Compliance Restoration
CRM	Cultural Resource Manager
CSP	Certified Safety Professional
DID	Data Item Description
DOD	Department of Defense
DODI	Department of Defense Instruction
EOD	explosive ordnance disposal
EM	Engineering Manual
EP	Engineering Pamphlet
EPA	Environmental Protection Agency
ES&H	environmental safety and health
EZ	exclusion zone
FFP	firm fixed-price
FWCUG	facility-wide cleanup goals

GPS	Global Positioning System
HAZWOPER	Hazardous Waste Operations and Emergency Response
HTRW	Hazardous Toxic and Radioactive Waste
IAW	in accordance with
IDW	investigation-derived waste
IR	Investigation Report
IRP	Installation Restoration Program
ISM	Incremental Sampling Methodology
KO	Contracting Officer
LL	load line
MC	munitions constituents
MD	munitions debris
MDAS	material documented as safe
MEC	munitions and explosives of concern
mm	millimeter
MPPEH	Material Potentially Presenting an Explosive Hazard
msl	mean sea level
NCP	National Contingency Plan
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
OE	ordnance explosives
OESS	Ordnance and Explosive Safety Specialist
Ohio EPA	Ohio Environmental Protection Agency
OHARNG	Ohio Army National Guard
OHPO	Ohio Historic Preservation Office
OSHA	Occupational Safety and Health Administration
PAO	Public Affairs Office
PIKA	PIKA International, Inc.
PM	Program Manager

PjM	Project Manager
PMP	Project Management Plan
POC	point of contact
PPE	personal protective equipment
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QCP	Quality Control Plan
QSM	Quality Systems Manual
RCWM	recovered chemical warfare materiel
RVAAP	Former Ravenna Army Ammunition Plant
SAP	Sampling and Analysis Plan
SARA	Superfund Amendment and Reauthorization Act
SM	Site Manager
SOP	standard operating procedure
SOW	Statement of Work
SSHO	Site Safety and Health Officer
SSHP	Site-Specific Safety and Health Plan
SUXOS	Senior Unexploded Ordnance Supervisor
SZ	support zone
TAL	Target Analyte List
TP	Technical Paper
USACE	United States Army Corps of Engineers
USP&FO	United States Property and Fiscal Officer
UTM	Universal Transverse Mercator
UXO	unexploded ordnance
UXOSO	Unexploded Ordnance Safety Officer
WP	Work Plan

WZ	work zone

1.0 INTRODUCTION

1.1 GENERAL INFORMATION

1.1.1 *Project Authorization and Background*

PIKA International, Inc. (PIKA) developed this Work Plan (WP) in response to the Statement of Work (SOW) for the Compliance Restoration (CR) Site CC RVAAP-80 (Group 2 Propellant Can Tops Area) at the Ravenna Army Ammunition Plant (RVAAP) in Ravenna, Ohio. A copy of the SOW is presented in Appendix A.

The WP describes the procedures, operational sequence, and resources PIKA will use for the following tasks:

- Reacquire the previously identified anomalies, conduct a surface clearance for the propellant tops and cans, certify as safe and dispose/recycle.
- Collect surface and subsurface soil samples based on the results of the previous investigation at the site.
- Analyze soil samples for target analyte list (TAL) metals, and common propellants used by the Department of Defense (DoD) including nitrocellulose, nitroglycerine, nitroguanidine, and perchlorate. One (1) of the samples will also be analyzed for the RVAAP full suite.
- Dispose of all Investigation derived waste (IDW).
- Prepare investigation report.

Authorization for performance is contained in contract W912QR-12-F-0212 issued to PIKA by U.S. Army Corps of Engineers - Louisville District (CELRL), Louisville, Kentucky. The work will be performed on behalf of the CELRL.

1.1.2 *Objectives and Scope*

The purpose of this project is to conduct an investigation of the Group 2 Propellant Can Tops Area to achieve the following objectives:

- Identify, collect, certify as safe and dispose of the propellant cans and tops associated the anomalies identified in the Final Investigation Report for the Compliance Restoration Site CC RVAAP-80, Group 2 Propellant Can Tops and other Environmental Services, January 27, 2012.

- Confirm the presence or absence of releases of propellants and/or other munitions constituents (MC) to the surface and subsurface soils at the area of concern (AOC).

1.1.3 *WP Organization*

This WP has been prepared to outline the goals, methods, procedures, and personnel used for field activities under the SOW. This WP will document the logical sequence of activities, the procedures that will be used, and the applicable regulations that will be followed. The investigation-specific Sampling and Analysis Plan (SAP), which is comprised of the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) are also included in the WP. The Accident Prevention Plan (APP) has been prepared and submitted under separate cover and includes a Site-Specific Safety and Health Plan (SSHP) as an attachment. The APP/SSHP will address task hazard analyses, emergency response, contingency plans, and emergency contacts that are specific to the project.

1.1.4 *Changes to the WP*

PIKA prepared this WP after a review of archival data, study of prior investigations, discussions with the CELRL, Army National Guard (ARNG) and Ohio Army National Guard (OHARNG), and a thorough evaluation of the site. The WP is based on the information available at the time of its preparation and may require modification if unforeseen circumstances arise during the execution of this WP. Should the WP require modification, changes will be made using the following procedures:

- Under no circumstances will any change to the approved WP be executed without prior approval of the CELRL Project Manager (PjM), the PIKA Program Manager (PM), and the Ohio Environmental Protection Agency (Ohio EPA).
- The PIKA PjM/Site Manager (SM) will notify the PIKA PM of the required changes and the rationale for the changes.
- The PIKA PM will develop the changes in conjunction with the CELRL PjM.
- Proposed changes to this WP will be submitted in writing by PIKA to CELRL PjM for consideration/approval.
- CELRL will forward proposed changes to the OHARNG for review and submittal to the Ohio EPA for approval. No changes will be implemented without prior written approval by the Ohio EPA to the OHARNG. PIKA will not communicate directly with the Ohio EPA.

1.2 RVAAP LOCATION

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 OHARNG over a two-year period (2002 and 2003), and the actual total acreage of the property was found to be 21,683 acres.

The facility, consisting of 21,683 acres, is located in northeastern Ohio within Portage and Trumbull counties, approximately 4.8 kilometers (3 miles) east/northeast of the City of Ravenna and approximately 1.6 kilometers (1 mile) northwest of the City of Newton Falls. The facility, previously known as the Ravenna Army Ammunition Plant (RVAAP), was formerly used as a load, assemble, and pack facility for munitions production. As of September 2013, administrative accountability for the entire acreage of the facility has been transferred to the United States Property and Fiscal Officer (USP&FO) for Ohio and subsequently licensed to the OHARNG for use as a military training site known as the Camp Ravenna Joint Military Training Center (Camp Ravenna). References in this

document to RVAAP relate to previous activities at the facility as related to former munitions production activities or to activities being conducted under the restoration/cleanup program.

A regional map indicating the location of the RVAAP/Camp Ravenna is presented in Appendix B as Figure 1. A facility map showing the location of the Group 2 Propellant Can Top Area within the RVAAP/Camp Ravenna is presented in Appendix B as Figure 2.

1.3 RVAAP HISTORY

Production at the facility began in December 1941, with the primary missions of depot storage and ammunition loading. The installation was divided into two separate units; the Portage Ordnance Depot and the Ravenna Ordnance Plant. The Portage Ordnance Depot's primary mission was storage of munitions and components, while the mission of the Ravenna Ordnance Plant was loading and packing major caliber artillery ammunition and the assembly of munitions initiating components that included fuzes, boosters, and percussion elements. In August 1943, the installation was redesignated the Ravenna Ordnance Center and again in November 1945, as the Ravenna Arsenal. The plant was placed in standby status in 1950; and operations were limited to renovation, demilitarization and normal maintenance of equipment, along with storage of ammunition and components.

The plant was reactivated during the Korean Conflict to load and pack major caliber shells and components. All production ended in August 1957 and in October 1957, the installation was again placed in a standby condition. In October 1960, the ammonium nitrate line was renovated for demilitarization operations that involved melting explosives out of bomb casings for subsequent recycling. These operations commenced in January 1961. In July 1961, the plant was again deactivated. In November 1961, the installation was divided into the Ravenna Ordnance Plant and an industrial section, with the entire installation then being designated as the RVAAP.

In May 1968, RVAAP began loading, assembling, and packing munitions on three load lines (LLs) and two component lines in support of the Southeast Asia Conflict. These facilities were deactivated in August 1972. The demilitarization of the M71A1 90-millimeter (mm) projectile extended from June 1973 until March 1974. Demilitarization of various munitions was conducted from October 1982 through 1992.

Until 1993, RVAAP maintained the capability to load, assemble, and pack military ammunition. As part of the RVAAP mission, the inactive facilities were maintained in a standby status by keeping equipment in a condition to permit resumption of production within prescribed limitations. In September 1993, the RVAAP was placed in inactive caretaker status, subsequently changed to modified caretaker status. The LLs and associated real estate were determined to be excess by the Army.

As of September 2013, all 21,683 acres of the former RVAAP have been transferred to the USP&FO for Ohio for use by OHARNG as a military training site, now called Camp Ravenna.

1.4 RVAAP – CC RVAAP-80: GROUP 2 PROPELLANT CAN TOPS AREA

CC RVAAP-80 consists of the Group 2 Propellant Can Tops Area. Propellant cans and tops were identified on the ground surface/near surface (9-inch depth maximum) at the southern end of the former Group 2 Ammunition Storage Area.

In order to identify the types of propellant tops and cans found at the Group 2 Area, the types of artillery ammunition must be discussed. There are basically three types of artillery ammunition; Fixed, Semi-Fixed and Separate Loading.

- **Fixed:** ammunition in which the projectile is permanently attached to a case that contains the primer and the propellant in distinction from separate-loading ammunition
- **Semi-fixed:** ammunition consisting of complete rounds that can be loaded as a unit but have a cartridge case which is not fixed to the projectile and can

be removed in order to remove increments of the propelling charge.

- **Separate loading:** ammunition in which the projectile, propelling charge and primer are shipped and loaded separately rather than as a unit.

The propellant grains for all three types of ammunition are packed into cloth bags (increments) and securely stitched to prevent spillage of the propellant grains which would potentially change the desired range of the projectile fired. The fixed and semi-fixed ammunition are loaded as one unit with the propellant located in the cartridge case in tar impregnated fiberboard containers. These containers have steel tops/bottoms and a clip to hold the projectile in place. When secured within the fiberboard container the cartridge case has a closure disk which secures the propellant within the case. As long as the fiberboard container is intact it is physically impossible for the propellant to come in contact with the steel ends.

For separate loading ammunition the projectile, primer, fuze and propelling charge are shipped separately. There is no evidence of projectiles, primers and/or fuzes having been discovered on the site. The propellant containers are manufactured as a heavy steel cylinder with locking cap which supports and protects the propellant during shipping and storage. The propellant cans and tops for separate loading charges are identical to those found on the site.

The propellant bags (increments) are tightly placed within the protective wrapper to prevent any movement and any contact with the steel of the can in order to prevent the risk of propellant being ignited by a spark and/or static electricity. Cardboard packing material is then placed on top of the propellant increments and the cap inserted and locked in the top of the can. At no time does the propellant come in contact with the steel of the can. During the firing of artillery projectiles it is critical that the propellant grains maintain their shape and integrity and as such the individual grains cannot be subjected to rough handling which would cause them to crack or break. Given the care taken to prevent damage to the propellant grain and prevention of contact with the steel can, it is extremely unlikely that the propellant grains would break, much less be reduced to dust. Additionally, the powder bag would not allow release to the interior of the can.

Shipping containers/caps are not munitions rather the means used to transport the propellant to the appropriate firing point. Currently shipping containers and packing materials are classified as material potentially presenting an explosive hazard (MPPEH) until inspection and verification that propellant has been removed. Upon completion of this inspection process the items would be immediately reclassified as material documented as safe (MDAS) and as such able to be released to the public. All caps recovered to date at Former Ravenna Army Ammunition Plant (RVAAP/Camp Ravenna) have been classified as MDAS.

Given the former mission of RVAAP it is no surprise that propellant was stored and containers renovated at the facility. A review of the Historical Summary of Ravenna Arsenal by the Baltimore District Corps of Engineers District determined that it became necessary to repack certain propellant charge 155mm and 8 inch from wooden overpack to cartridge storage cases. The project was set up at the Depot Bundling Building, and over a period of seven months many hundreds of thousands were repacked into cartridge storage cases.

This would explain why there were empty propellant storage cans on site but provides no suggestion on why individual ends and debris were located at the Group 2 area. It is likely that the items recovered were most likely excess and/or were deemed unserviceable for use in repacking although there is no specific historical data to support this. Given the activities which took place on other ammunition storage facilities and the types of debris recovered it is a reasonable assumption.

The protection of the propellant grains and safety of workers during shipping and handling was critical therefore every effort was/is made to minimize movement of the propellant grains and completely eliminate the possibility of contact with the steel containers. Therefore, potential for propellant residue to be located on the steel shipping container or cap is highly unlikely.

The Baltimore District provided a detailed discussion which is provided in Appendix H of this WP.

The propellant cans and tops located at the south end of Group 2 were initially identified by OHARNG in the winter of 2008. The propellant can tops were observed in the vegetated area located immediately south of the ammunition storage magazines in the vicinity of the southern railroad spur lines (see Figure 3, Appendix B). This area consists of approximately 539,572 square feet (12.4 acres).

The United States Army Corps of Engineers (USACE), Louisville District, performed an emergency survey with a metal detector of a portion of the southern area ground surface. Results of the initial investigation revealed multiple magnetic anomalies in the surface and near surface soils did not extend below a depth of 9 inches bgs. On-site personnel visually identified the surface anomalies as propellants can lids or tops. During the emergency survey, it was noted that the ground surface had been disturbed and contained hummocks (mounds) ranging in height from 1 foot to 2 feet throughout the survey area. The historic aerial photos showed storage materiel on pallets in this area. The area appeared to not have been gravel covered, so the hummocks were likely caused by the tires of the vehicles used to place or retrieve the pallets sinking in when the ground was soft.

In April through May of 2011, an investigation was initiated to conduct a geophysical survey of the Group 2 Propellant Can Tops Area (12.4 acres total) and collect three surficial incremental soil samples. The geophysics utilized an EM-61MK2, which showed five clusters of ferrous items at or near the surface, as well as other scattered ferrous items (see Figure 4, Appendix B). The geophysics proved that there had not been any burial of the tops and cans. Please see Appendix D of the "*Final Investigation Report for Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops and Other Environmental Services (PIKA, January 27, 2012)* for details pertaining to the results/finding of the previous geophysical investigation at the site. Three of the clusters (i.e., 1, 3 and 5) became the location of the three incremental sampling methodology (ISM) samples collected during the investigation.

The soil samples were analyzed for target analyte list (TAL) metals, and common propellants used by the Department of Defense (DoD) including nitrocellulose,

nitroglycerine, nitroguanidine, and perchlorate. One (1) of the three samples was also analyzed for the RVAAP full suite, (including explosives, cyanide, volatile organic compounds; VOCs, semi-volatile organic compounds; SVOCs, and poly chlorinated bi-phenyls; PCBs). The three samples did not reveal any analytes exceeding the facility-wide cleanup goals (FWCUGs). The data obtained through this site inspection will be used to determine the need for a Remedial Investigation or support project closeout in the SI phase.

The geophysics work was preceded by wetland delineation and vegetation clearance. The field team was led by an unexploded ordnance (UXO) technician, and no munitions and explosives of concern (MEC) or munitions debris (MD) were encountered on the surface during any aspect of the work. Based upon the information to date, the site is a low probability site in regards to encountering MEC. However, the propellant tops and cans are considered MPPEH until inspected and certified as MDAS, If a non-packing MEC item is encountered, field work on this project will be halted immediately and the PIKA UXOSO will contact the onsite USACE OESS and the Camp Ravenna Restoration Project Manager for further direction. Based upon the potential hazard of the item found the site may need to be re-evaluated and potentially assigned a new probability rating.

1.5 SITE CLIMATE

The site lies at approximately 41° 11' 42.19" north latitude and 81° 05' 36.73" west longitude at an elevation of 1,043 feet above mean sea level (msl). The site has hot humid summers and cold damp winters with a maximum yearly mean temperature of 80° Fahrenheit (F) in July and a minimum yearly mean temperature of 16° F in January. The yearly average mean temperature is approximately 50° F with rainfall averages of 35 inches per year and snowfall averages of 25 inches per year.

2.0 TECHNICAL MANAGEMENT PLAN

2.1 GENERAL

This section of the WP addresses the specific field-level approach and procedures that PIKA will employ during the planned activities for site investigation activities at the Group 2 Propellant Can Tops Area including mobilization, site preparation, vegetation removal, collection of surface and subsurface soil samples, sample analysis, disposal of IDW, data management/data validation, surveying and mapping, and demobilization and document preparation in support of the ultimate completion of this environmental investigation.

2.2 GUIDANCE, REGULATIONS, AND POLICY

The work conducted under this SOW (see Appendix A) will be performed within the relevant requirements presented in Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendment and Reauthorization Act (SARA), and National Oil and Hazardous Substances Contingency Plan (NCP) requirements for and coordinating with the Ohio EPA as appropriate. This work will also be conducted in accordance with (IAW) Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) standards found in 29 Code of Federal Regulations (CFR) 1910, 1926, and 1904, and the referenced documents contained in Section 15.0 of this WP. All work will also be performed IAW all federal, state, local, Army, Ohio EPA, and environmental rules, regulations, and laws.

2.3 PROCEDURES IF MEC IS ENCOUNTERED

Based upon the information to date, the site is a low probability site in regards to encountering MEC. However, the propellant tops and cans are considered MPPEH until inspected and certified as MDAS, therefore, a 4-man UXO team including a Senior UXO Supervisor (SUXOS), a UXO Safety Officer (UXOSO) and two man

collection/inspection team comprised of a UXO Technician III and UXO Technician II will be needed for the project. The USACE ordnance and Explosive Safety Specialist (OESS) may be onsite during any recovery or intrusive activities. If a non-packing MEC item is encountered, field work on this project will be halted immediately and the PIKA UXOSO will contact the USACE OESS to discuss the presence of the item and the Camp Ravenna Range Control for further direction. Based upon the potential hazard of the item found the site may need to be re-evaluated and potentially assigned a new probability rating.

2.4 TECHNICAL SCOPE

2.4.1 *Project Site Layout*

PIKA has been contracted to conduct an environmental investigation of the Group 2 Propellant Can Top Areas to confirm the presence or absence of release of propellants and/or other MC to the surface and/or subsurface soils and prepare and submit a site inspection report to document the process and procedures used in conducting the investigation; and describe all the soil sampling activities conducted during this project PIKA will accomplish these tasks as described in the following subsections.

2.4.2 *Operational Sequence Overview*

The environmental investigation operations at the Group 2 Propellant Can Top Areas will be conducted with procedures approved by this WP. A general overview of these procedures is as follows:

1. Conduct site preparation to include vegetation removal.
2. Identify, collect, certify as safe and dispose of the propellant tops and cans associated the anomalies identified during the previous site inspection.
3. Collect ISM five (5) surface and three (3) subsurface soil samples within the areas of the referenced anomalies.

4. Perform sample analysis for the common propellants used by DoD including nitrocellulose, nitroglycerine, nitroguanidine, and perchlorate.
5. Analysis and disposal of IDW IAW the Camp Ravenna Waste Management Guidelines, 30 March 2015.
6. Manage and validate data IAW EPA Contract Laboratory Program (CLP) Level IV data validation to meet the requirements of DoD Quality Systems Manual (QSM).
7. Survey and map the site.

2.5 PROCEDURES FOR CHANGED SITE CONDITIONS

In the event that the site conditions change, such as the identification of non-packing material MEC, PIKA will notify the CELRL Contracting Officer's Representative (COR) to determine the potential impact of the change onsite operations and project funding. The CELRL will discuss the condition with the OHARNG/Camp Ravenna to determine the path forward. If the condition results in a change to the approved WP, the OHARNG will notify the Ohio EPA of the required change to the WP. All issues will be resolved and all changes to site plans will be generated, submitted, and approved before conducting tasks associated with the change.

2.6 MANAGEMENT ROLES AND RESPONSIBILITIES GENERAL

In addition to PIKA personnel, the project team consists of Denise Bush, Contracting Officer (KO), Jay Trumble, CELRL COR; Gregory F. Moore, CELRL PjM Mark Leeper, Camp Ravenna Restoration Program Manager, Kevin Sedlak, Camp Ravenna Restoration Project Manager and Katie Tait, Camp Ravenna Environmental Specialist. Table 2-1 identifies primary roles/responsibilities of PIKA personnel assigned to the project. All PIKA personnel assigned to this project meet the CELRL training and experience requirements for the positions to which they are assigned.

TABLE 2-1: KEY PROJECT PERSONNEL

Title/Name	Responsibilities
Program Manager (PM)/Project Chemist Kathleen Anthony	- Ensures resources are available - WP/APP Review - Conflict Resolution/Stop Work - Analytical Laboratory Procurement and oversight - Review of laboratory QAPP and deliverables, data reduction, validation, and verification - Direct sample collection, analysis, and validation - Assists project team in the development of the FSP and QAPP.
Project Manager (PjM) Richard Callahan	- Project Budget - Resolve Regulatory-Level Issues - WP Preparation - APP Review - Notification - Conflict Resolution/Stop Work
Corporate Environmental Health and Safety Manager (CESHM) Sarosh Manekshaw	- APP Preparation and Approval - APP Review and Implementation Audits - APP Modification/Deviation Recommendation - Conduct/assist with site, task & hazard specific training - Conflict Resolution/Stop Work
Site Manager (Project Geologist) Margaret Carte	- Site Supervisor - APP/SSHP Review - APP/SSHP and Work Plan implementation - Notifications - Conflict resolution/stop work
Senior UXO Supervisor Mel Lau	- WP/APP/SSHP Implementation - Notification(s) - Conflict Resolution/Stop Work - Co-ordinate Site Activities - Supervise/reacquisition of magnetic anomalies - Supervise Propellant Can and Lid (MPPEH) location and Inspection - Documentation/Reporting
UXO Safety Officer Cameron Wenzel	- APP and WP Implementation - Documentation/Reporting - Safety Inspections - Site Safety Control - Accident Prevention - Conflict Resolution/Stop Work
Field Personnel – to be determined	- APP Adherence - Accident Prevention

2.6.1 *Program Manager (PM)*

Ms. Kathleen Anthony is the PM for this project. Ms. Anthony will manage the PIKA resources needed for site operations and is responsible for the overall implementation of the project. Ms. Anthony has over 16 years of technical and management experience with environmental and explosive remediation projects.

2.6.2 *Project Manager (PjM)*

Mr. Richard Callahan is the PjM for this project. Mr. Callahan has over 34 years of experience in the management of environmental remediation and MPPEH related projects and will have the following responsibilities:

- Manage the funding, manpower, and equipment necessary to conduct site operations.
- Act as the point of contact (POC) for communicating with the COR and ARNG.
- Oversee the overall performance of all PIKA individuals assigned to the project.
- Review the SOW and ensure that necessary elements are addressed in project plans.
- Coordinate all contract and subcontract work and control costs and schedules.

2.6.3 *Corporate Environmental Safety and Health Manager (CESHM)*

Mr. Sarosh Manekshaw, Certified Safety Professional (CSP), will perform occupational safety and health management duties as presented in detail in the APP/SSHP for this project. Mr. Manekshaw will direct how the APP/SSHP are implemented including delegating authority to the Site Safety and Health Officer

(SSHO) and directing the enforcement of the APP/SSHP, including removing individuals from the project for environmental, safety, or health non-compliance.

2.6.4 *Site Manager (SM) – Project Geologist*

Ms. Margaret Carte is the SM for this project. Ms. Carte is a professional geologist with substantial experience in the on-site management of environmental sampling and remediation projects and will have the following responsibilities:

- Manage the on-site project resources needed to safely perform site operations.
- Understand this WP, the Project Management Plan (PMP), and any other relevant documents.
- Assure that project personnel and subcontractors review the WP.
- Ensure the safety and health issues have been addressed in the APP.
- Consult and coordinate with the PM for the implementation of site tasks and coordinate with subcontractors regarding schedule and contract requirements.
- Schedule and present the operational portion of the daily safety briefing.
- Enforce compliance with this PMP and the WP.
- Maintain copies (onsite) of current training certificates and respirator fit test records.
- Act as the lead technical consultant for all environmental related matters.

2.6.5 *Senior UXO Supervisor (SUXOS)*

Mr. Mel Lau is the SUXO for this project. Mr. Lau has 27 years' experience performing UXO-related tasks and is a graduate of U.S. Military Naval Explosive

Ordnance Disposal (EOD) School. He has worked on MEC/MPPEH projects involving remediation and demolition at PIKA as SUXOS/Team Lead/Demolition Supervisor. He has over 16 years of EOD experience with the U.S. Army and 11 years of civilian UXO experience. He has extensive experience working on explosives contaminated areas as well as contaminated soil sites involving ordnance explosives (OE), UXO, and MEC.
As SUXOS, Mr. Lau will be responsible for the operational items listed below:

- Co-ordinate Site Activities
- Supervise/reacquisition of magnetic anomalies
- Supervise Propellant Can and Lid (MPPEH) location and Inspection
- Field Documentation/Reporting
- Issuing and/or approving "Stop Work" orders for safety and health reasons.
- Conducting on-site safety and health training for PIKA and subcontractor personnel.
- Identifying and evaluating any known or potential safety problems that may interfere with or interrupt site operations and endanger site personnel.
- Consulting with the PjM and UXOSO on identifying and implementing any necessary technical or safety-related corrective actions.
- Ensuring that all site activities are conducted IAW this WP and relevant federal, state and local rules, laws, and regulations.

2.6.6 *Site Safety and Health Officer (SSHO/UXOSO)*

Mr. Cameron Wenzel holds the position of UXOSO. Mr. Wenzel has 15 years' experience performing UXO-related tasks and is a graduate of U.S. Military Naval

Explosive Ordnance Disposal (EOD) School. He has worked on MEC/MPPEH projects involving remediation and demolition at PIKA as SUXOS/Team Lead/Demolition Supervisor. He has over six years of EOD experience with the U.S. Air Force (USAF) and nine years of civilian UXO experience. He has extensive experience working on explosives contaminated areas as well as contaminated soil sites involving ordnance explosives (OE), UXO, and MEC.

As UXOSO, Mr. Wenzel will be responsible for the operational items listed below in addition to the safety and health responsibilities:

- Issuing and/or approving "Stop Work" orders for safety and health reasons.
- Conducting on-site safety and health training for PIKA and subcontractor personnel.
- Identifying and evaluating any known or potential safety problems that may interfere with or interrupt site operations and endanger site personnel.
- Consulting with the PjM on identifying and implementing any necessary safety-related corrective actions.
- Coordinating with the PjM for the implementation of the safety requirements in the APP.
- Ensuring that all site activities are conducted IAW this WP and relevant federal, state and local rules, laws, and regulations.

2.6.7 *Field Team(s)*

The UXO and Sampling Technicians assigned to this project as field staff will be responsible to adhere to the approved WP and APP and incorporate accident prevention into daily tasks.

2.6.8 *Functional Relationships*

The PIKA PjM will interact with the COR for all matters concerning management and the SOW. All contract-related issues will be reported directly to the USACE COR for consideration and/or approval. The PIKA PjM will report directly to the PIKA PM. The PIKA SUXOS and Site Manager will report directly to the PIKA PjM for all matters concerning site operations. Regarding safety issues, the UXOSO will have direct access to and will report functionally to the CESHM.

2.7 OVERALL SAFETY PRECAUTIONS AND PRACTICES

PIKA will conduct safety and operational briefings daily. Additionally, the UXOSO may hold a safety stand-down to conduct training at any time a deviation or degradation of safety warrants a review. The safety and operational training and briefings will be performed IAW the SSHP for this project as summarized below:

- **Daily Safety Briefing:** Each day, before the commencement of work, a safety briefing will be conducted for all site personnel by the UXOSO. A written record of this meeting will be maintained in the PIKA Safety Meeting Attendance Log. The briefing will focus on specific daily hazards, potential hazards and risks that may be encountered, and the safety measures that should be used to eliminate or mitigate those hazards. These briefings will provide personnel with the known or potential task-specific hazards related to the day's operation. The Activity Hazard Analysis (AHA) forms will be available and used during the safety briefing to inform personnel of the task-related hazards, the personal protective equipment (PPE) and safe work practices that will be used to mitigate the task hazards.

- **Visitor Safety Briefing:** All visitors entering the site must report to the UXOSO and sign the visitor's log. Visitors will be given a safety briefing, as outlined in the SSHP, prior to entering any work area. Visitors shall be escorted at all times by the UXOSO.

- **Environmental Concerns:** The promotion of environmental sensitivity will be an ongoing part of the daily safety and operational briefs.
- **Additional Training:** The SSHP prepared for this project details additional on-site training.

2.8 COMPLIANCE WITH PLANS AND PROCEDURES

All personnel will adhere strictly to approved plans and established procedures. If operational parameters change and there is a corresponding requirement to change procedures or routines, careful evaluation of such changes will be conducted by on-site supervisory personnel. Any new course of action or desired change in procedures will be submitted in writing along with justification for approval. Approved written changes will be implemented in a manner to ensure procedural uniformity and end-product quality.

2.9 GENERAL SITE PRACTICES

Throughout the entire project, PIKA personnel will adhere to the following general practices.

- **Work Hours:** Operations will be conducted only during daylight hours. PIKA intends to work four 10-hour days with an optional schedule of five 8-hour days. However, based on operational needs, PIKA may decide to work more than 40 hours in a week as necessary to meet project schedules. PIKA will request permission from the OHARNG Range Control and USACE if it intends to modify its work schedule. Additionally, a minimum 48-hour rest period will be provided before the start of the next work week.

- **PIKA Standard Operating Procedures (SOPs):** During site operations PIKA personnel will adhere to the operational and environmental safety and health (ES&H) SOPs referenced and presented in the APP.

- **Site Access:** PIKA will control access to all work areas. Access will be granted only to those personnel required to accomplish the specific operations or to those personnel who have a specific purpose and authorization to be on the site. PIKA will maintain contact and coordination with the OHARNG Range Control (614-336-6041) in order to eliminate any negative impacts caused by the performance of operations associated with the project.

- **Handling of MEC:** The procedures outlined in Section 2.3 will be adhered to in the event MEC Non propellant can MPPEH is encountered during the investigation operations.

- **Visitor Safety:** All visitors entering the site will report to the PIKA field office and sign the visitor's log. All site visitors will receive a safety briefing, as outlined in the SSHP, and visitors will be escorted at all times by UXO personnel when inside the AOC.

2.10 SAFETY AND OPERATIONAL TRAINING AND BRIEFING

PIKA will conduct safety and operational training on a daily basis starting with the morning briefing. Daily safety training will typically be conducted by the UXOSO; however, with regard to safety, PIKA solicits and welcomes comments and input from all employees. This training will address team assignments, potential problems and their respective resolutions, and productivity status.

2.11 MOBILIZATION AND SITE PREPARATION

2.11.1 *Mobilization of Manpower*

PIKA will schedule the arrival of the work force in a manner designed to facilitate immediate productivity. All PIKA personnel mobilized to the site will meet OSHA requirements for hazardous waste operations training and medical surveillance requirements as specified in the APP/SSHP. Site personnel will also be trained to perform the specific tasks to which they are assigned. At no time will site personnel be tasked with performing an operation or duty for which they do not have appropriate training and experience.

2.11.2 *Preliminary Activities*

During the initial mobilization, PIKA site management personnel will engage in the following preliminary activities:

- Prior to initiating site activities and following WP approval, PIKA will notify in accordance with the Director's Final Findings and Orders (DFFO), the CELRL and the OHARNG, of its intent to initiate on-site activities. The Camp Ravenna Restoration Program Manager, Mark Leeper prepare, sign and send the intent to initiate letter to notify the Ohio EPA;
- Coordination with the Camp Ravenna Restoration Project Manager to finalize access requirements, location of any temporary facilities to be used, and communications requirements;
- Contact and coordination with the Camp Ravenna Restoration Project Manager and local fire, medical, and other emergency services to ensure availability of services and the appropriate response actions IAW the WP and APP;
- Contact and coordination with local vendors for accommodations as well as vendors/suppliers for routine purchases to ensure smooth project start up; and
- Inspection of each work area to identify possible environmental constraints, terrain limitations, and other interferences.

2.11.3 *Equipment*

All equipment will be inspected as it arrives to ensure it is in proper working order. Any equipment found damaged or defective will be repaired or returned to the point of origin, and a replacement will be secured. All instruments and equipment that require routine maintenance and/or calibration will be checked initially upon their arrival and then checked again before its use each day. This system of checks ensures that the equipment is functioning properly. If an equipment check indicates that any piece of equipment is not operating correctly, and field repair cannot be made, the equipment will be tagged and removed from service. A request for replacement equipment will be placed immediately for expeditious receipt. Replacement equipment will meet the same specifications for accuracy and precision as the equipment removed from service. As part of the initial equipment set-up and testing, PIKA will also install and test its communication equipment that includes the following:

- Cellular phone service to maintain communication with Camp Ravenna Range Control;
- Hand-held portable radios used to maintain communications between the PjM and the SM;
- Cellular telephones to be used as back up communications between the PjM and the SM; and
- Prior to initiating site activities, PIKA will coordinate communication with Camp Ravenna Range Control, including information related to planned road blocks, if needed, during vegetation clearing operations.

2.11.4 *Site-Specific Training*

As part of the mobilization process, PIKA will perform site-specific training for all on-site personnel assigned to this project. The purpose of this training is to ensure that

all on-site personnel fully understand the operational procedures and methods to be used by PIKA at Camp Ravenna. Individual responsibilities and safety and environmental concerns associated with operations will also be covered in the training. The SM will conduct the training sessions which will include the following topics:

- Overview of the below procedures and USACE EM 385-1-1, Section 33 Munitions and Explosives of Concern (MEC):

  a. Recognize. Recognize the hazard and do not touch, disturb, or move the item as it could detonate with movement or ground vibrations.

  b. Retreat. Stop work, mark the general location, and have everyone retreat from the area.

  c. Report. Report the situation immediately to the appropriate local emergency response authority (i.e., Camp Ravenna Range Control to summon needed emergency response authority), providing as much information as possible about the items encountered. USACE personnel should also notify their project chain of command, District Safety Office, and installation staff as appropriate.

- Field equipment operation, including the safety and health precautions, field inspection, and maintenance procedures that will be used;

- Interpretation of relevant sections of this WP and APP/SSHP as they relate to the tasks being performed;

- Personnel awareness of potential site and operational hazards associated with site-specific tasks and operations;

- Public relations to ensure that personnel will not make any public statements to the media without prior coordination with and approval of the Camp Ravenna Restoration Project Manager;

- Environmental concerns and sensitivity including endangered/threatened species and historic, archeological, and cultural issues; and
- Additional OSHA or CELRL mandated training as required by the APP.

2.11.5 *Project Notifications*

2.11.5.1 Public Notification

PIKA will not publicly disclose any data generated or reviewed under this contract. All requests for any public conveyance will be routed through the Camp Ravenna Restoration Project Manager in conjunction with the USACE Public Affairs Specialist. All regulatory agency contact will be coordinated and run through the OHARNG, USACE, and Camp Ravenna Restoration Project Manager. PIKA will not make direct contact with the Ohio EPA.

2.11.5.2 Emergency Response and General Notifications

At least one week before the initiation of field activities, PIKA will contact all local emergency services to verify the availability of requisite services and to confirm the means used to summon the services. General notifications will be made to key project personnel at this time as well. This includes the following contacts:

- Camp Ravenna Range Control– (614) 336-6041
- Ravenna City Fire Department – (330) 296-5783
- Ravenna Police Department – (330) 297-6486
- Camp Ravenna Support Services Contractor; VISTA Sciences Corporation, (for access coordination) – (330) 872-8009
- Hospital – Robinson Memorial Hospital – (330) 297-0811
- Police – Portage County Sheriff Office – (330) 296-5100

- Police – Trumbull County Sheriff Office – (330) 675-2508
- Ohio State Patrol – (330) 297-1441
- Gregory F. Moore – CELRL PjM – (502) 315-6855
- Jay Trumble – CELRL COR – (502) 315-6349
- Brenna Crawford – CELRL ContractSpecialist (KO) – (502) 315-6209
- Mark Leeper – Camp Ravenna Restoration Program Manager – (703) 607-7955Kevin Palombo – Ohio EPA – 330-963-1292
- OHARNG – Lt. Col. Ed Meade – (614) 336-6560
- Kevin Sedlak – Camp Ravenna Restoration Project Manager – (614) 336-6000 Ex 2053
- Katie Tait – Camp Ravenna Environmental Specialist – (614) 336-6136

2.11.6 *Permitting*

To date, PIKA has not identified any permit requirements for the execution of work under this SOW.

2.11.7 *Establishing Site control*

PIKA will establish site control through the implementation of the following procedures for the Group 2 Propellant Can Tops Area.

2.11.7.1 Set-up of Work Zones

PIKA does not anticipate the installation of any facilities with the exception of work zones (WZs). In general, the regulated work zones will include an exclusion zone (EZ), and support zone (SZ) for site access control during field operations.

Given the short duration of the project and proximity of the project site to the PIKA Ravenna, Ohio, services such as water, telephone, and gas will not be installed at the work site. Potable water for decontamination of personnel and equipment (if needed) will be stored in portable poly containers. Cellular and two-way radios will be used for communications and emergency notifications. Temporary sanitary facilities will be delivered to the site and maintained by local vendors.

Upon delineation of the WZs, site access control points will be established and site control and security will be implemented. This will consist of establishing barriers such as warning cones and yellow tape to control points of site access control. The UXOSO will be responsible for site access.

2.12 VEGETATION REMOVAL

PIKA will, as needed, conduct both manual and mechanical brush removal of the Group 2 Propellant Can Tops Area to facilitate the sampling operations. The Northern Long-Eared Bat (NLEB) is a federally threatened species known to exist at Camp Ravenna. Due to the existence of this species, seasonal tree cutting restrictions must be followed when doing vegetation removal at the AOC. Trees (3 inches and greater) will only be cut in the period between 1 October to 30 March. All vegetation removal will be coordinated with the Camp Ravenna Environmental Office prior to removal. The brush removal operations for this project will be limited to cutting/removal of small trees (less than 3 inches in diameter) and ground-level vegetation that may hinder site operations. PIKA will primarily use a Bush Hog with the deck locked in position at 6 inches above ground level during the brush removal operation; however, hand-held weed eaters and/or chain saws may also be used as needed. During vegetation removal operations, site personnel will utilize all the safety and health PPE specified in the APP.

2.13 COLLECTION OF MPPEH PROPELLANT CANS AND TOPS

PIKA will mobilize a team of four UXO Technicians, as described above, to re-acquire the anomalies identified during the 2011 limited Site Inspection (SI) geophysical

survey, the coordinates of which are provided on Figure 5, in Appendix B. Once reacquired, PIKA will mark each anomaly with a pin flag, inspecting the area within a 1 meter radius, removing all propellant cans and tops.. Any unrelated materials such as railroad spikes, banding/strapping related to the pallets used to transport the propellant cans will be set aside for pickup and recycling by the OHARNG in order to remove the potential magnetic interferences. All propellant cans and tops will be inspected, certified as MDAS and consolidated for proper disposal/recycling IAW Department of Defense Instruction (DoDI) 4140.62, USACE EM 385-1-97, Change 1, Chapter 1, Section 11, PIKA SOPs and ORC 3734.03 and OAC 3745.27.05C.

All recovered propellant cans and lids will receive a minimum of two 100% inspections by a UXO Technician III and UXO Technician II. The SUXOS and the UXOQC will then verify and certify the items as MDAS. Verified and certified MDAS will be secured onsite in closed-cover, locked, and sealed containers. As containers reach appropriate volume and weight capacity, the JV will ship the containers to a disposal/recycling facility meeting the requirements of USACE EM 385-1-97, Change 1, Chapter 1, Section 11, where at a minimum the MDAS will be smelted to basic content and documentation completed recording the final disposition. The SUXOS and UXOQC are responsible for maintaining the chain of custody, preparing and signing the DD Form 1348-1a, which will be filed as a part of the permanent record of the site and the contract history. If during inspection and certification either a propellant can / lid or a non-packing item is encountered and determined to be and certified as a Material Documented with an Explosive Hazard (MDEH) item, the location will be documented and fieldwork will be halted immediately. The item will be reported to the USACE OESS and Camp Ravenna Range Control for collection and disposition.

2.14 COLLECTING SURFACE AND SUBSURFACE SOIL SAMPLES

As discussed in Section 1.4 of this WP, during the 2012 Site Investigation of the AOC, the geophysical survey identified 5, high density anomaly clusters, from which 3 were selected for surface Incremental Sampling (IS) and analysis. Discussions

between the Ohio EPA and the OHARNG resulted in the decision to collect additional surface and subsurface IS from the previously identified clusters and three new cluster areas. Therefore, PIKA will collect ISM surface soil samples based on the results of the previous investigation to assess possible releases of propellant MC to the surface and subsurface soils. Five (5) surficial ISM samples (0-1‵ bgs) and three (3) subsurface ISM samples (1-4′ bgs) (eight primary, plus quality assurance (QA) samples) will be collected from the designated decision units, depicted on Figure 5 in Appendix B. All samples will be analyzed for TAL metals and common propellants used by the DoD including nitrocellulose, nitroglycerine, nitroguanidine, and perchlorate. In addition, one (1) of the samples will also be analyzed for the RVAAP full suite. The boundaries of the 3 original IS sample locations were surveyed during the 2012 investigation. Prior to sample collection, the 5 additional IS sample areas will be surveyed to define the sample areas. The details pertaining to the collection, data management, and validation of the surface and subsurface soil samples at the Group 2 Propellant Can Tops Area are covered in SAP Addendum and QAPP Addendum provided in Appendix D and Appendix E, respectively.

Based upon the information to date, the site has a low probability in regards to encountering MEC. If a MEC item is encountered, the PIKA UXOSO will contact the Camp Ravenna Range Control IAW the approach discussed above in Section 2.13.

2.15 DISPOSAL OF IDW

The potential types of IDW include the dedicated plastic liners and sampling implements from the soil sampling activities and a limited volume of decontamination fluids. Samples of the IDW will be collected prior to demobilization, in order to characterize the materials for disposal. Within 90 days of the generation of IDW, PIKA will properly dispose (per ORC 3734.03 and OAC 3745.27.05C) of all IDW at approved off-site facilities in compliance will all applicable federal, state, and local rules, laws, and regulations. PIKA will be responsible for maintaining all applicable waste characterization and disposal records.

All IDW will be managed in accordance with the Camp Ravenna Waste Management Guidelines dated 30 March 2015 and will be tracked throughout the duration of the project. The IDW containers will be will be inspected on a weekly basis and documented. Once the waste characterization results have been received and reviewed by PIKA and the OHARNG Environmental Specialist, the determination can be made if the IDW is hazardous or non-hazardous. PIKA will coordinate the review, approval and signature of the waste manifests and profiles with the OHARNG Environmental Specialist, prior to offsite transportation and disposal of the IDW to the appropriate facilities. PIKA will prepare an IDW Report for review and approval by the OHARNG Environmental Specialist.

PIKA will manage transportation and disposal operations in a manner to ensure that all IDW is removed from the subject property no later than 90 days following waste generation.

2.16 DEMOBILIZATION

Upon completion of the tasks covered under this SOW, PIKA will demobilize from the site. The demobilization activities will consist of the following steps:

1. Remove/demobilize all PIKA equipment.
2. Demobilize any other remaining equipment and supplies.
3. Demobilize any necessary personnel.

2.17 PUBLIC AFFAIRS AND COMMUNITY RELATIONS

2.17.1 *Public Involvement*

All public relations efforts for the Group Propellant Can Tops Area at RVAAP/Camp Ravenna will be coordinated and approved by the Camp Ravenna Restoration Project Manager and the USACE Public Affairs Office (PAO). PIKA will coordinate and provide Public Affairs and Community Relations support for this project and ensure

that all Public Affairs and Community Relations activities are coordinated and approved by the Camp Ravenna Restoration Project Manager/COR.

2.17.2 *Public Approach*

PIKA personnel will not make available or publicly disclose any data generated or reviewed under this contract. When approached by any person or entity requesting information about the subject of this or any contract, PIKA personnel will defer to the Camp Ravenna Restoration Project Manager and notify the COR for response.

2.18 DISSEMINATION OF DATA

Reports and data generated under this contract will become the property of the government, and distribution to any other source by the contractor is prohibited unless authorized by the Camp Ravenna Restoration Project Manager.

2.19 PROJECT SCHEDULE

PIKA anticipates a start date for field work in early December 2015 which is contingent on the timing of document (WP and APP) review and approvals by all stakeholders, as well as coordination of activities with the Camp Ravenna Restoration Project Manager (see Project Schedule in Figure 6, Appendix B). Should the review/approval process require additional time, a start date during the winter months may not be conducive to completing the MPPEH collection/inspection and soil sampling with the potential snow cover which may adjust the start date to the Spring of 2016.

2.20 MONTHLY PROGRESS REPORTS

The monthly progress report will be provided electronically during the last week of each month. The monthly status report will document the following:

- Activities completed during the month;

- Issues and problems encountered and their resolution;
- Quality control (QC) data and reports;
- Health and safety reports;
- Activities planned for the next month; and
- Schedule status showing actual versus planned activities.

2.20.1 *Master Schedule*

PIKA will supply a schedule for inclusion into the RVAAP Restoration Program master schedule. PIKA will participate in the biweekly schedule update meetings with USACE and complete the RVAAP Restoration Program weekly activity summary report. .

2.21 SITE INSPECTION (SI) REPORT

PIKA will prepare and submit a preliminary draft, draft and final SI report for this project with the preliminary draft being submitted within 90 calendar days following the completion of the field investigation activities. The SI report will document the process and procedures used in conducting the investigation; and describe all the soil sampling activities conducted during this project. The SI report will include details about premobilization, mobilization, site preparation, sample collection, decontamination, analytical results (including the results from the 2012 limited SI) waste management, event chronology, final site inspection, and mapping. The report will also document the collection, certification and disposal/recycling of the propellant cans and tops as MDAS. The SI report maps will delineate the boundaries of the site, locations of ISM sample area boundaries.

3.0 EXPLOSIVES MANAGEMENT PLAN

Not required under this SOW.

4.0 EXPLOSIVE SITING PLAN

Not required under this SOW.

5.0 GEOPHYSICAL PROVE OUT PLAN AND REPORT

Not required under this SOW.

6.0 GEOPHYSICAL INVESTIGATION PLAN

Not required under this SOW.

7.0 GEOSPATIAL INFORMATION & ELECTRONIC SUBMITTALS

7.1 GENERAL

To the maximum extent possible, PIKA will use drawings, plans, and maps provided by the Camp Ravenna Restoration Project Manager. Survey maps to be included in the SI report, which delineate the boundaries of the investigation area, and the ISM soil sample locations subject to this SOW. Points will be uniquely numbered and identified on the map/drawing and as required in the SOW - *all coordinates will be collected with applicable equipment capable of gauging field surveys within an accuracy of one meter or less of error.* All data submitted will be in the Universal Transverse Mercator (UTM) coordinate system.

7.2 MEC/UXO SAFETY PROVISIONS

Based upon the information available to date, the site is a low probability site in regards to encountering MEC other than the propellant cans and tops. However, the propellant tops and cans are considered MPPEH until inspected and certified as MDAS, therefore, a 4-man UXO team including a SUXOS, a UXOSO and two man collection/inspection team comprised of a UXO Technician III and UXO Technician II will be needed for the project. The USACE Ordnance and Explosive Safety Specialist (OESS) will be onsite during any recovery or intrusive activities. If a non-propellant can and tops related MEC item is encountered, field work on this project will be halted immediately and the PIKA UXOSO will contact the USACE OESS and the Camp Ravenna Restoration Project Manager for further direction. Based upon the potential hazard of the item found the site may need to be re-evaluated and potentially assigned a new probability rating.

7.3 CONTROL POINTS

Existing permanent monuments will be used.

7.3.1 *Accuracy*

A tabulated list of all control points and monuments showing their final adjusted coordinates and respective elevations (in feet to the nearest 0.3 foot) established and/or used for survey will be provided. A tabulated list of each individual boundary corner will show the adjusted coordinates to the nearest 1 meter.

7.3.2 *Monument Caps*

Existing monuments will be used.

7.3.3 *Plotting*

N/A

7.3.4 *Description Cards*

N/A

7.4 MAPPING

Survey maps will be provided in the IR to delineate the boundaries of the survey site, locations of ferrous anomaly locations (from the 2012 SI report and the ISM sample area boundaries. All data submitted will be in the UTM coordinate system. All survey and mapping will be provided IAW Section 3.4 (Electronic Data Files) of the SOW located in Appendix A.

7.5 DIGITAL DATA AND COMPUTER REQUIREMENTS

All digital data and computer requirements will be IAW the SOW requirements (see Appendix A).

7.6 LAND SURVEY AND MAPPING SUBMITTALS

Global Positioning System (GPS) systems and requirements will be IAW the SOW requirements (see Appendix A).

8.0 WORK DATA AND COST MANAGEMENT PLAN

8.1 PROJECT MANAGEMENT APPROACH

This Work Data and Cost Management Plan outlines how the project work will be managed and accomplished. Items pertaining to cost control are in general terms for tasks awarded under CELRL, Louisville, Kentucky as a firm fixed price (FFP) Task Order. PIKA will conduct internal data management for project management purposes.

8.2 PROJECT SCHEDULE

PIKA has developed a proposed Project Schedule for the completion of all tasks presented in this WP. The Project Schedule is shown in Appendix B as Figure 6. PIKA anticipates a start date for field work in early December 2015 which is contingent on the timing of document (WP and APP) review and approvals by all stakeholders, as well as coordination of activities with the Camp Ravenna Restoration Project Manager. Should the review/approval process required additional time, a start date during the winter months may not be conducive to the completing the MPPEH collection/inspection and soil sampling with the potential snow cover which may adjust the start date to the Spring of 2016.

8.3 PROJECT COST CONTROL AND TRACKING

This is a fixed price contract and, as such, the cost control and tracking required by the government will be minimal. PIKA will utilize Primavera, Microsoft Project, or other cost and resource tracking software to ensure that the project costs are maintained within the proposed fixed price. In the event that unexpected and unplanned changes occur that may be expected to have a significant cost impact, the PIKA PM will contact the USACE KO and the Camp Ravenna Restoration Project Manager to evaluate any potential for changes to the fixed price based upon that cost differential. No contractual changes will be made without the final written approval by the USACE KO.

8.4 SUBCONTRACTOR COSTS

PIKA will control subcontractor costs by using its approved accounting policies, which require acquisition of three quotes for any equipment or services charged to a project. To secure subcontractor services, PIKA will issue a request for proposal containing a SOW for the service needed that corresponds to the requirements of the client.

PIKA will select a subcontractor source on the basis of best value to PIKA and the government, and the PIKA PM will subsequently review and approve all subcontractor invoices. The PIKA PM, in conjunction with the Senior UXO Supervisor (SUXOS), will monitor subcontractor progress to ensure effective completion of the subcontract.

8.5 MANPOWER REQUIREMENTS

PIKA will assign the personnel to the project on an as-needed basis to ensure that the project is completed within the fixed price budget, on schedule, and in a safe, efficient manner. The project management personnel assigned to this project are listed in Section 2.7 of this WP; and those personnel will be responsible for safe, successful project performance. For the performance of on-site operations, the PIKA SUXOS will be responsible and will track the manpower requirements for the project. This information will be transmitted and coordinated with the PIKA PM.

8.6 RECURRING DELIVERABLES

8.6.1 *Monthly Progress Reports*

PIKA will prepare and submit electronic copies of the monthly progress reports to CELRL. These progress reports will document the project activities conducted by PIKA in its performance of the project tasks as previously described in Section 2.21. The monthly reports will be submitted for receipt by the addressee during the last week of each month.

In preparation for and during field work, PIKA will also submit the weekly RVAAP/Camp Ravenna Activity Schedule to coordinate with other contractors and Camp Ravenna and attend the biweekly schedule meeting for contractors and government agencies.

8.7 DAILY PROGRESS REPORTS

PIKA will prepare daily progress reports that will be maintained at the PIKA Ravenna, Ohio field office. The daily report will be prepared using a form that provides for the collection of the relevant information for the project-specific forms and reports.

8.8 COMMUNICATIONS

Project management communications for this project will generally be conducted as:

- **Field Tasks** – The SM will communicate field information to PIKA's PM, who in turn will inform the Camp Ravenna Restoration Project Manager.
- **Task Order Management** – PIKA's PM or other staff will address all task order management information (e.g., budgetary issues, change orders) directly to the USACE PM.

8.9 RECORDS MANAGEMENT

Hard copies of primary records for the site will be retained by PIKA. The records will include, but are not limited to:

- Task order and modification files,
- Correspondence,
- Draft document submittals,
- Responses to comments, and

- Final document submittals.

During field investigations, records will be maintained in the PIKA field office. Following completion of definable phases of work, all files will be transferred to the PIKA Corporate Office in Stafford, TX.

9.0 PROPERTY MANAGEMENT PLAN

Not required under this SOW.

10.0 QUALITY CONTROL PLAN (QCP)

Provided under separate cover in the PMP.

11.0 ENVIRONMENTAL PROTECTION PLAN

11.1 INTRODUCTION

The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract will be protected during the entire period of this contract. PIKA will confine its activities to areas defined by this WP. Environmental protection will be as stated in the following subsections.

PIKA is directly responsible for the implementation of this plan. Inspections will be made to assure field personnel's compliance with this plan. The following subsections address several specific areas of concern that fall under environmental protection.

11.2 IDENTIFICATION OF AREAS REQUIRING PROTECTION

11.2.1 *Endangered/Threatened Species*

PIKA will perform all site activities in such a manner as to avoid or minimize adverse effects on any rare or protected plant/wildlife species and resources discovered on the site. If endangered or threatened species are encountered during site activities, PIKA will locate and flag off the areas and immediately notify and obtain guidance from Camp Ravenna-Environmental and USACE PM before continuing operations within the flagged area. All PIKA site personnel will adhere to the specific guidance received from Camp Ravenna-Environmental and CELRL PM. A listing of rare species known within the confines of Camp Ravenna is provided in the WP, as listed below.

TABLE 11-1 RARE SPECIES THAT NEST OR RESIDE AT THE CRJMTC

Group	Common Name	Scientific Name	Status
Amphibian	Eastern box turtle	*Terrapene Carolina*	SC
Amphibian	Four-toed Salamander	*Hemidactylium scutatum*	SC
Bird	American bittern	*Botaurus lentiginosus*	E
Bird	American Black Duck	Anas rubripes	SI

Group	Common Name	Scientific Name	Status
Bird	Barn owl	*Tyto alba*	T
Bird	Blackburnian warbler	*Dendroica fusca*	SI
Bird	Black-throated blue warbler	*Dendroica caerulescens*	SI
Bird	Bobolink	*Dolichonyx oryzivorus*	SC
Bird	Brown creeper	*Certhia americana*	SI
Bird	Canada warbler	*Wilsonia canadensis*	SI
Bird	Cerulean warbler	*Dendroica cerulea*	SC
Bird	Common moorhen	*Gallinula chloropus*	SC
Bird	Dark-eyed junco	*Junco hyemalis*	SI
Bird	Gadwall	*Anas strepera*	SI
Bird	Golden-crowned kinglet	*Regulus satrapa*	SI
Bird	Golden-winged warbler	*Vermivora chrysoptera*	X
Bird	Great egret	*Ardea alba*	SC
Bird	Green-winged teal	*Anas crecca*	SI
Bird	Henslow's sparrow	*Ammodramus henslowii*	SC
Bird	Hermit thrush	*Catharus guttatus*	SI
Bird	Least bittern	*Ixobrychus exilis*	T
Bird	Least flycatcher	*Empidonax minimus*	SI
Bird	Magnolia warbler	*Dendroica magnolia*	SI
Bird	Marsh wren	*Cistothorus palustris*	SC
Bird	Mourning warbler	*Oporornis philadelphia*	SI
Bird	Northern bobwhite	*Colinus virginianus*	SC
Bird	Northern harrier	*Circus cyaneus*	E
Bird	Northern shoveler	*Anas clypeata*	SI
Bird	Northern waterthrush	*Seiurus noveboracensis*	SI
Bird	Pine siskit	*Carduelis pinus*	SI
Bird	Prothonotary warbler	*Protonotaria citrea*	SC
Bird	Purple finch	*Carpodacus purpureus*	SI
Bird	Red-breasted nuthatch	*Sitta canadensis*	SI
Bird	Redhead duck	*Aythya americana*	SI
Bird	Ruddy duck	*Oxyura jamaicensis*	SI

Group	Common Name	Scientific Name	Status
Bird	Sandhill crane	*Grus canadensis*	SE
Bird	Sedge wren	*Cistothorus platensis*	SC
Bird	Sharp-shinned hawk	*Accipiter striatus*	SC
Bird	Sora rail	*Porzana carolina*	SC
Bird	Trumpeter swan	*Cygnus buccinator*	ST
Bird	Virginia rail	*Rallus limicola*	SC
Bird	Wilson's Snipe	*Gallinago delicata*	SI
Bird	Winter wren	*Troglodytes troglodytes*	SI
Bird	Yellow-bellied sapsucker	*Sphyrapicus varius*	SC
Fish	Eastern sand darter	*Ammocrypta pellucida*	SC
Fish	Mountain brook lamprey	*Ichthyomyzon greeleyi*	E
Insect	Brush-tipped emerald	*Somatochlora walshii*	E
Insect	Caddisfly	*Psilotreta indecisa*	T
Insect	Graceful underwing	*Catocala gracilis*	E
Insect	Mayfly	*Stenonema ithica*	SC
Insect	Moth	*Apamea mixta*	SC
Insect	Moth	*Brachylomia algens*	SC
Insect	Scurfy quaker	*Homorthodes furfurata*	SC
Insect	Subflava sedge borer	*Capsula subflava*	SI
Mammal	Big brown bat	*Eptesicus fuscus*	SC
Mammal	Black Bear	*Ursus americanus*	E
Mammal	Bobcat	*Felis rufus*	T
Mammal	Deer mouse	*Peromyscus maniculatus*	SC
Mammal	Eastern red bat	*Lasiurus borealis*	SC
Mammal	Hoary bat	*Lasiurus cinereus*	SC
Mammal	Little brown bat	*Myotis lucifugus*	SC
Mammal	Northern long-eared bat	*Myotis septentrionalis*	SC
Mammal	Pygmy shrew	*Sorex hovi*	SC
Mammal	Southern Bog Lemming	*Svnaptomys cooperi*	SC
Mammal	Star-nosed mole	*Condylura cristata*	SC
Mammal	Tri-colored bat	*Perimyotis subflavus*	SC

Group	Common Name	Scientific Name	Status
Mammal	Woodland jumping mouse	*Napaeozapus insignis*	SC
Mussel	Creek heelsplitter	*Lasmigona compressa*	SC
Plant (Bryophyte)	Lurking leskea	*Plagiothecium latebricola*	T
Plant (Bryophyte)	Narrow-necked Pohl's Moss	*Pohlia elongata var. elongata*	E
Plant (Bryophyte)	Tufted moisture-loving Moss	*Philonotis fontana var. caespitosa*	E
Plant (Vascular)	Appalachian quillwort	*Isoetes engelmannii*	E
Plant (Vascular)	Arbor vitae	*Thuja occidentalis*	P
Plant (Vascular)	False hop sedge	*Carex lupuliformis*	P
Plant (Vascular)	Greenwhite sedge	*Carex albolutescens*	P
Plant (Vascular)	Handsome sedge	*Carex formosa*	E
Plant (Vascular)	Hobblebush	*Viburnum alnifolium*	T
Plant (Vascular)	Long beech fern	*Phegopteris connectilis*	P
Plant (Vascular)	Pale sedge	*Carex pallescens*	P
Plant (Vascular)	Philadelphia panic-grass	*Panicum philadelphicum*	E
Plant (Vascular)	Sharp-glumed manna-grass	*Glyceria acutifolia*	P
Plant (Vascular)	Shining ladies'-tresses	*Spiranthes lucida*	P
Plant (Vascular)	Simple willow-herb	*Epilobium strictum*	T
Plant (Vascular)	Straw sedge	*Carex straminea*	P
Plant (Vascular)	Strict blue-eyed grass	*Sisyrinchium montanum*	T
Plant (Vascular)	Variegated scouring-rush	*Equisetum variegatum*	E
Plant (Vascular)	Water avens	*Geum rivale*	P
Plant (Vascular)	Woodland Horsetail	*Equisetum sylvaticum*	P
Reptile	Eastern garter snake	*Thamnophis sirtalis*	SC
Reptile	Smooth green snake	*Opheodrys vernalis*	SC

Group	Common Name	Scientific Name	Status
OHIO STATUS: E = Endangered T = Threatened SC = Species of Concern** SI = Special Interest** P = Potentially Threatened** X = Extirpated *Arborvitae was planted on site and does not occur naturally within the facility. **Administrative status; not a legal designation			

Source: Source: USFWS, 2014; DNAP, 2014; ODOW, 2012; BHE, 2012

TABLE 11-2 RARE BIRD SPECIES OBSERVED BUT NOT KNOWN TO NEST AT THE CRJMTC

Common Name	Scientific Name	State Status	Federal Status
American bittern	*Botaurus lentiginosus (migrant)*	E	-
Dark-eyed junco	*Junco hyemalis (migrant)*	T	-
Great Egret	*Ardea alba (migrant)*	SC	-
Hermit thrush	*Catharus guttatus (migrant)*	T	-
Sandhill Crane	*Grus Canadensis*	E	-
Trumpeter swan	*Cygnus buccinator (migrant)*	E	-
FEDERAL STATUS E = Endangered (Danger of extinction throughout range) T = Threatened (Likely to become endangered in foreseeable future throughout range) C = Federal Candidate		OHIO STATUS E = Endangered T = Threatened P = Potentially Threatened (Administrative status; not a legal designation) SC = Species of Concern SI = Special Interest (Administrative status; not a legal designation)	

Source: Camp Ravenna Surveys; USFWS; Ohio DNR

11.2.2 *Wetlands*

Wetland areas have been delineated within the AOC. Minimization and avoidance techniques will be utilized if work activities occur within the wetland areas. Any work within wetland areas will be coordinated with the Ohio EPA, Camp Ravenna Environmental, and CELRL.

11.2.3 *Cultural and Archaeological Resources*

This area has not been previously surveyed for cultural or archaeological resources due to the potential MEC hazard. In the event that cultural materials, artifacts, or human remains are encountered in or near the project area, either by PIKA, its subcontractors or by other personnel observing the project area during the project activities, the following procedures for inadvertent discoveries will be followed:

- Report any observations or discoveries or artifacts or human remains immediately to the OHARNG Cultural Resource Manager (CRM)/Camp Ravenna Environmental Office. If the CRM is not available, report the discovery to Camp Ravenna Range Control. CELRL and the Camp Ravenna Restoration Project Manager will also be notified.
- The CRM or Range Control will secure any artifacts or non-human remains identified in the project area for analysis or curation, as appropriate. Human remains are not to be disturbed or removed from the project area.
- The CRM will examine the area to determine whether an archaeological deposit or human burial has been exposed within the area and will take measures to protect the location from further disturbance.
- If human remains are known or suspected to be present, the CRM or Range Control will also promptly notify the State Police or Federal Bureau of Investigation, as appropriate.
- The CRM will promptly notify the Ohio Historic Preservation Office (OHPO) of the discovery. The CRM will follow Native American Graves Protection

and Repatriation Act of 1990 (NAGPRA) and Archaeological Resources Protection Act of 1979 (ARPA) procedures to contact Native American tribes and any other stakeholders as appropriate.

- If a site area or burial is identified as the source of the materials found in the project area, the CRM will make arrangements for the site recordation and stabilization, in consultation with OHPO and any interested Native American tribes.

- All archaeological and cultural activities will be performed with OHARNG oversight and approval.

11.2.4 *Water Resources*

PIKA will keep activities under surveillance, management, and control to avoid pollution of surface and ground waters. Special management techniques, as set out below; will be implemented to control water pollution by site operations.

11.3 MITIGATION PROCEDURES

11.3.1 *Waste Disposal*

All IDW will be managed in accordance with the Camp Ravenna Waste Management Guidelines dated 30 March 2015 and will be tracked throughout the duration of the project. The IDW containers will be inspected on a weekly basis and documented. Samples will be collected prior to demobilization from the field and will be submitted for analysis. Once the waste characterization results have been received and reviewed by PIKA and the OHARNG Environmental Specialist, the determination can be made if the IDW is hazardous or non-hazardous. PIKA will coordinate the review, approval and signature of the waste manifests and profiles with the OHARNG Environmental Specialist, prior to offsite transportation and disposal of the IDW to the appropriate facilities. PIKA will prepare an IDW Report for review and approval by the OHARNG Environmental Specialist.

11.3.1.1 Solid Waste Disposal

Solid wastes will be placed in appropriate containers, which will be emptied regularly. All handling and disposal will be conducted to prevent further contamination and/or contaminant migration. PIKA will dispose of all solid waste IAW all applicable federal, state, local and DoD/Army rules, laws, and regulations.

11.3.1.2 Hazardous Waste Disposal

Hazardous waste (although not anticipated) will be removed from the project site and will be manifested, transported, and disposed of IAW all applicable federal, state, local and DoD/Army rules, laws, and regulations.

11.3.1.3 Dust and Emission Control

PIKA will maintain all operational areas, waste areas, and other work areas free from excess dust in quantities constituting a hazard or nuisance. For this site investigation project, no dust control measures will be needed. Should unanticipated dust control issues arise, PIKA will recommend temporary methods to control dust (e.g., wetting with potable water) to Ohio EPA, CELRL, and the Camp Ravenna Restoration Project Manager for approval. PIKA will control dust as the work proceeds and whenever a dust nuisance or hazard occurs.

Hydrocarbon, carbon monoxide, oxides of nitrogen, and sulfur emissions are the emissions associated with heavy equipment. If this type of equipment is needed at this site, the emissions will be controlled through proper vehicle maintenance and use of mufflers IAW all applicable Federal, State, local and DoD/Army rules, laws, and regulations.

11.4 SPILL CONTROL AND PREVENTION

Special measure will be taken to prevent chemicals, fuels, oils, greases, bituminous materials, sawdust, waste washings, herbicides, insecticides, rubbish or sewage, and other pollutants from entering public waters.

With the exception of the brush clearing equipment and direct-push sampling truck on site, there is limited potential for spillage of chemicals. PIKA will take all necessary precautions to prevent spills and will implement contingency measures for cleanup should any occur. To minimize the potential for and impact of spillage, PIKA will:

- Submit spill response procedures as part of the SSHP for review and approval;
- Use and store minimal quantities of fuels and oils on-site;
- Apply work practice controls to prevent spills during refueling and maintenance of power tools, site vehicles, and equipment; and
- Maintain on-site spill response supplies and equipment necessary to contain spilled materials and to remove and contain materials that become contaminated as a result of spillage.

All spills will be reported to the Camp Ravenna Range Control in accordance with the Camp Ravenna Integrated Contingency Plan and the First Responder Form. PIKA will perform, at a minimum, the following emergency procedures if a spill occurs:

- Initiate the Camp Ravenna Integrated Contingency Plan
- Immediately notify Camp Ravenna Range Control at 614-336-6041, the CELRL, the Camp Ravenna Restoration Project Manager and the OHARNG Environmental Specialist (within 1 hour). The OHARNG will notify the Ohio EPA for spills in excess of the material's Reportable Quantity. PIKA will not make direct contact with the Ohio EPA.
- Halt site operations in the area and take immediate measures, using PPE and personnel, to control and contain the spill as directed by Range Control;

- Isolate the hazardous area through flagging, removing, or extinguishing ignition sources and evacuation of all unnecessary personnel from the area;
- If mandated by the nature of the spill, evacuate personnel upwind to the pre-designated assembly area, and post personnel at access routes to prevent unauthorized personnel from entering the area; and
- Implement control measures, if needed, to reduce vapors, gases, and/or dust emissions.
- Submit necessary reports and forms as required to Range Control and the Camp Ravenna Environmental Office within 24 hours of the initial spill.

11.5 STORAGE AREAS AND TEMPORARY FACILITIES

PIKA will not be installing any new storage areas or temporary facilities with this project.

11.6 ACCESS ROUTES

During all site activities PIKA will, to the greatest extent possible, use existing paved and unpaved roadways to minimize the impact of site operations.

11.7 PROTECTION AND RESTORATION OF TREES AND SHRUBS

The brush removal operations for this project will be limited to cutting ground-level vegetation and small trees (less than 3 inches in diameter), as required, which may hinder the sampling operations. In addition, the Northern Long-Eared Bat (NLEB) is a federally threatened species known to exist at Camp Ravenna. Due to the existence of this species, seasonal tree cutting restrictions must be followed when doing vegetation removal at the AOC. Trees (3 inches and greater) will only be cut in the period between 1 October to 30 March. All vegetation removal will be coordinated with the Camp Ravenna Environmental Office prior to removal.

PIKA will primarily use a Bush Hog with the deck locked in position at six (6) inches above ground level during the brush removal operation, however, hand-held weed eaters and/or chain saws may also be used as needed. Wherever possible, trees and other vegetation existing on the site will be conserved. All the brush clearing and vegetation removal operations will be coordinated with OHARNG.

11.8 CONTROL OF WATER RUN-ON AND RUN-OFF

Soil disturbance activities are not expected during the implementation of this statement of work. PIKA will take all reasonable precautions to prevent run-on from entering areas of the site where it may be exposed to contaminated soils, water, or waste as a result of PIKA site activities. If necessary, PIKA will construct, monitor and maintain silt fencing, temporary dikes, or diversion ditches to prevent water from entering the site. Any erosion and/or sediment control measures installed as part of this investigation (if any) will be properly maintained throughout the duration of the project, as needed, to minimize erosion potential.

11.9 POST-CONSTRUCTION CLEANUP

PIKA will remove all signs of disturbed areas such as work sites, fencing, or any other construction artifacts within the work, storage, and access areas. The area will be restored to near-natural conditions and, if needed, IAW the OHARNG/Camp Ravenna seed mix specifications. Any damage to roads, bridges, gates, or other structures, as determined by Camp Ravenna-Environmental, will be restored to pre-contract conditions.

12.0 INVESTIGATION DERIVED WASTE (IDW) PLAN

An IDW plan describing procedures for handling IDW on Recovered Chemical Warfare Materiel (RCWM) projects is not required under this task order. The procedures for handling IDW generated during this specific project can be found in Appendix D of the Work Plan (Sampling and Analysis Plan, Section 8.0). If in the future CWM is found or suspected at this site, an IDW plan will be prepared IAW the Data Item Description (DID).

13.0 INTERIM HOLDING FACILITY SITING PLAN FOR CWM PROJECTS

No Interim Holding Facility Siting Plan is associated with this Project.

14.0 PHYSICAL SECURITY PLAN FOR RECOVERED CHEMICAL WARFARE MATERIEL (RCWM) PROJECT SITES

Not required by under this SOW.

15.0 REFERENCES

1. Ohio EPA, 2004. Director's Final Findings and Orders in the matter of United States Department of the Army, Ravenna Army Ammunition Plant, Ravenna, Ohio.
2. Ohio EPA, 2006, Ohio Standards for Stormwater Management and Land Development and Urban Stream Protection,
3. Industrial Operations Command (IOC) Pamphlet 385-1 Classification and Remediation of Explosive Contamination,
4. VISTA/SAIC, 2012. Ravenna Army Ammunition Plant Submission Format Guidelines, Version 20.0. March.
5. SAIC, 2011. Facility-Wide Safety and Health Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna Ohio, February.
6. SAIC 2011. Facility-Wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna Ohio, February.
7. Department of Defense (DoD), 6055.09-M, Ammunition and Explosives Safety Standard.
8. USACE, Engineering Manual (EM) 385-1-97, Explosives Safety and Health Requirements Manual.
9. Occupational Safety and Health Administration (OSHA) General Industry, 29 CFR 1910, and Construction Industry Standards, 29 CFR 1926.
10. USACE, Engineering Manual (EM) 385-1-1, Safety and Health Requirements Manual.
11. DDESB Technical Paper (TP) 18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel.
12. USACE, Engineering Manual (EM) 1110-1-4009 – Military Munition Response.
13. Department of Defense Instruction (DoDI) 4140.62. Management and Disposition of Material Potentially Presenting an Explosive Hazard (MPPEH).
14. Environmental Protection Agency (EPA, Code of Federal Regulations).

APPENDIX A

STATEMENT OF WORK

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
J	1 | 19

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO.(If applicable)
P00004	20-May-2015	W22W9K22587089	

6. ISSUED BY	CODE	7. ADMINISTERED BY (If other than item 6)	CODE
U. S. ARMY ENGINEER DISTRICT, LOUISVILLE 600 DR. MARTIN LUTHER KING, JR. PLACE ROOM 821 LOUISVILLE KY 40202-2239	W912QR	CIVIL/OPS/ENVIRONMENTAL BR ATTN: HEATHER D. BAUER 600 DR. M. L. KING, JR. PL., RM. 821 LOUISVILLE KY 40202-2236	964860

8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		
PIKA INTERNATIONAL, INC. TERRY KASNAVIA 12723 CAPRICORN ST STE 500 STAFFORD TX 77477-4022		9A. AMENDMENT OF SOLICITATION NO.
		9B. DATED (SEE ITEM 11)
	X	10A. MOD. OF CONTRACT/ORDER NO. W912QR-12-F-0212
	X	10B. DATED (SEE ITEM 13) 14-Sep-2012
CODE 3SEM1	FACILITY CODE	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer ☐ is extended, ☐ is not extended.

Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

See Schedule

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS.
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

☐ A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

☐ B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).

☐ C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

X D. OTHER (Specify type of modification and authority)
Changes Clause

E. IMPORTANT: Contractor ☒ is not, ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
Modification Control Number: h2ctchdb151148

Contract W912QR-12-F-0212 for environmental services at the former Ravenna Army Ammunition Palnt (RVAAP) is hereby modified as follows:

1. This modification is necessary for pick up of additional munitions related to discarded metal items left by the Army and an extra soil sample.
2. The value of this order is hereby increased by $73,722.69 from $148,853.45 to a new total of $222,576.14 IAW attached statement of work and contractor's revised proposal dated 29 April 2015.
3. All other terms and conditions will remain unchanged.
4. This modification is effective the date of the Contracting Officer's signature.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) CHRISTOPHER T BRACKETT / ADDED BY SUMI TEL: 502.315.6211 EMAIL: christopher.t.brackett@usace.army.mil	
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY Christopher Brackett (Signature of Contracting Officer)	16C. DATE SIGNED 21-May-2015

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

SUMMARY OF CHANGES

SECTION SF 30 - BLOCK 14 CONTINUATION PAGE

The following have been added by full text:
STATEMENT OF WORK-P00004

US Army Corps of Engineers
Louisville District

STATEMENT OF WORK FOR
COMPLIANCE RESTORATION SITE CC-RVAAP-80
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

~~**10 April 2013**~~

Modification
10 March 2015

IMPORTANT NOTE

- **All Modification text is in bold**
- **All text no longer applicable, has been struck out**
- **Updates to how RVAAP operates are underlined and appear throughout the SOW**

Edits to sections included as part of the Modification;
1.2 - Clarification on the nature of the propellant cans and tops
- Change in oversight by USACE
2.0 - Return purpose removed by modification
4.0 - Refined purpose to remove cans/tops, but not all metal (artifact from previous metal descope)
4.1 - Task 1.0 - Additional Project Management effort for the added work
4.1 - Task 1.2 - Revised pre draft and draft SSHP to include metal pickup
4.1 - Task 2.0 - Respond to current Ohio EPA comments on Rev F Work Plan (WP)
- Revise pre draft and draft WP to include metal pickup / MDAS certification
4.1 - Task 3.0 - Align scope objectives for this modification
- Change in oversight by USACE
4.1 - Task 3.1 - Additional (1) surficial ISM sample
- Collection of metal / MDAS certification

4.1 - Task 3.2 - Additional sampling for IDW characterization
4.1 - Task 3.3 - Update on IDW disposal requirements
4.1 - Task 4.0 - Documenting the added work above
END
The Louisville District, U.S. Army Corps of Engineers (USACE) is requesting environmental services as described in this Statement of Work (SOW) at the former Ravenna Army Ammunition Plant (RVAAP).
Compliance Restoration (CR) site CC-RVAAP-80 (Group 2 Propellant Can Tops ~~Lids~~) is potentially impacted by range-related debris (RRD) and/or chemical residues of munitions or munitions constituents (MC). Response actions are required under the Defense Environmental Restoration Program (DERP), Installation Restoration Program (IRP) to complete the investigation of this AOC, and remove these materials. The SOW identifies specific requirements that will be completed by the Contractor.

1.0 GENERAL INFORMATION

1.1 Site Description and Location

Past Department of Defense (DoD) activities at the former RVAAP date back to 1940 and include the manufacturing, loading, handling, and storing of military explosives and ammunition. The facility consists of ~~Until 1999, the RVAAP was identified as a 21,419 acre installation. The Ohio Army National Guard (OHARNG) resurveyed the property boundary, finishing in 2003, and the actual total acreage was found to be~~ 21,683.~~289~~ acres. As of September 2013~~February 2006~~, all acreage ~~a total of 20,403 acres of the former 21,683 acre RVAAP have~~ has been transferred to the Army National Guard ~~Bureau~~ (ARNG~~B~~) via the United States Property and Fiscal Officer (USP&FO) for Ohio and subsequently licensed to the Ohio Army National Guard (OHARNG~~)~~ for use as a training site, now known as the Camp Ravenna Joint Military Training Center (Camp Ravenna). ~~Currently, RVAAP consists of 1,280 acres in several distinct parcels scattered throughout the confines of the OHARNG's Camp Ravenna Joint Military Training Center (Camp Ravenna). RVAAP's remaining parcels of land are located completely within the Camp Ravenna perimeter fence. The RVAAP facility is controlled by the U.S. Army Base Realignment and Closure Division (BRACD).~~ The RVAAP restoration program involves cleanup of former production/operational areas throughout the facility related to former activities conducted under the RVAAP.

Camp Ravenna/RVAAP is located in northeastern Ohio within Portage and Trumbull Counties, approximately 4.8 kilometers (three miles) east/northeast of the City of Ravenna and approximately 1.6 kilometers (one mile) northwest of the City ~~Village~~ of Newton Falls. ~~The RVAAP portions of the property are located completely within Portage County.~~ Camp Ravenna (Inclusive of RVAAP) ~~-~~is a parcel of property approximately 17.7 kilometers (11 miles) long and 5.6 kilometers (3.5 miles) wide. The facility is bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad on the south; Garrett, 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 9.6 kilometers (six miles) to the northwest; Newton Falls 1.6 kilometers (one mile) to the southeast; Charlestown to the southwest, and Wayland 4.8 kilometers (three miles) to the south. The property location is depicted in Figure 1.

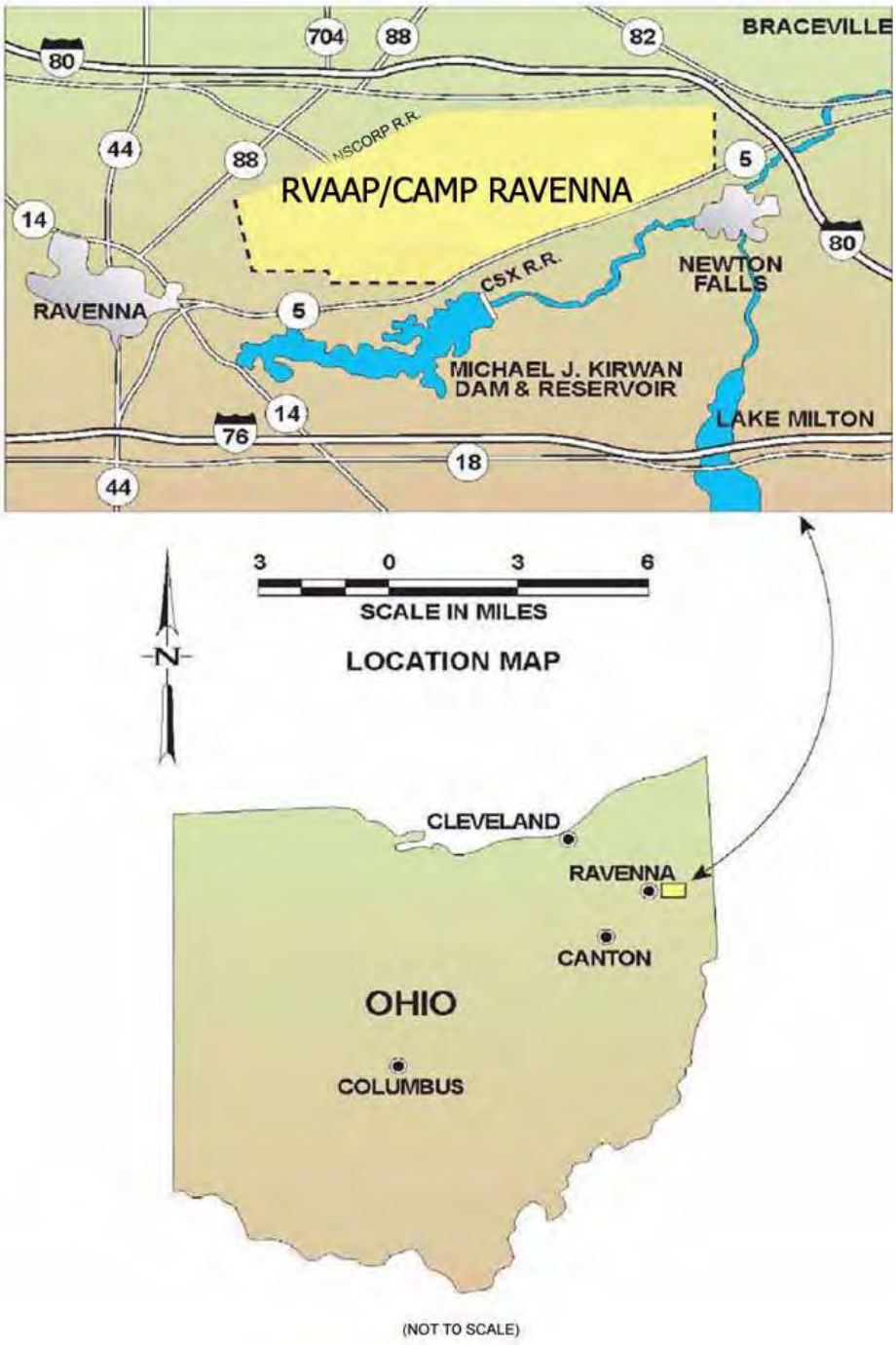


Figure 1. RVAAP/Camp Ravenna Location and General Vicinity Maps

~~Camp Ravenna did not exist when the RVAAP was operational, and the entire 21,683 acre parcel was a GOCO industrial facility. The RVAAP BRACD sites encompass investigation and clean up of past activities over the entire 21,683 acres of the former RVAAP. Therefore, references to the RVAAP in this document shall include the historical extent of the RVAAP, inclusive of the combined acreages of the current Camp Ravenna and RVAAP, unless otherwise specifically stated.~~

1.2 Area of Concern

CC-RVAAP-80: Group 2 Propellant Can Tops ~~Lids~~

CC-RVAAP-80 consists of the Group 2 Propellant Can Tops ~~Lids~~ area of concern (AOC). Propellant can lids or tops were identified on the ground surface/near surface at the southern end of the former Group 2 Ammunition Storage Area. These materials are typically classified as range scrap (similar to munitions packaging materials); however, this site was never used or classified as an operational range.

Discarded propellant cans and lids are considered, by definition, Material Potentially Presenting an Explosive Hazard (MPPEH). It is believed that the discarded propellant cans and tops, after inspection performed by two qualified UXO technicians, would be classified as Material Documented As Safe (MDAS). Dispose of properly for final disposition IAW DoDI 4140.62.

The propellant can lids located at the south end of Group 2 were initially identified by Ohio Army National Guard trainees in the winter of 2008. The propellant can lids were observed in the vegetative area located immediately south of the ammunition storage magazines in the vicinity of the southern railroad spur lines. This area consists of approximately 539,572 square feet (12.4 acres).

The Louisville District USACE performed an emergency survey with a metal detector of a portion of the southern area ground surface. Results of the initial investigation revealed multiple magnetic anomalies in the surface and near surface soils. On-site UXO personnel visually identified the surface anomalies as propellant can lids or tops. During the emergency survey it was also noted that the ground surface had been disturbed and contained hummocks (mounds) ranging in height from 1' to 2' throughout the survey area. The historic aerial photos showed storage of materiel on pallets in this area. The area appeared to not have been gravel covered, so the hummocks were likely caused by the tires of the vehicles used to place or retrieve the pallets sinking in when the ground was soft.

An investigation was initiated to conduct a geophysical survey of the 12.4 acres, and collect three surficial incremental soil samples. The geophysics utilized an EM-61MK2, which showed five clusters of steel at or near the surface, as well as other scattered steel. Three of the clusters became the location of the three multi-incremental samples collected during the investigation. As such, the propellant can lids (or RRD) are of environmental concern for the subject area.

The three samples did not result in any analytes exceeding the facility wide cleanup goals (FWCUGs). Additional soil investigation is warranted to fully characterize the surface and subsurface soils in the vicinity of the can lids.

The geophysics work was preceded by wetland delineation and vegetative clearance. The field team was led by a UXO tech, and no Munitions and Explosives of Concern (MEC) or Munitions Debris (MD) was encountered on the surface during any aspect of the work. Based upon the information to date, the site is a low probability site in regards to encountering MEC, and the work for this CC site needs to be carried out in the same manner as at any IRP or CC site. ~~Therefore, only unexploded ordnance (UXO) construction support will be needed for this project, which will be provided by the Government~~ **Coordinate all of these efforts with the assigned USACE OE Safety Specialist, so that they are present during any intrusive activities,** as stated in Section 4.1, Task 3.0. However, if prior to this project or during any phase of this project MEC are found at the site, the project may be stopped and the site will need to be reevaluated and potentially assigned a new probability rating.

2.0 PROJECT OBJECTIVES

The objective of this project is to conduct an investigation of the above-described Group 2 Propellant Can Tops ~~Lids~~ area~~s~~. The investigation shall achieve the following objectives:

- Confirm the presence or absence of releases of propellants and/or other MC to the surface soils at this AOC

- **Collect munitions packaging material (propellant cans and tops) at or near the surface (as revealed by the previous geophysics) within the AOC, inspect, certify, and dispose of properly for final disposition IAW DoDI 4140.62.**

3.0 GENERAL REQUIREMENTS

The Contractor shall possess all the required expertise, knowledge, equipment and tools required to perform the work described in this SOW in accordance with established industry standards. The Contractor shall be responsible for and shall furnish all labor, materials, plant, equipment, and supplies necessary to fully execute the Firm Fixed-Price work described herein within the contract performance period (see Section 4.0).

The Contractor shall perform all environmental services pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and National Oil and Hazardous Substances Contingency Plan (NCP) requirements, and coordinating with the Ohio Environmental Protection Agency (EPA) as appropriate. The installation is not on the National Priorities List (NPL).

The Contractor shall comply with all applicable federal, state, and local rules, laws, and regulations. The Contractor shall fulfill the work described in this SOW in a manner that is consistent with any applicable orders or permits, all cleanup agreements or guidance for the Facility, and relevant DoD and Army policies that exist or may become effective during the performance of this contract. This specifically includes the Director's Final Findings & Orders (DFFO), which the Army and Ohio EPA agreed to in 2004. The DFFO establishes certain criteria that apply to the relationship between the Army and Ohio EPA, including but not limited to approval authority, document review schedules, and various agency responsibilities. All work performed shall conform to the DFFO.

3.1 Government Property

All documents, maps, photographs, graphics, mailing lists, radio telemetry transmitters, computer files and the like developed by the Contractor while completing the requirements of this SOW are government property and will be delivered to the facility Point of Contact (POC) upon completion of this project.

3.2 Data Security

The Contractor shall not release any data, reports, or materials collected and/or developed during this project without the expressed written consent of the U.S. Army Corps of Engineers (USACE).

3.3 Deliverables and Document Format

The Contractor shall prepare and submit the following project management documents:

- Project Management Plan (PMP) including a Quality Control Plan (QCP)

In addition (but not limited to), the Contractor shall prepare the following project specific documents (as applicable) in support of the work:

- Work Plan (WP)
- Sampling and Analysis Plan (SAP)
- Site Safety and Health Plan (SSHP)
- Quality Assurance Project Plan (QAPP)
- Report of Findings and Conclusions

The Work Plan documents can be developed as Addenda to the approved Facility-Wide documents; however, references to the Facility-Wide documents should be held to a minimum with respect to describing actual field

assessment activities. The Work Plan should be treated as the body of the report while the above associated plans are entered as tabbed sections (or incorporated by reference).

The work completed previously had approved plans in place. The contractor shall use the existing content to the extent it applies, and have this advantage reflected in the costs for production of the above mentioned documents.

The above documents are subject to stakeholder review and approval. All documents shall be submitted by the Contractor in preliminary draft, draft, and final format. The number of documents and their distribution is described below:

Preliminary Draft Documents

Organization	Number of Paper Copies	Number of Electronic Copies
USACE	2	2
RVAAP Administrative Record	2	2
~~Ohio Army National Guard~~ OHARNG/ARNG – Camp Ravenna	1	1
ARNG ~~NGB~~		1
REIMS	1	1

Draft Documents

Organization	Number of Paper Copies	Number of Electronic Copies
USACE	2	2
RVAAP Administrative Record	2	2
Ohio EPA	2	2
~~Ohio Army National Guard~~ OHARNG/ARNG – Camp Ravenna	1	1
ARNG ~~NGB~~		1
REIMS	1	1

Final Documents

Organization	Number of Paper Copies	Number of Electronic Copies
USACE	2	2
RVAAP Administrative Record	2	2
Ohio EPA	2	2
OHARNG/ARNG – Camp Ravenna ~~hio Army National Guard~~	1	1
ARNG ~~NGB~~		1
REIMS	1	1

The Army, through the Contracting Officer's Representative (COR), will receive preliminary draft documents from the Contractor and will provide review comments to the Contractor within thirty ~~business~~ calendar days. Once preliminary draft comments are addressed, the Army will review draft and final documents concurrently with the other stakeholders. The Contractor shall ensure that review and response periods are consistent with the applicable regulatory drivers (see DFFO). All documents shall be identified as draft until completion of stakeholder

coordination, when they will be signed and finalized. ~~One c~~ Copies~~y~~ of the final documents shall be placed in both the project repositories and Administrative Record (for CERCLA documents).

All documents shall be submitted in electronic and printed format in accordance with the latest version of the document entitled "Ravenna Army Ammunition Plant Deliverable Document Formatting Guidelines." The referenced document is available and can be downloaded from www.rvaap.org/docs/pub/Formatting_Guidelines.pdf.

All reports are to be typed. Field notes shall be reviewed for quality assurance (QA) and then be submitted in handwritten form. Other handwritten field originals shall also be included in the reports.

In addition, final electronic document files must be in text-searchable PDF format and be accompanied by defined metadata for upload into the Army Repository of Environmental Documents (READ).

The contractor shall secure a USACE approved laboratory that can provide analytical data in the USACE Automatic Data Review (ADR) electronic format. All samples collected and analyzed under this agreement shall be provided in the referenced electronic data deliverable (EDD) format. The project-specific library file must be maintained to accurately reflect all of the analytical quality and will be provided to both the USACE and the sub-contract laboratory for use in screening EDD submittals.
Data review must comply with the procedures outlined in the Louisville Quality System Manual (QSM) Supplement and provide compatibility with data management software, at minimum, Environmental Data Management System (EDMS) software. The Contractor shall set up libraries in ADR/EDMS for deriving site constituents of potential concern (COPCs). The contractor is responsible for keeping ADR current.

All electronic data submitted by the contract laboratory is required to be error-free, and in complete agreement with the hardcopy data. Data files are to be delivered both by e-mail and high density CD accompanying the hardcopy data reports. The disk must be submitted with a transmittal letter from the laboratory that certifies the file is in agreement with hardcopy data reports and has been found to be free of errors using the latest version of the ADR evaluation software provided to the laboratory. The contract laboratory, at its cost, will correct any errors identified by the USACE, Louisville District.

All documents shall be provided in electronic format for posting to the Ravenna Environmental Information Management System (REIMS). All analytical data shall also be provided in EDD format for posting to REIMS. REIMS is currently administered by Mr. Patrick Ryan of ~~SAIC~~ LEIDOS. Mr. Ryan can be contacted at (865) 481-4664. The Contractor shall coordinate with Mr. Ryan to ensure proper sample numbering, EDD formatting, etc.

All project documents must meet the approval of the USACE. Project documents must also meet the approval of the Ohio EPA and all other stakeholders in compliance with the DFFO, and the most current version of the RVAAP Deliverable Document Format Guidelines.

3.4 Electronic Data Files

Currently the Louisville District standards for software are MicroStation Version 8 (.dgn) and MS Office Version 2007 Professional. These products are to be considered the default software of choice unless otherwise specified within individual task order statements of work, as determined by individual customer requirements or as the District incorporates updated versions of its software.
CADD Files: When required and requested in a task order, all CADD files (survey and topographic data, remedial action design drawings, contaminant migration maps and models, etc.) shall be digitized into files compatible with Microstation vector format (or other format if directed in the individual task order). Specific design file features will be provided in the individual task orders. CADD files shall also meet any upgrade to all Corps of Engineers systems throughout the duration of the contract.

GIS Files: When required and requested in a task order, all GIS files (survey and topographic data, remedial action data collected, contaminant migration maps generated, etc.) shall be submitted compatible with Environmental Systems Research Institute (ESRI) 9.x (shape files or personal geodatabases) format (or other format if directed in the individual task order). All GIS data shall be made compliant to the Spatial Data Standards for Facilities,

Infrastructure, and Environment (SDSFIE) version 2.6 (http://www.sdsfie.org/). Specific GIS file features will be provided in the individual task orders. GIS files shall also meet any upgrade to all Corps of Engineers systems throughout the duration of the contract. All GIS data shall be collected using the local State Plane coordinate system using the North American Datum of 1983 and the North American Vertical Datum of 1988. All files shall be collected using linear units of US Survey feet for both the horizontal and vertical.

Electronic Files: All final reports and documents, including laboratory analysis data, shall be submitted on CD/DVD. Report documents shall be in Adobe (pdf) format, and shall be accompanied by the Contractor's associated work files.

3.5 Conducting Meetings

Unless otherwise specified, the Contractor shall arrange and conduct all meetings required by this SOW. Unless otherwise specified, the installation shall provide facilities for meetings.

3.6 Project Stake Holders

For the purposes of this SOW, project stakeholders include the USACE~~Army,~~ Ohio Army National Guard, Army National Guard ~~Bureau~~, Ohio EPA, the Restoration Advisory Board (RAB), and the general public. The Contractor's required level of involvement may differ for each AOC/Site, and the Contractor shall be responsible for obtaining comments with appropriate approval or concurrence on project deliverables consistent with applicable regulatory drivers and agreements for each AOC/CR site.

4.0 STATEMENT OF WORK

The Contractor shall implement and complete an environmental investigation at Compliance Restoration site CC-RVAAP-80, the Group 2 Propellant Can Tops ~~Lids~~ Areas~~,~~ and collect, ~~and~~ **certify as MDAS,** and dispose of ~~all~~ **the munitions packing material** ~~metallic items present within the AOC~~ **identified during the previous SI.**

The Contractor is encouraged to become thoroughly familiar with all programmatic and scheduling requirements contained in this SOW as well as the DFFO in order to prepare the cost proposal. The Contractor is also encouraged to attend a preliminary site visit at the ~~RVAAP~~ facility with the USACE, and other Army representatives. ~~and the Ohio EPA~~. The purpose of the site visit is to familiarize the Contractor with the AOC/CR sites, and to provide other relative information (as applicable) necessary for the Contractor to prepare the cost proposal.

The following additional details and assumptions should also be considered in the preparation of the cost proposal:

- All of the access routes on the subject property are managed by the Ohio Army National Guard (OHARNG). Additionally, the primary AOC listed in this SOW is currently off limits but is located adjacent to a heavily used military training area ~~located on OHARNG property~~. Military training and other OHARNG activities are a priority ~~on OHARNG property~~. Contractor activities must be coordinated with the OHARNG through ~~Mr. Mark Patterson~~ Range Control, ~~the BRACD Facility Manager.~~

- Contractor is subject to OHARNG security and access procedures.

- Contractor may not disturb soil, water, vegetation, buildings, equipment or animals without prior coordination and approval of the OHARNG.

- Contractor is responsible for repairing damage to any roads, soil, vegetation, drainage, or otherwise caused by their activities on federal ~~or adjacent to OHARNG~~ property.

All work performed on this SOW shall follow the Contractor's approved Project Management Plan (PMP), and shall be performed in accordance with the following existing documents (if applicable) developed for the facility (or updates to the existing documents, if applicable):

- Ohio EPA's Director's Final Findings and Orders (DFFO) for RVAAP (Ohio EPA 2004)
- RVAAP's Facility-Wide Human Health Risk Assessor Manual (USACE 2004)
- Facility-Wide Ecological Risk Assessment Work Plan (USACE 2003a)
- Facility-Wide Sampling & Analysis Plan and Quality Assurance Project Plan (USACE 2011b)
- Facility-Wide Safety and Health Plan (USACE 2011a)
- Facility-Wide Groundwater Monitoring Program Plan (Portage 2004)
- RVAAP Community Relations Plan (USACE 2003b)
- RVAAP Final Position Paper for the Application and Use of Facility-Wide Human Health Cleanup Goals (USACE 2009)

The above documents are available for review online at http://www.rvaap.org/. Following contract award, the Contractor may direct questions to the USACE by contacting Mr. Quyet La ~~Derek Kinder~~ at 502-315-6892 ~~393~~.

4.1 Environmental Investigation at Compliance Restoration Site CC-RVAAP-80.

The detailed Tasks for this SOW are discussed in the following sections.

Task 1.0: Project Management

The Contractor shall provide a Project Manager qualified to oversee all work described in the SOW. The Project Manager shall serve as the single point of contact (POC) and liaison for all work required. All work shall be accomplished with adequate internal controls and review procedures to eliminate conflicts, errors, and omissions and to ensure the accuracy of all work completed under this SOW. The Contractor shall accept direction only from the USACE Contracting Officer (KO) or the designated COR. Any changes to this SOW must be authorized in writing by the KO. **Add project management for the additional tasks included in this modification.**

Task 1.1: Project Management Plan (PMP)

Contractor shall develop a Preliminary Draft PMP within 30 days of contract award. The PMP shall summarize Contractor's overall technical and management approach for this project. The PMP shall also include the summary of work to be performed and project schedule, project team roles and responsibilities, and a deliverable matrix in accordance with the project performance objectives.

The PMP shall also include a Quality Control Plan (QCP). The QCP will be developed to define how quality control will be executed for products and performance of work activities by all personnel, including subcontractors.

Upon receipt of USACE comment responses, Contractor shall submit a Draft PMP for stakeholder review and approval. The Contractor shall submit the Final PMP within 30 calendar days of receipt of COR comments on the draft document or in compliance with the schedule specified by the Ohio EPA. Schedules specified by the Ohio EPA will take precedence over the USACE schedule. Army approval is achieved through the COR, and Ohio EPA approval is achieved through receipt of EPA documentation confirming PMP approval.

Task 1.2: Site Safety and Health Plan (SSHP)

Contractor shall develop a Preliminary Draft Site-Specific Safety and Health Plan (SSHP) addenda for each appropriate task of the project. The SSHP will be presented as an addendum to the Facility-Wide Health and Safety Plan (USACE 2011a). The SSHP Addendum will address task hazard analyses, emergency response, contingency plans, and emergency contacts. The SSHP will include UXO avoidance services. The SSHP will meet the requirements of federal, state, and local regulations and will identify safety and health regulations applicable to the work. The Preliminary Draft SSHP shall be submitted to the USACE within 30 calendar days of contract award.

Upon receipt of USACE comment responses, Contractor shall submit a Draft SSHP for stakeholder review and approval. The Contractor shall submit the Draft SSHP within 30 calendar days of receipt of COR comments on the draft document or in compliance with the schedule specified by the Ohio EPA. Schedules specified by the Ohio EPA will take precedence over the USACE schedule. Army approval is achieved through the COR. The Ohio EPA may provide review and comment on the SSHP; however, does not approve health and safety documents for USACE Contractors.

Revise the safety plan to include the work to collect and certify the propellant cans/tops. Submit to the military stakeholders as a preliminary draft, respond to Army comments, submit draft to the Ohio EPA, respond to comments, submit Final plan. Make sure the document aligns with the final Responses to Comments (RTCs) to the revised final Work Plan currently under discussion.

Task 1.3: Project Execution/Client Correspondence

The following activities and deliverables shall be performed in support of this project:

- Project Kick-Off Meeting
- Monthly Progress Reports
- Records of Conversations
- Teleconference Progress Updates
- Meeting Minutes Documentation
- Public Involvement / RAB Meetings

The above activities will be conducted by the Contractor to achieve project execution, and maintain client correspondence with the USACE. These activities are discussed in further detail below.

Task 1.3.1: Project Kick-Off Meeting - Upon Army and Ohio EPA approval of the PMP and SSHP, the Contractor shall implement and attend an initial Project Kick-Off Meeting at the RVAAP facility. The Contractor shall present the details of the PMP, the SSHP, and the anticipated approach to conducting the IRA Activities. The Kick-Off Meeting is intended to assist the Contractor with the submittal and stake holder approval of the related Work Plan documents.

Task 1.3.2: Monthly Progress Reports - The Contractor shall submit monthly written progress reports to the USACE for every month by the fifth (5th) day of the following month. The monthly reports will include an accurate and current account of all work completed and deliverables furnished to the government. Progress reports will be prepared following the described sections presented in Section XVI of the DFFO. Contractor’s payment invoices may accompany the monthly progress reports.

Task 1.3.3: Records of Conversations - The Contractor shall prepare and maintain records of telephone conversations and significant verbal conversations conducted in support of this project. These records will be forwarded with monthly progress reports.

Task 1.3.4: Teleconference Progress Updates - The Contractor shall attend periodic teleconference progress meetings with the USACE to provide project status updates. The progress update meetings are currently held on a biweekly basis.

Task 1.3.5: Meeting Minutes Documentation - The Contractor shall document discussions at all meetings held in support of this project. Meeting minutes will be typed, and distributed to the USACE and installation POCs within 7 calendar days following the meeting.

Task 1.3.6: Public Involvement / RAB Meetings – The Contractor should note that the Installation has an active Restoration Advisory Board (RAB) and detailed information concerning the RAB's organization and activities will be provided to the Contractor. The Contractor shall attend a minimum of one (1) applicable RAB meeting during the specified period of performance at the direction of the COR.

All public participation coordination shall be approved by the Army through the ARNG/OHARNG ~~Facility Manager~~ and the COR. The Contractor shall provide the necessary support to initiate, schedule, and address all public participation aspects of the project (e.g., preparation of briefings, presentations, fact sheets, newsletters, articles/public notices to news media, and notifications to RAB members). The Contractor shall be responsible for requesting and addressing all public comments consistent with the applicable regulatory drivers. The USACE COR, or designee, will attend and represent the Army at all meetings with the public.

Task 2.0: Preparation of Work Plan and Supporting Documents

The Contractor shall prepare a work plan (WP) and the necessary supporting documents to implement and complete an initial environmental investigation at the designated Group 2 Propellant Can Lid Area. The investigation shall consist of a limited soil investigation of the surface and subsurface soils in this AOC.

Consistent with the RVAAP Deliverable Document Format Guidelines, the deliverables shall consist of the WP, the Sampling and Analysis Plan (SAP), the Site Safety and Health Plan (SSHP as discussed in Task 1.2), and the Quality Assurance Project Plan (QAPP). The WP documents shall follow the most recent version of the outline specified in the RVAAP Deliverable Document Format Guidelines.

The following paragraphs describe the requirements associated with the Contractor’s development of the WP documents:

Contractor shall develop a Preliminary Draft WP, SAP and QAPP within 60 days of approval of the final PMP. The SAP and QAPP will be developed as an Addendum, tiered under the existing RVAAP Facility-Wide SAP (USACE 2011b), to comply with USACE and Ohio EPA requirements.

All analytical work shall be performed in accordance with the most recent version of the DOD Quality System Manual (QSM). Sampling objectives will be established and the appropriate method will be identified to satisfy the performance objectives. The chemical analytical laboratory must be selected and included in all QAPP deliverables. No sampling activities shall commence until all plans are approved.

Upon receipt of USACE, and Army comment responses, Contractor shall submit a Draft SAP and QAPP for stakeholder review and approval. The Contractor shall submit the Final documents within 30 calendar days of receipt of Ohio EPA comments. Schedules specified by the Ohio EPA will take precedence over the USACE schedule. Army approval is achieved through the COR, and Ohio EPA approval is achieved through receipt of EPA correspondence confirming the Plan approvals.

The Contractor shall produce responses to the most recent Ohio EPA comments on the revised final work plan dated 6 March 2014 (comment letter dated 16 July 2014). Note that the Baltimore District USACE has

produced a draft document on the history of Group 2 related to propellant cans to cover part of comment #1. This history will be placed into an appendix in the WP.

Revise the WP to include the work to collect and inspect the propellant cans/tops. Submit the revised WP to the Army stakeholders as a preliminary draft, respond to Army comments, submit draft to the Ohio EPA, respond to comments, and submit Final plan. Make sure the document aligns with the final RTCs to the revised final WP currently under discussion.

Task 3.0: Implementation of Work Plan

Within 30 days of Final WP approval, Contractor shall begin implementation of the WP by performing the field assessment activities specified in the approved plan. A revised schedule for implementation of field activities may be warranted due to weather conditions or other unforeseen changes in the project schedule. The USACE reserves the right to modify the schedule for field activities due to inclement weather, and for safety and health purposes.

The Contractor shall be responsible for and bear all associated costs necessary to achieve the objectives of the WP. This includes, but is not limited to, possible vegetation clearing activities, the soil sampling and analysis activities, ~~and~~ collection~~,~~ and disposal of the ~~steel~~ **propellant cans and tops** identified in the previous geophysical work, **and certification as MDAS**. Access ~~Right-of-Entry~~ to Camp ~~the~~ Ravenna ~~facility~~ shall be coordinated with the OHARNG and the Army. Coordination with both agencies must first go through the Ravenna ~~Facility Manager~~ Range Control. ~~The Government shall provide on-call UXO support during the fieldwork.~~ **Coordinate all of these field efforts with the assigned USACE OE Safety Specialist, so that they are present during any intrusive activities.**

Task 3.1: Collecting Surface and Subsurface Soil Samples

The Contractor shall collect soil samples using Incremental Sampling Methodology (ISM) surface soil samples and subsurface samples based on the results of the previously completed geophysical delineation. **Five (5)** ~~Four (4)~~ surficial, and three (3) subsurface (1-4') (**eight** ~~seven~~ primary, plus QA samples) MI surface soil samples will be collected within those areas that are identified to include near surface propellant can lids or other possible ferrous materials. **This is an increase of one surficial ISM sample.**

The ISM surface soil samples shall be obtained by collecting a minimum of 30 increments per sample area from 0 to 1 foot below ground surface (bgs). MI Sample areas should be approximately one quarter of an acre or less in size. Multiple smaller areas where anomalies are found can be combined into one designated MI sample area. The Contractor shall provide a unit price and total price for this task.

The ISM subsurface samples shall be obtained by means of direct push technology, and shall also consist of a minimum of 30 increments per sample.

Collect the propellant can and top items identified by the geophysics performed during the limited SI performed on the AOC. Any unrelated materials such as railroad spikes, banding/strapping related to the pallets used to transport the propellant cans is not to be collected, but left on the ground surface. Inspect and dispose properly, all collected items IAW DoDI 4140.62. Marking the location of the previous anomalies, then clearing the spot, and within a meter radius around the spot of propellant cans/tops (if nothing found at the flag) will be an acceptable level of effort for this work.

If an item other than munitions packing materials is identified, and it is determined to be MEC, document the location, cease fieldwork on this compliance restoration project, and immediately notify the Army of the find.

Task 3.2: Sample Analysis

Contractor shall provide fixed unit costs and total cost for analyses as specified in Table 1 included in this SOW. Costs shall include all labor, materials, equipment, and supplies necessary to complete this task. All samples shall be

analyzed for TAL Metals, and common propellants used by the DoD including Nitrocellulose, Nitroglycerine, Nitroguanidine, and Perchlorate. One (1) of the samples shall also be analyzed for the RVAAP full suite as prescribed in the Facility Wide SAP. Contractor shall provide for quality control testing as specified in the facility wide SAP. QA samples will be collected at a frequency of 10% and sent to a lab contracted by the USACE. All analytical data should be reported per Ravenna specific ADR specifications. Analytical methods shall be in accordance with the Facility-Wide SAP and the Contractor's approved Work Plan.

IDW samples shall be **collected and** analyzed for **Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, TCLP herbicides, TCLP pesticides, total sulfide, total cyanide, corrosivity (pH), and flashpoint,** ~~the Full List TCLP for waste characterization purposes~~ **within 10 days of the first day of generation. All waste must be sampled and characterized in accordance with the RVAAP Facility-wide Sampling and Analysis Plan (FWSAP) and Camp Ravenna Hazardous Waste Management Plan.** Upon project completion, the Government will de-obligate any unused funds associated with this Task.

Table 1 Costs for Soil Sample Analysis

Analyte	Fixed Unit Price	Number of Tests	Total Cost
Surface/Subsurface Soil			
MI Sample Prep			
TAL Metals			
Mercury			
Hexavalent Chromium			
Propellants			
Explosives			
SVOCs			
VOCs			
Pesticides			
PCBs			
TCLP			

Task 3.3: **Management and** Disposal of IDW

All waste is to be managed in accordance with the Camp Ravenna Waste Management Guidelines, Camp Ravenna Hazardous Waste Management Plan and the RVAAP FWSAP. All waste shall be properly containerized, labeled, and stored in accordance with Federal, State, local and facility rules and regulations. All waste must be tracked by the Contractor on a Container Log and a waste tracking sheet and inspected on a weekly basis. Waste inspections must be submitted to the Restoration Waste POC (Katie Tait) on a weekly basis. The container log and waste tracking sheet must be turned into the Restoration Waste POC at the end of the project. Within 90 days of the generation of IDW, **the** Contractor shall properly dispose of all IDW at **an** approved off-site waste disposal facility in compliance with all applicable Federal, State, and local rules, laws and regulations. **The contractor must submit all waste profiles to the Restoration Waste POC for review and approval prior to finalization with the disposal facility.** Contractor is responsible for maintaining all applicable waste characterization and disposal records, and for producing a**n IDW** report for submittal t**o, and approval by, the ARNG/OHARNG. Additionally, the final approved IDW report will be included in the draft SI report. All** IDW disposal activities shall be coordinated with the **Restoration Waste POC (Katie Tait)** in the **Camp Ravenna** Environmental Office. (Note: All IDW is to be removed from the subject property no later than 90 days following waste generation.) The contractor shall be prepared to report IDW status in the biweekly status calls, currently held every other Tuesday afternoon **and provide updates to be included in the monthly DFFO report to the Ohio EPA. All waste manifests must be reviewed, approved and signed by the Restoration Waste POC prior to shipment of waste from the facility. All waste shipments and disposal operations must be coordinated with the Restoration Waste POC.**

Task 3.4: Data Management / Data Validation

~~EPA CLP Level IV data validation will be required to meet the requirements of the DoD QSM. The~~ Contractor shall perform data verification for all analytical results according to the process provided in the Louisville QSM Supplement and QC criteria in the DoD QSM. USACE Louisville District shall contract a third-party contractor for a minimum 10% or greater validation of analytical results. The Contractor shall include the completed validation report as presented by the validator as an appendix to the final document, and discuss results in the project report. The report shall also be sent directly from the validator to the USACE technical contact upon completion of validation.

Task 3.5: Surveying and Mapping

Survey maps shall be provided in the report, which delineate the boundaries of the survey site, and the soil sample locations subject to this SOW. All data submitted shall be in the Universal Transverse Mercator (UTM) coordinate system. (Note: All coordinates shall be collected with applicable equipment capable of gauging field surveys within an accuracy of one meter or less of error.)

Task 4.0: Investigation Report

The Contractor shall prepare and submit a Preliminary Draft investigation report within 90 calendar days following the completion of the field investigation activities to the Army. The report shall document the process and procedures used in conducting the geophysical delineation, and describe all soil sampling activities conducted during this project. This report shall include details about pre-mobilization, mobilization, site preparation, sample collection, decontamination, analytical results, waste management, event chronology, final site inspection, and mapping. The investigation report maps shall include the basic location and amount of recovered steel (along with photos), and the locations of MI sample area boundaries.

Also document the work to collect and evaluate MPPEH (i.e., the propellant cans/tops), and the certification of MDAS. Supply the certification to the ARNG/OHARNG when complete, and include the certification as an appendix to the report.

Upon receipt of approval of Army ~~USACE~~ comment responses, the Contractor shall submit a Draft investigation report for stakeholder review and approval. The Contractor shall submit the Draft investigation report within 30 calendar days of receipt of COR comments on the draft document or in compliance with the schedule specified by the Ohio EPA. Schedules specified by the Ohio EPA will take precedence over the USACE schedule. Army approval is achieved through the COR.

5.0 PAY ESTIMATES

The Contractor shall submit Pay Estimates using ENG Form 93 as specified in the contract. ENG Form 93 may be found on the Internet under the library of USACE publications. The Contractor shall ensure that the Pay Estimates include a separate line item for each task. All ENG Form 93 shall be submitted to the USACE COR or the COR designated representative. Electronic submission of Pay Estimates to the USACE is acceptable; however, should be followed with the mailing of a hard copy. The contractor shall ensure that the address appearing in block 2 of the ENG Form 93 is the same as the address submitted to USACE to allow electronic deposit of payments. If the addresses are not the same, the ENG Form 93 will be returned to the contractor for correction.

Release of Claims shall accompany the final Pay Estimate. The Release of Claims shall be signed and shall include the total contract amount, amount of final payment due, and a statement similar to the following:

"The undersigned architect-engineer firm, under Contract No. ##, Delivery Order No. ##, between the United States of America and said Contractor for services at (property name) in (location) hereby release the U.S., its officers, agents, and employees from any and all claims arising under or by virtue of said contract or any modification or change thereof except with respect to those claims, if any, listed below:"

6.0 PROPOSAL ESTIMATE

The Contractor shall submit a detailed estimate of the effort required to complete the described SOW. The proposal submittal shall also include the estimated costs associated with all planned sampling and analysis activities (other direct and indirect costs). The proposed sampling shall include 15% of the samples also having analyses for propellants, VOCs, SVOCs, pesticides/herbicides, and PCBs (full analyses), as prescribed in the Facility Wide SAP. The Contractor shall complete and submit Table 1 (as shown) as a summary of estimated costs.

Table 2: Contractor's Summary of Estimated Costs

Task #	**Task Description**	**Unit**	**Fixed Unit Cost**	**Number of Units**	**Total Cost**
1.1	Project Management Plan				
1.2	Site Safety Health Plan				
1.3.1	Project Kickoff Meeting				
1.3.2	Monthly Progress Reports				
1.3.3	Records of Conversation				
1.3.4	Teleconference Progress Updates				
1.3.5	Meeting Minutes Documentation				
1.3.6	RAB Meetings				
2.0	Work Plan and Support Documents				
3.0	Implementation of Work Plan				
3.1	Surface & Subsurface Soil Sampling				
3.2	Sample Analysis				
3.3	Disposal of IDW				
3.4	Data Management / Data Validation				
3.5	Survey and Mapping				
4.0	Investigation Report				
Total Cost Estimate					

7.0 PROJECT SCHEDULE

The Contractor shall propose a reasonable schedule based upon the agreements in the DFFOs on the number and duration of document reviews, and duration of fieldwork. The contractor shall ensure that the *schedule does not exceed 21 months from notice to proceed**.**

The Contractor shall submit a proposed project schedule for the described SOW. The schedule should be prepared in general conformance with the following schedule anticipated by the USACE. (Note: The award of this SOW to the Contractor is subject to the availability of funding.)

Task No.	**Identified Task**	**Duration / Due Date**
- -	Notice to Proceed (NTP) / Task Order Award	***Per KO***
1.1	Pre-Draft Project Management Plan	30 Calendar Days of NTP
1.2	Pre-Draft Site Safety Health Plan	30 Calendar Days of NTP

1.3.1	Project Kickoff Meeting	30 Calendar Days of Approval of PMP and SSHP
1.3.2	Monthly Progress Reports	By the 5th Day of Each Month
1.3.3	Records of Conversation	By the 5th Day of Each Month
1.3.4	Teleconference Progress Updates	Bi-Weekly
1.3.5	Meeting Minutes Documentation	7 Calendar Days Following Meeting
1.3.6	RAB Meetings	Once per Army Direction
2.0	Pre-Draft Work Plan and Supporting Documents	60 Calendar Days of NTP
*3.0	Implementation of Work Plan#*	Begin 30 Calendar Days of Approval of Final Work Plan
4.0	Pre-Draft Investigation Report	Within 90 Calendar Days of Completing Field Investigation Activities
*# Coordination with the OHARNG will be necessary to avoid conflicts between fieldwork and Guard training.		

Upon project award to the Contractor, the agreed upon project schedule will be updated with calendar dates and will be included in the Contractor's PMP. Adherence to the PMP project schedule will serve as a measurement of Contractor performance on this project.

8.0 ADDITIONAL INFORMATION

8.1 Additional Contractor Requirements

The Contractor shall be aware of the following requirements:

- HTRW, MEC, MC or MD may be found in munitions, containers, landfills, Open Burning/Open Detonation (OB/OD) areas, ground spills, surface water, or groundwater. If suspected HTRW, MEC, MC or MD of unknown origin and nature is encountered, the contractor shall immediately notify the Camp Ravenna ~~Facility Manager~~ Range Control, the Contracting Officer and ~~or~~ the designated COR. The contractor shall take necessary actions to protect the safety of its workforce, the public, and the environment.

- Permits. The contractor shall obtain the permits and licenses necessary to conduct his/her operations including, but not necessarily limited to, installation required permits, building permits, drilling permits, and/or waste transportation and disposal permits.

- Safety and Health Program. The contractor shall ensure that its subcontractors, suppliers, and support personnel follow all safety and health provisions established in the approved Accident Prevention Plan (APP) for the site. A Site Safety and Health Plan (SSHP) shall be included in the APP as an Attachment. The Government reserves the right to stop work under this contract for any violations at no additional cost. The Government will verify that corrective action has been implemented prior to the contractor continuing performance under the contract. All personnel performing onsite activities shall participate in an ongoing medical surveillance program meeting the requirements of 29 CFR 1910.120. The medical examination protocols and results shall be overseen by a licensed physician who is certified in Occupational Medicine by the American Board of Preventive Medicine or who by necessary training and experience is board eligible.

- Quality Management. The contractor is responsible for the control of product quality and for offering to the Government for acceptance only those products/services that conform to the contractual requirements.

SECTION A - SOLICITATION/CONTRACT FORM

The total cost of this contract was increased by $73,722.69 from $148,853.45 to $222,576.14.

SECTION B - SUPPLIES OR SERVICES AND PRICES

CLIN 0002 is added as follows:

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0002		1	Job	$73,722.69	$73,722.69
	Modification P00001 FFP Contractor shall provide pick up of additional munitions related to discarded metal items left by the Army and an extra soil sample IAW attached statement of work and contractor's revised proposal dated 29 April 2015. FOB: Destination				
				NET AMT	$73,722.69
	ACRN AB CIN: 000000000000000000000000000000				$73,722.69

SECTION E - INSPECTION AND ACCEPTANCE

The following Acceptance/Inspection Schedule was added for CLIN 0002:

INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
N/A	N/A	N/A	Government

SECTION F - DELIVERIES OR PERFORMANCE

The following Delivery Schedule item has been added to CLIN 0002:

DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC

22-DEC-2016	1	ENVIRONMENTAL BRANCH CHRIS KAREM 600 DR. MLKJ PLACE, ROOM 921 LOUISVILLE KY 40201-0059 502-315-6285 FOB: Destination	H2L0H00

SECTION G - CONTRACT ADMINISTRATION DATA

Accounting and Appropriation

Summary for the Payment Office

As a result of this modification, the total funded amount for this document was increased by $73,722.69 from $148,853.45 to $222,576.14.

CLIN 0002:
Funding on CLIN 0002 is initiated as follows:

ACRN: AB

CIN: 000000000000000000000000000000

Acctng Data: 021 NA 2015 2015 2020 000 0000 CCS: NA H2 2015 08 8041 49300811000 33017 3230 2FKD3F

Increase: $73,722.69

Total: $73,722.69

(End of Summary of Changes)

APPENDIX B

SITE MAPS/ FIGURES

Figure 1 – General Location and Orientation of Ravenna

Figure 2 – Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops within RVAAP

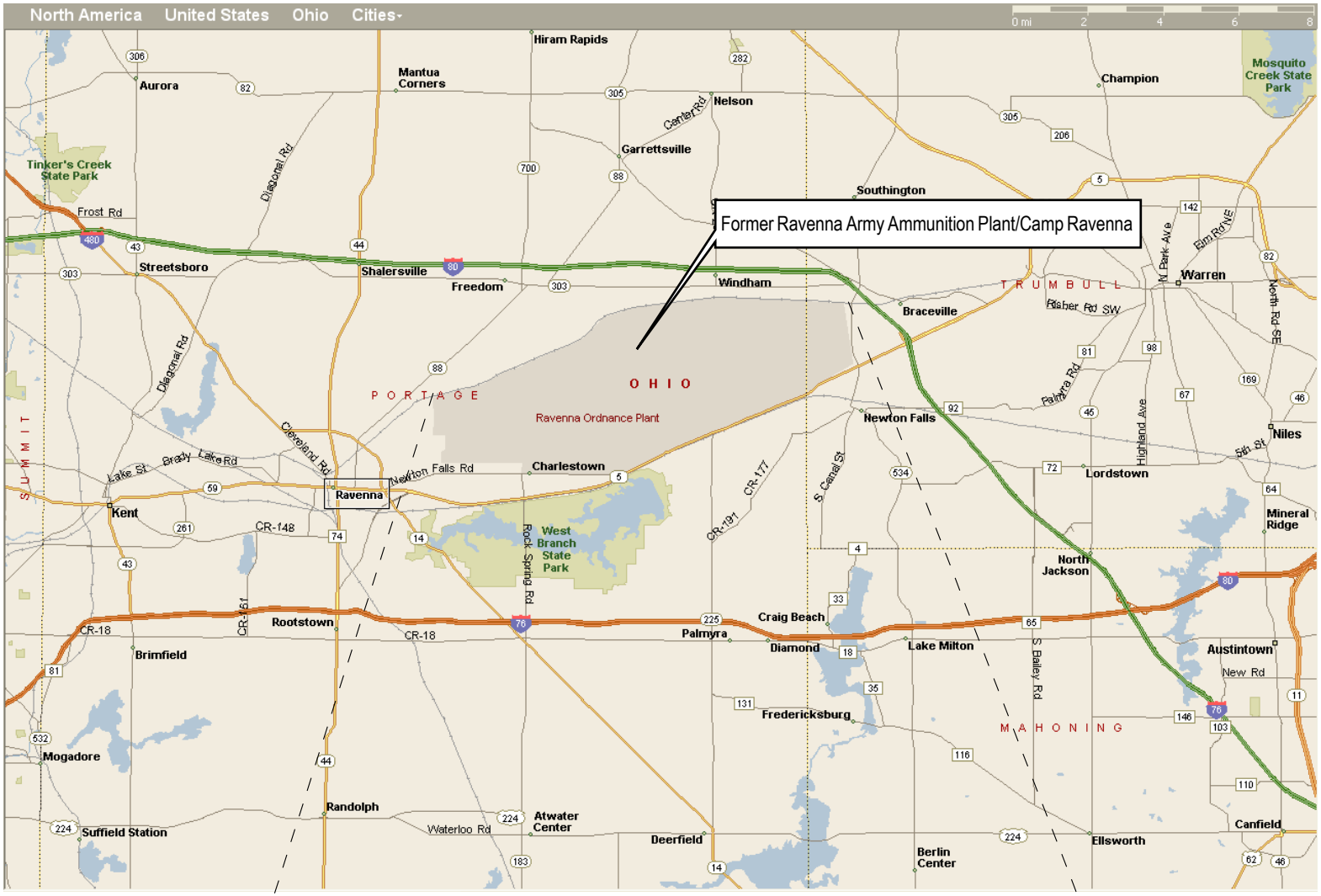
Figure 3 – CC RVAAP-80 Group 2 Propellant Can Tops Site Map

Figure 4 – Previously Identified Anomalies and Anomaly Cluster Areas

Figure 5 – Proposed Sample Locations

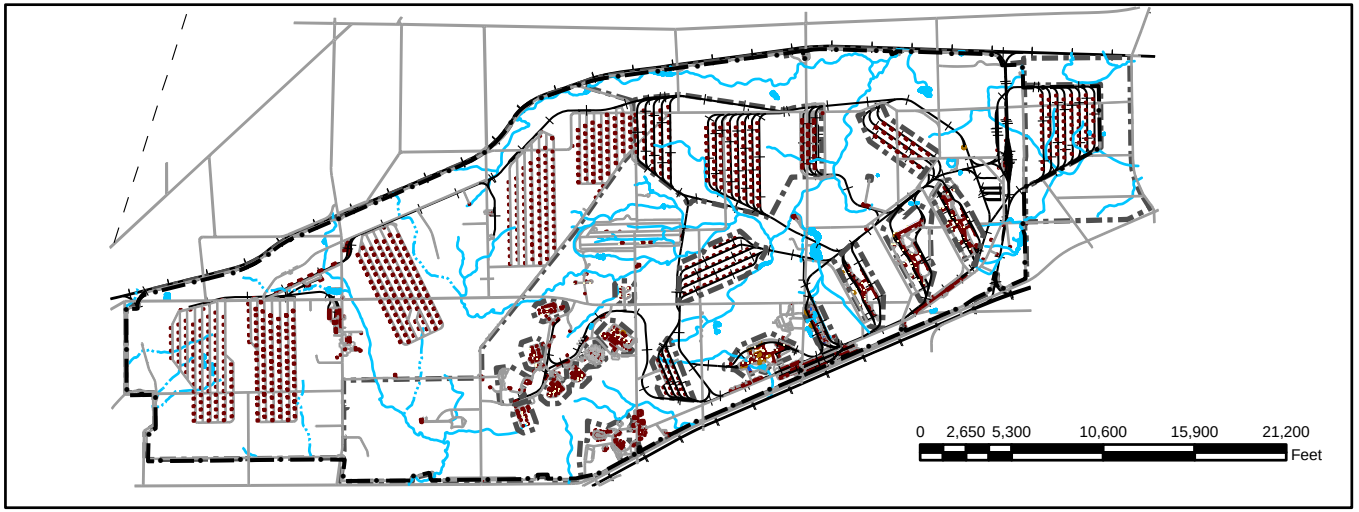
Figure 6 – Project Schedule

Figure 7 – Group 2 Wetlands Locations



Legend

- Roads
- Railroads
- Installation Boundary
- Pond
- Perennial Stream
- Intermittent Stream



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S

PIKA INTERNATIONAL, INC.

PIKA International, Inc.
12723 Capricorn Dr. Ste#500
Stafford, TX 77477

Former Ravenna Army Ammunition Plant/Camp Ravenna, Ravenna, OH

FIGURE 1 - GENERAL LOCATION AND ORIENTATION OF THE CAMP RAVENNA

Drawn On: 12/01/2010 Drawn By: QX

CC RVAAP-80 GROUP 2 PROPELLANT CAN TOPS SITE

Legend
- Water Bodies
- Buildings
- Walkways
- Railroads
- Berms
- CC RVAAP-80 Group 2 Propellant Can Tops Site

Slagle Road
Slagle Road
BlockD Road1
BlockD Road3
BlockD Road5
BlockD Road7
South D Road
Greenleaf Road
WP Lane E
WP Lane C
WP Lane A
Winklepeck Road
WP Lane B
OD-2 Road
WS Road
George Road
Newton Falls Road
FB Stor Road
FB Stor Road
Wilcox-Wayland Road
Paris-Windham Road
Load Line 4 Road
Load Line 4 Road
Load Line 4-2 Road
South Service Road
Route 5
Load Line 3 Road
LL-3 Road
Load Line 2 Road
LL-2 Road
Storage Area 6 Road
Patrol Road
Sectioning Area Road
Remalia Road
LL-1 Road
LL-1 Road
LL-1 Road
Ramsdell Road
Butts-Kistler Road
B D Wye Road
South Patrol Road
Greenleaf Road
WH44 Road
Fuze and Booster Road
Demolition Road
Demolition Road
Dormitory Road
George Rd
New Newton Falls Road

N

0 1,500 3,000 6,000 9,000 12,000 Feet

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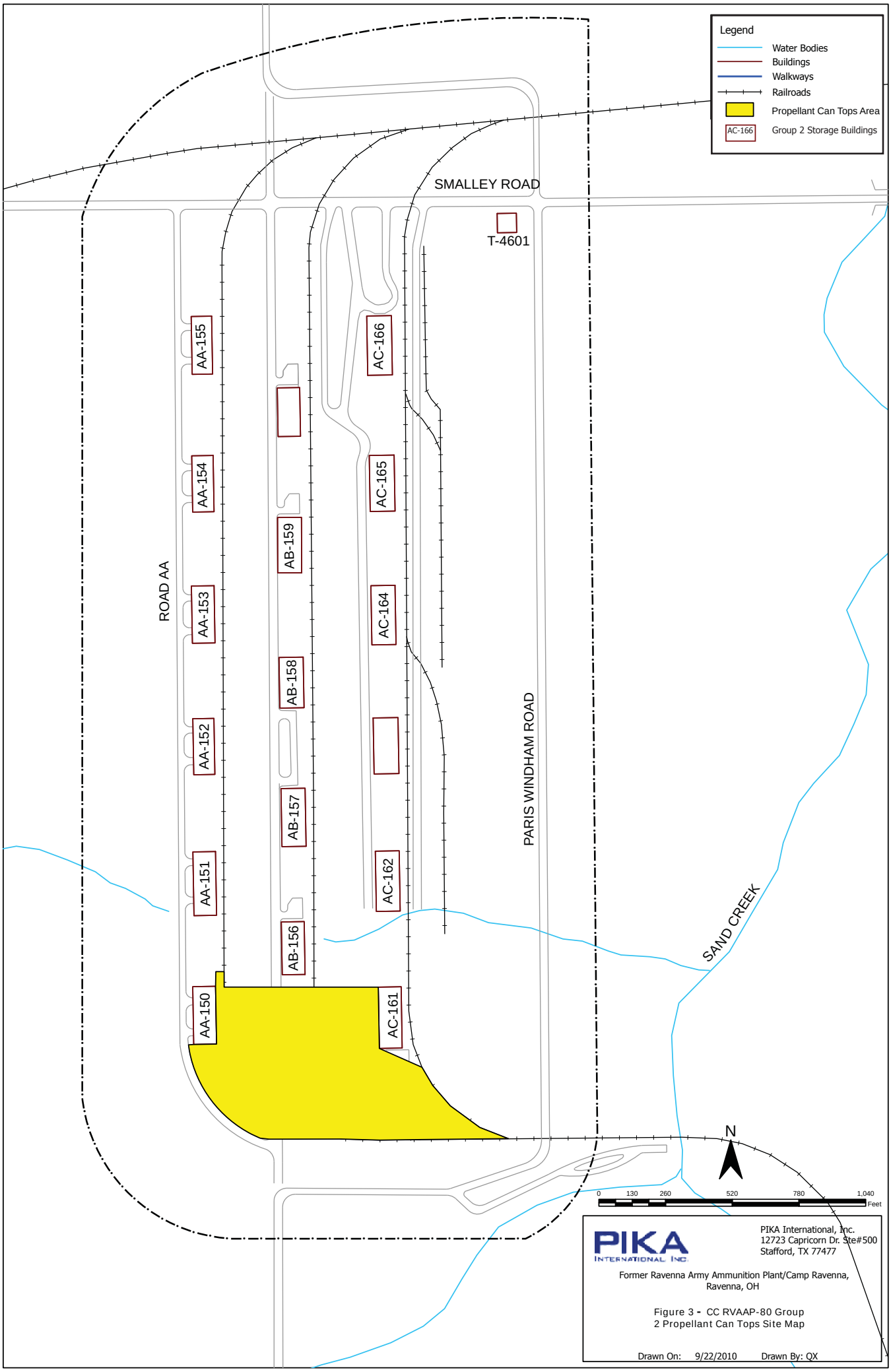
PIKA International, Inc.
12723 Capricorn Dr. Ste#500
Stafford, TX 77477

Former Ravenna Army Ammunition Plant
Ravenna, OH

Figure 2
Compliance Restoration Site CC RVAAP-80
Group 2 Propellant Can Tops Area

Drawn On: 6/28/2012 Drawn By: NS



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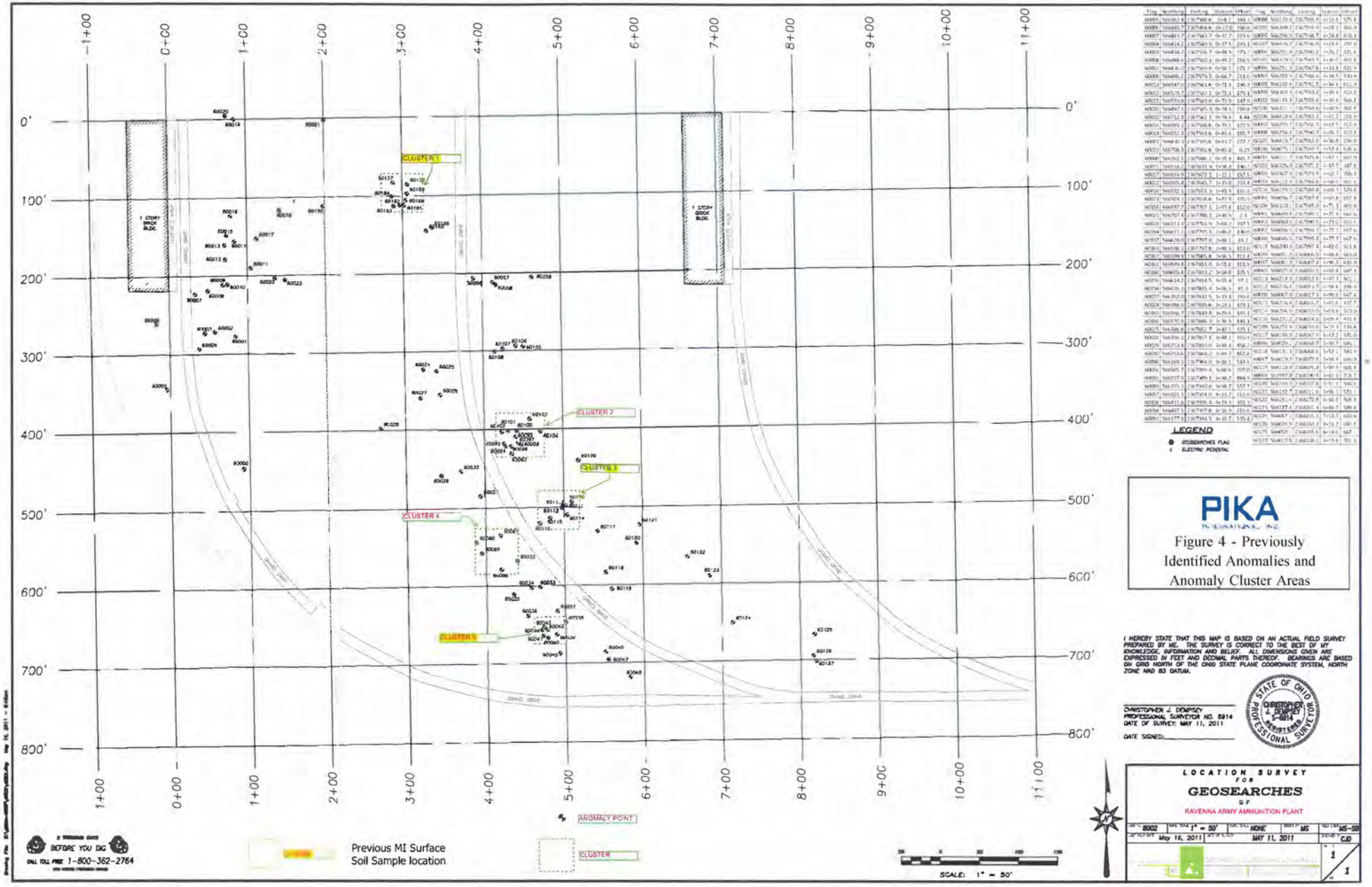
Stafford, TX 77477

Former Ravenna Army Ammunition Plant/Camp Ravenna, Ravenna, OH

Figure 3 - CC RVAAP-80 Group 2 Propellant Can Tops Site Map

Drawn On: 9/22/2010 Drawn By: QX


-1+00
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
0'
100'
200'
300'
400'
500'
600'
700'
800'
CLUSTER 1
CLUSTER 2
CLUSTER 3
CLUSTER 4
CLUSTER 5
1 STORY BRICK BLDG.
1 STORY BRICK BLDG.
ANOMALY POINT
CLUSTER
Previous MI Surface Soil Sample location
SCALE: 1" = 50'
LEGEND
GEOSEARCHES FLAG
ELECTRIC PEDESTAL
PIKA
Figure 4 - Previously Identified Anomalies and Anomaly Cluster Areas
I HEREBY STATE THAT THIS MAP IS BASED ON AN ACTUAL FIELD SURVEY PREPARED BY ME. THE SURVEY IS CORRECT TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF. ALL DIMENSIONS GIVEN ARE EXPRESSED IN FEET AND DECIMAL PARTS THEREOF. BEARINGS ARE BASED ON GRID NORTH OF THE OHIO STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD 83 DATUM.
CHRISTOPHER J. DEMPSEY
PROFESSIONAL SURVEYOR NO. 8914
DATE OF SURVEY: MAY 11, 2011
DATE SIGNED:
STATE OF OHIO CHRISTOPHER J. DEMPSEY 8914 REGISTERED PROFESSIONAL SURVEYOR
LOCATION SURVEY FOR
GEOSEARCHES
OF
RAVENNA ARMY AMMUNITION PLANT
8002
1" = 50'
NONE
MS
MS-58
May 16, 2011
MAY 11, 2011
CJD
1
1
BEFORE YOU DIG
CALL TOLL FREE 1-800-362-2764

LEGEND

ANOMALY POINT

Proposed ISM Surface Soil Sample Locations for Additional Cluster Area 0-1 ft below ground surface

Proposed ISM Surface Soil Sample Location Within Existing Cluster Area 0-1 ft below ground surface

Proposed ISM Subsurface Soil Sample Locations Within Existing Cluster Area 1-4 ft below ground surface

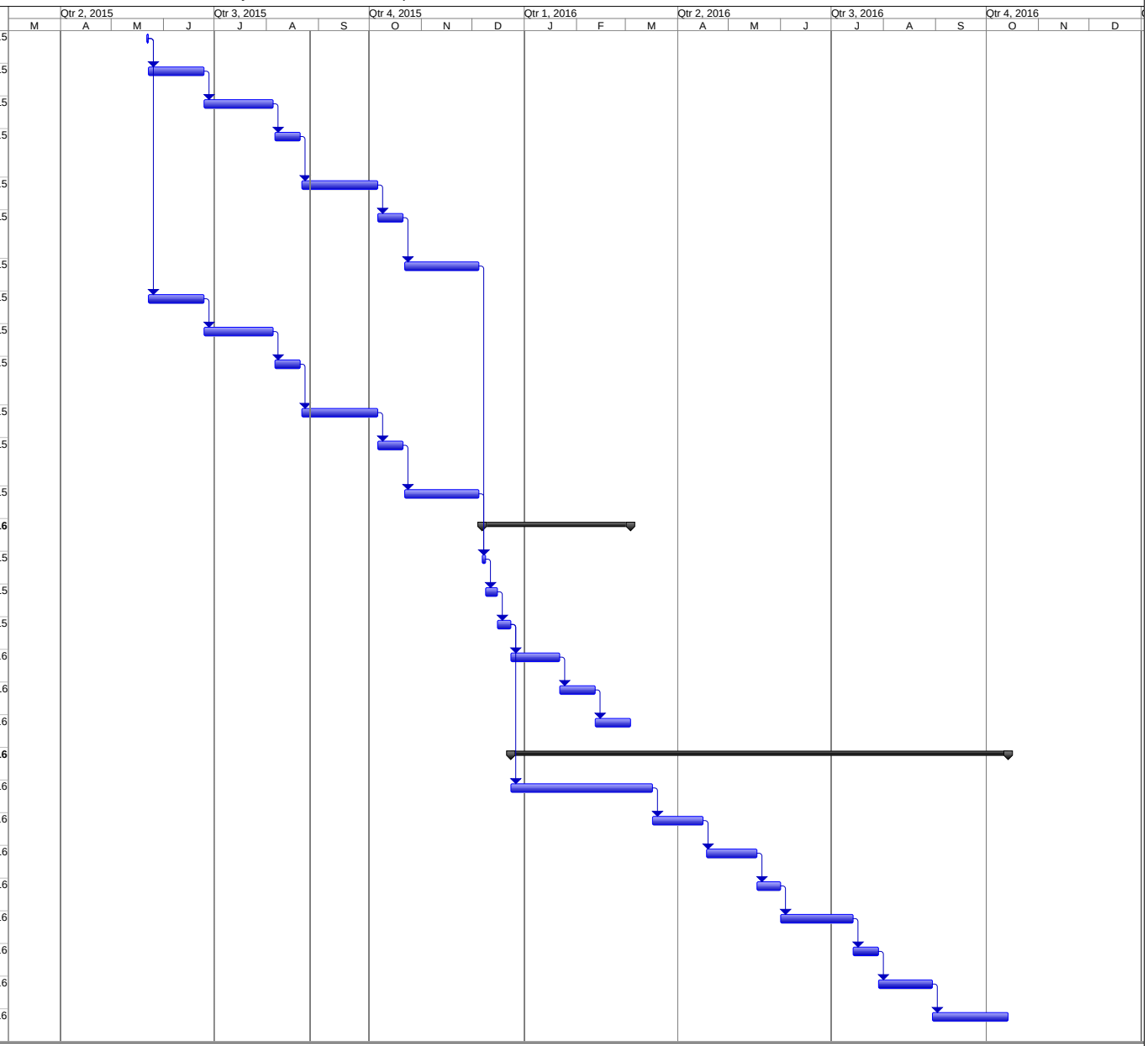
PIKA INTERNATIONAL, INC.

Figure 5
Proposed Sample Locations

Date: 8 June 2015
Drawn by: CVJ

Figure 6 - Project Schedule
Compliance Restoration Site CC-RVAAP-80
Former Ravenna Army Ammunition Plant / Camp Ravenna, Ravenna, Ohio

ID	Task Name	Duration	Start	Finish
1	Award Contract Mod 0004	1 day	Fri 5/22/15	Fri 5/22/15
2	Prepare Pre-Draft Revised WP, SAP and QAPP	33 edays	Fri 5/22/15	Wed 6/24/15
3	Army review of Pre-Draft Revised WP, SAP and QAPP	41 edays	Wed 6/24/15	Tue 8/4/15
4	Pre-Draft Revised comment response, develop Draft Revised WP, SAP & QAPP	15 edays	Wed 8/5/15	Thu 8/20/15
5	Army/OEPA review of Draft Revised WP, SAP and QAPP	45 edays	Fri 8/21/15	Mon 10/5/15
6	Draft Revised comment reponse, devlop Final Revised WP, SAP and QAPP	15 edays	Mon 10/5/15	Tue 10/20/15
7	Army/OEPA review of Final Revised WP, SAP and QAPP	44 edays	Wed 10/21/15	Fri 12/4/15
8	Prepare Pre-Draft Revised APP/SSHP	33 edays	Fri 5/22/15	Wed 6/24/15
9	Army review of Pre-Draft Revised APP/SSHP	41 edays	Wed 6/24/15	Tue 8/4/15
10	Pre-Draft Revised comment response, develop Draft Revised APP/SSHP	15 edays	Wed 8/5/15	Thu 8/20/15
11	Army/OEPA review of Draft Revised APP/SSHP	45 edays	Fri 8/21/15	Mon 10/5/15
12	Draft Revised comment reponse, devlop Final Revised APP/SSHP	15 edays	Mon 10/5/15	Tue 10/20/15
13	Army/OEPA review of Final Revised APP/SSHP	44 edays	Wed 10/21/15	Fri 12/4/15
14	**Begin Field Work**	**64 days**	**Mon 12/7/15**	**Thu 3/3/16**
15	Mobilization for Site Investigation	2 days	Mon 12/7/15	Tue 12/8/15
16	Brush clearing	5 days	Wed 12/9/15	Tue 12/15/15
17	Surface and subsurface soil sampling	6 days	Wed 12/16/15	Wed 12/23/15
18	Laboratory analysis	21 days	Thu 12/24/15	Thu 1/21/16
19	Data Valadation	15 days	Fri 1/22/16	Thu 2/11/16
20	Disposal of IDW	15 days	Fri 2/12/16	Thu 3/3/16
21	**Investigation Report**	**211 days**	**Thu 12/24/15**	**Thu 10/13/16**
22	Prepare and Submit Predraft Report	60 days	Thu 12/24/15	Wed 3/16/16
23	Army review of Pre-draft report	22 days	Thu 3/17/16	Fri 4/15/16
24	Pre-draft report comment response	22 days	Mon 4/18/16	Tue 5/17/16
25	Develop Draft report	10 days	Wed 5/18/16	Tue 5/31/16
26	Army/OEPA review of Draft report	31 days	Wed 6/1/16	Wed 7/13/16
27	Draft report comment response	11 days	Thu 7/14/16	Thu 7/28/16
28	Develop Final Report	22 days	Fri 7/29/16	Mon 8/29/16
29	Army/OEPA review of Final Report	33 days	Tue 8/30/16	Thu 10/13/16



Thu 8/27/15

Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Progress
Deadline

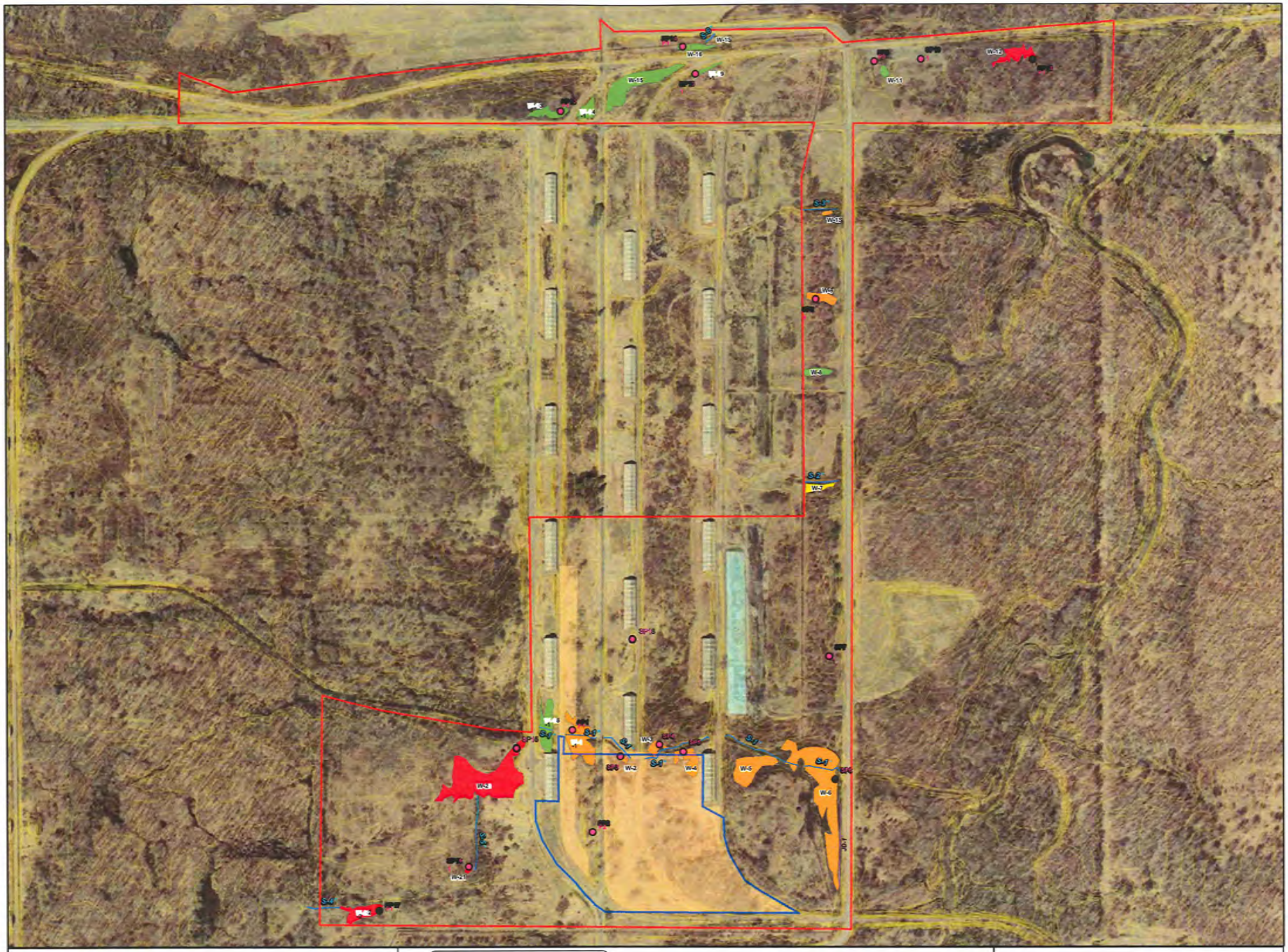


Figure 7 - Group 2 Wetland Locations

APPENDIX C

POINTS OF CONTACT

POINTS OF CONTACT

**CONTACT CAMP RAVENNA RANGE CONTROL BY RADIO COMMUNICATION OR BY PHONE AT
614-336-6041 FOR ALL EMERGENCY NOTIFICATIONS**

(The numbers listed below are for information only)

Service / Contact	**Agency / Position**	**Telephone Number**
Land or Air Ambulance	Ravenna City Fire Department Ravenna, OH	330-297-5738
Emergency Hospital Care	Robinson Memorial Hospital 6847 North Chestnut Street Ravenna, OH 44266	330-297-0811
WorkCare	Medical Management Subcontractor	1-888-449-7787
Occupational Clinic	Summa Western Reserve Urgent Care 3913 Darrow Road, Suite #100 Stow, OH, 44224	330-688-7900
Police	Portage County Sheriff Office	330-296-5100 or 330-325-1023
Police	Trumbull County Sheriff Office	330-675-2508
Ravenna City Fire Dept	Ravenna, OH	911 Operator or 330-296-5783
Closest Military EOD Unit	731st Ordnance Company (EOD), Wright Patterson AFB, OH	937-257-0436 or 937-257-0664
Denise Bush	USACE Contracting Officer	Office: 502-315-6209
Gregory F. Moore	USACE Project Manager	Office: 502-315-6855 Cellular: 502-381-6061
Jay Trumble	USACE COR	Office: 502-315-6349 Cellular: 502-216-1411
Katelyn Newton	USACE Public Affairs Specialist	Office: 502-315-6773

Service / Contact	Agency / Position	Telephone Number
Mark Leeper	ARNG/RVAAP Restoration Program Manager	Office: 703-607-7955
Kevin Sedlak	ARNG/Camp Ravenna Restoration Project Manager	Office 614-336-6000 Ext. 2053
Lt. Col Ed Meade	OHARNG/Camp Ravenna	Office: 614-336-6560
Katie Tait	OHARNG/Camp Ravenna Environmental Specialist	Office: 614-336-6136
Camp Ravenna Range Control	OHARNG/Camp Ravenna	Office: 614-336-6041
Paul Greene	Baltimore ACE, OESS	Cellular: 410-320-8175
Kevin Palombo	Ohio EPA NE District DERR	Office – 330-963-1292
Richard Callahan	PIKA Project Manager	Cellular: 330-352-4822
Kathleen Anthony	PIKA Program Manager	Office: 916-920-9146 Cellular: 713-724-2893
Sarosh Manekshaw	PIKA Safety and Health Mgr.	Cellular: 713-412-9948
Cameron Wenzel	PIKA UXOSO	Cellular: 281-543-3316

APPENDIX D

SAMPLING AND ANALYSIS PLAN

PART I

Revised Final Field Sampling Plan Addendum for Site Inspection at the Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops Area Ravenna Army Ammunition Plant

Revision O

Former Ravenna Army Ammunition Plant (RVAAP) Ravenna, Ohio

Contract Number: W912QR-12-F-0212

Prepared For:

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

Prepared By:

PIKA International, Inc.
12723 Capricorn Drive, Suite 500
Stafford, TX 77477

January 2016

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LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

ºC	degree's Celsius
AOC	area of concern
APP	Accident Prevention Plan
bgs	below ground surface
CCQC	Contractor Chemical Quality Control
CELRL	United States Army Corps of Engineers, Louisville District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chain of custody
CR	Compliance Restoration
DCQCR	daily chemical quality control reports
DFFO	Directors Final Finding and Orders
DoD	Department of Defense
DOT	Department of Transportation
DQO	data quality objective
EPA	Environmental Protection Agency
FCR	field change request
FSP	Field Sampling Plan
FWCUG	facility-wide cleanup goals
FWFSP	Facility-Wide Field Sampling Plan
FWQAPP	Facility-Wide Quality Assurance Project Plan
FWSAP	Facility-Wide Sampling and Analysis Plan
FWSSHP	Facility Wide Site-Specific Health and Safety Plan
IDW	investigation derived waste
ISM	incremental sampling methodology
ITRC	Interstate Technology and Regulatory Council
MC	munitions constituents
MEC	munitions and explosives of concern
MD	munitions debris
MS/MSD	matrix spike/Matrix spike duplicate
NCR	non-conformance report
OHARNG	Ohio Army National Guard
PCB	polychlorinated biphenyl
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
PIKA	PIKA International, Inc.
REIMS	Ravenna Environmental Information Management System
RVAAP	Former Ravenna Army Ammunition Plant
SAP	Sampling and Analysis Plan
SSHO	Site Safety and Health Officer
SSHP	Site-Specific Safety and Health Plan
SUXOS	Senior Unexploded Ordnance Supervisor
SVOC	semi-volatile organic compound
TAL	target analyte list

ACRONYMS AND ABBREVIATIONS

TCLP	toxicity characteristic leaching procedure
USACE	U.S. Army Corps of Engineers
UXO	unexploded ordnance
UXOSO	Unexploded Ordnance Site Safety Officer
VOC	volatile organic compound
WP	Work Plan

1.0 INTRODUCTION

This Field Sampling Plan (FSP) Addendum has been developed under contract number W912QR-12-F-0212 with the U.S. Army Corps of Engineers (USACE) to tier under and supplement the final Facility-Wide Field Sampling Plan (FWFSP) which is part of the *Final Facility-Wide Sampling and Analysis Plan (FWSAP) for Environmental Investigation at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio* (SAIC 2011). The FWSAP provides the base documentation (i.e., technical and investigative protocols) for conducting an investigation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at RVAAP, whereas this FSP includes all of the specific sampling and analysis objectives, rationale, planned activities, and criteria. Consequently, both documents are necessary to perform this task. Where appropriate, this FSP Addendum contains references to the FWFSP for base procedures and protocols.

This FSP Addendum describes the sampling procedures that will be used to collect surface and subsurface soil samples based on the results of the previous Compliance Restoration Site CC RVAAP-80 (Group 2 Propellant Can Tops Area) site inspection.

The FWFSP and this FSP Addendum have been developed following the USACE 2001 guidance document, *Requirements for the Preparation of Sampling and Analysis Plans*, to collectively meet the requirements established by the Ohio Environmental Protection Agency (EPA) Northeast District and the U.S. EPA.

2.0 PROJECT DESCRIPTION

2.1 Facility Description and Site History

The facility description and history of the RVAAP and the CC RVAAP-80, Group 2 Propellant Can Tops Area are discussed in Section 1.0 of the Work Plan (WP). A detailed history of the facility is summarized in the FWSAP (Section 2.1).

CC RVAAP-80 consists of the Group 2 Propellant Can Tops Area. The location of the Group 2 Propellant Can Tops Area within the RVAAP is shown in Figure 1. In the winter of 2008, propellant cans and tops were identified on the ground surface/near surface at the southern end of the former Group 2 Ammunition Storage Area. The discarded propellant cans and tops are considered materials potentially presenting an explosive hazard (MPPEH).

The propellant can tops located at the south end of Group 2 were initially discovered by Ohio Army National Guard (OHARNG) trainees in the winter of 2008. The propellant can tops were observed in a vegetated area located immediately south of the ammunition storage magazines in the vicinity of the southern railroad spur lines. This area consists of approximately 539,572 square feet (12.4 acres). A site map of the Group 2 Propellant Can Tops Area is posted as Figure 2.

The Louisville District USACE performed an emergency survey with a metal detector of a portion of the southern area ground surface. Results of the initial investigation revealed multiple magnetic anomalies in the surface and near surface soils. On-site personnel visually identified the surface anomalies as propellant can lids or tops. During the emergency survey it was noted that the ground surface had been disturbed and contained hummocks (mounds) ranging in height form 1 to 2 feet throughout the survey area. Historic aerial photos showed storage materiel on pallets in this area. The area appeared to not have been gravel covered, so the hummocks were likely caused by the tires of the vehicles used to place or retrieve the pallets sinking in when the ground was soft.

2.2 Environmental Setting

The environmental setting is discussed in the FWSAP (Section 2.2).

2.3 Summary of Existing Data

In April through May of 2011 an investigation was initiated to conduct a geophysical survey of the Group 2 Propellant Can Tops Area (12.4 acres total), and collect three surficial incremental soil samples. The geophysical survey utilized an EM-61MK2, which showed five clusters of ferrous items at or near the surface, as well as other scattered ferrous items (see Figure 3). The geophysical survey proved that there had not been any burial of the lids. The propellant can lids are of environmental concern for the subject area. Three of the clusters (i.e., 1, 3 and 5) became the location of the three multi-increment surface soil samples collected during the investigation.

The soil samples were analyzed for target analyte list (TAL) metals, and common propellants used by the Department of Defense (DoD) including nitrocellulose, nitroglycerine, nitroguanidine, and perchlorate. One (1) of the three samples was also analyzed for the RVAAP full suite, (including explosives, cyanide, volatile organic compounds; (VOCs), semi-volatile

organic compounds; (SVOCs), and poly chlorinated bi-phenyls; (PCBs). The three samples did not result in any analytes exceeding the facility wide cleanup goals (FWCUGs). The data obtained through this site investigation will be used to determine the need for a Remedial Investigation or support preparation of record of decision for no further actions.

CC RVAAP-80 GROUP 2 PROPELLANT CAN TOPS SITE

Legend
- Water Bodies
- Buildings
- Walkways
- Railroads
- Berms
- CC RVAAP-80 Group 2 Propellant Can Tops Site

Slagle Road
BlockD Road1
BlockD Road3
BlockD Road5
BlockD Road7
South D Road
Greenleaf Road
WP Lane E
WP Lane C
WP Lane A
Winklepeck Road
WP Lane B
OD-2 Road
WS Road
George Road
Newton Falls Road
FB Stor Road
Wilcox-Wayland Road
Paris-Windham Road
Load Line 4 Road
Load Line 4-2 Road
South Service Road
Route 5
Load Line 3 Road
LL-3 Road
Load Line 2 Road
LL-2 Road
Storage Area 6 Road
Patrol Road
Sectioning Area Road
Remalia Road
LL-1 Road
Ramsdell Road
Butts-Kistler Road
B D Wye Road
WH44 Road
Fuze and Booster Road
South Patrol Road
Demolition Road
Demolition Road
Dormitory Road
New Newton Falls Road

N

0 1,500 3,000 6,000 9,000 12,000 Feet

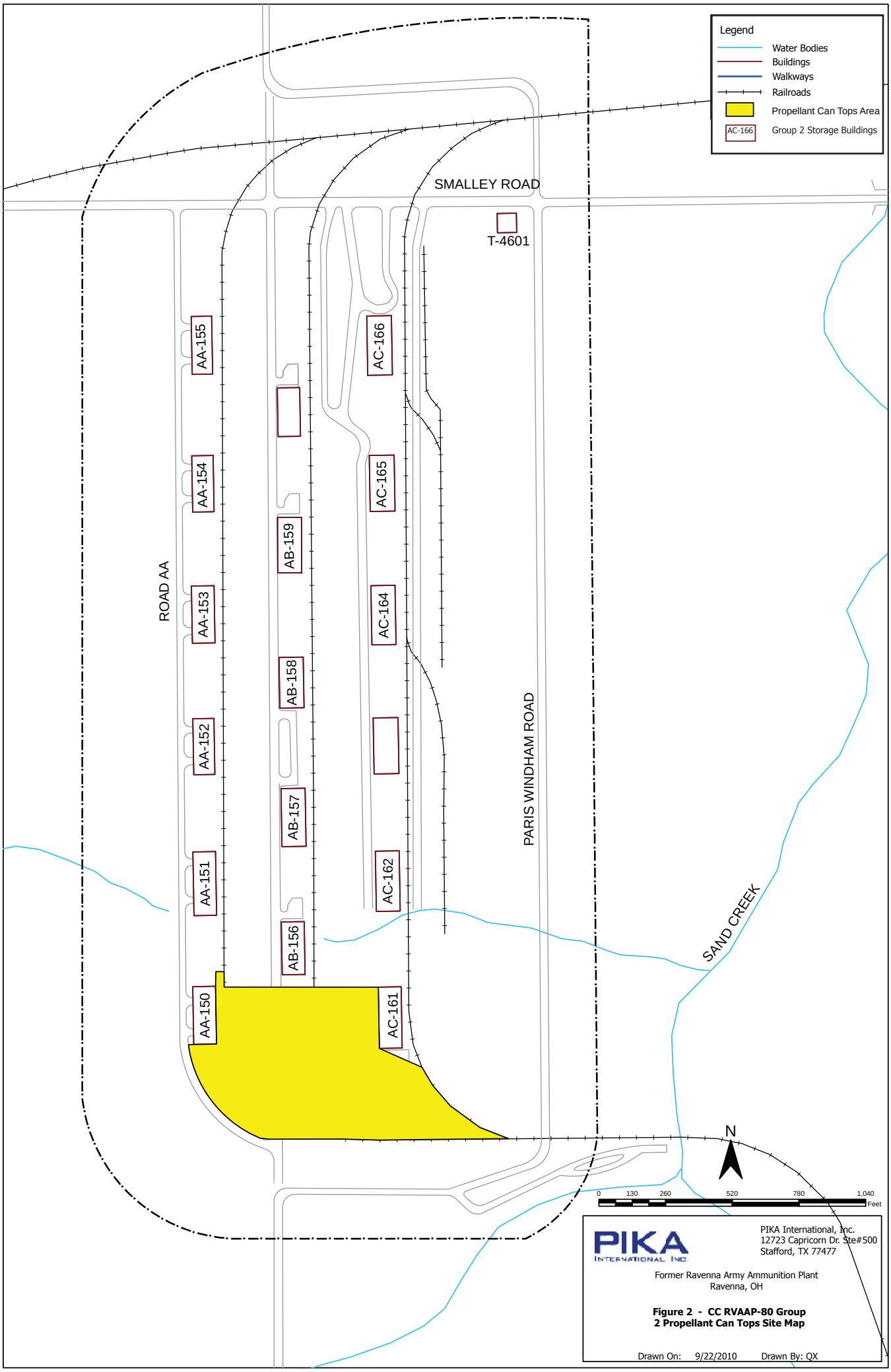
PIKA INTERNATIONAL, INC.

PIKA International, Inc.
12723 Capricorn Dr. Ste#500
Stafford, TX 77477

Former Ravenna Army Ammunition Plant
Ravenna, OH

Figure 1
Location of Compliance Restoration Site
CC RVAAP-80 Group 2 Propellant Can Tops Area

Drawn On: 10/15/2012 Drawn By: NS



PIKA International, Inc.
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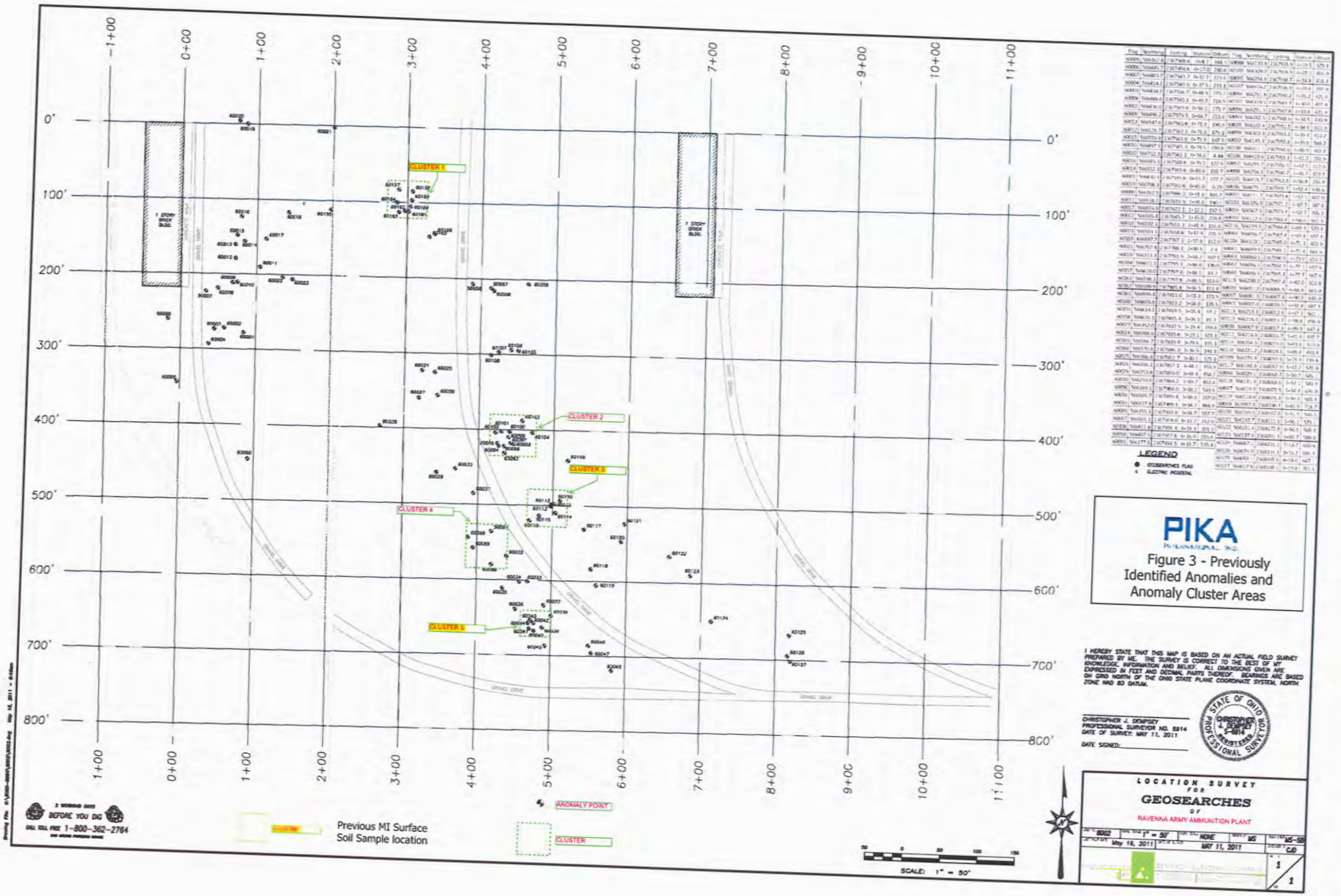
Stafford, TX 77477

Former Ravenna Army Ammunition Plant
Ravenna, OH

Figure 2 - CC RVAAP-80 Group 2 Propellant Can Tops Site Map

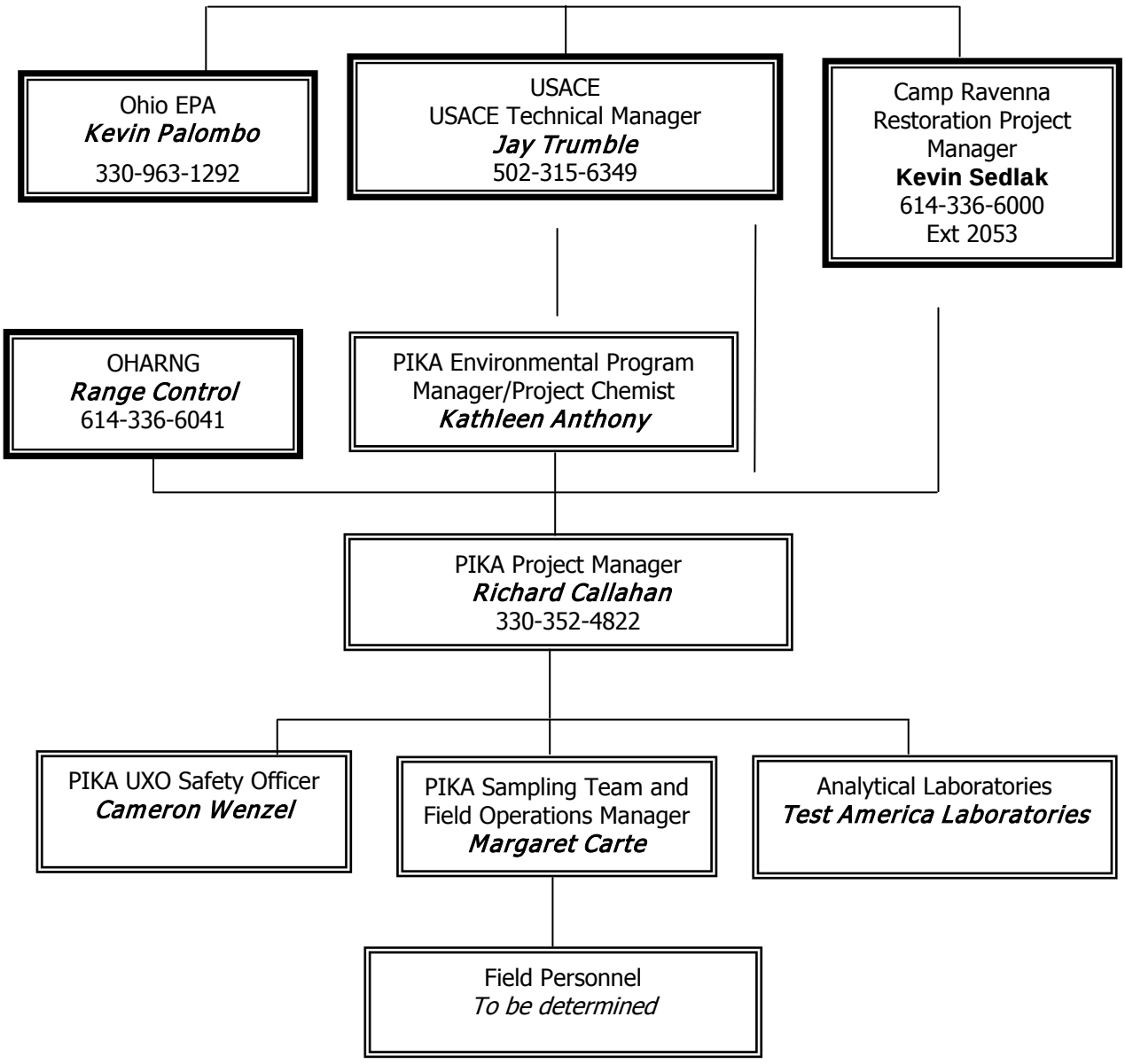
Drawn On: 9/22/2010 Drawn By: QX


CLUSTER 1
CLUSTER 2
CLUSTER 3
CLUSTER 4
CLUSTER 5
1 STORY BRICK BLDG.
1 STORY BRICK BLDG.
GRAVEL DRIVE
ANOMALY POINT
CLUSTER
Previous MI Surface Soil Sample location
SCALE: 1" = 50'
LEGEND
GEOSEARCHES FLAG
ELECTRIC PEDESTAL
PIKA
Figure 3 - Previously Identified Anomalies and Anomaly Cluster Areas
I HEREBY STATE THAT THIS MAP IS BASED ON AN ACTUAL FIELD SURVEY PREPARED BY ME. THE SURVEY IS CORRECT TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF. ALL DIMENSIONS GIVEN ARE EXPRESSED IN FEET AND DECIMAL PARTS THEREOF. BEARINGS ARE BASED ON GRID NORTH OF THE OHIO STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD 83 DATUM.
CHRISTOPHER J. DEMPSEY
PROFESSIONAL SURVEYOR NO. 8914
DATE OF SURVEY: MAY 11, 2011
DATE SIGNED:
STATE OF OHIO
CHRISTOPHER J. DEMPSEY
8914
REGISTERED
PROFESSIONAL SURVEYOR
LOCATION SURVEY
FOR
GEOSEARCHES
OF
RAVENNA ARMY AMMUNITION PLANT
8002
1" = 50'
NONE
MS
AS-SB
May 16, 2011
MAY 11, 2011
CAD
1
1
BEFORE YOU DIG
CALL TOLL FREE 1-800-362-2764

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The organization chart shown in Figure 4 outlines the management structure that will be used to implement the 2013 Environmental Investigation at Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops Area. The functional responsibilities of key PIKA International, Inc. (PIKA) personnel are also described in brief.

Figure 4 – Project Organization Chart



3.1 Program Manager

The Program Manager leads the overall management and oversees the quality of all projects performed at RVAAP under the general contract. This individual will ensure that all project goals and objectives are met in a high-quality and timely manner. This individual, in coordination with the Project Manager, will address quality assurance and non-conformance issues for corrective action.

3.2 Project Chemist

The Project Chemist will be responsible for the procurement and oversight of the analytical laboratory, review the laboratory QAPP and deliverables data verification, and data validation. The Project Chemist will assist the project team in the development and implementation of the FSP and QAPP.

3.3 Project Manager

The Project Manager has direct responsibility for implementing a specific project, including all phases of work plan development, field activities, data management, and report preparation. This individual will also provide the overall management of the project, and serve as the technical lead and principal point of contact with the RVAAP Environmental Coordinator. These activities will involve coordinating all personnel working on the project, interfacing with RVAAP personnel, and tracking project budgets and schedules. The Project Manager will also develop, monitor, and fill project staffing needs, delegate specific responsibilities to project team members, and coordinate with administrative staff to maintain a well organized and timely flow of all project activities. The Project Manager will also serve in the capacity of Laboratory Coordinator for this project and will coordinate sample collection and subsequent laboratory analysis. The Project Manager reports directly to the Program Manager.

3.4 Field Operations Manager

The Field Operations Manager is responsible for the project Quality Assurance/Quality Control (QA/QC) in accordance with the requirements of the Facility-Wide Quality Assurance Project Plan (FWQAPP), the project-specific QAPP addendum, and appropriate management guidance. This individual, in coordination with the Project Manager, will be responsible for the technical aspects of all field operations; all field sampling activities; adherence to required sample custody and other related QA/QC field procedures; coordination of field subcontractor personnel activities; and management of project investigation-derived wastes (IDW). The Field Operations Manager is also responsible for coordinating the sampling activities with the Site Safety and Health Officer.

3.5 UXO Safety Officer

The UXO Safety Officer (UXOSO) will ensure that health and safety procedures designed to protect personnel are maintained throughout all field activities conducted at RVAAP. This will be accomplished by strict adherence to the Site-Specific Safety and Health Plan (SSHP), which has been prepared as a companion document to the FWSAP, and the project-specific Accident Prevention Plan (APP), which has been prepared as an addendum to the Facility-Wide SSHP for each investigation. This individual will have the authority to halt field work if health and/or safety issues arise that are not immediately resolvable in accordance with the Facility Wide

Site-Specific Health and Safety Plan (FWSSHP) and the project-specific APP addendum. This individual will report to the Program and Project Managers.

3.6 Sampling Team Manager

The Sampling Team Manager is responsible for planning and executing all sampling activities on site and coordinating the laboratory activities for sample analysis and associated QC parameters. This individual will be responsible for obtaining required sample containers from the laboratory for use during field sample collection, resolving questions the laboratory may have regarding QAPP requirements and deliverables, and preparing a quality assessment report for sample data package deliverables received from the laboratory. This individual reports directly to the Project Manager.

3.7 Unexploded Ordnance (UXO) Personnel

However, the propellant tops and cans are considered MPPEH until inspected and certified as MDAS, therefore, a 4-man UXO team including a Senior UXO Supervisor (SUXOS), a UXO Safety Officer (UXOSO) and two man collection/inspection team comprised of a UXO Technician III and UXO Technician II will be needed for the project. The USACE ordnance and Explosive Safety Specialist (OESS) will be onsite during any recovery or intrusive activities. If a non-packing munitions and explosives of concern (MEC) item is encountered, field work on this project will be halted immediately and the PIKA UXOSO will contact the onsite USACE OESS and the Camp Ravenna Restoration Project Manager for further direction. Based upon the potential hazard of the item found the site may need to be re-evaluated and potentially assigned a new probability rating.

3.8 Field Personnel

Other field personnel participating in the implementation of field activities, in coordination with field subcontractor personnel, will be responsible for performing all field activities in accordance with the FWSAP and Facility-Wide SSHP and their project-specific addenda. These individuals report directly to the Field Operations Manager or UXOSO.

4.0 PROJECT SCOPE AND OBJECTIVES

The project scope and objectives are to conduct an investigation of the Group 2 Propellant Can Tops Area. The investigation is intended to achieve the following objectives:

- Identify, collect, certify as safe and dispose of the propellant tops and cans associated the anomalies identified in the Final Investigation Report for the Compliance Restoration Site CC RVAAP-80, Group 2 Propellant Can Tops and other Environmental Services, January 27, 2012.
- Confirm the presence or absence of releases of propellants and/or other munitions constituents (MC) to the surface and/or subsurface soils at the Area of Concern (AOC).

4.1 Task Description

PIKA will perform the following tasks to meet these objectives:

- Reacquire the previously identified anomalies, conduct a surface clearance for the propellant tops and cans, certify as safe and dispose/recycle.
- Collect (5) surface and (3) subsurface soil samples using incremental sampling methodology (ISM), sample locations being based on the results of the previous site investigation.
- Analyze soil samples for target analyte list (TAL) metals, and common propellants used by the Department of Defense (DoD) including nitrocellulose, nitroglycerine, nitroguanidine, and perchlorate. One (1) of the surface soil samples will also be analyzed for the RVAAP full suite consisting of TAL metals, explosives, propellants, VOCs, SVOCs, pesticides, and PCBs.
- Dispose of all IDW, (i.e. decon water, soil, acetate sleeves).
- Prepare a site investigation report to document the process and procedures used in conducting the investigation, and describe all the soil sampling activities conducted during this project. The report will include details about sample collection, decontamination, analytical results, waste management, event chronology, final site inspection, and mapping. The site investigation report maps will delineate the boundaries of the site and sample areas.

4.2 Task Specific Data Quality Objectives (DQO)

The task-specific DQO is to provide sufficient high-quality data to confirm the presence or absence of releases of propellants and/or other MCs to the surface and/or subsurface soils at the AOC to aid in the scoping of possible future cleanup activities. The specific DQOs for the Group 2 Propellant Can Tops site investigation will be accomplished by performing the following activities:

- Provide Level IV sample data package of sufficient quality for a data review on 100% of the data collected,
- Collect sample data of sufficient quality for third-party data validation on a minimum of 10% of the data collected,
- Field duplicate soil samples will be collected at a frequency of 10%, from the IS volume collected
- Field equipment rinsate blanks will be collected at a frequency of 10% for any sample collected with non-dedicated equipment.

4.2.1 Conceptual Site Model (CSM)

The conceptual site model is based upon the FWSAP Preliminary CSM, (Section 4.2.1). The CSM for this AOC is further refined using the information provided in the 2012 Site Inspection and is defined as follows:

- The ground surface is relatively flat and exhibits shallow (1-2 feet) hummocky likely due to ruts caused by vehicle tires, which inhibits runoff from the site.
- The topography slopes to the north where small (Mod 2) wetlands were identified at the AOC boundary.
- Results from the three surface samples did not reveal any analytes exceeding the facility-wide cleanup goals (FWCUGs).The site is heavily vegetated with ground level vegetation (i.e. grasses and small bushes) which reduces runoff from the site.
- The COCs include propellants, perchlorate and metals.

4.2.2 Define the Problem

The problem to be addressed at the Group 2 Propellant Can Tops AOC is that the scope of the previous (2012) Site Investigation was limited and did not fully characterize the surface and subsurface soils in the vicinity of the propellant can lids. The additional samples identified in this SAP are designed to fill those data gaps. The project WP provides a summary of the previous site inspection and the rationale for this additional effort.

4.2.3 Remedial Action Objectives

A major goal of implementing the DQO process is to ensure that all data critical for decision making are collected as part of the site investigation. This means all data necessary for determining the need for a Remedial Investigation (RI) or support preparation of decision documents for no further actions.

4.2.4 Identify Decisions

The key decisions for all investigations at RVAAP have been identified in the FWSAP Section 4.2.4. Data generated by the Group 2 Propellant Can Tops Area sampling activities will be used to determine answers to these questions:

- Have any propellants and/or other munitions constituents been released to the surface and/or subsurface soils within the defined study boundaries of the propellants tops areas?

- If so, is contamination present at levels exceeding the FWCUGs that would warrant cleanup?

4.2.5 Define the Study Boundaries

The investigation area boundaries for the Group 2 Propellant Can Tops Area are presented in Figure 5. The boundary encompasses the five previously identified cluster areas along with the concentrated area of anomalies found in the northwest portion of the site.

4.2.6 Identify Decision Rules

Determination of Potential Site-related Chemicals (SRCs)

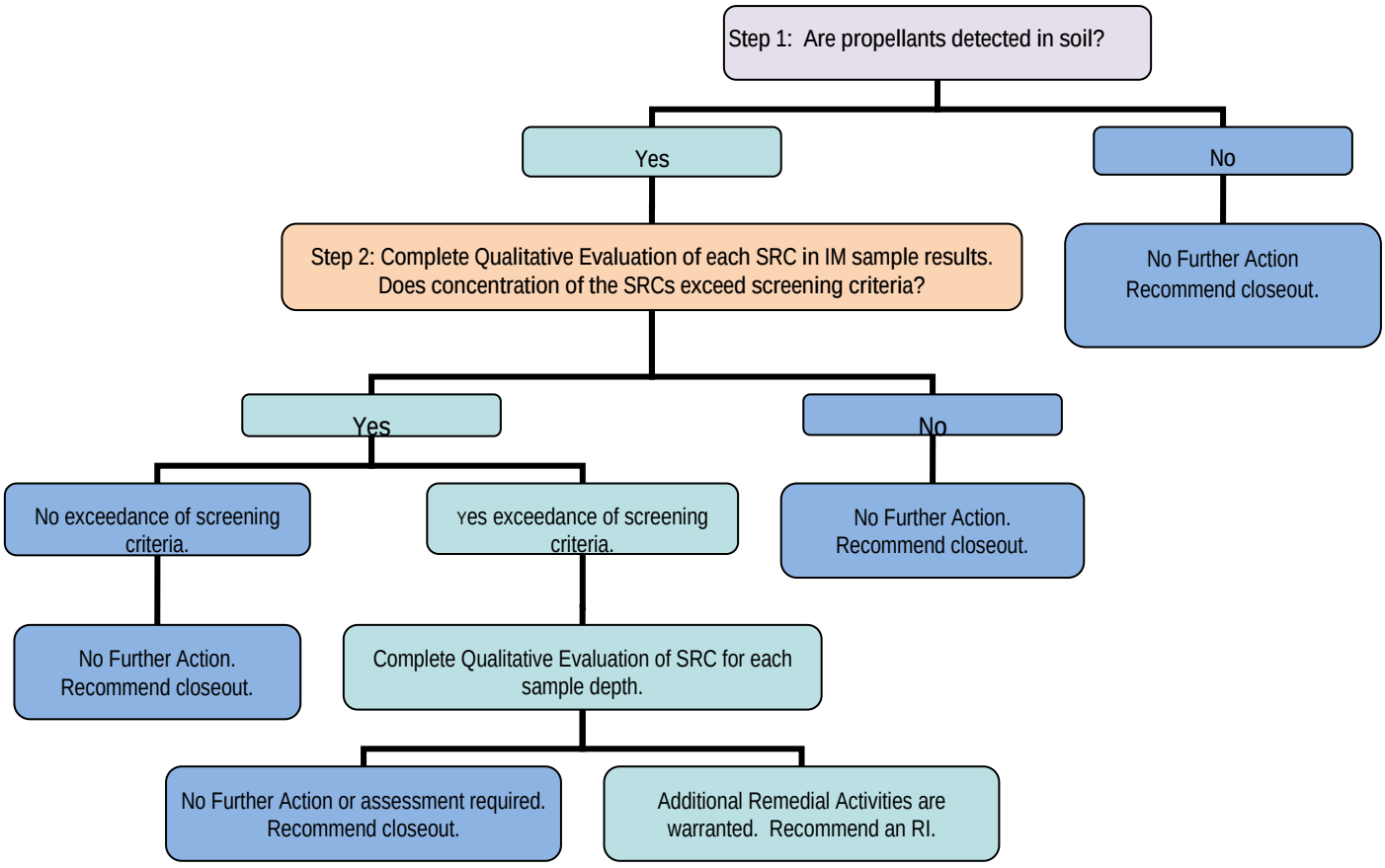
The sample results will be evaluated to determine the presence of propellants. Since each of the sample results will be from IM samples, each sample result will be evaluated separately. Normally, the detected concentrations of a chemical are compared to facility background values, essential nutrients, and frequency of detection (5% in samples) to determine if they are Site-related Chemicals (SRCs). Since the sample results for this SI are not undergoing these comparisons, any propellants detected in the IM sample results (0 to 1 foot surface and 1 to 4 feet deep surface samples) will be deemed as SRCs. The SRCs are then further evaluated to determine if additional investigation is warranted. If there are no SRCs determined, then the data will be used to support preparation of a decision document for no further action.

Determination of Whether or Not Additional Investigation is Warranted

Once a chemical is determined to be an SRC, then the next step is to assess the potential hazards associated with the chemical at each sample location where the SRC was detected. The maximum concentration of the SRC will be compared to applicable screening criteria. When the maximum detected concentration of an SRC exceeds the screening criteria, then the SRC will be qualitatively evaluated to determine if additional investigation is necessary. If results of the Qualitative Evaluation indicate that the SRCs require further characterization, then additional investigation will be deemed necessary. If the Qualitative Evaluation indicates that the SRCs do not require additional assessment, then the data used in the SI will be used to support preparation of decision document for no further action.

The following flow diagram provides the decision process.

Flow Diagram illustrating the Decision Rule Process



4.2.7 Inputs to the Decision

The inputs to the decision include the results of the investigation and data analysis. The data will be obtained by collecting biased ISM surface and subsurface soil samples from the defined investigation area.

4.2.8 Specify Limits on Decision Error

Limits on decision errors are addressed in Section 4.2.8 of the FWSAP.

4.2.8.1 Sampling Errors

Sampling errors are discussed in Section 4.2.8.1 of the FWSAP.

4.2.8.2 Measurement Errors

Measurement errors are discussed in Section 4.2.8.2 of the FWSAP.

4.2.9 Optimize Sample Design

Sample design takes into consideration the purpose of sampling and selection of sample locations.

4.2.9.1 Purpose of Sampling

Sampling and analysis for the Group 2 Propellant Can Tops site investigation will focus on determining the concentrations of propellants and TAL metals within site soils, if any are present.

4.2.9.2 Selection of Sample Locations

To fulfill the data needs described in Section 4.2, the investigation will use the following approach to assess potential contamination to surface and subsurface soils within the study boundaries:

- As discussed in Section 1.4 of the WP, during the 2012 site investigation of the site, the geophysical survey identified 5, high density anomaly clusters, from which 3 were selected for surface Incremental Sampling (IS) and analysis. Discussions between the Ohio EPA and the OHARNG resulted in the decision to collect additional surface and subsurface IS from the previously identified clusters and three new cluster areas. The locations of the ISM surface and subsurface samples are presented in Figure 5.

- PIKA will collect ISM surface and subsurface soil samples based on the results of the previously completed geophysical delineation. Five (5) surficial (0 to 1 foot below ground surface [bgs]) and three (3) subsurface (1 foot to 4 feet bgs) (seven primary, plus QA samples) ISM soil samples will be collected within those areas that are found to include near surface propellant can tops or other possible ferrous metals. The ISM surface and subsurface samples will be obtained by collecting a minimum of 30 increments per sample area. ISM sample areas will be approximately one-quarter of an acre or less in size incorporating the anomalies identified on Figure 5.

LEGEND

ANOMALY POINT

Proposed ISM Surface Soil Sample Locations for Additional Cluster Area 0-1 ft below ground surface

Proposed ISM Surface Soil Sample Location Within Existing Cluster Area 0-1 ft below ground surface

Proposed ISM Subsurface Soil Sample Locations Within Existing Cluster Area 1-4 ft below ground surface

PIKA INTERNATIONAL, INC.

Figure 5
Proposed Sample Locations

Date: 8 June 2015
Drawn by: CVJ

5.0 FIELD SAMPLING METHODS AND PROCEDURES

The field sampling activities must be performed in a well-defined and consistent manner to ensure that the resulting data are comparable between sampling locations and can be validated against all applicable quality assurance/quality control (QA/QC) requirements. This section defines field methods and/or procedures applicable to the following field activities.

- ISM soil sampling,
- Field QC sampling procedures,
- Decontamination procedures,
- Site survey and mapping, and
- Laboratory analysis

The methods and procedures are written with the intent of providing specific details to ensure consistent data quality, while providing sufficient flexibility to allow for unexpected or changing geologic, environmental, or sampling conditions. Occasionally, modifications to the field procedures are required for reasons of safety or practicality. Any modifications will be reviewed and approved by the PIKA Project and Program Managers and presented to the Ohio EPA and USACE for approval. All variances to the procedures presented in this FSP Addendum will be documented. No changes/modifications will be implemented without prior written approval by the Ohio EPA. All regulatory agency contact will be coordinated and run through the OHARNG, and USACE. PIKA will not make direct contact with the Ohio EPA.

All field activities will be under the overall supervision of the Project Manager or his designees. Specific sampling activities will be performed or controlled by the Sampling Team Manager. Subcontractors performing specific activities will be required to comply with all project procedures and requirements. All sampling procedures will be consistent with the FWSAP.

Table 2-1 in the QAPP Addendum summarizes the investigative sampling and analysis. The following sections discuss the field protocols and procedures to be used for the sampling activities to be conducted for this project.

5.1 Geophysics

Geophysical analysis is not required.

5.2 Soil Gas Survey

Soil gas survey is not required.

5.3 Utility Clearance

PIKA will coordinate with OHARNG to verify utility clearance before initiating any field operations.

5.4 Ground Water

Ground water analysis is not required.

5.5 Subsurface Soil

5.5.1 Rationale

During the 2012 site investigation of the site, the geophysical survey identified 5, high density anomaly clusters, from which 3 were selected for surface Incremental Sampling (IS) and analysis. Discussions between the Ohio EPA and the OHARNG resulted in the decision to collect additional surface and subsurface IS from the previously identified clusters and three new cluster areas. The locations of the ISM surface and subsurface samples are presented in Figure 5. A total of three (3) ISM subsurface samples will be collected from one (1) foot to four (4) feet bgs within the specified sample boundaries to assess contaminant occurrence and distribution in subsurface soil, if any. All subsurface soil samples will be analyzed for TAL metals and common propellants used by the DoD including nitrocellulose, nitroglycerine, nitroguanidine, and Perchlorate.

5.5.2 Procedures

5.5.2.1 Drilling Methods

5.5.2.1.1 Equipment Condition and Cleaning

The equipment condition and cleaning requirements are discussed in the FWSAP, Section 5.5.2.1.1.

5.5.2.1.2 Hollow-Stem Auger Drilling and Cleaning

The hollow-stem auger method will not be used.

5.5.2.1.3 Trenching Method

The trenching method will not be used.

5.5.2.1.4 Bucket Hand Auger Method

The bucket hand auger method will not be used.

5.5.2.1.5 Hydraulic Direct-Push Method - ISM

A total of three (3) ISM subsurface soil samples (plus QA samples) will be collected from (1) foot to four (4) feet bgs using a truck or track mounted Geoprobe. Prior to initiating the subsurface sampling operations, the corners of each the ISM subsurface soil sampling area will be located, marked, and surveyed by a licensed surveyor.

Within each ISM area, the field team will lay out a minimum of thirty (30) Geoprobe sample locations in a systematic, random manner. Borings will then be installed at or as near as possible to each of the marked locations. Upon recovery of the Geoprobe sampler, small portions of soil material (i.e., aliquots of equal size) will be collected over the entire sample interval using a wedge sampler. The individual aliquots from the 30 Geoprobe locations will be placed in a labeled container for transport to the laboratory. Although a specific sample volume is not required, typically the total mass of the 30 aliquots is approximately 1 kilogram or just over 2 pounds of sample. At the laboratory, the sample will be processed by being air dried, sieved (#10 seive), and finely ground for specific constituent analysis. Table 5-1 of the QAPP Addendum lists the sample container, preservation, and holding time requirements for soil samples.

5.5.2.2 Boring Logs

General descriptions of soil characteristics will be recorded on field sampling reports using the USFS Soil Classification System and Munsell Color charts to describe and differentiate the soil types.

5.5.2.3 Field Measurement Procedures

Organic vapor screening will follow Section 5.5.2.3 of the FWSAP.

5.5.2.4 Sampling for Physical/Geotechnical Analysis

Sampling will not be conducted for physical/geotechnical analyses.

5.5.2.5 Sampling for Chemical Analyses

5.5.2.5.1 Hollow-Stem Auger Driller Method

The hollow-stem auger method will not be used.

5.5.2.5.2 Trenching and Bucket Hand Auger Method

The trenching and bucket hand auger method will not be used.

5.5.2.5.3 Hydraulic Direct-Push Method

The standard equipment requirements for the hydraulic direct-push method (Geoprobe) are presented in Section 5.5.2.5.3 of the FWSAP.

5.5.2.6 Sample Containers and Preservation Techniques

Information regarding sample containers and preservation techniques for subsurface soil samples collected for chemical analyses during the Group 2 Propellant Can Tops site investigation is presented in Section 5.0 of the FWQAPP. Contracted laboratories will provide all chemical sample containers. All sample containers will be stored at 4 degrees Celsius (ºC) (±2ºC) immediately after collection and will be maintained at this temperature until the samples are received at the contracted laboratory.

5.5.2.7 Field Quality Control Sampling Procedures

Field duplicate (FD) QC samples, matrix spike/matrix spike duplicate (MS/MSD) samples, and equipment rinsate blanks will be collected in association with subsurface soil samples during the Group 2 Propellant Can Tops site investigation. FD soil samples will be designated in the field, at a frequency of 10% of the total number of soils samples, but collected at the laboratory from the processed IS volume collected. MS/MSD soil samples will also be designated in the field, at a frequency of 5% of the total number of soils samples, and collected at the laboratory from the processed IS volume collected. Equipment rinsate blanks will be collected at a frequency of 10% for any sample collected with non-dedicated equipment as described in Section 5.4.7 of the FWSAP, with the exception that subsurface soil sampling equipment will be rinsed for the equipment rinsate blanks.

Temperature blanks will be used in coolers to evaluate temperatures during shipping to the laboratory.

Field QC sample types, numbers, and frequencies are identified in Section 2.5 of the QAPP Addendum.

5.5.2.8 Decontamination Procedures

The non-dedicated Geoprobe core samplers and stainless steel wedge samplers will be decontaminated at the completion of the sampling activities at each ISM area. Decontamination will be conducted in accordance with the Ohio EPA Division of Environmental Response and Revitalization Sampling Equipment Decontamination Final Standard Operating Procedure 1.6 (March 8, 2011).

5.5.2.9 Borehole Abandonment

Each ISM boring will be sealed with bentonite and hydrated upon completion of the subsurface soil sampling operations.

5.6 Surface Soil and Sediment

ISM surface soil samples will be collected from 0 to one (1) foot bgs within the specified sample boundaries using a stainless steel push probe. No sediment samples are anticipated to be collected.

5.6.1 Rationale

As discussed in Section 1.4 of this WP, during the 2012 site investigation of the site, the geophysical survey identified 5, high density anomaly clusters, from which 3 were selected for surface Incremental Sampling (IS) and analysis. Discussions between the Ohio EPA and the OHARNG resulted in the decision to collect additional surface IS from the 2 previously identified anomaly clusters and three new cluster areas. A total of five (5) ISM surface soil samples will be collected from 0 to one (1) foot bgs within the specified sample boundaries to assess contaminant occurrence and distribution in surface soil, if any. All surface soil samples will be analyzed for TAL metals, and common propellants used by the DoD including nitrocellulose, nitroglycerine, nitroguanidine, and perchlorate. Additionally, one (1) of the samples will be analyzed for the RVAAP full suite which also includes explosives, VOCs, SVOCs, pesticides, and PCBs. The sample location to be selected for the full suite analysis will be decided upon based upon observed site conditions and evaluation of the sample areas with the Ohio EPA.

5.6.2 Procedures

5.6.2.1 Sampling Methods for Surface Soil

5.6.2.1.1 Bucket Hand Auger Method

The bucket hand auger method will be used for collecting the VOC analyte portion of ISM surface soil samples as described in Section 5.6.2.1.3 of this document.

5.6.2.1.2 Trowel/Spoon Method

The trowel/spoon method will not be used.

5.6.2.1.3 ISM Surface Soil Sampling

A total of five (5) ISM surface soil samples (plus QA samples) will be collected from 0 to one (1) foot bgs using a stainless steel step probe. Prior to initiating the surface sampling operations, the corners of each the ISM area will be located, marked, and surveyed by a licensed surveyor.

ISM surface soil samples will be aggregated samples collected from thirty (30) systematically selected random locations (marked with flagging) within each ISM area. The aliquots (i.e., 30

total 0-1 foot step probe cores) collected from each ISM area will be of equal size/proportions and placed in a labeled container for transport to the laboratory. Although a specific sample volume is not required, typically the total mass of the 30 aliquots is approximately 1 kilogram or just over 2 pounds of sample. At the laboratory, the sample will be processed by being air dried, sieved (10 sieve), and finely ground for specific constituent analysis. Table 5-1 of the QAPP Addendum lists the sample container, preservation, and holding time requirements for soil samples.

ISM will not be used for VOC analysis. If a sample is designated for VOC analysis, such as for the RVAAP full suite, one discrete sample will be collected from within the ISM area using the bucket hand auger method as described in Section 5.6.2.1.1 of the FWSAP. 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 biased in the area with the highest concentration of propellant cans and tops. 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 or laboratory.

5.6.2.2 Sampling Methods for Underwater Sediments from Ponds, Lakes, and Lagoons

No ponds, lakes, or lagoons are present at the AOC, therefore no samples will be collected from underwater sediments.

5.6.2.3 Boring Logs

Boring logs will not be produced because surface soil samples are being collected.

5.6.2.4 Field Measurement Procedures and Criteria

Field measurements will not be conducted during this project.

5.6.2.5 Sampling for Physical/Geotechnical Analyses

Sampling will not be conducted for physical/geotechnical analyses.

5.6.2.6 Sampling for Chemical Analyses

Sampling for chemical analyses is discussed in the FWSAP, Section 5.6.2.6.

5.6.2.7 Sample Containers and Preservation Techniques

Information regarding sample containers and preservation techniques for surface soil samples collected for chemical analyses during the detonation investigation is presented in Section 5.0 of the FWQAPP. Contracted laboratories will provide all chemical sample containers. All sample containers will be stored at 4ºC (±2ºC) immediately after collection and will be maintained at this temperature until the samples are received at the contracted laboratory.

5.6.2.8 Field Quality Control Sampling Procedures

Duplicate (QC) samples, MS/MSD samples, and equipment rinsate blanks will be collected in association with surface soil samples during the Group 2 Propellant Can Tops site investigation. Duplicate surface soil samples and MS/MSD samples (if extra volume is required for MS/MSD analysis) will be collected during the investigation using the same composited material as the primary sample and using procedures defined for field surface soil samples in Section 5.6.2.6 of

the FWSAP and in Section 9.0 of the FWQAPP. Equipment rinsate blanks will be collected as described in Section 5.4.7, with the exception that surface soil sampling equipment will be rinsed for the equipment rinsate blanks.

Temperature blanks will be used in coolers to evaluate temperatures during shipping to the laboratory.

Field QC sample types, numbers, and frequencies are specified in Section 2.5 of the QAPP Addendum.

5.6.2.9 Decontamination Procedure

The non-dedicated sampling equipment (i.e., step probe and bucket hand auger) will be decontaminated at the completion of the sampling activities at each ISM area. Decontamination will be conducted in accordance with the Ohio EPA Division of Environmental Response and Revitalization Sampling Equipment Decontamination Final Standard Operating Procedure 1.6 (March 8, 2011).

5.7 Surface Water

Surface water sampling is not required. This section is not applicable.

5.8 Other Matrices

This section is not applicable.

5.9 Munitions and Explosives of Concern Avoidance

Based upon the available information to date, the site is a low probability site in regards to encountering MEC. However, the propellant tops and cans are considered MPPEH until inspected and certified as MDAS. Therefore, PIKA will mobilize a team of four UXO Technicians, as described above, to re-acquire the anomalies identified during the 2011 limited Site Inspection (SI) geophysical survey, the coordinates of which are provided on Figure 5, in Appendix B. PIKA will clear the location of the previous anomalies of all propellant cans and tops, marking the location with a pin flag. If nothing found at the flag then the UXO Technicians will clear the area within a one meter radius around the pin flag of all propellant cans/tops. Any unrelated materials such as railroad spikes, banding/strapping related to the pallets used to transport the propellant cans will be set aside for pickup and recycling by the OHARNG in order to remove the potential magnetic interferences. All propellant cans and tops will be inspected, certified as MDAS and consolidated for proper disposal/recycling IAW Department of Defense Instruction (DoDI) 4140.62, USACE EM 385-1-97, Change 1, Chapter 1, Section 11, PIKA SOPs and ORC 3734.03 and OAC 3745.27.05C.

All recovered propellant cans and lids will receive a minimum of two 100% inspections by a UXO Technician III and UXO Technician II. The SUXOS and the UXOQC will then verify and certify the items as MDAS. Verified and certified MDAS will be secured onsite in closed-cover, locked, and sealed containers. As containers reach appropriate volume and weight capacity, the JV will ship the containers to a disposal/recycling facility meeting the requirements of USACE EM 385-1-97, Change 1, Chapter 1, Section 11, where at a minimum the MDAS will be smelted to basic content and documentation completed recording the final disposition. The SUXOS and UXOQC are responsible for maintaining the chain of custody, preparing and signing the DD Form 1348-1a, which will be filed as a part of the permanent record of the site and the contract

history. If during inspection and certification either a propellant can / lid or a non-packing item is encountered and determined to be and certified as a Material Documented with an Explosive Hazard (MDEH) item, the location will be documented and fieldwork will be halted immediately. The item will be reported to the USACE OESS and Camp Ravenna Range Control for collection and disposition.

6.0 CHAIN OF CUSTODY/DOCUMENTATION

PIKA will follow the guidelines set forth in the FWSAP for project document requirements and QA/QC sampling requirements.

6.1 Field Log Book and/or Sample Field Sheets

All field logbook information will follow structures identified in Section 6.1 of the FWSAP, where appropriate. Field forms will be used to record specific sampling or investigational data to ensure consistency across sampling locations.

6.2 Photographs

Photographic documentation of field efforts will be performed in accordance with Section 5.4.2.4.2 of the FWSAP. Representative photographs of field activities and any significant observations will be taken during the field operations. Photographs will be suitable for presentation in a public forum as well as for documenting scientific information.

6.3 Sample Numbering System

The numbering system that will be used to identify samples collected during the investigation is explained in Section 6.3 and Figure 6-3 of the FWSAP. Samples will be identified sequentially using the identification number system consistent with the remedial investigations. If a sample is not collected or is reassigned to a different location, a specific reason and notation will be noted in the project field books.

6.4 Sample Documentation

All sample label, logbook, field records, chain-of-custody forms, and field form information will follow procedures identified in Section 6.4 of the FWSAP.

6.5 Documentation Procedures

Documentation involves the tracking of samples through the receipt of a final laboratory data package for the investigation. Documentation procedures will be performed in accordance with Section 6.5 of the FWSAP.

6.6 Corrections to Document

This procedure is required to ensure that all field/sampling records are correct and legally defensible. Corrections to documentation will follow the protocol established in Section 6.6 of the FWSAP.

6.7 Monthly Reports

Monthly reports will be submitted to USACE Louisville District during the last week of each month. The monthly reports will include an accurate and current account of all work completed and deliverables furnished to the government. The content will meet the requirements as presented in Section 6.7 of the FWSAP.

6.8 Submittal of Information

All information including, but not limited to, sample numbers, collection time and date, and water quality measurements will be submitted in electronic format for entry into Ravenna

Environmental Information Management System (REIMS) per procedures outlined in Section 10.3 of the FWQAPP, Electronic Data Deliverable File Specifications.

7.0 SAMPLE PACKAGING AND SHIPPING REQUIREMENTS

Sample packaging and shipping will follow the protocols in Section 7.0 of the FWSAP. Exceptions to the FWSAP procedures include:

Per protocols of the contracted laboratory, ISM sample packaging and shipping will be conducted as follows:

- Place packing material on the bottom of the cooler;
- Place 55-gallon plastic bag (included in sample kit) in the cooler;
- Pack the sample containers (included in sample kit), protective padding and wet ice inside the bag and seal the bag;
- Place additional packing material on top of the bag to keep containers from shifting during shipment;
- Place chain-of-custody documentation inside a small, separate plastic bag inside cooler on top of the sealed 55-gallon plastic bag.

8.0 INVESTIGATION-DERIVED WASTE

All IDW will be properly segregated, handled, labeled, characterized, managed and disposed of in accordance with the Camp Ravenna Waste Management Guidelines dated 30 March 2015 and will be tracked throughout the duration of the project. The IDW containers will be will be inspected on a weekly basis and documented. Samples will be collected prior to demobilization from the field and will be submitted for analysis. Once the waste characterization results have been received and reviewed by PIKA and the OHARNG Environmental Specialist, the determination can be made if the IDW is hazardous or non-hazardous. PIKA will coordinate the review, approval and signature of the waste manifests and profiles with the OHARNG Environmental Specialist, prior to offsite transportation and disposal of the IDW to the appropriate facilities. PIKA will prepare an IDW Report for review and approval by the OHARNG Environmental Specialist.

The following types of IDW are anticipated:

- Soil derived from surface and subsurface sampling activities.
- Decontamination fluids derived from decontamination of any non-dedicated sampling equipment; and
- Expendables/solid waste, including PPE and disposable sampling equipment.

Each of the three types of IDW will be containerized separately. Characterization and classification of the different types of IDW will be based on the specific protocols described below. Expendable solid waste (i.e., PPE) will not be sampled for characterization purposes. IDW samples shall be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, TCLP herbicides, TCLP Pesticides, total sulfide, total cyanide, corrosivity (pH), and flashpoint.

- Soil - Any residual soils from the surface soil sampling operations will be placed in a properly labeled Department of Transportation (DOT)-approved, 55-gallon open top drum (estimated two total). Disposition of the residual soil will be based upon analytical results from a toxicity characteristic leaching procedure (TCLP) sample collected and coordinated with the Camp Ravenna Restoration Project Manager.
- Decontamination Wash/Rinse Water – All decontamination rinse and wash water will be placed in a properly labeled DOT-approved, 55-gallon closed-top drum (estimated one total). Disposition of the waste water will be based upon analytical results from a TCLP sample collected and coordinated with the Camp Ravenna Restoration Project Manager.
- Decontamination fluids - Given the small number of samples being collected during this investigation, the decontamination fluids derived from any non-dedicated surface soil sampling equipment will be placed in properly labeled approved safety cans (estimated one 5-gallon container total). Disposition will be based upon the collection and analysis of TCLP liquid sample(s) and coordinated with the Camp Ravenna Restoration Project Manager.

Containerized IDW will be transported to Building 1036 for temporary storage while awaiting receipt of sample results, waste profiles (as applicable) and transport/disposal at an approved

facility. All temporary storage of IDW will be coordinated with the Camp Ravenna Restoration Project Manager or designee. Drummed waste will be staged on wooden pallets. Safety cans will be staged within approved storage cabinets.

9.0 CONTRACTOR CHEMICAL QUALITY CONTROL

PIKA will follow the Contractor Chemical Quality Control (CCQC) program per the FWSAP, Section 9.0, for the Group 2 Propellant Can Tops site investigation. This program consists of three phases (preparatory, initial, and follow-up), all of which will be performed by PIKA during the course of the project. A U.S. Army representative is not required to be present to conduct these QC checks. The PIKA CCQC representative will be responsible for implementing and documenting the CCQC program and features of work defined in the WP.

10.0 DAILY CHEMICAL QUALITY CONTROL REPORTS (DCQCR)

Per Section 10.0 of the FWSAP, during the field activities performed for the Group 2 Propellant Can Tops Area investigation, DCQCRs will be prepared, signed, and dated by the CCQC representative. These reports are submitted to the U.S. Army Project Manager on a weekly basis. The contents of each DCQCR will include a summary of activities performed during the Group 2 Propellant Can Tops site investigation, weather information at the time of sampling, results of measurements made with field instruments, results of CCQC activities performed including field instrument calibrations, departures from the approved FWFSP and/or this FSP addendum, problems encountered during field activities, and any instructions received from government personnel. Any deviations that may affect the project DQOs will be immediately conveyed to the U.S. Army Project Manager. The following will be attached to each DCQCR submittal, as appropriate:

- The QA sample table that matches up primary and QC samples collected,
- A summary of field-generated analytical results,
- Any other project-related forms utilized, and
- A copy of the CCQC preparatory phase meeting minutes (unless bound in a logbook).

A copy of the chain of custody (COC) form(s) will be sent to the PIKA Laboratory Coordinator on a weekly basis.

11.0 FIELD VARIANCE AND CORRECTIVE ACTIONS

11.1 Field Variance System

Variances from the operating procedures and approved investigation-specific addenda will be documented on a field change request (FCR) form (FWSAP Figure 11-1) or a non-conformance report (NCR) form (FWSAP, Figure 11-2), where appropriate. If, during the investigation, changes necessary to meet the objectives of the investigation-specific addenda are identified, the PIKA Site Supervisor will contact the PIKA Project Manager, who will in turn communicate the question to the CELRL Project Manager. CELRL will coordinate communications between the OHARNG and the Ohio EPA to obtain review and approval for recommended changes.

11.2 Sample Collection and Field Measurements

Corrective actions will be implemented in the event that a discrepancy is discovered by field personnel, laboratory personnel, and/or during a field or desk audit. The initial responsibility for monitoring the quality of field activities and measurements lies with the field personnel, who are required to follow QA procedures; the CCQC representative is responsible for verifying these procedures are being adhered to. This verification requires that the CCQC representative assess the correctness of the field methods and the ability of the field team to meet the QA objectives and to make a subjective assessment of the impact that a procedure has on the field objective and resulting data quality.

If a field problem occurs that might jeopardize the integrity of the project, cause a QA objective not to be met, or affect data quality, the first action taken will be an assessment of the severity of the problem by the CCQC representative. If the problem is determined to be minor, the CCQC representative will initiate an appropriate corrective action, which will be recorded in the field logbook. If the problem is determined to be significant or subject to recurrence, the CQC representative will initiate an NCR that will be submitted to the Contractor QA/QC Officer. The PIKA QA/QC Officer will then propose and implement an appropriate corrective action as documented on the NCR. The PIKA QA/QC Officer is responsible for ensuring that corrective actions for non-conformances are initiated by:

- Evaluating all reported non-conformances,
- Controlling additional work on non-conforming items,
- Determining disposition or action to be taken,
- Maintaining a log of non-conformances,
- Reviewing NCRs and corrective actions taken, and
- Ensuring that NCRs are included in the project evidence file.

If appropriate, PIKA's CQC representative or QA/QC Officer will ensure that no additional work that depends on the non-conforming activity is performed until corrective actions are implemented and the non-conforming activity is corrected. Corrective actions for field measurements may include the following:

- Repeat measurement to check errors,
- Check proper instrument adjustments for ambient conditions such as temperature,

- Check battery charge and connections,
- Check instrument calibration and recalibrate as necessary,
- Replace instrument or measurement devices, and
- Stop work (if necessary).

11.3 Laboratory Analyses

In the event that a laboratory problem occurs that might jeopardize the integrity of the project analytical results, cause a QA objective not to be met, or affect data quality, the first action taken will be an assessment of the severity of the problem by the PIKA Laboratory Coordinator. If the problem is determined to be minor, the PIKA Laboratory Coordinator will initiate an appropriate corrective action, which will be recorded in a memorandum submitted to the PIKA Project Manager. The PIKA Project Manager will then relate the corrective action to be implemented to the PIKA CQC representative and/or PIKA QA/QC Officer if the problem is associated with activities being performed in the field. If the problem is determined to be significant, the PIKA Laboratory Coordinator will initiate an NCR, which will be submitted to the PIKA QA/QC Officer. Analytical NCRs will be copied to the U.S. Army Project Manager. Laboratory personnel will be alerted that corrective actions may be necessary if any of the following apply:

- QC data are outside the warning or acceptable windows for precision and accuracy,
- Blanks contain target analytes above acceptable levels,
- Undesirable trends are detected in spike recoveries or relative percent differences between duplicates,
- Unusual changes in detection limits are encountered,
- Deficiencies are detected during internal or external audits or from the results of performance evaluation samples, and
- Inquiries concerning data quality are received.

12.0 PROJECT SCHEDULE

The project schedule can be found in Appendix B of the project WP.

13.0 REFERENCES

- Interstate Technology and Regulatory Council (ITRC), 2012. Technical and Regulatory Guidance, Incremental Sampling Methodology. February.
- Ohio EPA, 2004. Director's Final Finding and Orders (DFFO) for RVAAP, dated June 10, 2004.
- Ohio EPA, 2011. Division of Environmental Response and Revitalization Sampling Equipment Decontamination Final Standard Operating Procedure 1.6, dated March 8, 2011.
- PIKA, 2012. Final Investigation Report for the Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops and Other Environmental Services, RVAAP, Ravenna, Ohio. January.
- USACE, 2011. Facility-Wide Sampling and Analysis Plan for Environmental Investigations, Revision 0, Ravenna Army Ammunition Plant, Ravenna, OH, W912QR-08-D-0008, Delivery Order No. 0016, Science Applications International Corporation. February.
- USACE, 2001, Requirements for the Preparation of Sampling and Analysis Plans, EM 200-1-3. February.

APPENDIX E

QUALITY ASSURANCE PROJECT PLAN

PART II

Revised Final Field Quality Assurance Project Plan Addendum For Site Inspection at the Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops Area at Ravenna Army Ammunition Plant

Revision 0

Former Ravenna Army Ammunition Plant (RVAAP)
Ravenna, Ohio

Contract Number: W912QR-12-F-0212

Prepared For:

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Acronyms and Abbreviations

ADR	automated data review
AOC	area of concern
bgs	below ground surface
CELRL	United States Army Corps of Engineers, Louisville District
COC	chain of custody
CR	compliance restoration
CX	Center of Expertise
DoD	Department of Defense
DOT	Department of Transportation
DQO	Data Quality Objectives
EDD	electronic data deliverable
EDMS	Environmental Data Management System
ELAP	Environmental Laboratory Approval Program
EPA	Environmental Protection Agency
FWCUG	Facility-Wide Cleanup Goal
FWSAP	Facility-Wide Sampling and Analysis Plan
FWQAPP	Facility-Wide Quality Assurance Project Plan
HTRW	Hazardous, Toxic, and Radioactive Waste
IAW	In Accordance With
IDW	investigation derived wastes
IRP	Installation Restoration Program
ISM	incremental sampling methodology
LCS	laboratory control samples
MC	munitions constituents
MEC	munitions and explosives of concern
MD	munitions debris
MDL	Method Detection Limit
MRL	Method Reporting Level
MS/MSD	matrix spike/matrix spike duplicate
NELAP	National Environmental Laboratories Accreditation Program
PCB	Polychlorinated Biphenyl
pH	potential hydrogen
PWS	performance work statement
QA	Quality Assurance
QC	Quality Control
QAMP	Quality Assurance Management Plan
QAPP	Quality Assurance Project Plan
QSM	Quality Systems Manual
RVAAP	Former Ravenna Army Ammunition Plant
SAP	Sampling and Analysis Plan
SOP	standard operating procedure
SVOC	Semivolatile Organic Compound
TAL	target analyte list
TCLP	toxicity characteristic leaching procedure
USACE	United States Army Corps of Engineers

USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VOC	volatile organic compound
WP	Work Plan

1.0 INTRODUCTION

This investigation-specific Quality Assurance Project Plan (QAPP) Addendum addresses supplemental project-specific information and tiers under the *Final Facility-Wide Quality Assurance Project Plan (FWQAPP) for Environmental Investigation at the Ravenna Army Ammunition* Plant *(RVAAP), Ravenna, Ohio* (SAIC, 2011). Each QAPP section in this Addendum documents adherence to the FWQAPP or stipulates project-specific requirements.

This QAPP Addendum describes the laboratory procedures that will be implemented to analyze the samples coinciding with the Site Inspection at Compliance Restoration Site CC RVAAP-80 (Group 2 Propellant Can Tops Area) at Ravenna Army Ammunition Plant.

2.0 PROJECT DESCRIPTION

2.1 Site History/Background Information

Site history and background information of the RVAAP is discussed in Section 1.0 of the Work Plan (WP).

2.2 Past Data Collection Activity/Current Status

CC RVAAP-80 consists of the Group 2 Propellant Can Tops area. Propellant can lids or tops were identified on the ground surface/near surface at the southern end of the former Group 2 Ammunition Storage Area. The discarded propellant cans and tops are considered materials potentially presenting an explosive hazard (MPPEH).

The propellant can tops located at the south end of Group 2 were initially identified by Ohio Army National Guard (OHARNG) trainees in the winter of 2008. The propellant can tops were observed in the vegetative area located immediately south of the ammunition storage magazines in the vicinity of the southern railroad spur lines (see Sampling and Analysis Plan (SAP) Figure 2). This area consists of approximately 539,572 square ft (12.4 acres).

The United States Army Corps of Engineers (USACE), Louisville District performed an emergency survey with a metal detector of a portion of the southern area ground surface. Results of the initial investigation revealed multiple magnetic anomalies in the surface and near surface soils. On-site personnel visually identified the surface anomalies as propellants can lids or tops. During the emergency survey it was noted that the ground surface had been disturbed and contained hummocks (mounds) ranging in height form 1' to 2' throughout the survey area. The historic aerial photos showed storage materiel on pallets in this area. The area appeared not to have been gravel covered, so the hummocks were likely caused by the tires of the vehicles used to place or retrieve the pallets sinking in when the ground was soft.

In April through May of 2011, an investigation was initiated to conduct a geophysical survey of the Group 2 Propellant Can Tops Area (12.4 acres total), and collect three surficial incremental soil samples. The geophysics utilized an EM-61MK2, which showed five clusters of ferrous items at or near the surface as well as other scattered ferrous items (see SAP Figure 3). The geophysics proved that there had not been any burial of the lids. The propellant can lids are of environmental concern for the subject area. Three of the clusters (i.e., 1, 3, and 5) became the location of the three multi-increment samples collected during the investigation.

The soil samples were analyzed for target analyte list (TAL) metals, and common propellants used by the Department of Defense (DoD) including nitrocellulose, nitroglycerine, nitroguanidine, and perchlorate. One (1) of the three samples was also analyzed for the RVAAP full suite, (including explosives, cyanide, volatile organic compounds; VOCs, semi-volatile organic compounds; SVOCs, and poly chlorinated bi-phenyls; PCBs). The three samples did not result in any analytes exceeding the facility-wide cleanup goals (FWCUGs). Additional soil investigation was deemed warranted to fully characterize the surface and subsurface soils in the vicinity of the can lids.

The geophysics work was preceded by wetland delineation and vegetation clearance. The field team was led by an unexploded ordnance (UXO) Technician, and no munitions and explosives of concern (MEC) or MD was encountered on the surface during any aspect of the work. The

propellant tops and cans are considered MPPEH until inspected and certified as MDAS, therefore, a 4-man UXO team including a Senior UXO Supervisor (SUXOS), a UXO Safety Officer (UXOSO) and two man collection/inspection team comprised of a UXO Technician III and UXO Technician II will be needed for the project. The USACE ordnance and Explosive Safety Specialist (OESS) will be onsite during any recovery or intrusive activities. If a non-packing MEC item is encountered, field work on this project will be halted immediately and the PIKA UXOSO will contact the onsite USACE OESS and the Camp Ravenna Restoration Project Manager for further direction. Based upon the potential hazard of the item found the site may need to be re-evaluated and potentially assigned a new probability rating.

2.3 Project Objectives and Scope

The objective of this project is to conduct an investigation of the Group 2 Propellant Can Lids Area. The investigation is intended to achieve the following objectives:

- Identify, collect, certify as safe and dispose of the propellant tops and cans associated the anomalies identified in the Final Investigation Report for the Compliance Restoration Site CC RVAAP-80, Group 2 Propellant Can Tops and other Environmental Services, January 27, 2012.
- Confirm the presence or absence of releases of propellants and/or other munitions constituents (MCs) to the surface and/or subsurface soils at the area of concern (AOC).

PIKA will perform the following tasks to meet these objectives:

- Reacquire the previously identified anomalies, conduct a surface clearance for the propellant tops and cans, certify as safe and dispose/recycle;
- Collect (5) surface and (3) subsurface soil samples based on the results of the previous site investigation;
- Analyze soil samples for target analyte list (TAL Metals), and common propellants used by the Department of Defense (DoD) including nitrocellulose, nitroglycerine, nitroguanidine, and perchlorate. One (1) of the samples will also be analyzed for the RVAAP full suite consisting of TAL metals, explosives, propellants, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOC)s, pesticides, and polychlorinated biphenyls (PCBs);
- Dispose of all investigation-derived waste (IDW); and
- Prepare a site investigation report to document the process and procedures used in conducting the investigation, and describe all the soil sampling activities conducted during this project. The report will include details about sample collection, decontamination, analytical results, waste management, event chronology, final site inspection, and mapping. The site investigation report maps will delineate the boundaries of the site and sample areas.

2.4 Sample Network Design and Rationale

2.4.1 Surface Water

There is no surface water present at the AOC. As such, surface water samples will not be collected.

2.4.2 Soil

PIKA will collect incremental sampling methodology (ISM) surface soil samples and subsurface samples based on the results of the previously completed geophysical delineation. A total of five (5) surficial and three (3) subsurface (eight primary, plus QA samples) will be collected within those areas that are identified to include near surface propellant can or tops. The sample locations will be coordinated with and pre-approved by USACE Louisville District (CELRL), Ohio Environmental Protection Agency (EPA), and Camp Ravenna Restoration Project Manager.

The ISM surface soil samples will be obtained by collecting a minimum of 30 increments per sample area from 0 to 1 foot below ground surface (bgs). ISM subsurface soil samples will be obtained by collecting a minimum of 30 increments per sample area from one (1) to four (4) feet bgs. The ISM areas will be approximately one-quarter of an acre or less in size.

All aliquots collected from each ISM surface and subsurface sample area will be placed in a labeled five-gallon bucket for transport to the laboratory. The resultant sample from each area will be forwarded to the offsite laboratory identified in Section 3.0 of this document where they will be air dried, sieved, and ground to homogenize the sample prior to analysis. ISM will not be used for VOC analysis. If a sample is designated for VOC analysis, such as for the RVAAP full suite, one discrete sample will be collected from within the ISM area using the bucket hand auger method as described in Section 5.6.2.1.1 of the FWSAP. 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 biased in the area with the highest concentration of propellant cans and tops. 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 or laboratory. Tables 5-1 and 5-2 list the sample container, preservation, and holding time requirements for soil samples.

2.5 Parameters to be Tested and Frequency

All soil samples will be analyzed for the following parameters:

- TAL metals,
- Propellants, and
- Perchlorate.

Additionally, one surface soil sample will be analyzed for the RVAAP full suite:

- TAL metals,
- Propellants,
- Explosives,

- VOCs,
- SVOCs, and
- PCBs

For the waste characterization samples, one composite sample will be collected and analyzed for each waste stream for IDW samples shall be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, TCLP herbicides, TCLP Pesticides, total sulfide, total cyanide, corrosivity (pH), and flashpoint. Table 2-1 lists the anticipated sample numbers, quality assurance (QA) sample frequencies, and field quality control (QC) sample frequencies.

2.6 Schedule

The project schedule is presented as Figure 6 in Appendix B of the WP.

Table 2-1 - Sampling and Analytical Requirements

CC RVAAP-80 Group 2 Propellant Can Tops Area

SAMPLE ID														QA/QC SAMPLES[1]				
CC-RVAAP-80 Group 2 - Propellant Can Tops Area	VOCs 8260B	SVOCs 8270C	Pesticides 8081A	PCBs 8082	Explosives 8330	Nitrocellulose 353.2	Nitroguanidine 8330 Modified	Nitroglycerine 8330	Perchlorate 6860	TAL Metals 6010B	Mercury 7471A	Solids 160.3	Full TCLP, total Sulfide, Total Cyanide, pH & Flash Point	Duplicate Sample[2]	Trip Blank	Equipment Rinse	MS/MSD	USACE QA Split Sample[4]
PROPELLANT CAN TOPS AREA - WASTE CHARACTERIZATION SAMPLES																		
PCTss-WC001-SO													1					
PROPELLANT CAN TOPS AREA ISM SUBSURFACE SOIL SAMPLES																		
PCTsb-001M-0001-SO						1	1	1	1	1								
PCTsb-002M-0001-SO						1	1	1	1	1								
PCTsb-003M-0001-SO						1	1	1	1	1							1	
PROPELLANT CAN TOPS AREA ISM SURFACE SOIL SAMPLES																		
PCTss-004M-0001-SO						1	1	1	1	1								
PCTss-005M-0001-SO						1	1	1	1	1				1				1
PCTss-006M-0001-SO [3]	1	1	1	1	1	1	1	1	1	1	1	1			1	1		
PCTss-007M-0001-SO						1	1	1	1	1								
PCTss-008M-0001-SO						1	1	1	1	1								
	1	1	1	1	1	8	8	8	8	8	1	1	1	1	1	1	1	1

Notes:

[1] Field QC Samples - QC samples will be analyzed for the same parameters as the associated primary

[2] Duplicate Samples will be numbered PCTss-XXXM-0001-DUP

[3] Full Suite Sample location will be determined by Ohio EPA

[4] USACE QA Split Sample will be collected at a frequency of 10%

Analysis Name	Analysis Method	Preparation Method
Volatile Organic	EPA 8260B	EPA5035A
Semi-Volatile Organic	EPA 8270C	EPA 3540C
Pesticides	EPA 8081A	EPA 3540C
PCB	EPA 8082	EPA 3540C
Explosives	EPA 8330	EPA 8330B_Sonc_10g
Nitrocellulose	EPA 353.2	NCEL_HYD & NCEL_Prep
Nitroguanidine	EPA 8330	EPA 8330_P_2g
Perchlorate	EPA 6860	EPA 6860_Prep
TAL Metals	EPA 6010B	EPA 3050B
Mercury	EPA 7471A	EPA7471A_Prep

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The functional project organization and responsibilities are described in Section 3.0 of the Field Sampling Plan Addendum. Analytical support has been contracted to TestAmerica, Inc. Laboratory. Test America's Quality Assurance Management Plan (QAMP) is available for review upon request. As required by the performance work statement (PWS), TestAmerica, Inc. is certified under the National Environmental Laboratories Accreditation Program (NELAP) and accredited by the DoD Environmental Laboratory Approval Program (ELAP) under the DoD ELAP program. The laboratories' organizational structure, roles, and responsibilities are identified in their QAMPs and facility-specific appendices. The addresses and telephone number for the laboratories are as follows:

TestAmerica, Inc.
4101 Shuffel Street, NW
North Canton, OH 44720
330-497-9396

Project Manager (PM): John McFadden john.Mcfadden@testamericainc.com
330-966-0355 (Direct)

4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

4.1 Data Quality Objectives (DQOs)

DQOs summaries for this investigation will follow Tables 4-1 and 4-2 in the FWQAPP. 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. Concurrence with the *DoD Quality System Manual (QSM) for Environmental Laboratories* (Environmental Data Quality Workgroup, Version 5.0, 2013), and the Louisville QSM Supplement (USACE, 2007) is expected. The contract laboratory will provide Level IV data packages.

The contract laboratory will deliver an electronic data deliverable (EDD) that is automated data review (ADR) compatible. The contract laboratory must identify variances to the established library prior to any analysis being performed. No variances to the DoD QSM 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 Measurements will include 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. LCS measurements will include the standard mid-level analyte concentration, plus 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 DoD 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, precision, and sensitivity goals will follow Section 4.3 of the FWQAPP. The accuracy and precision required for the specified analytical parameters listed in Section 2, Table 2-1, are incorporated in Tables 4-1 and 4-2 of the FWQAPP and are consistent with the analytical requirements found in the DoD QSM.

Laboratories will make all reasonable attempts to meet the reporting levels in Tables 4-3 through 4-9 of the FWQAPP for each individual sample analysis. 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 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 PIKA, forward analytical and chromatographic information from diluted runs, and obtain direction on how to proceed. The PIKA PM will then contact the USACE CELRL, and Ohio EPA to discuss the data and the path forward.

The analyte lists and detection limits for the analyses listed in Section 2.5 are included in Tables 4-1 through 4-5.

Table 4-1

Volatile Organic Compounds (VOC) Method 8260 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		ug/Kg		ug/L	
1,1,1-Trichloroethane	71-55-6	0.36	5.0	0.19	1
1,1,2,2-Tetrachloroethane	79-34-5	0.68	5.0	0.15	1
1,1,2-Trichloroethane	79-00-5	0.44	5.0	0.31	1
1,1-Dichloroethane	75-34-3	0.29	5.0	0.15	1
1,1-Dichloroethene	75-35-4	0.26	5.0	0.14	1
1,2-Dibromoethane	106-93-4	0.27	10.0	0.22	2
1,2-Dichloroethane	107-06-2	0.73	5.0	0.22	1
1,2-Dichloroethene, Total	540-59-0	0.89	5.0	0.11	1
1,2-Dichloropropane	78-87-5	0.60	5.0	0.15	1
2-Butanone	78-93-3	1.40	10.0	0.35	2
2-Hexanone	591-78-6	0.74	10.0	0.17	2
4-Methyl-2-pentanone	108-10-1	0.92	10.0	0.18	2
Acetone	67-64-1	1.40	20.0	2.1	10
Benzene	71-43-2	0.26	5.0	0.13	1
Bromochloromethane	74-97-5	0.94	5.0	0.14	1
Bromodichloromethane	75-27-4	0.53	5.0	0.14	1
Bromoform	75-25-2	0.40	5.0	0.1	1
Bromomethane	74-83-9	0.86	5.0	0.29	1
Carbon disulfide	75-15-0	0.49	10.0	0.16	2
Carbon tetrachloride	56-23-5	0.53	5.0	0.15	1
Chlorobenzene	108-90-7	0.29	5.0	0.12	1
Chloroethane	75-00-3	0.45	5.0	0.34	1
Chloroform	67-66-3	0.26	5.0	0.12	1
Chloromethane	74-87-3	0.50	5.0	0.25	1
cis-1,2-Dichloroethene	156-59-2	0.89	5.0	0.1	1
cis-1,3-Dichloropropene	10061-01-5	0.64	5.0	0.22	1
Dibromochloromethane	124-48-1	0.26	5.0	0.13	1
Ethylbenzene	100-41-4	0.34	5.0	0.15	1
Methylene Chloride	75-09-2	0.84	5.0	0.35	1
m-Xylene & p-Xylene	179601-23-1	0.81	5.0	0.18	1
o-Xylene	95-47-6	0.33	5.0	0.1	1

Table 4-1 (continued)

Volatile Organic Compounds (VOC) Method 8260 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		ug/Kg		ug/L	
Styrene	100-42-5	0.31	5.0	0.15	1
Tetrachloroethene	127-18-4	0.61	5.0	0.15	1
Toluene	108-88-3	0.61	5.0	0.25	1
trans-1,2-Dichloroethene	156-60-5	0.38	5.0	0.11	1
trans-1,3-Dichloropropene	10061-02-6	0.75	5.0	0.15	1
Trichloroethene	79-01-6	0.60	5.0	0.13	1
Vinyl chloride	75-01-4	0.36	5.0	0.22	1
Xylenes, Total	1330-20-7	0.81	5.0	0.18	1.5

[a] Specific quantitation limits are highly matrix-dependent; project reporting levels listed here are goals and may not always be achievable.

Table 4-2

Semivolatile Organic Compounds (SVOC) Method 8270 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		ug/Kg		ug/L	
1,2,4-Trichlorobenzene	120-82-1	83.0	330	1.4	10
1,2-Dichlorobenzene	95-50-1	75.0	330	1.5	10
1,3-Dichlorobenzene	541-73-1	78.0	330	1.5	10
1,4-Dichlorobenzene	106-46-7	77.0	330	1.4	10
2,4,5-Trichlorophenol	95-95-4	83.0	330	2	10
2,4,6-Trichlorophenol	88-06-2	84.0	330	2	10
2,4-Dichlorophenol	120-83-2	89.0	330	2.6	10
2,4-Dimethylphenol	105-67-9	167	500	2.2	10
2,4-Dinitrophenol	51-28-5	214	2000	20	60
2,4-Dinitrotoluene	121-14-2	89.0	330	2	10
2,6-Dinitrotoluene	606-20-2	99.0	330	2	10
2-Chloronaphthalene	91-58-7	81.0	330	1.3	10
2-Chlorophenol	95-57-8	88.0	330	1.6	10
2-Methylnaphthalene	91-57-6	85.0	330	1.5	10
2-Methylphenol	95-48-7	58.0	330	0.93	10
2-Nitroaniline	88-74-4	84.0	1600	2	50
2-Nitrophenol	88-75-5	82.0	330	1.9	10
3,3'-Dichlorobenzidine	91-94-1	94.0	1600	0.96	50
3-Methylphenol & 4-Methylphenol	15831-10-4	330	1000	1.15	10
3-Nitroaniline	99-09-2	167	1600	1.4	50
4,6-Dinitro-2-methylphenol	534-52-1	81.0	2000	2.2	60
4-Bromophenyl phenyl ether	101-55-3	85.0	330	1.1	10
4-Chloro-3-methylphenol	59-50-7	92.0	330	2	10
4-Chloroaniline	106-47-8	58.0	330	2	10
4-Chlorophenyl phenyl ether	7005-72-3	93.0	330	1.1	10
4-Nitroaniline	100-01-6	88.0	1600	1.5	50
4-Nitrophenol	100-02-7	280	2000	6.1	60
Acenaphthene	83-32-9	83.0	330	1.1	10
Acenaphthylene	208-96-8	85.0	330	1.1	10
Anthracene	120-12-7	86.0	330	1	10
Benzo[a]anthracene	56-55-3	92.0	330	1	10
Benzo[a]pyrene	50-32-8	94.0	330	1	10
Benzo[b]fluoranthene	205-99-2	95.0	330	1.2	10
Benzo[g,h,i]perylene	191-24-2	110	330	1.4	10
Benzo[k]fluoranthene	207-08-9	113	330	0.96	10
Benzoic acid	65-85-0	289	1600	20	75
Benzyl alcohol	100-51-6	170	510	2.6	10
bis (2-chloroisopropyl) ether	108-60-1	79.0	330	1.3	10

Table 4-2 (continued)

Semivolatile Organic Compounds (SVOC) Method 8270 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		ug/Kg		ug/L	
Bis(2-chloroethoxy)methane	111-91-1	88.0	330	1	10
Bis(2-chloroethyl)ether	111-44-4	81.0	330	1.5	10
Bis(2-ethylhexyl) phthalate	117-81-7	98.0	330	1	10
Butyl benzyl phthalate	85-68-7	95.0	330	1.4	10
Carbazole	86-74-8	95	330	1.2	10
Chrysene	218-01-9	84	330	1	10
Dibenzo(a,h)anthracene	53-70-3	102	330	2	10
Dibenzofuran	132-64-9	86	330	1.1	10
Diethyl phthalate	84-66-2	90	330	0.93	10
Dimethyl phthalate	131-11-3	87	330	0.88	10
Di-n-butyl phthalate	84-74-2	97	330	1.1	10
Di-n-octyl phthalate	117-84-0	97	330	1.5	10
Fluoranthene	206-44-0	95	330	1	10
Fluorene	86-73-7	92	330	0.93	10
Hexachlorobenzene	118-74-1	89	330	1.4	10
Hexachlorobutadiene	87-68-3	82	330	1.3	10
Hexachlorocyclopentadiene	77-47-4	62	1600	5	50
Hexachloroethane	67-72-1	81	330	1.4	10
Indeno[1,2,3-cd]pyrene	193-39-5	96	330	3.4	15
Isophorone	78-59-1	93	330	1	10
Naphthalene	91-20-3	82	330	1.3	10
Nitrobenzene	98-95-3	76	330	1.6	10
N-Nitrosodi-n-propylamine	621-64-7	84	330	1.4	10
N-Nitrosodiphenylamine	86-30-6	86	330	1	10
Pentachlorophenol	87-86-5	51	1600	5	60
Phenanthrene	85-01-8	94	330	1	10
Phenol	108-95-2	83	330	1.1	10
Pyrene	129-00-0	94	330	1.4	10

[a] Specific quantitation limits are highly matrix-dependent; project reporting levels listed here are goals and may not always be achievable.

Table 4-3

Pesticides Method 8081 DoD and Polychlorinated Biphenyls (PCBs) Method 8082 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		ug/Kg		ug/L	
Method 8081					
4,4'-DDD	72-54-8	0.26	1.7	0.012	0.05
4,4'-DDE	72-55-9	0.22	1.7	0.012	0.05
4,4'-DDT	50-29-3	0.4	1.7	0.012	0.05
Aldrin	309-00-2	0.21	1.7	0.006	0.05
alpha-BHC	319-84-6	0.22	1.7	0.007	0.05
alpha-Chlordane	5103-71-9	0.2	1.7	0.006	0.05
beta-BHC	319-85-7	0.33	1.7	0.007	0.05
delta-BHC	319-86-8	0.16	1.7	0.011	0.05
Dieldrin	60-57-1	0.091	1.7	0.012	0.05
Endosulfan I	959-98-8	0.1	1.7	0.006	0.05
Endosulfan II	33213-65-9	0.1	1.7	0.012	0.05
Endosulfan sulfate	1031-07-8	0.092	1.7	0.012	0.05
Endrin	72-20-8	0.11	1.7	0.012	0.05
Endrin aldehyde	7421-93-4	0.11	1.7	0.025	0.1
Endrin ketone	53494-70-5	0.34	1.7	0.02	0.1
gamma-BHC (Lindane)	58-89-9	0.17	1.7	0.006	0.05
gamma-Chlordane	5103-74-2	0.1	1.7	0.012	0.05
Heptachlor	76-44-8	0.19	1.7	0.007	0.05
Heptachlor epoxide	1024-57-3	0.12	1.7	0.006	0.05
Methoxychlor	72-43-5	1.3	3.4	0.042	0.1
Toxaphene	8001-35-2	20	67	0.51	2
Method 8082					
Aroclor-1016	12674-11-2	3.4	33	0.15	1
Aroclor-1221	11104-28-2	5.2	33	0.53	1
Aroclor-1232	11141-16-5	6.4	33	0.16	1
Aroclor-1242	53469-21-9	7.4	33	0.25	1
Aroclor-1248	12672-29-6	5.7	33	0.24	1
Aroclor-1254	11097-69-1	2.7	33	0.19	1
Aroclor-1260	11096-82-5	2.9	33	0.22	1

a Specific quantitation limits are highly matrix-dependent; project reporting levels listed here are goals and may not always be achievable.

Table 4-4

Explosives - Method 8330B
Propellants - Method 8330 Modified and 353.2
Perchlorate - Method 6860

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		mg/Kg		ug/L	
1,3,5-Trinitrobenzene	99-35-4	0.02	0.25	0.031	0.15
1,3-Dinitrobenzene	99-65-0	0.05	0.25	0.05	0.15
2,4,6-Trinitrotoluene	118-96-7	0.02	0.25	0.05	0.15
2,4-Dinitrotoluene	121-14-2	0.02	0.25	0.05	0.13
2,6-Dinitrotoluene	606-20-2	0.03	0.25	0.05	0.13
2-Amino-4,6-dinitrotoluene	35572-78-2	0.1	0.25	0.03	0.15
2-Nitrotoluene	88-72-2	0.08	0.25	0.088	0.5
3-Nitrotoluene	99-08-1	0.07	0.25	0.057	0.5
4-Amino-2,6-dinitrotoluene	19406-51-0	0.02	0.25	0.05	0.15
4-Nitrotoluene	99-99-0	0.08	0.25	0.088	0.5
HMX	2691-41-0	0.03	0.25	0.036	0.15
Nitrobenzene	98-95-3	0.05	0.25	0.05	0.15
Nitroglycerin	55-63-0	0.13	0.5	0.33	1.5
PETN	78-11-5	0.16	0.5	0.3	1.5
RDX	121-82-4	0.04	0.25	0.036	0.15
Tetryl	479-45-8	0.05	0.25	0.05	0.15
Nitroguanidine (8330 modified)	556-88-7	0.02	0.25	2.4	20
Perchlorate (6860)	14797-73-0	0.00015	0.005	0.082	0.5
Nitrocellulose (353.2)	9004-70-0	0.78	5	475	2000

[a] Specific quantitation limits are highly matrix-dependent; project reporting levels listed here are goals and may not always be achievable.

Table 4-5

Target Analyte List (TAL) ICP Metals - Methods 6010 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		mg/Kg		ug/L	
Aluminum	7429-90-5	5.6	20	48	200.0
Antimony	7440-36-0	0.94	3	9.8	30.0
Arsenic	7440-38-2	1.3	4	12.0	40.0
Barium	7440-39-3	0.2	2	2.5	20.0
Beryllium	7440-41-7	0.03	0.3	0.3	3.0
Cadmium	7440-43-9	0.03	0.3	0.5	3.0
Calcium	7440-70-2	10	50	100.0	500.0
Chromium	7440-47-3	0.14	1	2.0	10.0
Cobalt	7440-48-4	0.25	1	3.0	10.0
Copper	7440-50-8	0.22	1.5	2.1	15.0
Iron	7439-89-6	2	10	20.0	100.0
Lead	7439-92-1	0.26	1	2.5	10.0
Magnesium	7439-95-4	4.5	50	40.0	500.0
Manganese	7439-96-5	0.25	1	2.5	10.0
Mercury	7439-97-6	0.0086	0.04	0.1	0.25
Nickel	7440-02-0	0.24	1	2.4	10.0
Potassium	7440-09-7	10	100	93.0	1000
Selenium	7782-49-2	1.4	4	13.0	40.0
Silver	7440-22-4	0.09	0.5	0.84	5.0
Sodium	7440-23-5	20	100	250.0	1000
Thallium	7440-28-0	0.84	3	9.0	30.0
Vanadium	7440-62-2	0.19	2	1.9	20.0
Zinc	7440-66-6	0.4	2	3.0	20.0

a Specific quantitation limits are highly matrix-dependent; project reporting levels listed here are goals and may not always be achievable.

4.4 Completeness, Representativeness, and Comparability

Completeness, representativeness and comparability goals identified in Section 4.3 and Tables 4-1 and 4-2 of the FWQAPP will be imposed for this investigation.

5.0 SAMPLING PROCEDURES

Sampling Procedures are described in Section 5.0 of the FWFSP as referenced in Section 5.0 of the FSP Addendum. Table 5-1 summarizes sample container, preservation, and holding time requirements for the soil and 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 sampling team and identified for the laboratory on respective chain-of-custody (COC) documentation. Field duplicate samples will be labeled and numbered in manner that does not allow the analytical facility to compare information with primary sample data.

Table 5-1 Container Requirements for Soil Samples

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
VOC	Two 2-oz glass jars with septum cap (no headspace) or Encore® or equivalent	20 g	Cool, 4°C	14 days
SVOC	One 16-oz glass jar with Teflon®-lined cap	60 g	Cool, 4°C	14 days (extraction) 40 days (analysis)
Pesticides	Include in SVOC container	60 g	Cool, 4°C	14 days (extraction) 40 days (analysis)
PCB	Include in SVOC container	60 g	Cool, 4°C	14 days (extraction) 40 days (analysis)
Explosive Compounds	One 4-oz glass jar with Teflon®-lined cap	60 g	Cool, 4°C	14 days (extraction) 40 days (analysis)
Propellant Compounds	One 4-oz glass jar with Teflon®-lined cap	60 g	Cool, 4°C	14 days (extraction) 40 days (analysis)
TCLP VOCs	Two 4-oz glass jars with Teflon®-lined cap	20 g	Cool, 4°C	14 days
TCLP SVOCs	One 16-oz glass jar with Teflon®-lined cap	60 g	Cool, 4°C	14 days (extraction) 40 days (analysis)
TCLP Pesticide Compounds	Include in SVOC container	60 g	Cool, 4°C	14 days (extraction) 40 days (analysis)
TCLP PCBs	Include in SVOC container	60 g	Cool, 4°C	14 days (extraction) 40 days (analysis)
TCLP Herbicides	Include in SVOC container	60 g	Cool, 4°C	14 days (extraction) 40 days (analysis)
Metals, Mercury (Hg)	One 4-oz glass jar with Teflon®-lined cap	50 g	Cool, 4°C	180 days; Hg at 28 days
Perchlorate	Include in SVOC container	10 g	Cool, 4°C	28 days
Solids	One 4-oz glass jar with Teflon®-lined cap	50 g	Cool, 4°C	None
Incremental Sampling Method (ISM) Samples for multiple analyses	One or more 16-oz glass jar with Teflon®-lined cap	Varies per analyses to be requested.	Cool, 4°C	Varies per analyses to be requested.

Table 5-2 Container Requirements for Water Samples

Analyte Group	Container	Minimum Sample Size	Preservative	Holding Time
Explosive Compounds	One 1-L amber glass bottle with Teflon®-lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Propellant Compounds (Nitrocellulose & Nitroguanidine)	One 1-L amber glass bottle with Teflon®-lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Metals, Mercury (Hg)	One 1-L polybottle	500 mL	HNO3 to pH <2 Cool, 4°C	180 days; Hg at 28 days
VOCs	Three 40-mL glass vials with Teflon®-lined septum (no headspace)	80mL	HCI to pH <2 Cool, 4°C	14 days
SVOCs	Two 1-L amber glass bottles with Teflon®-lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Pesticide Compounds	Two 1-L amber glass bottles with Teflon®-lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
PCBs	Two 1-L amber glass bottles with Teflon®-lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Cyanide	One 500-mL polybottle	500 mL	NaOH to pH >12 Cool, 4°C	14 days
Perchlorate	One 125-mL polybottle with headspace	100 mL	Filter with 2-micron Teflon® filter, Cool, 4°C	28 days
Solids	500-mL polybottle	100 mL	Cool, 4°C	28 days

6.0 SAMPLE CUSTODY

Sample custody procedures will follow those identified in Section 6.0 of the FWQAPP.

6.1 Field Chain-of-Custody (COC) Procedures

The sample packaging and shipment procedures summarized below will ensure that the samples will arrive at the laboratory with the COC intact. The protocol for specific sample numbering and other sample designations is included in Section 6.3 of the FSP Addendum.

6.1.1 Field Procedures

Based upon the available information to date, the site is a low probability site in regards to encountering MEC. the propellant tops and cans are considered MPPEH until inspected and certified as MDAS, therefore, a 4-man UXO team including a Senior UXO Supervisor (SUXOS), a UXO Safety Officer (UXOSO) and two man collection/inspection team comprised of a UXO Technician III and UXO Technician II will be needed for the project. The USACE ordnance and Explosive Safety Specialist (OESS) will be onsite during any recovery or intrusive activities. If a non-packing MEC item is encountered, field work on this project will be halted immediately and the PIKA UXOSO will contact the onsite USACE OESS and the Camp Ravenna Restoration Project Manager for further direction. Based upon the potential hazard of the item found the site may need to be re-evaluated and potentially assigned a new probability rating.

The PIKA Field Operations Manager will be responsible for the collection, care, and custody of the samples until the samples are shipped or transferred to the laboratory or designated courier. Each sample container will be labeled with a sample number, date and time of collection, name of sampler, and sampling location. Sample labels are to be completed for each sample using indelible ink, unless prohibited by weather conditions.

A COC form will be used to record pertinent information for each sample and the name of sampler for the sample collection, shipment, and receipt. Samples will be collected following the sampling procedures documented in the FWFSP and the FSP Addendum.

6.1.2 Field Logbook/Documentation

Field logbook/documentation will provide a means of recording data collection activities performed. Entries will be described in as much detail as possible so that persons going to the project site could reconstruct the sampling event without reliance on memory. Field logbooks will be bound field survey books or notebooks. The logbook will be identified by PIKA contract number and document number. The title page of the logbook will contain the name of the person to whom the logbook is assigned, the logbook number, the project name, and the project start and end dates. Field forms will be used to document the details associated with the sample collection.

The date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the project site and the purpose of their visit will also be recorded in the

field logbook. Measurements made and samples collected will be recorded. All entries will be made in ink, and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark and the entry will be initialed and dated.

When a sample is collected or a measurement is made, a detailed description of the location will be recorded. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume, and number of containers. A sample identification number will be assigned before sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description. Equipment employed to make field measurements will be identified along with their calibration dates. A map showing the locations of each sample will be maintained.

6.1.3 Transfer of Custody and Shipment Procedures

Each sample will be assigned a unique identification number, as described in Section 6.3 of the FSP Addendum, and that number will be entered on the COC form. In order to be complete, project identification, date and time of sample collection, sample location, requested analyses, turnaround time, and any special instructions must be included on the COC, along with each sample identification number. Custody will be relinquished by using the signature blocks at the bottom of the custody form. The COC form will accompany the shipment (a copy placed inside each cooler if multiple coolers are within the same shipment. A copy of the COC and shipping paperwork, if applicable, will be retained by the PIKA Field Operations Manager. A signed COC form will be obtained from the laboratory custodian after the samples have been received, their condition checked and logged into the laboratory system. All information on COC forms will be recorded in black water proof ink and in a completely legible manner. Errors will be corrected with a single line strike through, initialed, and dated.

Samples will be individually packed with bubble wrap or other cushioning material to prevent breakage during transport. Ice will be placed in the coolers with the samples to maintain shipping temperature at 4 ±2 degrees Celsius. A temperature blank will be included with each cooler. The COC will be placed in plastic and affixed to the underside of the cooler lid. Custody seals will be affixed to the front right and back left of each cooler and covered with clear adhesive tape. The cooler will be strapped shut with strapping tape. The strapping tape will completely encircle the cooler in at least two places.

When the samples are sent by common carrier, a bill of lading will be used. Receipts or bills of lading will be retained as part of the permanent documentation. When sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact. All samples will be packaged and shipped following all state and federal regulations and will conform with United States Department of Transportation (DOT) requirements.

6.2 Laboratory Chain-of-Custody Procedures

Laboratory custody procedures for sample receiving and log-in, sample storage and numbering, tracking during sample preparation and analysis, and storage of data are described in the Laboratory QA program.

6.3 Final Evidence Files Custody Procedures

The field logbook, field notes, and COC forms for each sampling event will be maintained by the PIKA Field Operations Manager until the end of the project. At the end of the project, the field logbook, field notes, COC, photographs, laboratory reports, correspondence, and relevant reports comprising the evidence files will be retained in the PIKA Project Management Office.

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

The analytical laboratory will be responsible for the maintenance of laboratory instruments and equipment. Calibration of Laboratory equipment will follow procedures described in Section 7.2 of the FWQAPP, the contract laboratory QAPP, and Laboratory-specific standard operating procedures (SOPs). The laboratory's QA program ensures that only trained personnel perform routine maintenance on all major instruments and that repairs are performed by trained laboratory personnel or service technicians employed by the instrument manufacturer or representative. Instrument maintenance will be appropriately documented through the use of instrument logs, which will be included in the laboratory project file.

8.0 ANALYTICAL PROCEDURES

8.1 Laboratory Analysis

Analytical methods, parameters, and quantitation or detection limits are listed in Tables 4-1 through 4-6 of this QAPP Addendum. Laboratory analysis procedures are listed in Section 8.1 of the FWQAPP. The laboratory will make efforts to analyze samples within the first half of the analytical holding time, thus allowing potential repeat analyses to be conducted within analytical holding time windows

The laboratories will maintain a safe and contaminant-free environment for the analysis of samples. The laboratories will demonstrate, through instrument blanks, holding blanks, and analytical method blanks, that the laboratory environment and procedures do not impact analytical results.

The laboratories will implement all reasonable procedures to maintain project-reporting levels for all sample analyses. Where contaminant and sample matrix analytical interferences impact the laboratories' ability to obtain required project reporting levels, the laboratory will institute sample clean-up processes, minimize dilutions, adjust instruments 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 undiluted and diluted sample results must be reported.

8.2 Field Screening Analytical Protocols

Procedures for instrument calibration, calibration frequency, and field analysis are described in Section 7.0 of the FWQAPP.

9.0 INTERNAL QUALITY CONTROL CHECKS

The laboratory QC program will ensure the reliability and validity of the analysis performed at the laboratory. All analytical procedures will be documented in writing in SOPs that include a QC section addressing the minimum QC requirements for the procedure.

9.1 Field Sample Collection

Field quality QC/QA sample types, numbers, and frequencies are listed in Table 2-1 of this document. In general, field duplicates will be collected at a frequency of one field duplicate for every ten investigative samples; field equipment rinsates at a frequency of 10% for samples collected with non-dedicated equipment. One MS/MSD sample will be designated in the field and collected for at least every 20 investigative samples per sample matrix (e.g., soil and surface water).

9.2 Field Measurement

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

9.3 Laboratory Analysis

Analytical QC procedures will follow those identified in the referenced USEPA methodologies, the DoD QSM and CELRL QSM Supplement. These will include method blanks, LCS, MS, MSD, laboratory duplicate analysis, calibration standards, internal standards, surrogate standards, and calibration check standards. The subcontracted laboratory facilities will conform to their QAPP and implement their established SOPs to perform the various analytical methods required by the project. Laboratory analyses will proceed as discussed in Section 9.3 of the FWQAPP.

9.3.1 Sample Preparation

All samples must be prepared according to the requirements of the DoD QSM, applicable SW-846 or USEPA methods, and the laboratory SOPs.

9.3.1.1 Incremental Samples

Incremental samples will be prepared as discussed in Section 9.3.1.1 of the FWQAPP.

9.3.1.2 Explosives

Samples for explosives analysis will be prepared as discussed in Section 9.3.1.2 of the FWQAPP.

9.3.1.3 Metals

Samples for metals analysis will be prepared as discussed in Section 9.3.1.3 of the FWQAPP.

9.3.1.4 Organic Extraction

Samples for organic analysis will be prepared as discussed in Section 9.3.1.4 of the FWQAPP.

9.3.2 Quality Assurance Program

The subcontracted analytical laboratory has a written QA program providing rules and guidelines to ensure the reliability and validity of work conducted at the laboratory. Compliance with the QA program is coordinated and monitored by the laboratory's QA department, which is independent of the operating departments.

9.3.3 Quality Control Checks

QC procedures will be implemented during sample collection, analysis, and reporting to ensure that the data obtained are consistent with intended use. Both field and laboratory QC checks will be performed throughout the work effort to generate data confidence. Analytical QC measures are used to determine the analytical process is in control and to determine the sample matrix effects on the data being generated. QC checks will be performed as discussed in Section 9.3.3 of the FWQAPP.

9.3.3.1 Analytical Process Quality Control

QC samples will be analyzed with each group of samples submitted to the laboratory for analysis.

9.3.3.1.1 Method Blanks

Method blanks will be prepared and analyzed for each analytical batch as discussed in Section 9.3.3.1.1 of the FWQAPP.

9.3.3.1.2 Laboratory Control Samples (LCSs)

LCSs will be prepared and analyzed for each analytical batch as discussed in Section 9.3.3.1.2 of the FWQAPP.

9.3.3.2 Matrix and Sample-Specific Quality Control

QC samples will be collected to ensure that representative and reproducible data are obtained.

9.3.3.2.1 Laboratory Duplicates

Laboratory duplicates will be prepared and analyzed for each analytical batch as discussed in Section 9.3.3.2.1 of the FWQAPP.

9.3.3.2.2 Surrogate Spikes

Surrogate spikes will be added to samples as applicable to the analytical procedure and method in accordance with (IAW) Section 9.3.3.2.2 of the FWQAPP.

9.3.3.2.3 Matrix Spikes and Matrix Spike Duplicates (MS/MSD)

MS/MSD will be prepared and analyzed for each analytical batch as discussed in Section 9.3.3.2.3 of the FWQAPP.

9.3.3.2.4 Method-Specific Quality Control

Method-specific QC procedures will be followed as discussed in Section 9.3.3.2.4 of the FWQAPP.

10.0 DATA REDUCTION, VALIDATION, AND REPORTING

10.1 Data Reduction

Data reduction will follow the established protocols defined in Section 10.1 in the FWQAPP. Sample collection and field measurements will follow the established protocols defined in the FWQAPP, FWFSP, and the FSP Addendum. Laboratory data reduction will follow the contract laboratory QAPP guidance and will conform to general direction provided in the FWQAPP; the USACE Shell for Analytical Chemistry Requirements, Appendix I EM 200-1-3, February 2001; the DoD QSM for environmental laboratories; and the CELRL QSM Supplement.

10.1.1 Field Measurement and Sample Collection

Field measurement and sample collection will follow the protocols defined in FWQAPP Section 10.1.1.

10.1.2 Laboratory Services

Laboratory services will be performed as defined in FWQAPP Section 10.1.2.

10.2 Data Verification/Validation

Project data verification and validation will follow direction provided in the FWQAPP Section 10.2.

10.2.1 Data Verification/Validation Approach

Project data verification/validation approach will follow direction provided in the FWQAPP Section 10.2.1 and as shown in Figure 10-1 of the FWQAPP. Protocol for analytical data verification and validation can be found in the following references:

- *DoD Quality System Manual (QSM) for Environmental Laboratories* Version 5.0, 2013),
- USACE, Louisville District's QSM Supplement (USACE 2007);
- *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA 2008);
- *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review,* EPA-540/R-99/008. Final. October (USEPA 1999); and
- *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,* EPA-540/R-04/004. Final. October. (USEPA 2004a).

All data will be reviewed for completeness by PIKA according to the FWQAPP.

10.2.2 Primary Analytical Data Verification/Validation Categories

All data will be reviewed and verified by PIKA in accordance with the FWQAPP using automated electronic verification software and manual methods. Automated reviews against the project ADR library will be performed in conjunction with manual review of the data packages for compliance with the established QC criteria based on the following categories:

- Holding times,
- Blanks,
- LCSs,
- Calibration,
- Surrogate recovery (organic methods),
- Internal standards (primarily organic methods),
- MS/MSD and duplicate results,
- Sample re-analysis,
- Secondary dilutions, and
- Laboratory case narrative.

These primary analytical data verification/validation categories will be evaluated for compliance to the DQOs listed in Tables 4-1 and 4-2 of the FWQAPP and qualified IAW Section 10.2.2 of the FWQAPP. Ten percent of the data will be validated by an independent data validation subcontractor qualified by USACE, Louisville District following the direction provided in Section 10 and Figure 10-1 of the FWQAPP.

10.3 Data Reporting

Data reporting will follow the established protocols defined in Section 10.3 in the FWQAPP. The contract laboratory will deliver an EDD that is ADR compatible. All data will be processed by ADR Environmental Data Management System (EDMS) software using the RVAAP-specific data library. All errors in the ADR/EDD found must be corrected by the laboratory prior to submittal. EDDs with errors will not be accepted.

10.4 Data Quality Assessment

Data quality will be accessed using the procedures provided in Section 10.4 of the FWQAPP.

11.0 PERFORMANCE AND SYSTEM AUDITS

11.1 Field Audits

One field surveillance for the project will be performed by the PIKA QA/QC Officer or another properly trained PIKA auditor. 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 HTRW CX on-site laboratory audits may be conducted by USACE, and 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 staff as defined in their QA/QC program. More information regarding laboratory audits can be found in Section 11.2 of the FWQAPP.

12.0 PREVENTIVE MAINTENANCE PROCEDURES

12.1 Field Instruments and Equipment

Maintenance of all field sampling and laboratory analytical equipment will follow direction provided in Section 12.0 of the FWQAPP. Field instruments and equipment that will be used for this project are discussed in Section 5.0 of the FSP Addendum.

12.2 Laboratory Instruments

Routine and preventative maintenance for all laboratory instruments and equipment will follow the direction of the contract laboratory's QA/QC program.

13.0 SPECIFIC ROUTINE PROCEDURES TO ASSESS 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.

14.0 CORRECTIVE ACTIONS

14.1 Sample Collection/Field Measurements

Field activity corrective action protocol will follow directions provided in Section 14.1 of the FWQAPP.

14.2 Laboratory Analysis

The laboratory activity corrective action protocol will follow directions provided in Section 14.2 of the FWQAPP. Laboratory corrective actions will also follow the procedures in the contract laboratory QA/QC program.

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's QA/QC program.

16.0 REFERENCES

- DoD, 2010. Quality Systems Manual for Environmental Laboratories, Environmental Data Quality Workgroup, Version 4.2;
- SAIC, 2011. Facility-Wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna, Ohio, Final. February;
- USACE, 2007. Louisville DoD Quality Systems Manual Supplement (LS) Version 1. March;
- 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; and
- USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA 2008).

APPENDIX F

CUMULATIVE SIGNED DOCUMENTATION AND CORRESPONDENCE

OhioEPA

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

July 16, 2014

**RE: RAVENNA ARMY AMMUNITION PLANT
PORTAGE/TRUMBULL COUNTIES
COMMENTS ON REVISION 1 OF THE FINAL
PROJECT WORK PLAN FOR SI AT CRS ARMY
SITE CC-RVAAP-80 GROUP 2 PROPELLANT
CAN TOPS (OHIO EPA ID # 267-000859-160)**

Mr. Brett Merkel
National Guard Directorate
ARNGD-ILE Clean up
111 South George Mason Drive
Arlington, VA 22203

Dear Mr. Merkel:

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received and reviewed the document entitled: "Final Project Work Plan for Site Inspection at Compliance Restoration Site CC-RVAAP-80 Group 2 Propellant Can Tops, Revision 1." This document was received at Ohio EPA's Northeast District Office (NEDO) on March 6, 2014, and is also dated March 6, 2014. The document was prepared for the U.S. Army Corps of Engineers (USACE), Louisville District, by PIKA International Inc. under contract number W912QR-0.

Comments on the document based on Ohio EPA review are provided below. Please provide responses to the enclosed comments in accordance with the Directors Findings and Orders.

General

Ohio EPA, the National Guard Directorate, and the US Army Corps of Engineers have been in discussion regarding this site and others where possible Munition Debris (MD) or Munition Constituents (MC) have been identified and are buried or are on the ground surface.

Whether the Propellant Can Tops are defined as MD or possibly MC, to Ohio EPA they are considered a solid waste. It is the understanding of Ohio EPA that there may be some question as to funding mechanisms for certain types of clean-up. This Plan actually calls out the intent to "collect and dispose of all metallic items within the AOC," i.e., Appendix A, Statement of Work, Section 4.0, paragraph 1, which Ohio EPA agrees should be completed. Regardless of funding mechanism, Ohio EPA refers the National Guard Directorate and US Army Corps of Engineers to Ohio Revised Code 3734.03 and the Ohio Administrative Code 3745.27.05C, which defines the regulations prohibiting open dumping and requirements for proper removal, disposal or management of the solid waste.

Specific comments are provided below:

The Following Comments Refer to the Project Work Plan

1. Page 6, Section 1.4, RVAAP CC-RVAAP-80: Group 2 Propellant Cant Tops, Paragraph 1 describes the initial identification of 5 clusters of ferrous items in 2011 and that soils in

the vicinity of three of the clusters were sampled at that time. A review of the previous report dated January 27, 2012 (Final Investigation Report for CC Site CC-RVAAP-80 Group 2 Propellant Can Tops..." identified propellants in soils from all three of the clusters. It is understood the concentrations were below Facility Wide Clean-Up Goals (FWCUGS); however, these compounds should be identified in this section. In fact a summary table showing these "hits" from the 2011 sampling event would be very useful in this plan. It is also important to note that although the primary focus and title of the current evaluation highlights propellant can tops, a number of propellant cans were also identified in the study area. This should also be mentioned in this section.

This section should explain the physical characteristics of propellant cans and tops/lids and how they were used as a munition and an explanation of why they are located at this location. Based on their use, why is it expected or not expected that residual propellants remain in media surrounding them. This information has never been satisfactorily provided in any of the reports on the Group 2 Propellant Can Tops area. This information would help to alleviate some of the discomfort Ohio EPA has with this area of concern.

2. Page 9, Section 2.4.2. This section provides an overview of the operational sequence of activities. Provide a descriptive word in Number 2, i.e., "Collect ISM surface and subsurface (using Geoprobe) soil samples..." or others as appropriate.

3. Page 10, Section 2.6. Management Roles and Responsibilities General. This section needs to be updated to include Gregory F. Moore of the US Army Corps of Engineers.

4. Page 21, Section 2.11.5.2 Emergency Response and General Notifications. This section needs to be updated to include Gregory F. Moore of the US Army Corps of Engineers.

5. Page 23, Section 2.13, paragraph 1 refers the reader to Appendix B Figure 5 and describes where soil samples are proposed to be collected. Ohio EPA believes that based on a review of the "scatter' of the identified ferrous anomalies on Figure 5 that an additional ISM surface sample location should be added north of Cluster 2 in the area surrounding anomaly points, 60105, 60106, 60107, and 60108.

   This section also mentions that one sample will be collected for the full RVAAP suite of analyses. Please clarify that this particular sample will be a "discreet" sample and not an ISM sample. Also, how will the decision be made where to collect this sample? Ohio EPA suggests the sample be collected where the highest concentration of ferrous anomalies (propellant cans or lids) are present.

   Please clarify how the use of the incremental sampling methodology will not destroy propellants including perchlorates prior to analysis.

6. Section 2.14 Disposal of IDW, Page 24. This section describes the handling of Investigation Derived Waste but does not define what type of waste is anticipated. Ohio

EPA requires that any metallic/ferrous waste found at the surface be collected and disposed of per ORC 3734.03 and OAC 3745.27.05C. This material can be recycled based on descriptions provided. Ohio EPA can even provide contacts with Portage County Solid Waste Management to facilitate this recycling at your request. If any waste is left in place below the surface, the area must be classified as a solid waste management unit for future land use purposes.

7. Section 2.20 Site Inspection (SI) Report, page 27 provides a description of activities that will be made part of the SI Report. Ohio EPA notes that the last of these is the location of the recovered ferrous items. We understand that removal was not intended to be part of the investigation, but Ohio EPA requires that these solid waste materials be removed per our Solid Waste Regulations that are cited in Question 6, above.

   The report should also provide a clear summary table of all identified compounds within the body of the report. This table should include the data from 2011.

The Following Comments Refer to Appendix A-Scope of Work

8. Section 1.2 Area of Concern, There is no page numbers present. An acronym was used and not defined, RRD. It is assumed it is referring to range related debris. Please include this acronym on the list on page vii.

   Based on photographs and information presented in January 27, 2012, Final Investigation Report on the Propellant Can Tops area, propellant cans were also identified, please provide this information in this section.

9. Section 4.0, paragraph 1 states that a contractor will collect and dispose of all metallic items within the AOC. Ohio EPA supports this statement and encourages its fulfillment.

The Following Comment Refers to Appendix C-Points of Contact

10. Gregory F. Moore with the US Army Corps of Engineers should be added to this contact list.

The Following Comment Refers to Appendix F-Cumulative Documentation and Correspondence and G-Comment Response Table

11. In Appendix F, an April 3, 2013, e-mail memo from Jay Trumble of the US Army Corps of Engineers to Brian Stockwell of Pika International Inc. explains that the Army intends to descope the collection of can tops from the task order to complete the site inspection; however, a response to Ohio EPA comments based on the April 3, 2013, e-mail in Appendix G and dated June18, 2013, states, "the removal will occur as originally discussed." These discrepancies will need to be clarified prior to moving forward with the Site Investigation.

Pursuant to the CERCLA process, the property owner usually can provide the expected land uses to assist in ensuring that the investigation addresses all receptors for both current and future land uses. Be advised that due to land use uncertainty, Ohio EPA may require additional work in the future, to address data gaps. It is incumbent upon the Army to finalize land use at Camp Ravenna as soon as possible, otherwise additional work and schedule slippage may result.

This document was reviewed by personnel from Ohio EPA's Division of Environmental Response and Revitalization (DERR). Ohio EPA has determined that additional information is necessary to approve the document. If you have any questions, please call me at (330) 963-1292.

Sincerely,

Kevin M. Palombo
Environmental Specialist
Division of Environmental Response and Revitalization

KMP/nvr

cc: Katie Tait, OHARNG
Kevin Sedlak, ARNG
Gregory F. Moore, USACE
Jay Trumble, USACE
Rebecca M. Haney/Gail Harris, VISTA Sciences Corp.

ec: Nancy Zikmanis, Ohio EPA, NEDO, DERR
Jarnal Singh, Ohio EPA, NEDO, DMWM
Justin Burke, Ohio EPA, CO, DERR
Rod Beals, Ohio EPA, NEDO, DERR

Ohio Environmental Protection Agency

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

October 23, 2015

Mr. Mark Leeper
Army National Guard Directorate
ARNGD-ILE Clean Up
111 South George Mason Drive
Arlington, VA 22204

Re: US Army Ammunition Plt RVAAP
Remediation Response
Plans
Remedial Response
Portage County
267000859160

Subject: Ravenna Army Ammunition Plant, Portage/Trumbull Counties. Approval with Modifications on the "Revised Draft Project Work Plan for Site Inspection at Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops" for the Ravenna Army Ammunition Plant, Ravenna, Ohio, Dated September 8, 2015, Ohio EPA ID # 267-000859-160

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) has received the "Revised Draft Project Work Plan for Site Inspection at Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops" at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. This document was received at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR), on September 8, 2015. The report was prepared for the US Army Corps of Engineers (USACE) Louisville District by PIKA International, Inc. under Contract Number W912QR-12-F-0212.

Ohio EPA notes that this revised document includes agreements to collect and dispose of propellant can tops and associated materials identified in this area of concern (AOC). The propellant cans and tops will be inspected, certified as materials documented as safe (MDAS) and consolidated for proper disposal/recycling IAW Department of Defense Instruction (DoDI) 4140.62, USACE EM 385-1-97, Change1, Chapter 1, Section 11, PIKA SOPs, and ORC 3745.27.05c. Ohio EPA also notes that additional sampling areas have been added to the Work Plan, which we believe were necessary. A third addition to this Work Plan was a thorough description of propellant cans and tops, their use, reasons why they are located on the property, and the potential for contamination. Several discussions between the Army National Guard, US Army Corps of Engineers, PIKA and Ohio EPA were held to clarify positions and requirements for the investigation of this AOC. Ohio EPA appreciates and understands the efforts made to provide this revised document.

Pursuant to The Directors Findings and Orders Paragraph 39 (b), Ohio EPA approves the submittal upon satisfactory written response to specified conditions as presented below:

Revised Draft Project Work Plan for Site Inspection at Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops

Comment 1. Page 26, Section 2.13. An expression is used in this section, "PIKA will clear the locations of the previous anomalies of all propellant can tops..." and, "...the UXO Technicians will clear the area within a one meter radius..." Does this expression mean that the propellant can lids will be removed? Ohio EPA understands from other locations in the documents that these materials will be removed and properly disposed.

Comment 2. Appendix B, Figure 5 provides the proposed samples locations for the collection of ISM samples. How was the size of each decision unit determined? It appears some are much larger than others, even though they have a similar number of anomalies. Wouldn't a larger decision unit around the same number of anomalies allow for the possibility of more diluted sample result? Why was the red circle in the northwest part of Figure 5 left partially completed? It is assumed the whole area of the circle is the decision unit. Please provide explanations for these questions.

Comment 3. Page 27, Section 2.14, Sentences 4 and 5. Please explain that ISM surface soil samples will be collected within the designated ISM from 0-1 foot and from 1-4 feet below ground surface (bgs). It is understood that propellant can tops and lids were identified at most locations within the top nine inches of the ground surface. It is also understood that the shallow (0-1 foot) samples will be analyzed for TAL metals, and common propellants and perchlorate. Is there a chance soils collected so shallow may have oxidized or in other ways reacted so that the results might be biased low?

Comment 4. Appendix D, Sampling and Analysis Plan, page 19, Section 5.6.1 sentence 3 states, "A total five ISM surface soil samples will be collected from 0 to one (1) foot bgs..." Sentence 4 states, "No sediment samples are anticipated to be sampled." What does it mean that "no sediment samples are anticipated to be collected?" This Sampling and Analysis Plan does not agree with page 27, Section 2.14 of the Revised Draft Project Work Plan. Please make the correction. Ohio EPA anticipates samples will also be collected from 1-4 feet bgs at locations shown on Figure 5, and as provided in the Work Plan.

Comment 5. Appendix E, Quality Assurance Project Plan, Page 4, Section 2.4.2, paragraph 2, last sentence states, "Multiple smaller areas where anomalies are found may be combined into one designated ISM sample area." This is unclear, please provide additional clarification.

Comment 6. Appendix E, Quality Assurance Plan, Table 4-1. This table provides a soil Reporting Limit of 250 ug/Kg. Will this reporting limit for these compounds exceed the CUGs? Will you report data that is above the Method Detection Limit (MDL) but below the Reporting Limit (RL) as "J" value, or not at all? Why is the RL so much higher than the MDL?

If you have any questions, or request a meeting to discuss these comments, please call me at (330) 963-1292.

Sincerely,

Kevin M. Palombo
Environmental Specialist
Division of Environmental Response and Revitalization

KP/nvr

cc: Katie Tait, OHARNG RTLS
Kevin Sedlak, ARNG
Gregory F. Moore, USACE
Rebecca Haney/Gail Harris, VISTA Sciences Corp.

ec: Bob Princic, Ohio EPA, NEDO DERR
Rodney Beals, Ohio EPA NEDO DERR
Justin Burke, Ohio EPA, CO DERR

Ohio Environmental Protection Agency

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

December 17, 2015

Mr. Mark Leeper
Army National Guard Directorate
ARNGD-ILE Clean Up
111 South George Mason Drive
Arlington, VA 22204

Re: US Army Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage
267000859160

Subject: **Ravenna Army Ammunition Plant, Portage/Trumbull Counties. Approval of the Response to Comments on the Revised Draft Project Work Plan for Site Inspection at Compliance Restoration Site CC-RVAAP-80 Group 2 Propellant Can Tops, Dated December 9, 2015. Ohio EPA ID # 267-000859-160**

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) has received the Response to Comments on the "Revised Draft Project Work Plan for Site Inspection at Compliance Restoration Site CC- RVAAP-80 Group 2 Propellant Can Tops" at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. These responses to comments were received at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) on December 10, 2015. The report was prepared for the US Army Corps of Engineers (USACE) Louisville District by PIKA International, Inc., under Contract Number W912QR-12-F-0212.

The response to Ohio EPA comments provided clarifications on site clearing using Unexploded Ordnance (UXO) Technicians, Incremental sampling methodologies (ISM) and the Quality Assurance Project Plan, specifically related to laboratory Reporting Limits.

This document was reviewed by personnel from Ohio EPA's DERR, pursuant to the Director's Findings and Orders paragraph 39 (b), the response to Ohio EPA comments are satisfactory and the document may be finalized.

If you have any questions, please call me at (330) 963-1292.

Sincerely,

Kevin M. Palombo
Environmental Specialist
Division of Environmental Response and Revitalization

KP/nvr

cc: Katie Tait, OHARNG RTLS
Kevin Sedlak, ARNG
Gregory F. Moore, USACE
Rebecca Haney/Gail Harris, VISTA Sciences Corp.

ec: Bob Princic, Ohio EPA, NEDO, DERR
Rodney Beals, Ohio EPA, NEDO, DERR
Justin Burke, Ohio EPA, CO, DERR
Al Muller, Ohio EPA, NEDO, DDAGW

APPENDIX G

COMMENT RESPONSE TABLE

NATIONAL GUARD BUREAU
111 SOUTH GEORGE MASON DRIVE
ARLINGTON VA 22204-1373

September 2, 2015

Ohio Environmental Protection Agency
DERR-NEDO
Attn: Mr. Kevin Palombo
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Response to comments on the Final Project Work Plan, Revision 1, and the Revised Draft Project Work Plan for Site Inspection at CC RVAAP-80, Group 2 Propellant Can Tops, Former Ravenna Army Ammunition Plant/Camp Ravenna, Portage and Trumbull Counties, Ohio
Ohio EPA ID 267-000859-036

Dear Mr. Palombo:

Enclosed, for your review and approval, please find the responses to comments dated 16 July, 2014, on the Final Project Work Plan, Revision 1, for Site Inspection at Compliance Restoration Site CC-80 Group 2 Propellant Can Tops. Also enclosed is the Revised Draft Project Work Plan for Site Inspection at CC-80 Group 2 Propellant Can Tops. The revised draft project work plan replaces the previously submitted final document, necessitated by the addition of the collection/disposal of the propellant cans and tops.

Please contact the undersigned at (703) 607-7955 or mark.s.leeper.civ@mail.mil if there are issues or concerns with this submittal.

Sincerely,

Mark S. Leeper
RVAAP Restoration Program Manager
Army National Guard Directorate

cc: Bob Princic, Ohio EPA, DERR-NEDO (email transmittal letter only)
Rod Beals, Ohio EPA, DERR-NEDO (email transmittal letter only)
Justin Burke, Ohio EPA, CO-DERR (email letter and document w/o attachments)
Brian Tucker, Ohio EPA, CO-DERR (email letter and document w/o attachments)

cc: Kevin Sedlak, ARNG-ILE, Camp Ravenna (letter and CD of document)
Katie Tait, OHARNG, Camp Ravenna (letter and printed document)
Greg Moore, USACE Louisville (email transmittal letter only)

Subject: Revised Draft Work Plan for Compliance Restoration Site CC RVAAP-80, Group 2 Propellant Can Tops, Ravenna Army Ammunition Plant/Camp Ravenna, Portage and Trumbull Counties, Ohio, Ohio EPA ID 267-000859-036

Jay Trumble, USACE Louisville (letter and printed document)
Admin Records Manager, Camp Ravenna (letter with two printed copies and two CDs)

DOCUMENT: Final Project Work Plan for Site Inspection at Compliance Restoration Site CC RVAAP- 80 Group 2 Propellant Can Tops. REV 1
REVIEWER: Ohio EPA, Kevin Palombo
DATE: July 16, 2014

CMT #	PAGE # LINE #	COMMENT	Recommendation / Requirement	RESPONSE
	General	Ohio EPA, the National Guard Directorate, and the US Army Corps of Engineers have been in discussion regarding this site and others where possible Munition Debris (MD) or Munition Constituents (MC) have been identified and are buried or are on the ground surface. Whether the Propellant Can Tops are defined as MD or possibly MC, to Ohio EPA they are considered a solid waste. It is the understanding of Ohio EPA that there may be some question as to funding mechanisms for certain types of clean-up. This Plan actually calls out the intent to "collect and dispose of all metallic items within the AOC," i.e., Appendix A, Statement of Work, Section 4.0, paragraph 1, which Ohio EPA agrees should be completed. Regardless of funding mechanism, Ohio EPA refers the National Guard Directorate and US Army Corps of Engineers to Ohio Revised Code 3734.03 and the Ohio Administrative Code 3745.27.0SC, which defines the regulations prohibiting open dumping and requirements for proper removal, disposal or management of the solid waste.		The propellant cans and tops were munitions packing material, and therefore qualify as material potentially presenting an explosive hazard (MPPEH). The Work Plan and accompanying documents have been revised (see follow on comment responses) to treating the Propellant Cans and Tops as MPPEH and include the following tasks: • Re-acquiring the coordinates of each anomaly documented in the Final Investigation Report for the Compliance Restoration Site CC-RVAAP-80, Group 2 Propellant Can Tops and other Environmental Services, January 27, 2012. • Conducting a surface clearance for the propellant can and tops with a 1 meter radius of each anomaly. • Collecting, inspecting and certifying the recovered Propellant Cans and Tops as MDAS. • Shipping them to a licensed facility Other areas of the document have been adjusted to accommodate the modification to the scope of this project.

				Because this new work is being added to the plans, they will need to undergo Army review as pre drafts before being sent to Ohio EPA as draft plans.
Project Work Plan				
1	Page 6, section 1.4	RVAAP CC-RVAAP-80: Group 2 Propellant Can Tops, Paragraph 1 describes the initial identification of 5 clusters of ferrous items in 2011 and that soils in the vicinity of three of the clusters were sampled at that time. A review of the previous report dated January 27, 2012 (Final Investigation Report for CC Site CC-RVAAP-80 Group 2 Propellant Can Tops ..." identified propellants in soils from all three of the clusters. It is understood the concentrations were below Facility Wide Clean-Up Goals (FWCUGS); however, these compounds should be identified in this section. In fact a summary table showing these "hits" from the 2011 sampling event would be very useful in this plan. It is also important to note that although the primary focus and title of the current evaluation highlights propellant can tops, a number of propellant cans were also identified in the study area. This should also be mentioned in this section. This section should explain the physical characteristics of propellant cans and tops/lids and how they were used as a munition and an		The text in the paragraph that discusses the results of the previous Site inspection now reads as follows: "The soil samples were analyzed for target analyte list (TAL) metals, and common propellants used by the Department of Defense (DoD) including nitrocellulose, nitroglycerine, nitroguanidine, and perchlorate. One (1) of the three samples was also analyzed for the RVAAP full suite, (including explosives, propellants, volatile organic compounds; VOCs, semi-volatile organic compounds; SVOCs, and poly chlorinated bi-phenyls; PCBs). The three samples did not reveal any analytes exceeding the facility-wide cleanup goals (FWCUGs). The data obtained through this site inspection will be used to determine the need for a Remedial Investigation or support project closeout in the SI phase." The text in this section (in three places) was revised to read "…propellant cans and tops…"

		explanation of why they are located at this location. Based on their use, why is it expected or not expected that residual propellants remain in media surrounding them. This information has never been satisfactorily provided in any of the reports on the Group 2 Propellant Can Tops area. This information would help to alleviate some of the discomfort Ohio EPA has with this area of concern.		A history or the physical characteristics, their use and origin of the propellant tops and cans was provided by the Baltimore District Corps of Engineers. The entire document has been attached to the WP document as Appendix H and the following summary of this history has been inserted into Section 1.4 : In order to identify the types of propellant tops and cans found at the Group 2 Area, the types of artillery ammunition must be discussed. There are basically three types of artillery ammunition; Fixed, Semi-Fixed and Separate Loading. • **Fixed:** ammunition in which the projectile is permanently attached to a case that contains the primer and the propellant in distinction from separate-loading ammunition • **Semi-fixed:** ammunition consisting of complete rounds that can be loaded as a unit but have a cartridge case which is not fixed to the projectile and can be removed in order to remove increments of the propelling charge. • **Separate loading:** ammunition in which the projectile, propelling charge and primer are shipped and loaded separately rather than as a unit. The propellant grains for all three types of ammunition are packed into cloth bags (increments) and securely stitched to prevent spillage of the propellant grains which would

				potentially change the desired range of the projectile fired. The fixed and semi-fixed ammunition are loaded as one unit with the propellant located in the cartridge case in tar impregnated fiberboard containers. These containers have steel tops/bottoms and a clip to hold the projectile in place. When secured within the fiberboard container the cartridge case has a closure disk which secures the propellant within the case. As long as the fiberboard container is intact it is physically impossible for the propellant to come in contact with the steel ends. For separate loading ammunition the projectile, primer, fuze and propelling charge are shipped separately. There is no evidence of projectiles, primers and/or fuzes having been discovered on the site. The propellant containers are manufactured as a heavy steel cylinder with locking cap which supports and protects the propellant during shipping and storage. The propellant cans and tops for separate loading charges are identical to those found on the site. The propellant bags (increments) are tightly placed within the protective wrapper to prevent any movement and any contact with the steel of the can in order to prevent the risk of propellant being ignited by a spark and/or static electricity. Cardboard packing material is then placed on top of the propellant increments and the cap inserted and locked in the top of the can. At no time does the propellant come in contact with the steel of the can. During the firing of artillery projectiles it is critical that the propellant grains

				maintain their shape and integrity and as such the individual grains cannot be subjected to rough handling which would cause them to crack or break. Given the care taken to prevent damage to the propellant grain and prevention of contact with the steel can, it is extremely unlikely that the propellant grains would break, much less be reduced to dust. Additionally, as the powder bag would not allow release. Shipping containers/caps are not munitions rather the means used to transport the propellant to the appropriate firing point. Currently shipping containers and packing materials are classified as material potentially presenting an explosive hazard (MPPEH) until inspection and verification that propellant has been removed. Upon completion of this inspection process the items would be immediately reclassified as material documented as safe (MDAS) and as such able to be released to the public. All caps recovered to date at Former Ravenna Army Ammunition Plant (RVAAP) have been classified as MDAS. Given the former mission of RVAAP it is no surprise that propellant was stored and containers renovated at the facility. A review of the Historical Summary of Ravenna Arsenal by the Baltimore Corps of Engineers District determined that it became necessary to repack certain propellant charge 155mm and 8 inch from wooden overpack to cartridge storage cases. The project was set up at the Depot Bundling Building, and over a period of seven months many hundreds of thousands were

				repacked into cartridge storage cases. This would explain why there were empty propellant storage cans on site but provides no suggestion on why individual ends and debris were located at the Group 2 area. It is likely that the items recovered were most likely excess and/or were deemed unserviceable for use in repacking although there is no specific historical data to support this. Given the activities which took place on other ammunition storage facilities and the types of debris recovered it is a reasonable assumption. The protection of the propellant grains and safety of workers during shipping and handling was critical therefore every effort was/is made to minimize movement of the propellant grains and completely eliminate the possibility of contact with the steel containers. Therefore, potential for propellant residue to be located on the steel shipping container or cap is highly unlikely. The Baltimore District provided a detailed discussion which is provided in Appendix H of this WP.
2	Page 9, Section 2.4.2.	This section provides an overview of the operational sequence of activities. Provide a descriptive word in Number 2, i.e., "Collect ISM surface and subsurface (using Geoprobe) soil samples ..." or others as appropriate.		Item No. 2 has been revised to read as follows: 2. Identify, collect, certify as safe and dispose of the propellant tops and cans associated the anomalies identified during the previous site investigation. 3. Collect ISM five (5) surface and three (3)

				subsurface soil samples within the areas of the referenced anomalies
3	Page 10, Section 2.6.	Management Roles and Responsibilities General. This section needs to be updated to include Gregory F. Moore of the US Army Corps of Engineers.		Acknowledged. The text has been revised as noted.
4	Page 21, Section 2.11.5. 2	Emergency Response and General Notifications. This section needs to be updated to include Gregory F. Moore of the US Army Corps of Engineers.		Acknowledged. The text has been revised as noted.
5	Page 23, Section 2.13,	Paragraph 1 refers the reader to Appendix B Figure 5 and describes where soil samples are proposed to be collected. Ohio EPA believes that based on a review of the "scatter' of the identified ferrous anomalies on Figure 5 that an additional ISM surface sample location should be added north of Cluster 2 in the area surrounding anomaly points 60105 , 60106, 60107, and 60108. This section also mentions that one sample will be collected for the full RVAAP suite of analyses. Please clarify that this particular sample will be a "discreet" sample and not an ISM sample. Also, how will the decision be made where to collect this sample? Ohio EPA suggests the sample be collected where the		Due to the addition of a new section 2.13 which describes the collection of MPPEH Propellant Cans and Tops, this section "Collecting Surface Soil Samples is now numbered 2.14. An additional ISM surface soil sample has been added in the area of the referenced anomalies (increasing the number of surface ISM samples to 5) and is shown on the revised Figure 5 in Appendix B. The one sample collected for the full RVAAP suite of analyses will be collected as an ISM sample with the exception of the VOC aliquot, which will collected as a discreet sample – consistent with past sampling at the site. The discreet volatile aliquot will be collected in the area of the highest concentration of ferrous

		highest concentration of ferrous anomalies (propellant cans or lids) are present. Please clarify how the use of the incremental sampling methodology will not destroy propellants including perchlorates prior to analysis.		anomalies (propellant cans or tops) as recommended. The ISM preparation method involves the combination of short duration grinding and cool down periods so as not to affect/impact the integrity of the contaminants of concern (propellants and perchlorate).
6	Section 2.14	Disposal of IDW, Page 24. This section describes the handling of Investigation Derived Waste but does not define what type of waste is anticipated. Ohio EPA requires that any metallic/ferrous waste found at the surface be collected and disposed of per ORC 3734.03 and OAC 3745.27.05C. This material can be recycled based on descriptions provided. Ohio EPA can even provide contacts with Portage County Solid Waste Management to facilitate this recycling at your request. If any waste is left in place below the surface, the area must be classified as a solid waste management unit for future land use purposes.		The text has been revised to read as follows: The potential types of IDW include the propellant cans and tops, the dedicated plastic liners and sampling implements from the soil sampling activities and a limited volume of decontamination fluids. Within 90 days of the generation of IDW, PIKA will characterize and properly dispose or recycle (per ORC 3734.03 and OAC 3745.27.05C) of all IDW at approved off-site facilities in compliance will all applicable federal, state, and local rules, laws, and regulations.
7	Section 2.20	Site Inspection (SI) Report, page 27 provides a description of activities that will be made part of the SI Report. Ohio EPA notes that the last of these is the location of the recovered ferrous items. We understand that removal was not intended to be part of the investigation, but Ohio EPA requires that these solid waste materials be removed per our Solid Waste Regulations that are cited in Question 6, above.		As noted above in response to the General Comment the project scope has been revised to re-acquire the anomaly locations identified in the 2012 limited SI, recover the propellant cans and tops at those locations and certify them as MDAS for recycling/disposal, as appropriate. The text in this section has been revised as follows: "PIKA will prepare and submit a preliminary draft, draft and final SI report for this project

		The report should also provide a clear summary table of all identified compounds within the body of the report. This table should include the data from 2011.		with the preliminary draft being submitted within 90 calendar days following the completion of the field investigation activities. The SI report will document the process and procedures used in conducting the investigation; and describe all the soil sampling activities conducted during this project. The SI report will include details about premobilization, mobilization, site preparation, sample collection, decontamination, analytical results (including the results from the 2012 limited SI) waste management, event chronology, final site inspection, and mapping. The report will also document the collection, certification and disposal/recycling of the propellant cans and tops as MDAS. The SI report maps will delineate the boundaries of the site, locations of ISM sample area boundaries."
Appendix A – Scope of Work				
8	Section 1.2 Area of Concern	There is no page numbers present. An acronym was used and not defined, RRD. It is assumed it is referring to range related debris. Please include this acronym on the list on page vii. Based on photographs and information presented in January 27, 2012, Final Investigation Report on the Propellant Can Tops area, propellant cans were also		The Revised Statement of work dated 10March2015 will be included in Appendix A and has page numbers. The acronym RRD is defined in the Statement of Work on Page 3, first paragraph above Section **1.0 General Information**. The acronym has also been added to the list of Acronyms in the WP Table of Contents. Both the revised statement of work (provided in Appendix A) and the WP now reflect the

		identified, please provide this information in this section.		presence of propellant cans and tops.
9	Section 4.0	Paragraph 1 states that a contractor will collect and dispose of all metallic items within the AOC. Ohio EPA supports this statement and encourages its fulfillment		The text has been revised to reflect that all propellant cans and tops associated with the ferrous anomalies identified in the 2012 SI will be collected, removed and certified as MDAS. Other ferrous items will be identified for the OHARNG to collect and dispose/recycle as appropriate.
Appendix C – Points of Contact				
10		Gregory F. Moore with the US Army Corps of Engineers should be added to this contact list.		Acknowledged. The text has been revised as noted.
Appendix F-Cumulative Documentation and Correspondence and G-Comment Response Table				
11		In Appendix F, an April 3, 2013, e-mail memo from Jay Trumble of the US Army Corps of Engineers to Brian Stockwell of PIKA International Inc. explains that the Army intends to descope the collection of can tops from the task order to complete the site inspection; however, a response to Ohio EPA comments based on the April 3, 2013, e-mail in Appendix G and dated June 18, 2013, states, "the removal will occur as originally discussed." These discrepancies will need to be clarified prior to moving forward with the Site Investigation.		As noted above in response to the General Comment the project scope has been revised to re-acquire the anomaly locations identified in the 2012 limited SI, recover the propellant cans and tops at those locations, certify and dispose/recycle them as MDAS.

DOCUMENT: Revised Draft Work Plan for Site Inspection at Compliance Restoration Site CC RVAAP-80 Group 2 Propellant Can Tops, Dated September 8, 2015
REVIEWER: Comments by Ohio EPA, Kevin Palombo
DATE: October 29, 2015

CMT #	PAGE # LINE #	COMMENT	Recommendation /Requirement	RESPONSE
Project Work Plan				
1	Page 26, Section 2.13	An expression is used in this section, "PIKA will clear the locations of the previous anomalies of all propellant can tops ... "and," ... the UXO Technicians will clear the area within a one meter radius ... ". Does this expression mean that the propellant can lids will be removed? Ohio EPA understands from other locations in the documents that these materials will be removed and properly disposed.		Yes. The text relates more to the land, than the metal. Clearing means that all of the propellant cans and can tops at each reacquired anomaly location will be picked up, then the metal detector will be used to make sure another can top isn't lying just below the ground surface at the same location. The ordnance professionals will stop when that location doesn't have any cans or tops left. The Text has been revised as follows: "Once reacquired, PIKA will mark each anomaly with a pin flag, inspecting the area within a 1 meter radius, removing all propellant cans and tops. "
2	Appendix B, Figure 5	Figure 5 provides the proposed samples locations for the collection of ISM samples. How was the size of each decision unit determined? It appears some are much larger than others, even though they have a similar number of anomalies. Wouldn't a larger decision unit around the same number of anomalies allow for the possibility of more diluted sample result? Why was the red circle in the northwest part of Figure 5 left partially completed? It is assumed the whole area of the circle is the decision unit. Please provide explanations for these questions.		The goal of the sampling in the SI is to determine if a release occurred. As the can tops, and cans were found in five clusters, and scattered across the site, the soil at the location of the clusters represents the best place to find evidence of a release. The sample locations in themselves are not decision units, but an attempt to represent what impact if any, the work with the cans and tops had on the soil. As the samples relate to the top deposition, they should be representative. During the first part of this SI, the sample areas were; MI sample area 1 equaled 198 square meters;

				MI sample area 2 equaled 553 square meters; and MI sample area 3 equaled 330 square meters. The primary objective of the Figure was to incorporate the anomalies identified and selected by the stakeholders to ensure that they were included in each of the incremental samples for that decision unit. Once mobilized, and the anomalies reacquired, each of the IS decision unit areas will be refined in the field to a shape that reflects the included anomalies and surveyed. As for the incomplete red circle in the northwest portion of the figure – the reviewer is correct. It should be displayed as a complete circle. This was the result of a production error and has been corrected.
3	Page 27, Section 2.14, Sentences 4 and 5	Please explain that ISM surface soil samples will be collected within the designated ISM from 0-1 foot and from 1-4 feet below ground surface (bgs). It is understood that propellant can tops and lids were identified at most locations within the top nine inches of the ground surface. It is also understood that the shallow (0-1 foot) samples will be analyzed for TAL metals, and common propellants and perchlorate. Is there a chance soils collected so shallow may have oxidized or in other ways reacted so that the results might be biased low?		To clarify this section, sentences 4, 5 and 6 have been revised to read as follows: “Five (5) surficial ISM samples (0-1‘ bgs) and three (3) subsurface ISM samples (1-4’ bgs) (eight primary, plus quality assurance (QA) samples) will be collected from the designated decision units, depicted on Figure 5 in Appendix B.” The soil samples collected from the 0-1 foot interval are being collected where direct contact with the soil is possible. The sampling will show the current conditions, and identify a risk (if any) that proves that a RI (nature and extent) is necessary. We do not estimate that the past work with the cans/tops would have resulted in a release, but

				in case it did, the 1-4 ft samples can show if anything is moving downward through the soil.
Appendix D – Sampling and Analysis Plan				
4	page 19, Section 5.6.1 sentence 3	Section 5.6.1 sentence 3 states, "A total five ISM surface soil samples will be collected from 0 to one (1) foot bgs ..." Sentence 4 states, "No sediment samples are anticipated to be sampled." What does it mean that "no sediment samples are anticipated to be collected?" This Sampling and Analysis Plan does not agree with page 27, Section 2.14 of the Revised Draft Project Work Plan. Please make the correction. Ohio EPA anticipates samples will also be collected from 1-4 feet bgs at locations shown on Figure 5, and as provided in the Work Plan.		The WP discusses Surface and Subsurface IS in the same Section of the document - Page 27, Section 2.14, whereas the format of the SAP (based upon the RVAAP facility-wide document) separates the discussion of the two types of samples into separate sections. Subsurface Soil [samples] are presented in Section 5.5 (5.5.1 identifies the Rationale for the 3 subsurface IS) and separately discusses Surface Soil and Sediment [samples] in Section 5.6 (5.6.1 identifies the Rationale for the 5 surface IS). The title of Section 5.6 also includes the potential for the collection of sediment samples. Since Sediment Sampling is not part of the project scope - the statement "No sediment samples are anticipated to be collected." Was included to close out that potential sample matrix. This portion of the text was moved to the end of the paragraph to provide better continuity and revised to read: "Sediment samples are not included in this investigation scope of work."
Appendix E – Quality Assurance Project Plan				
5	Page 4, Section 2.4.2, paragraph	Section 2.4.2, paragraph 2, last sentence states, "Multiple smaller areas where anomalies are found may be combined into one designated ISM sample area." This is unclear, please provide		Agree that the text as stated is confusing. This sentence has been deleted as it does not provide additional clarity to the discussion. As noted above in response to Comment 2, once

	2	additional clarification.		mobilized, and the anomalies reacquired, each of the IS decision unit areas will be refined in the field to a shape that reflects the specified anomalies, the boundaries of which will then be surveyed. There are five clusters of can tops on the site. We currently have more than five total surficial samples scoped. Based upon the history, we do not believe the cans and tops could be the source of a release, but if they are, sampling in the same location as the can tops would yield the highest results. The exact location of the northwestern sample can be determined in the field. It is estimated that the individual aliquots will be placed near where can tops/cans were identified/currently exist in that portion of the site.
6	Table 4-1	This table provides a soil Reporting Limit of 250 ug/Kg. Will this reporting limit for these compounds exceed the CUGs? Will you report data that is above the Method Detection Limit (MDL) but below the Reporting Limit (RL) as "J" value, or not at all? Why is the RL so much higher than the MDL?		Upon review of Table 4-1, the Reporting limits were found to be incorrect and have been revised. Also, upon completing that review, it was determined that a revision to the DOD QSM was issued since this project was initiated in 2012, (Version 5.0, July 2013). So that revision has been made in the QAPP text. The project will be now performed in the TestAmerica – Sacramento Lab who is approved for Version 5.0. The SVOC extraction will now be performed using 3550 (Sonication) as per the QSM Version 5.0. In addition, since typically

				laboratories update their MDLs and RLs periodically, the Section 4 tables (Tables 4-1 through 4-5) were reviewed and revised by TestAmerica to reflect their current values for all analytes listed in the tables. Please see attached. Yes, Upon comparison, these revised reporting limits will satisfy the CUGs. YES, results between the MDL and RL will be reported and flagged as a “j” value.

4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

4.1 Data Quality Objectives (DQOs)

DQOs summaries for this investigation will follow Tables 4-1 and 4-2 in the FWQAPP. 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. Concurrence with the *DoD Quality System Manual (QSM) for Environmental Laboratories* (Environmental Data Quality Workgroup, Version 5.0~~4.2~~, 201~~3~~0), and the Louisville QSM Supplement (USACE, 2007) is expected. The contract laboratory will provide Level IV data packages.

The contract laboratory will deliver an electronic data deliverable (EDD) that is automated data review (ADR) compatible. The contract laboratory must identify variances to the established library prior to any analysis being performed. No variances to the DoD QSM 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 Measurements will include 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. LCS measurements will include the standard mid-level analyte concentration, plus 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 DoD 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, precision, and sensitivity goals will follow Section 4.3 of the FWQAPP. The accuracy and precision required for the specified analytical parameters listed in Section 2, Table 2-1, are incorporated in Tables 4-1 and 4-2 of the FWQAPP and are consistent with the analytical requirements found in the DoD QSM.

Laboratories will make all reasonable attempts to meet the reporting levels in Tables 4-3 through 4-9 of the FWQAPP for each individual sample analysis. 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 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 PIKA, forward analytical and chromatographic information from diluted runs, and obtain direction on how to proceed. The PIKA PM will then contact the USACE CELRL, and Ohio EPA to discuss the data and the path forward.

The analyte lists and detection limits for the analyses listed in Section 2.5 are included in Tables 4-1 through 4-5.

Table 4-1

Volatile Organic Compounds (VOC) Method 8260 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		ug/Kg		ug/L	
1,1,1-Trichloroethane	71-55-6	.036	5.0	0.19	1
1,1,2,2-Tetrachloroethane	79-34-5	0.68	5.0	0.15	1
1,1,2-Trichloroethane	79-00-5	0.44	5.0	0.31	1
1,1-Dichloroethane	75-34-3	0.29	5.0	0.15	1
1,1-Dichloroethene	75-35-4	0.26	5.0	0.14	1
1,2-Dibromoethane	106-93-4	0.27	10.0	0.22	2
1,2-Dichloroethane	107-06-2	0.73	5.0	0.22	1
1,2-Dichloroethene, Total	540-59-0	0.89	5.0	0.11	1
1,2-Dichloropropane	78-87-5	0.60	5.0	0.15	1
2-Butanone	78-93-3	1.40	10.0	0.35	2
2-Hexanone	591-78-6	0.74	10.0	0.17	2
4-Methyl-2-pentanone	108-10-1	0.92	10.0	0.18	2
Acetone	67-64-1	1.40	20.0	2.1	10
Benzene	71-43-2	0.26	5.0	0.13	1
Bromochloromethane	74-97-5	0.94	5.0	0.14	1
Bromodichloromethane	75-27-4	0.53	5.0	0.14	1
Bromoform	75-25-2	0.40	5.0	0.1	1
Bromomethane	74-83-9	0.86	5.0	0.29	1
Carbon disulfide	75-15-0	0.49	10.0	0.16	2
Carbon tetrachloride	56-23-5	0.53	5.0	0.15	1
Chlorobenzene	108-90-7	0.29	5.0	0.12	1
Chloroethane	75-00-3	0.45	5.0	0.34	1
Chloroform	67-66-3	0.26	5.0	0.12	1
Chloromethane	74-87-3	0.50	5.0	0.25	1
cis-1,2-Dichloroethene	156-59-2	0.89	5.0	0.1	1
cis-1,3-Dichloropropene	10061-01-5	0.64	5.0	0.22	1
Dibromochloromethane	124-48-1	0.26	5.0	0.13	1
Ethylbenzene	100-41-4	0.34	5.0	0.15	1
Methylene Chloride	75-09-2	0.84	5.0	0.35	1
m-Xylene & p-Xylene	179601-23-1	0.81	5.0	0.18	1
o-Xylene	95-47-6	0.33	5.0	0.1	1

Table 4-1 (continued)

Volatile Organic Compounds (VOC) Method 8260 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		ug/Kg		ug/L	
Styrene	100-42-5	0.31	5.0	0.15	1
Tetrachloroethene	127-18-4	0.61	5.0	0.15	1
Toluene	108-88-3	0.61	5.0	0.25	1
trans-1,2-Dichloroethene	156-60-5	0.38	5.0	0.11	1
trans-1,3-Dichloropropene	10061-02-6	0.75	5.0	0.15	1
Trichloroethene	79-01-6	0.60	5.0	0.13	1
Vinyl chloride	75-01-4	0.36	5.0	0.22	1
Xylenes, Total	1330-20-7	0.81	5.0	0.18	1.5

[a] Specific quantitation limits are highly matrix-dependent; project reporting levels listed here are goals and may not always be achievable.

Table 4-2

Semivolatile Organic Compounds (SVOC) Method 8270 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		ug/Kg		ug/L	
1,2,4-Trichlorobenzene	120-82-1	83.0	330	1.4	10
1,2-Dichlorobenzene	95-50-1	75.0	330	1.5	10
1,3-Dichlorobenzene	541-73-1	78.0	330	1.5	10
1,4-Dichlorobenzene	106-46-7	77.0	330	1.4	10
2,4,5-Trichlorophenol	95-95-4	83.0	330	2	10
2,4,6-Trichlorophenol	88-06-2	84.0	330	2	10
2,4-Dichlorophenol	120-83-2	89.0	330	2.6	10
2,4-Dimethylphenol	105-67-9	167	500	2.2	10
2,4-Dinitrophenol	51-28-5	214	2000	20	60
2,4-Dinitrotoluene	121-14-2	89.0	330	2	10
2,6-Dinitrotoluene	606-20-2	99.0	330	2	10
2-Chloronaphthalene	91-58-7	81.0	330	1.3	10
2-Chlorophenol	95-57-8	88.0	330	1.6	10
2-Methylnaphthalene	91-57-6	85.0	330	1.5	10
2-Methylphenol	95-48-7	58.0	330	0.93	10
2-Nitroaniline	88-74-4	84.0	1600	2	50
2-Nitrophenol	88-75-5	82.0	330	1.9	10
3,3'-Dichlorobenzidine	91-94-1	94.0	1600	0.96	50
3-Methylphenol & 4-Methylphenol	15831-10-4	330	1000	1.15	10
3-Nitroaniline	99-09-2	167	1600	1.4	50
4,6-Dinitro-2-methylphenol	534-52-1	81.0	2000	2.2	60
4-Bromophenyl phenyl ether	101-55-3	85.0	330	1.1	10
4-Chloro-3-methylphenol	59-50-7	92.0	330	2	10
4-Chloroaniline	106-47-8	58.0	330	2	10
4-Chlorophenyl phenyl ether	7005-72-3	93.0	330	1.1	10
4-Nitroaniline	100-01-6	88.0	1600	1.5	50
4-Nitrophenol	100-02-7	280	2000	6.1	60
Acenaphthene	83-32-9	83.0	330	1.1	10
Acenaphthylene	208-96-8	85.0	330	1.1	10
Anthracene	120-12-7	86.0	330	1	10
Benzo[a]anthracene	56-55-3	92.0	330	1	10
Benzo[a]pyrene	50-32-8	94.0	330	1	10
Benzo[b]fluoranthene	205-99-2	95.0	330	1.2	10
Benzo[g,h,i]perylene	191-24-2	110	330	1.4	10
Benzo[k]fluoranthene	207-08-9	113	330	0.96	10
Benzoic acid	65-85-0	289	1600	20	75
Benzyl alcohol	100-51-6	170	510	2.6	10
bis (2-chloroisopropyl) ether	108-60-1	79.0	330	1.3	10

Table 4-2 (continued)

Semivolatile Organic Compounds (SVOC) Method 8270 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		ug/Kg		ug/L	
Bis(2-chloroethoxy)methane	111-91-1	88.0	330	1	10
Bis(2-chloroethyl)ether	111-44-4	81.0	330	1.5	10
Bis(2-ethylhexyl) phthalate	117-81-7	98.0	330	1	10
Butyl benzyl phthalate	85-68-7	95.0	330	1.4	10
Carbazole	86-74-8	95	330	1.2	10
Chrysene	218-01-9	84	330	1	10
Dibenzo(a,h)anthracene	53-70-3	102	330	2	10
Dibenzofuran	132-64-9	86	330	1.1	10
Diethyl phthalate	84-66-2	90	330	0.93	10
Dimethyl phthalate	131-11-3	87	330	0.88	10
Di-n-butyl phthalate	84-74-2	97	330	1.1	10
Di-n-octyl phthalate	117-84-0	97	330	1.5	10
Fluoranthene	206-44-0	95	330	1	10
Fluorene	86-73-7	92	330	0.93	10
Hexachlorobenzene	118-74-1	89	330	1.4	10
Hexachlorobutadiene	87-68-3	82	330	1.3	10
Hexachlorocyclopentadiene	77-47-4	62	1600	5	50
Hexachloroethane	67-72-1	81	330	1.4	10
Indeno[1,2,3-cd]pyrene	193-39-5	96	330	3.4	10
Isophorone	78-59-1	93	330	1	10
Naphthalene	91-20-3	82	330	1.3	10
Nitrobenzene	98-95-3	76	330	1.6	10
N-Nitrosodi-n-propylamine	621-64-7	84	330	1.4	10
N-Nitrosodiphenylamine	86-30-6	86	330	1	10
Pentachlorophenol	87-86-5	51	1600	5	60
Phenanthrene	85-01-8	94	330	1	10
Phenol	108-95-2	83	330	1.1	10
Pyrene	129-00-0	94	330	1.4	10

a Specific quantitation limits are highly matrix-dependent; project reporting levels listed here are goals and may not always be achievable.

Table 4-3

Pesticides Method 8081 DoD and Polychlorinated Biphenyls (PCBs) Method 8082 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		ug/Kg		ug/L	
Method 8081					
4,4'-DDD	72-54-8	0.26	1.7	0.012	0.05
4,4'-DDE	72-55-9	0.22	1.7	0.012	0.05
4,4'-DDT	50-29-3	0.4	1.7	0.012	0.05
Aldrin	309-00-2	0.21	1.7	0.006	0.05
alpha-BHC	319-84-6	0.22	1.7	0.007	0.05
alpha-Chlordane	5103-71-9	0.2	1.7	0.006	0.05
beta-BHC	319-85-7	0.33	1.7	0.007	0.05
delta-BHC	319-86-8	0.16	1.7	0.011	0.05
Dieldrin	60-57-1	0.091	1.7	0.012	0.05
Endosulfan I	959-98-8	0.1	1.7	0.006	0.05
Endosulfan II	33213-65-9	0.1	1.7	0.012	0.05
Endosulfan sulfate	1031-07-8	0.092	1.7	0.012	0.05
Endrin	72-20-8	0.11	1.7	0.012	0.05
Endrin aldehyde	7421-93-4	0.11	1.7	0.025	0.1
Endrin ketone	53494-70-5	0.34	1.7	0.02	0.1
gamma-BHC (Lindane)	58-89-9	0.17	1.7	0.006	0.05
gamma-Chlordane	5103-74-2	0.1	1.7	0.012	0.05
Heptachlor	76-44-8	0.19	1.7	0.007	0.05
Heptachlor epoxide	1024-57-3	0.12	1.7	0.006	0.05
Methoxychlor	72-43-5	1.3	3.4	0.042	0.1
Toxaphene	8001-35-2	20	67	0.51	2
Method 8082					
Aroclor-1016	12674-11-2	3.4	33	0.15	1
Aroclor-1221	11104-28-2	5.2	33	0.53	1
Aroclor-1232	11141-16-5	6.4	33	0.16	1
Aroclor-1242	53469-21-9	7.4	33	0.25	1
Aroclor-1248	12672-29-6	5.7	33	0.24	1
Aroclor-1254	11097-69-1	2.7	33	0.19	1
Aroclor-1260	11096-82-5	2.9	33	0.22	1

a Specific quantitation limits are highly matrix-dependent; project reporting levels listed here are goals and may not always be achievable.

Table 4-4

Explosives - Method 8330B
Propellants - Method 8330 Modified and 353.2
Perchlorate - Method 6860

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		mg/Kg		ug/L	
1,3,5-Trinitrobenzene	99-35-4	0.02	0.25	0.031	0.15
1,3-Dinitrobenzene	99-65-0	0.05	0.25	0.05	0.15
2,4,6-Trinitrotoluene	118-96-7	0.02	0.25	0.05	0.15
2,4-Dinitrotoluene	121-14-2	0.02	0.25	0.05	0.13
2,6-Dinitrotoluene	606-20-2	0.03	0.25	0.05	0.13
2-Amino-4,6-dinitrotoluene	35572-78-2	0.1	0.25	0.03	0.15
2-Nitrotoluene	88-72-2	0.08	0.25	0.088	0.5
3-Nitrotoluene	99-08-1	0.07	0.25	0.057	0.5
4-Amino-2,6-dinitrotoluene	19406-51-0	0.02	0.25	0.05	0.15
4-Nitrotoluene	99-99-0	0.08	0.25	0.088	0.5
HMX	2691-41-0	0.03	0.25	0.036	0.15
Nitrobenzene	98-95-3	0.05	0.25	0.05	0.15
Nitroglycerin	55-63-0	0.13	0.5	0.33	1.5
PETN	78-11-5	0.16	0.5	0.3	1.5
RDX	121-82-4	0.04	0.25	0.036	0.15
Tetryl	479-45-8	0.05	0.25	0.05	0.15
Nitroguanidine (8330 modified)	556-88-7	0.02	0.25	2.4	20
Perchlorate (6860)	14797-73-0	0.15	5	0.082	0.5
Nitrocellulose (353.2)	9004-70-0	0.78	5	0.475	2

[a] Specific quantitation limits are highly matrix-dependent; project reporting levels listed here are goals and may not always be achievable.

Table 4-5

Target Analyte List (TAL) ICP Metals - Methods 6010 DoD

Analyte Description	CAS Number	SOIL		WATER	
		Method Detection Limit	Reporting Limit[a]	Method Detection Limit	Reporting Limit[a]
		mg/Kg		ug/L	
Aluminum	7429-90-5	5.6	20	48	200.0
Antimony	7440-36-0	0.94	3	9.8	30.0
Arsenic	7440-38-2	1.3	4	12.0	40.0
Barium	7440-39-3	0.2	2	2.5	20.0
Beryllium	7440-41-7	0.03	0.3	0.3	3.0
Cadmium	7440-43-9	0.03	0.3	0.5	3.0
Calcium	7440-70-2	10	50	100.0	500.0
Chromium	7440-47-3	0.14	1	2.0	10.0
Cobalt	7440-48-4	0.25	1	3.0	10.0
Copper	7440-50-8	0.22	1.5	2.1	15.0
Iron	7439-89-6	2	10	20.0	100.0
Lead	7439-92-1	0.26	1	2.5	10.0
Magnesium	7439-95-4	4.5	50	40.0	500.0
Manganese	7439-96-5	0.25	1	2.5	10.0
Mercury	7439-97-6	0.0086	0.04	0.1	0.25
Nickel	7440-02-0	0.24	1	2.4	10.0
Potassium	7440-09-7	10	100	93.0	1000
Selenium	7782-49-2	1.4	4	13.0	40.0
Silver	7440-22-4	0.09	0.5	0.84	5.0
Sodium	7440-23-5	20	100	250.0	1000
Thallium	7440-28-0	0.84	3	9.0	30.0
Vanadium	7440-62-2	0.19	2	1.9	20.0
Zinc	7440-66-6	0.4	2	3.0	20.0

a Specific quantitation limits are highly matrix-dependent; project reporting levels listed here are goals and may not always be achievable.

4.4 Completeness, Representativeness, and Comparability

Completeness, representativeness and comparability goals identified in Section 4.3 and Tables 4-1 and 4-2 of the FWQAPP will be imposed for this investigation.

APPENDIX H

GROUP 2 PROP CAN TOPS - HISTORY

Group 2 Prop Can Tops - History

Ohio EPA question -

"Explain the physical characteristics of propellant cans and tops/lids and how they were used as a munition and an explanation of why they are located at this location. Based on their use, why is it expected or not expected that residual propellants remain in media surrounding them."

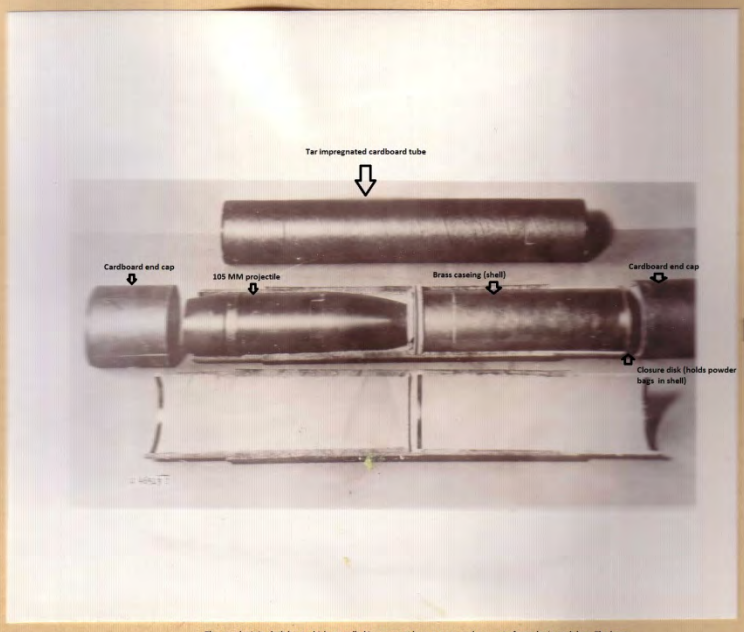
Physical Characteristics

In order to provide an adequate response to the question, the types of propellant cans in question must be identified. Basically there are three types of artillery ammunition; Fixed, Semi-Fixed and Separate Loading.

- **Fixed:** ammunition in which the projectile is permanently attached to a case that contains the primer and the propellant in distinction from separate-loading ammunition
- **Semi-fixed:** ammunition consisting of complete rounds that can be loaded as a unit but have a cartridge case which is not fixed to the projectile and can be removed in order to remove increments of the propelling charge.
- **Separate loading:** ammunition in which the projectile, propelling charge and primer are shipped and loaded separately rather than as a unit.

Fixed and semi-fixed ammunition are loaded as one unit with the propellant located in the cartridge case in tar impregnated fiberboard containers as depicted in Figure 1. These containers have steel tops/bottoms and a clip to hold the projectile in place similar to the items in the photo below:

As stated above the propellant for fixed and semi-fixed munitions is securely located within the cartridge case within the fiberboard container. Propellant grains are packed into cloth bags (increments) and



D3

D3

The powder is in cloth bags which are called increnment bags a measured amount of powder in each bag. The bags are in the brass caseing with a protective disk on the end. This is covered by the tar inpregnated cardboard tube. The tube contaning the round and propellant is normally shipped in a wooden crate (box). The ends of the tube are secured with tape.

D4

D4

In this photo you can see a small metal band on the edge of the cardboard tube, it is there to keep the tube from unraveling. This is the "band" that is is "rebanded" during the rentovations of the tar inpregnated cardboard tube.

Figure 1

securely stitched to prevent spillage of the propellant grains which would potentially change the desired range of the projectile fired. When secured within the fiberboard container the cartridge case has a closure disk which secures the propellant within the case. As long as the fiberboard container is intact it is physically impossible for the propellant to come in contact with the steel ends.

For separate loading ammunition the projectile, primer, fuze and propelling charge are shipped separately. There is no evidence of projectiles, primers and/or fuzes having been discovered on the site subsequently there is no discussion on the storage/shipping configurations of these items. Propelling charges were shipped separately in steel cans with locking caps identical to those found on the site as depicted in the photo below and Figure 2.

The photo above is representative of propellant shipping containers utilized for separate loading ammunition. Containers are manufactured as a heavy steel cylinder with locking cap which supports and protects the propellant during shipping and storage. As with the fix/semi-fixed ammunition, propellant grains are packed into cloth bags (increments) and securely stitched to prevent spillage of the propellant grains which would potentially change the desired range of the projectile fired. Loading of the propellant cans begins with a protective fiberboard wrapper placed between the propellant increments and the steel of the can as depicted in Figure 2. Propellant increments are tightly placed within the protective wrapper to prevent movement and any contact with the steel of the can. Once placed inside the can cardboard packing material is then placed on top of the propellant increments and the cap inserted and locked in the top of the can. Once again sufficient cardboard packing material is placed on the top of the propellant to prevent movement and/or contact with the propellant can lid. In order to prevent the risk of propellant being ignited by a spark and/or static electricity the propellant cannot move within the shipping container and at no time does the propellant come in contact with the steel of the can

In order to ensure the accuracy and safety of the weapon being fired, different types of propellant grains are designed to burn in a certain way. During the firing of artillery projectiles it is critical that the

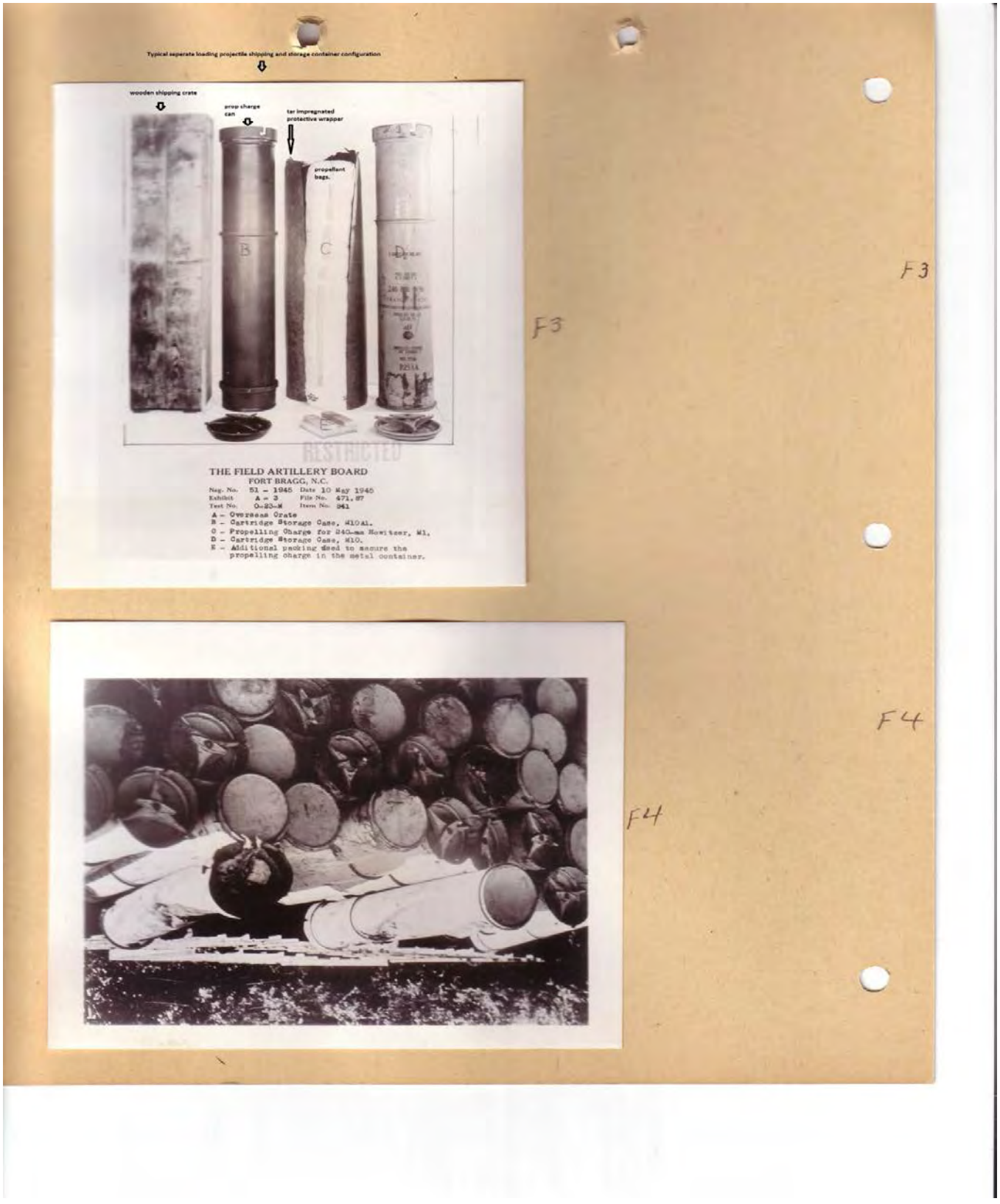

Typical seperate loading projectile shipping and storage container configuration
wooden shipping crate
prop charge can
tar impregnated protective wrapper
propellant bags.
B
C
D
RESTRICTED
THE FIELD ARTILLERY BOARD
FORT BRAGG, N.C.
Neg. No. 51 - 1945 Date 10 May 1945
Exhibit A - 3 File No. 471.87
Test No. O-23-M Item No. 941
A - Overseas Crate
B - Cartridge Storage Case, M10A1.
C - Propelling Charge for 240-mm Howitzer, M1.
D - Cartridge Storage Case, M10.
E - Additional packing used to secure the propelling charge in the metal container.
F3
F3
F4
F4

Figure 2

propellant grains maintain their integrity which further demonstrates the importance of the different layers of packing. Individual grains cannot be subjected to rough handling which would cause them to crack or break. Given the care taken to prevent damage to the propellant grain and prevention of contact with the steel can, it is extremely unlikely that a grain would break, much less be reduced to dust as the powder bag would not allow release.

Use as a Munition

The propellant is only one component of the munition/firing system. In and of itself propellant is of no useful value but is critical in the proper launching of the projectile. Shipping containers/caps are not munitions rather the means used to transport the propellant to the appropriate firing point. Currently shipping containers and packing materials are classified as material potentially presenting an explosive hazard (MPPEH) until inspection and verification that propellant has been removed. Upon completion of this inspection process items are immediately reclassified as material documented as safe (MDAS) and as such can be released to the public. All caps recovered to date at Former Ravenna Army Ammunition Plant (RVAAP) are classified as MDAS. It should be noted that DoD will be revising current guidance to remove shipping containers/materials from the MPPEH restrictions.

Steel caps/debris above are classified as MDAS

Explanation of Location of individual items

Given the former mission of RVAAP it is no surprise that propellant was stored and containers renovated at the facility. A review of the Historical Summary of Ravenna Arsenal for the period of 2 September 1945 to 1 July 1951 provided the following:

"During 1946 it became necessary to repack certain propellant charge l55mm and 8 inch white and green bag from wooden overpack to cartridge storage cases. The project was set up at the Depot Bundling Building, and over a period of seven months many hundreds of thousands were repacked into cartridge storage cases"

The above summary would certainly explain why there were empty propellant storage cans on site but provides no suggestion on why individual ends and debris were located at the Group 2 area. A reasonable explanation would be that the items recovered were most likely excess and/or were deemed unserviceable for use in repacking. There is no historical data to support this explanation but given the activities which took place on other ammunitions storage facilities and the types of debris recovered it is a reasonable assumption.

Summary

As described above protection of the propellant grains and safety of workers during shipping and handling is critical therefore every effort was/is made to minimize movement of the propellant grains and completely eliminate the possibility of contact with the steel containers. The potential for propellant residue to be located on the steel shipping container or cap is highly unlikely to practically impossible.