FINAL
REMEDIAL DESIGN FOR SOIL, SEDIMENT, AND SURFACE WATER AT RVAAP-42 LOAD LINE 9

FORMER RAVENNA ARMY AMMUNITION PLANT PORTAGE AND TRUMBULL COUNTIES, OH

March 17, 2021

Contract Number: W912QR17C0045

Prepared for:

U.S. ARMY CORPS OF ENGINEERS, LOUISVILLE DISTRICT
600 Dr. Martin Luther King Pl, Room 821
Louisville, KY 40202

Prepared by:
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Prepared with:
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None

14. ABSTRACT

This Remedial Design (RD) outlines the requirements and procedures to be implemented by the Alaniz-Endpoint joint venture team for this task order under the requirements of the Performance Work Statement dated December 2018 and amended on November 21, 2019. Specifically, this RD sets forth details for site preparation, excavation, onsite thermal treatment of soil, transportation, and off-site disposal of soil exceeding clean-up goals at the RVAAP-42 Load Line 9 Area of Concern as required under this contract.

15. SUBJECT TERMS
Remedial design, project organization and responsibilities, excavation and thermal treatment activities, confirmation sampling, site restoration and field documentation.

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Disclaimer Statement

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ARNG = Army National Guard
OHARNG = Ohio Army National Guard
Ohio EPA CO = Ohio Environmental Protection Agency, Central Office
Ohio EPA DERR = Ohio Environmental Protection Agency, Division of Environmental Response and Revitalization
Ohio EPA SWDO = Ohio Environmental Protection Agency, Southwest District Office
REIMS = Ravenna Environmental Information Management System
USACE = United States Army Corps of Engineers

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Certification 4

CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Endpoint Consulting, Inc., has completed the preparation of this Remedial Design for Soil, Sediment, and Surface Water at RVAAP-42 Load Line 9 at the former 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 independent technical review included evaluation of data quality objectives; technical assumptions; methods, procedures, and material to be used in analyses; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing USACE policy.

Scott Nesbit, P.E.	3-15-2021
Quality Assurance Manager/Independent Technical Review	Date

Tim Naughton, P.E.	3-15-2021
Director of Operations & Engineering	Date

Significant concerns and explanation of the resolution are documented within the project file.
As noted above, all concerns resulting from independent technical review of the project have been considered.

M. Chris Pestana	3-15-2021
Program Manager	Date

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REMEDIAL DESIGN FOR SOIL, SEDIMENT AND SURFACE WATER AT RVAAP-42 LOAD LINE 9

FORMER RAVENNA ARMY AMMUNITION PLANT PORTAGE AND TRUMBULL COUNTIES, OHIO

Contract Number: W912QR17C0045

Reviewed and Approved by:

Tim Naughton, P.E.
Director of Operations & Engineering
Endpoint Consulting, Inc.

M. Chris Pestana
Program Manager
Alaniz Associates Corporation

The Alaniz-Endpoint Joint Venture (Alaniz-Endpoint Team) has prepared this report under the direction of USACE Louisville District (LRL). This document should be used only with the approval of USACE LRL. This report is based in part on information provided in other documents and is subject to the limitations and qualifications presented in the referenced documents.

March 2021

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ACRONYMS AND ABBREVIATIONS

Alaniz	Alaniz Associates Corporation
AOC	Area of Concern
ARNG	Army National Guard
bgs	below ground surface
BMP	Best Management Practice
Camp James A. Garfield	Camp James A. Garfield Joint Military Training Center
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CJAG JMTC	Camp James A. Garfield Joint Military Training Center
COC	Chemical of Concern
COR	Contracting Officer's Representative
CRM	Cultural Resources Manager
DFFO	Director's Final Findings and Orders
DLA	Defense Logistics Agency
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
Endpoint	Endpoint Consulting Inc.
ERA	Ecological Risk Assessment
F	Fahrenheit
ft	feet
FSA	Field Staging Area
FTL	Field Task Leader
FWCUG	Facility-Wide Cleanup Goal
FWSHP	Facility-Wide Safety and Health Plan
HAZWOPER	
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
IDW	Investigation-Derived Waste
ISM	Incremental Sampling Methodology
KO	Contracting Officer
LDC	Laboratory Data Consultants
LRL	Louisville District
mg/kg	milligrams per kilogram
MKM	MKM Engineers, Inc
mph	miles per hour
NACA	National Advisory Committee on Aeronautics
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
OSHA	
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photoionization Detector

ACRONYMS AND ABBREVIATIONS (CONTINUED)

PP	Proposed Plan
QA	Quality Assurance
QC	Quality Control
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSL	Regional Screening Level
RVAAP	Ravenna Army Ammunition Plant
SAP	Sampling and Analysis Plan
SSHO	Site Safety and Health Officer
SSHP	Site Specific Safety and Health Plan
SOP	Standard Operating Procedure
SVOC	Semi-Volatile Organic Compound
TRL	Target Risk Level
USACE	United States Army Corps of Engineers
USACE LRL	United States Army Corps of Engineers Louisville District
CHPPM	United States Army Center for Health Promotion and Preventative Medicine
U.S. Army	United States Department of the Army
USATHAMA	United States Army Toxic and Hazardous Materials Agency
USEPA	United States Environmental Protection Agency
VEG	Vapor Energy Generator
VOC	Volatile Organic Compound

1.0 INTRODUCTION

The Alaniz Associates Corporation (Alaniz) and Endpoint Consulting, Inc (Endpoint) Joint Venture (Alaniz-Endpoint Team) has been contracted by the United States Army Corps of Engineers, Louisville District (USACE LRL) to provide environmental remediation services within the RVAAP-42 Load Line 9 area of concern (AOC) at the former Ravenna Army Ammunition Plant (RVAAP) located in Portage and Trumbull Counties, Ohio; the former RVAAP is now known as the Camp James A. Garfield Joint Military Training Center (Camp James A. Garfield). All work will be overseen by USACE and the United States Army National Guard (ARNG). This work is being performed in accordance with USACE LRL, Remediation Contract W912QR17C0045, issued on July 31, 2017 and amended on November 21, 2019. In addition, planning and performance of all work elements will be conducted in accordance with the requirements of the Ohio Environmental Protection Agency (Ohio EPA).

The RVAAP Restoration Program has identified several AOCs which require soil remediation for various contaminants, with polycyclic aromatic hydrocarbons (PAHs) being the predominant chemical of concern (COC) at several AOCs targeted for remediation using Endpoint's patented Vapor Energy Generator (VEG) Technology. An onsite pilot study performed by Endpoint at the Atlas Scrap Yard (RVAAP-50) site at Camp James A. Garfield (Former Camp Ravenna) demonstrated the efficiency and effectiveness of the VEG Technology for remediating PAH-contaminated soil to unrestricted reuse levels (Endpoint, 2015). With remediation of PAHs at a total of five AOCs covered under this contract, application of the VEG Technology is considered most feasible and cost-effective if the VEG remediation system is set up at the RVAAP-38 National Advisory Committee on Aeronautics (NACA) Test Area AOC, with PAH-impacted soil from the Load Line 9 AOC (and four other AOCs) transported to this location for treatment. Following successful treatment, soil will be returned to each of the AOCs for use as backfill and site restoration. Independent Remedial Design (RD) or Non-Time-Critical Removal Action (NTCRA) workplans are under preparation for each of the other AOCs to be remediated under this contract.

This RD describes the requirements to implement the recommended remedial actions at the Load Line 9 AOC, as documented in:

- *Final Report for the Phase I Remedial Investigation at Load Line 9 (RVAAP 42) (MKM, 2007)*
- *Final Phase II Remedial Investigation Report and Feasibility Study (RI/FS) for Soil, Sediment, and Surface Water at RVAAP-42 Load Line 9 (Leidos, 2016);*
- *Final Proposed Plan (PP) for Soil, Sediment, and Surface Water at RVAAP-42 Load Line 9* (Leidos, 2017); and
- *Final Record of Decision (ROD) for Soil, Sediment, and Surface Water at RVAAP-42 Load Line 9 (Leidos, 2019).*

It should be noted that the ROD for this AOC, in part established the transition from historical facility-wide cleanup goals (FWCUGs) for PAHs to the recently revised US Environmental Protection Agency (USEPA) residential soil Regional Screening Levels (RSLs) for PAHs. Two areas within this AOC require remediation. Specifically, Area 1 requires excavation of lead- and mercury-impacted soil for subsequent profiling and off-site disposal. Area 2 requires excavation and onsite thermal treatment of PAHs in soil to levels below established cleanup goals using the VEG Technology. Soil treated by the VEG Technology and meeting cleanup goals will be returned to the excavation areas, providing unrestricted reuse of the land. The two areas of remediation at this AOC are discussed in more detail in Section 1.3. COCs and relevant cleanup goals, including FWCUGs for lead and mercury in soil and updated USEPA residential soil RSLs for PAHs are discussed further in Section 3.2.

1.1 PURPOSE

As defined in the RI/FS and PP/ROD, surface soil, defined as soil within 0-1 foot below ground surface (bgs), in two distinct areas of the Load Line 9 AOC contain chemicals with concentrations above established cleanup goals and should be remediated to a level protective of human health. No COCs were found in sediment or surface water; thus, no remedial actions are required for those media. Based on the fate and transport evaluation, no contaminant migration COCs for soil or sediment were identified as impacting groundwater. Groundwater will be further evaluated under the RVAAP-66 Facility-wide Groundwater Monitoring Program.

The selected remedial alternative for soil at the Load Line 9 AOC, as recommended in the PP/ROD, is Alternative 3: Excavation and Off-site Disposal of soil at LL9ss-011 and Ex-situ Thermal Treatment of soil at LL9ss-096/097 – Attain Unrestricted (Residential) Land Use. To this end, this RD details requirements and procedures necessary to implement the selected remedial action alternative, including a plan to excavate and dispose of metals impacted soil above FWCUGs and excavation and thermal treatment of PAH-impacted soil exceeding residential RSLs, allowing for unrestricted (i.e., residential) reuse of the AOC.

This RD provides specific remedial actions that will reduce chemical contamination in surface soil at the Load Line 9 AOC. The remedial action objective (RAO) and established cleanup goals for Load Line 9 are presented in Section 3.0. In summary, the RAO is to prevent resident receptor exposure to surface soil exceeding established FWCUGs/RSLs. Once the RAO and FWCUGs/RSLs are met following the implementation of this RD, soil will be considered protective for Unrestricted (residential) Land Use, which is inherently protective of potential planned future use of this AOC as a military training area or as commercial/industrial land use (Leidos, 2016).

Specific elements of the remedial actions described in this RD include:

- Excavating contaminated surface soil exceeding FWCUGs/RSLs for lead and mercury (Area 1) and PAHs (Area 2);
- Profile sampling, transportation, and off-site disposal of the estimated 16 in-situ cubic yards of lead- and mercury-impacted surface soil at an off-site permitted disposal facility;
- Thermally treating an estimated 761 in-situ cubic yards of PAH-impacted surface soil using the VEG Technology;
- Conducting confirmation sampling of excavation areas and treated soil to ensure that FWCUGs/RSLs have been met; and
- Restoring disturbed areas to their original elevation and site conditions.

The aforementioned remediation volumes are based on the in-situ volumes defined in the approved Final ROD (Leidos, 2019). As previously mentioned, the ROD established the transition from historical FWCUGs for PAHs to the recently revised (June 2017) residential soil RSLs for PAHs. Despite this transition, the anticipated remediation volumes at this AOC, did not change from those defined in the Final PP [Leidos, 2017 (see Section 3.2)] and the ROD; the excavation pit sidewall and bottom confirmation sampling proposed in this RD will help determine the final volume of soil to be excavated at this AOC. Remediation volumes are further discussed in Section 5.2.1.

Remedial activities will be overseen by USACE LRL and implemented by the Alaniz-Endpoint Team. The Alaniz-Endpoint Team (under contract with USACE LRL) is responsible for excavation, thermal treatment of PAH-impacted soil, confirmation sampling, profiling, transportation and disposal of lead- and mercury-impacted soil/vegetation, and restoring excavation sites to pre-remediation conditions using treated soil and approved imported soil as backfill. Implementation of these activities will meet the requirements of this RD, Standard Operating Procedures specified in Appendix I (Sampling and Analysis Plan) and the following documents:

- *Facility-Wide Safety and Health Plan for Environmental Investigations* (USACE 2011b); and
- *Site-Specific Health and Safety Plan* (to be prepared under separate cover)

1.2 FACILITY DESCRIPTION

The former RVAAP facility consists of 21,683 acres located in northeastern Ohio within Portage and Trumbull counties, approximately 4.8 km (3 miles) east/northeast of the City of Ravenna and approximately 1.6 km (1-mile) northwest of the City of Newton Falls. It consists of a parcel approximately 17.7 km (11 miles) long and 5.6 km (3.5 miles) wide and is bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad on the south; Garret McCormick, and Berry roads to the west; the Norfolk Southern Railroad on the north; and State Route 534 on the east (see Figure 1-1). The former RVAAP facility was used as a load, assemble, and pack facility for munitions production.

As of September 2013, administrative control of the 21,683-acre facility has been transferred to the United States Property and Fiscal Officer for Ohio and subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a military training site (Camp James A. Garfield).

During the RVAAP operational years, prior to Camp James A. Garfield, the entire 21,683- acre property was a government-owned, contractor-operated industrial facility. The RVAAP Restoration Program encompasses investigation and cleanup of past activities over the entire 21,683 acres of the former RVAAP; therefore, references to the RVAAP in this document are considered to be inclusive of the historical extent of the former RVAAP and Camp James A. Garfield, unless otherwise specifically stated.

The ARNG is the lead agency for remediation, decisions, and applicable cleanup within the former RVAAP facility. The Ohio EPA is the supporting state regulatory agency. The USACE-LRL is the contracting agency hired by the ARNG and OHARNG and is responsible for implementation and technical oversight of remedial activities. It is important to note that the RVAAP Restoration Program is bound to the Director's Final Findings and Orders (DFFO) issued June 10, 2004 by the Ohio EPA pursuant to the authority vested under Chapters 3734, 3745, and 6111 of the Ohio Revised Code. The objective of the DFFO is to ensure that the public health, safety, and welfare, as well as the environment, are protected from the disposal, discharge, or release of contaminants.

1.3 SITE BACKGROUND

Load Line 9 is a 69-acre, fenced AOC formerly known as the detonator line. The AOC is located in the central portion of Camp James A. Garfield and is north of Fuze and Booster Road, west of George Road, and south of RVAAP-45 Wet Storage Area (Figure 1-2). As shown on Figure 1-3, Load Line 9 is comprised of two areas defined as the former production area (33.2 acres) and the non-production area (35.8 acres).

Between 1941 and 1945, Load Line 9 operated within the former production area to produce fuze component parts for artillery projectiles. A fuze is an ignition device which causes the projectile or bomb to function. Following the end of World War II in 1945, Load Line 9 was deactivated and process equipment was removed. According to available historical information, the site has not been in use since 1945.

In 2003 and 2007, all buildings, slabs and foundations within the AOC were demolished and removed. During these activities, soil near the former production buildings were extensively disturbed. Following demolition activities, the site was re-graded and re-vegetated. Current features remaining at the site include an elevated water tank (WW-32, see Figure 1-3) and a perimeter fence. The water tank is no longer connected to a water distribution system. Gravel perimeter roads, two dirt mounds and small construction drainage ditches are also present. The closest remaining buildings are northwest of the Load Line 9 boundary and are not part of the AOC. The AOC is currently overgrown with grass, trees, and scrub vegetation (Leidos, 2017)

As identified in the 1978 Installation Assessment (USATHAMA, 1978), potential contaminants identified at Load Line 9 include explosives, inorganic chemicals (e.g., metals) and volatile organic compounds (VOCs). Potential VOC contaminants are suspected to stem from former building DT-33 (see Figure 1-3), which was utilized as a solvent storage facility and polychlorinated biphenyls (PCBs) from former onsite transformers. Additionally, PAHs were also identified as contaminants from former heater house buildings: Buildings DT-32 and DT-41 through DT-50 (Figure 1-3).

Since 1989, the Load Line 9 AOC has been included in various assessments and investigations including:

- Installation Assessment (USATHAMA, 1978);
- Preliminary Assessment (USACE,1996);
- Relative Risk Site Evaluation (USACHPPM, 1998);
- Phase I Remedial Investigation at Load Line 9 (MKM, 2007); and

- Phase II Remedial Investigation Report and Feasibility Study for Soil, Sediment, and Surface Water at RVAAP-42 Load Line 9 (Leidos, 2016).

Sampling results from the 2016 RI/FS were combined with applicable results of previous sampling events to evaluate the nature and extent of contamination, examine contaminant fate and transport, conduct risk assessments, and evaluate potential remedial alternatives. A human health risk assessment (HHRA) and ecological risk assessment (ERA) were conducted to document COCs that may pose potential risks to human health and the environment resulting from exposure to contamination within the AOC. The HHRA identified COCs based on the exceedances of Resident Receptor FWCUGs, developed in the *Facility-Wide Human Health Cleanup Goals Report* (USACE, 2010), at a target risk level (TRL) of 1E-05 and hazard quotient (HQ) of 1.

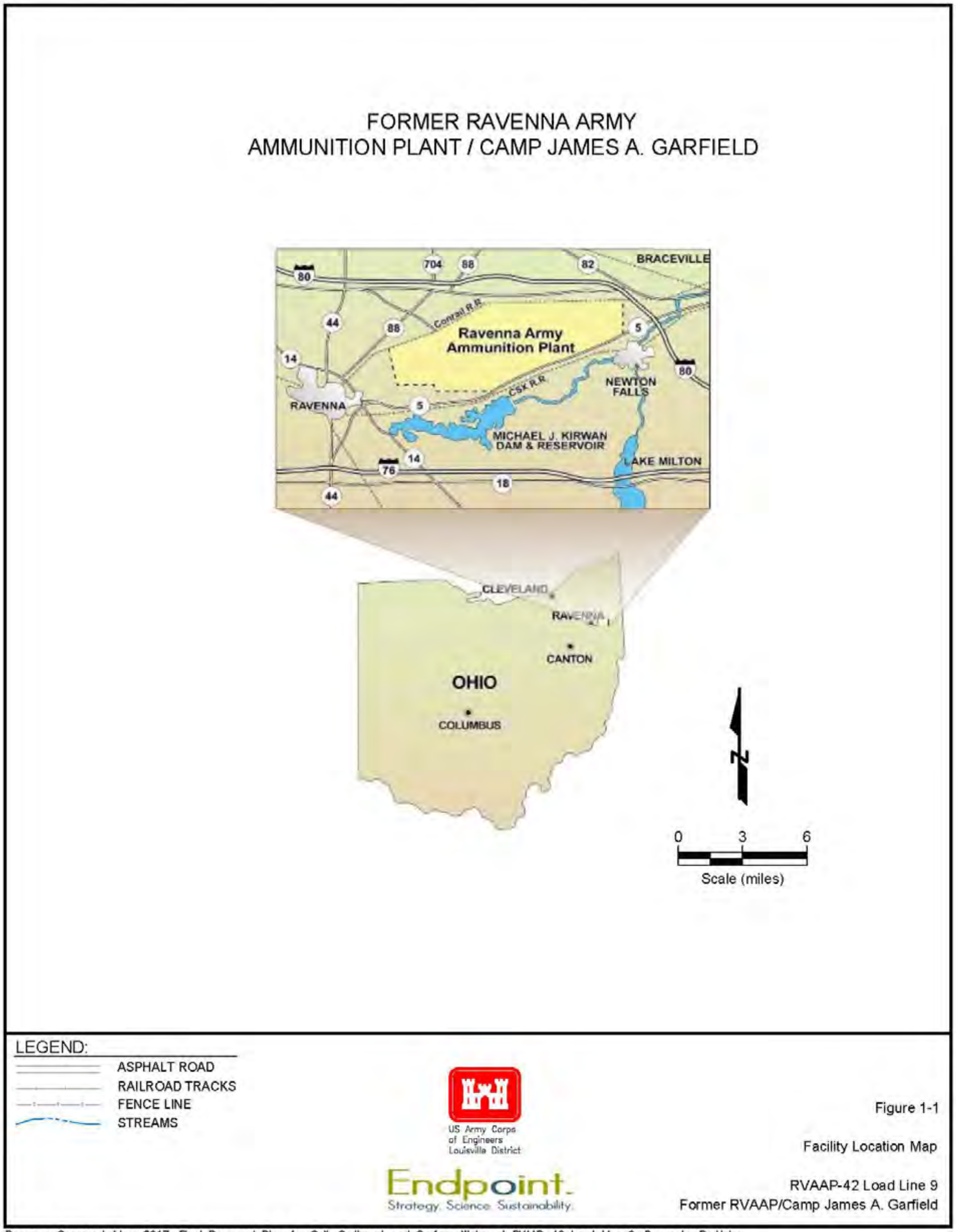
As previously indicated, two independent subareas within the Load Line 9 AOC were defined in the RI/FS for potential future remediation, as presented on Figure 1-4. As stated in the RI/FS, elevated levels of lead and mercury were found residing in surface soil in the area of former Detonator Destroying House (DT-34), while elevated concentrations of PAHs (benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and dibenz(a,h)anthracene) were found in surface soil surrounding the location of the former Change House (DT-28, see Figure 1-3); these metals and PAHs are accordingly recognized as the COCs for this AOC (Leidos, 2017). For purposes of this RD, the aforementioned sublocations will be referenced from here on as Area 1 (lead- and mercury-impacted surface soil) and Area 2 (PAH-impacted surface soil), as shown on Figure 1-4.

The ecological habitat at Load Line 9 does not contain any aquatic habitats and does not have a known connection to any off-site wetlands. The ERA concluded with a Level I Scoping ERA, which recommended no further action from the ecological perspective. The contaminant fate and transport evaluation indicated soil and sediment are not adversely impacting groundwater and no further remedial action is required to be protective of groundwater.

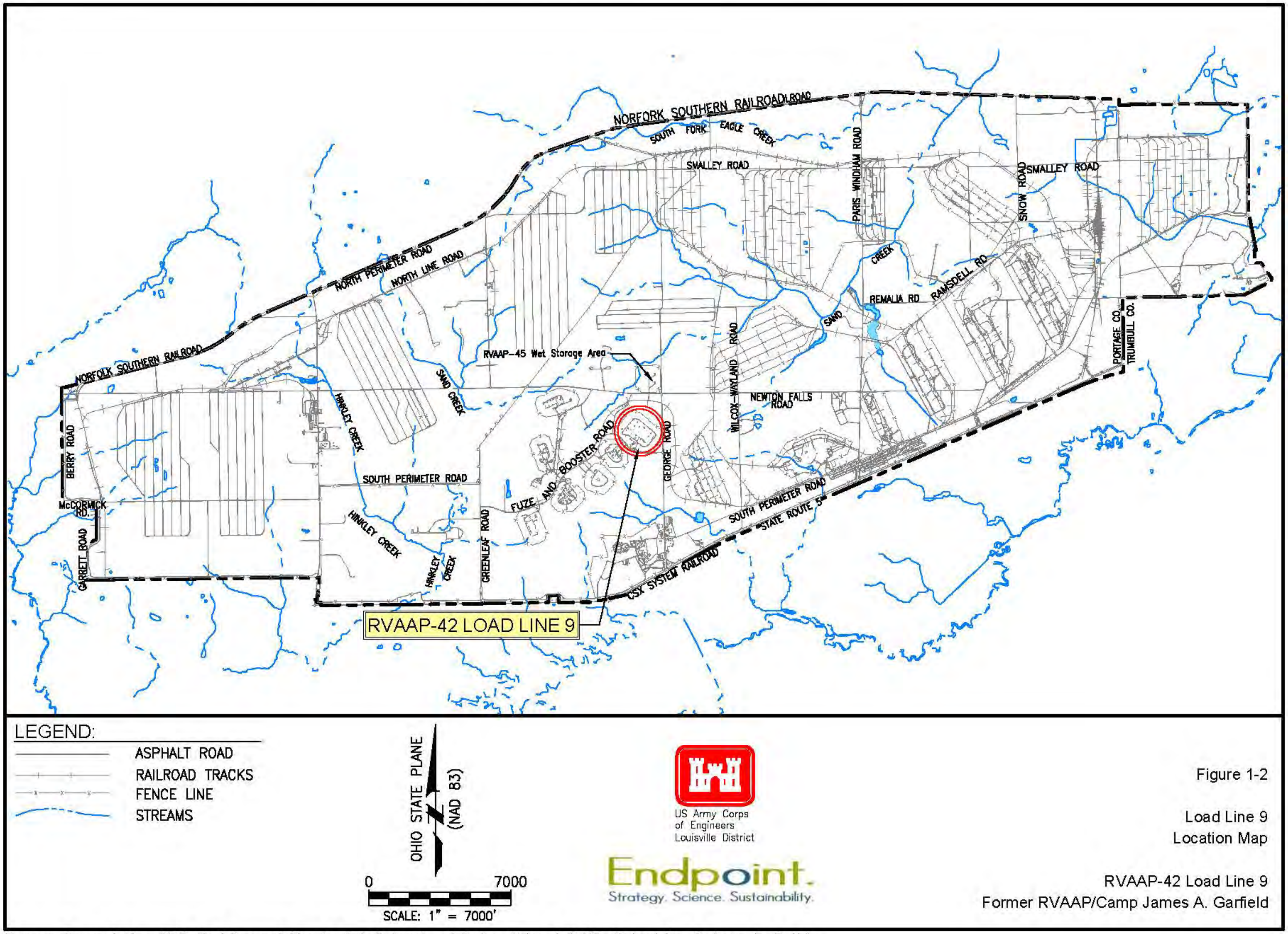
FWCUGs/RSLs for lead, mercury and four PAHs in surface soil were initially developed in the RI/FS, based on the Resident Receptor FWCUGs documented in the *Facility-Wide Human Health Cleanup Goals Report* (USACE, 2010). To support the remedial alternative selection process for soil remediation, these FWCUGs/RSLs were adopted as the numerical remedial action cleanup goals in the PP/ROD for the Load Line 9 AOC. FWCUG/RSL concentrations for COCs at this AOC are presented in Section 3.2.

1.4 COMMUNITY INVOLVEMENT AND REGULATORY APPROVAL

In accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 1179(a) and the National Oil and Hazardous Substance Pollution Contingency Plan Section 300.130(f)(2), the *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-42 Load Line 9* (Leidos, 2017) was released to the public on June 6, 2018, with documents made available in the Administrative Record maintained at Camp James A. Garfield and in the Information Repositories at Reed Memorial Library in Ravenna, Ohio, and at Newton Falls Public Library in Newton Falls, Ohio (Leidos, 2019). Notices of the availability of the Proposed Plan were sent to local radio stations, newspapers and television stations. A 30-day public comment period was held from June 6, 2018 to July 6, 2018 and a public meeting was held on June 21, 2018, to present the Proposed Plan, answer questions, and allow the public to provide comments for consideration. The Army considered input from the public meeting when selecting the remedy for this AOC (Leidos, 2019).



Basemap Source: Leidos, 2017. Final Proposed Plan for Soil, Sediment and Surface Water at RVAAP–42 Load Line 9. Drawn by P. Holm



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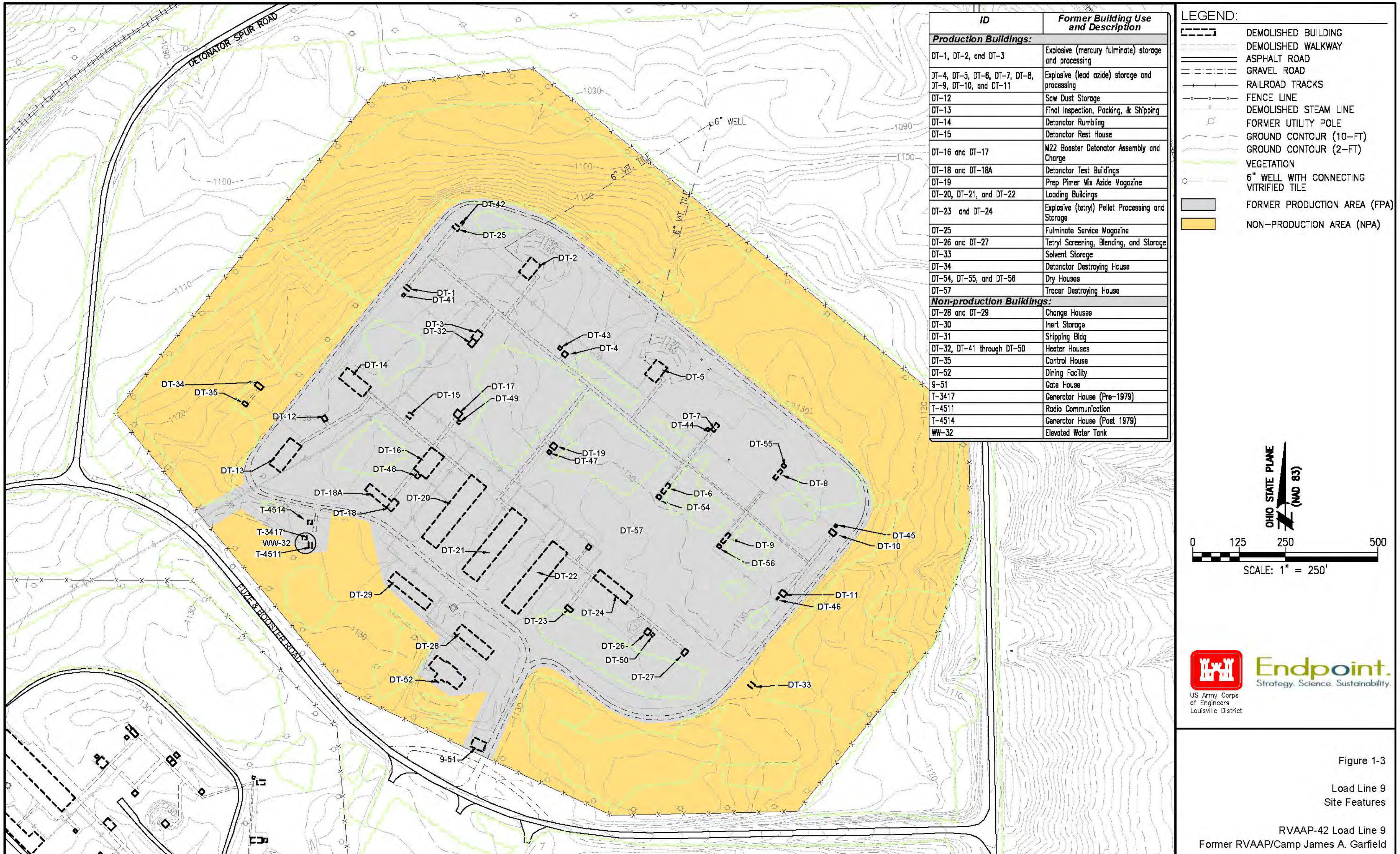
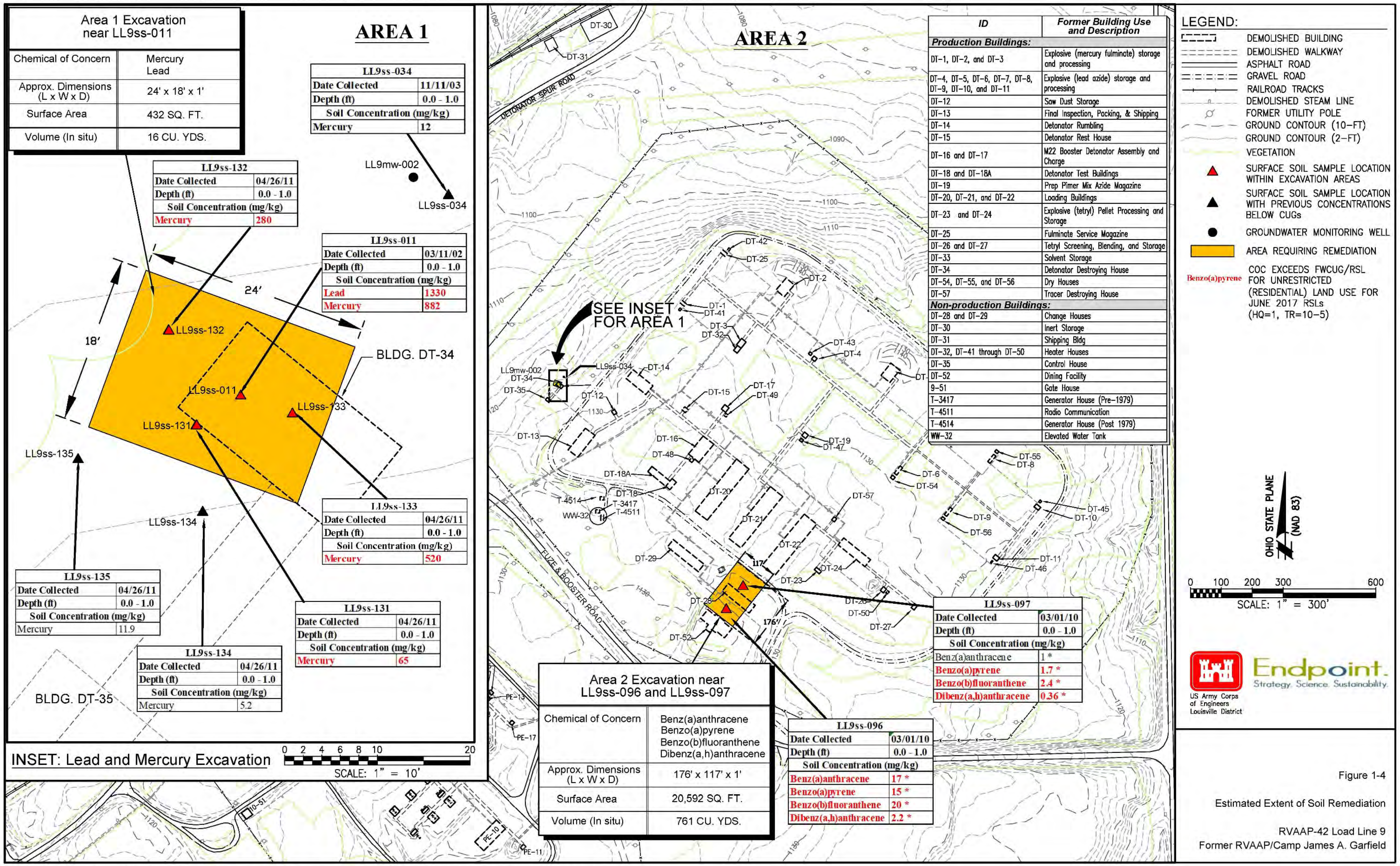


ID	Former Building Use and Description
Production Buildings:	
DT-1, DT-2, and DT-3	Explosive (mercury fulminate) storage and processing
DT-4, DT-5, DT-6, DT-7, DT-8, DT-9, DT-10, and DT-11	Explosive (lead azide) storage and processing
DT-12	Saw Dust Storage
DT-13	Final Inspection, Packing, & Shipping
DT-14	Detonator Rumbling
DT-15	Detonator Rest House
DT-16 and DT-17	M22 Booster Detonator Assembly and Charge
DT-18 and DT-18A	Detonator Test Buildings
DT-19	Prep Pimer Mix Azide Magazine
DT-20, DT-21, and DT-22	Loading Buildings
DT-23 and DT-24	Explosive (tetryl) Pellet Processing and Storage
DT-25	Fulminate Service Magazine
DT-26 and DT-27	Tetryl Screening, Blending, and Storage
DT-33	Solvent Storage
DT-34	Detonator Destroying House
DT-54, DT-55, and DT-56	Dry Houses
DT-57	Tracer Destroying House
Non-production Buildings:	
DT-28 and DT-29	Change Houses
DT-30	Inert Storage
DT-31	Shipping Bldg
DT-32, DT-41 through DT-50	Heater Houses
DT-35	Control House
DT-52	Dining Facility
9-51	Gate House
T-3417	Generator House (Pre-1979)
T-4511	Radio Communication
T-4514	Generator House (Post 1979)
WW-32	Elevated Water Tank

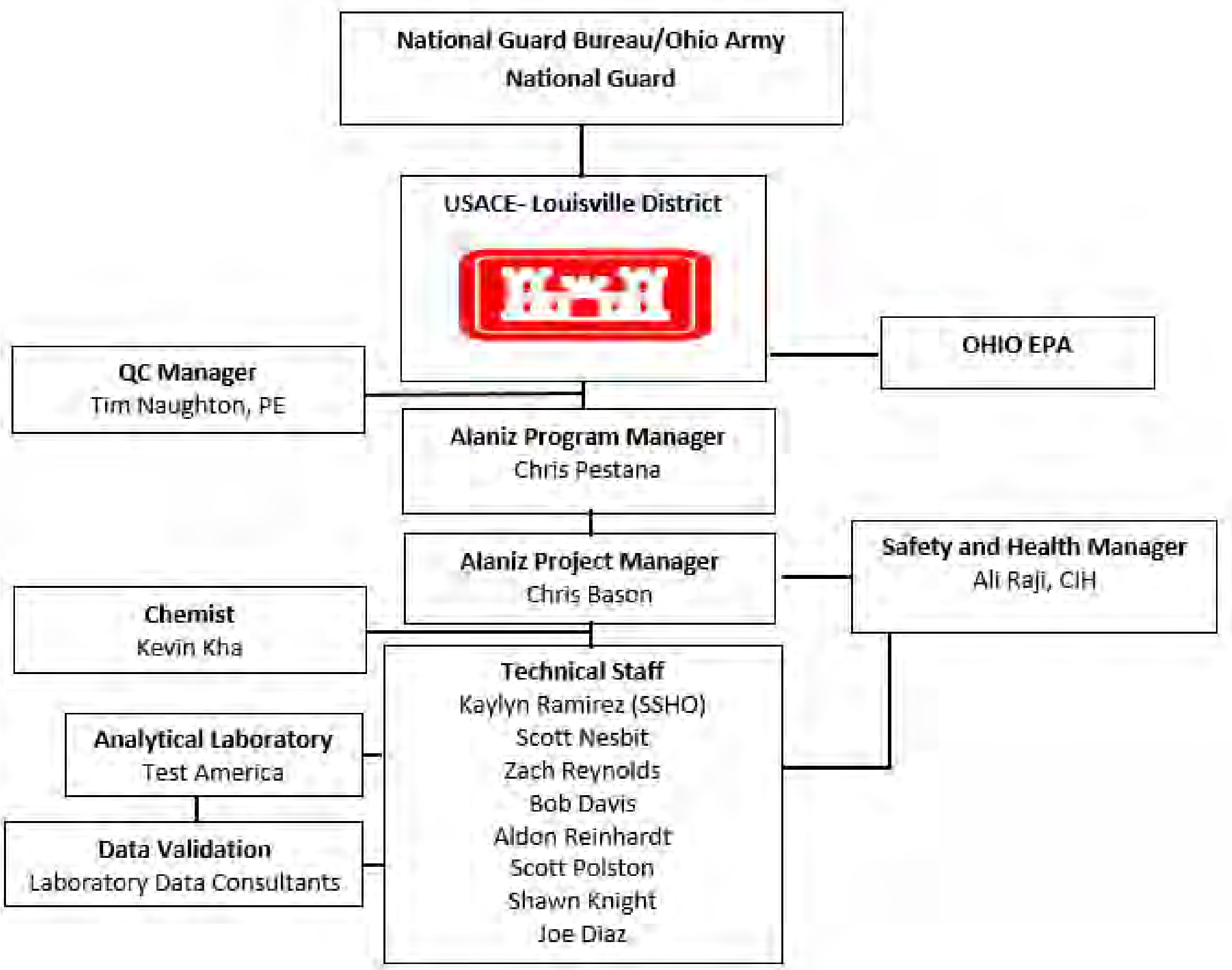
Basemap Source: Leidos, Drawn by P. Holm



Basemap Source: Leidos, 2017. Final Proposed Plan for Soil, Sediment and Surface Water at RVAAP-42 Load Line 9. Drawn by P. Holm

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section presents the project management structure and key personnel responsibilities that will be used to implement the activities covered in this RD. ARNG is the lead agency for remediation, decisions, and applicable cleanup within the former RVAAP facility. The Ohio EPA is the supporting state regulatory agency. The USACE-LRL is the contracting agency hired by the ARNG and OHARNG and is responsible for implementation and technical oversight of remedial activities. The Alaniz-Endpoint Team is the primary contractor responsible for implementing this RD. The organizational structure and key personnel for this project is summarized below.



2.1 USACE CONTRACTING OFFICER/CONTRACTING OFFICER'S REPRESENTATIVE

Mr. Aaron Sanford will serve as the Contracting Officer (KO). The KO will ensure performance of all necessary actions for effective contracting, ensure compliance with the contract terms, and will safeguard the interests of the United States in the contractual relationship. The KO is ultimately responsible for the final determination of the adequacy of the contractor's performance.

Dr. Nathaniel Peters II, will serve as the Contracting Officer's Representative (COR). The COR is responsible for technical administration of the contract and will assure proper Government surveillance of the contractor's performance.

2.2 USACE PROJECT MANAGER

Mr. Steve Kvaal will serve as the project manager for USACE LRL and will coordinate and communicate with ARNG and OHARNG.

2.3 OHIO ENVIRONMENTAL PROTECTION AGENCY

The Ohio EPA is the regulatory agency for this project and will review project documents and ensure that the RD and remedial action are completed in accordance with RD and regulatory requirements.

2.4 CONTRACTOR PROGRAM MANAGER

Mr. Chris Pestana will serve as Program Manager for the Alaniz-Endpoint Team. He will ensure the Alaniz-Endpoint Team has access to necessary corporate resources that will exceed the quality objectives for this contract. As Program Manager, Mr. Pestana will be responsible for the overall management of the contract including cost and schedule.

2.5 CONTRACTOR PROJECT MANAGER

Mr. Chris Bason will serve as the Project Manager. Mr. Bason will be executing tasks to meet scope, schedule and budget constraints, working closely with Mr. Pestana and the proposed quality assurance (QA) manager, Mr. Scott Nesbit.

2.6 CONTRACTOR QUALITY ASSURANCE MANAGER

Mr. Tim Naughton, PE, will serve as Quality Assurance Manager for the Alaniz-Endpoint Team. In this capacity, Mr. Naugton is responsible for the overall technical quality of the contract work, and will also serve as the main point-of-contact for program coordination with USACE LRL and stakeholders, including supporting USACE LRL as Regulatory Specialist and liaison as deemed necessary by USACE LRL. Mr. Naughton will be supported by Endpoint Project Engineer, Kaylyn Ramirez, EIT.

2.7 FIELD TASK LEADER

Mr. Zach Reynolds will serve as the Field Task Leader (FTL), responsible for performing and/or overseeing soil sampling defined in the SAP (Appendix I). He has over 10 years of experience in performing soil sampling, including serving the same role on over 10 other USACE projects involving sampling in support of implementing the VEG Technology.

2.8 SITE SAFETY AND HEALTH OFFICER

Ms. Kaylyn Ramirez will serve as the Site Safety and Health Officer (SSHO), ensuring preparation and implementation, on a daily basis, of protocols and procedures in the site-specific Safety and Health Plan (SSHP) prepared as an addendum to the Facility Wide Safety and Health Plan (FWSHP) and implementation of related procedures on a daily basis during field activities. Ms. Ramirez is formally trained as an SSHO, serving the same role on other USACE contracts involving the use of the VEG Technology. She holds a certificate for 40-hour training under USACE's EM 385.1.1 program, in addition to 40-hr and related 8-hr refresher certificates for The Occupational Safety and Health Administration (OSHA) hazardous waste operator (Hazardous Waste Operations and Emergency Response [HAZWOPER]) program.

2.9 CORPORATE SAFETY OFFICER/CERTIFIED INDUSTRIAL HYGIENIST (CIH)

Mr. Ali Raji, CIH, of Endpoint will serve as the corporate safety officer for the Alaniz-Endpoint Team and will ensure the work performed is planned appropriately and executed in a safe manner. Mr. Raji has previously served in that capacity on several USACE contracts performed by Endpoint. Mr. Raji will also serve as risk assessor on the project.

2.10 DATA VALIDATION CHEMIST

Serving as the Data Validation Chemist, Kevin Kha will ensure data reported by the laboratory is usable for its intended purpose. In this capacity, Mr. Kha and Laboratory Data Consultants (LDC) will work closely with the Department of Defense- and National Environmental Laboratory Accreditation Program certified Eurofins/Test America Laboratories in Savanah, Georgia, to be used throughout the remediation process. Mr. Kha and LDC have served in this capacity on numerous USACE projects, including several projects involving soil remediation using the VEG Technology for USACE.

3.0 REMEDIAL ACTION OBJECTIVE AND CLEANUP GOALS

This section describes the RAO and cleanup goals for the selected remedial action. The RAO specifies requirements to be achieved by the remedial action in order to protect human health and the environment under current and reasonably anticipated future land use scenarios. Correspondingly, cleanup goals are the numerical concentrations required to achieve the RAO for each COC.

3.1 REMEDIAL ACTION OBJECTIVE

The RAO for the Load Line 9 AOC is to prevent Resident Receptor (adult and child) exposure to surface soil with concentrations above:

1. FWCUGs for lead and mercury at sample location LL9ss-011 (i.e., Area 1); and
2. Residential soil RSLs for PAHs (i.e., benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and dibenz(a,h)anthracene) at sample locations LL9ss-096/LL9ss-097 (i.e., Area 2).

As previously indicated, the selected remedial action for the aforementioned locations, as defined in the Final PP and ROD for this AOC, is Alternative 3: Excavation and Off-site Disposal at LL9ss-011 and Ex-situ Thermal Treatment at LL9ss-096/097 – Attain Unrestricted (Residential) Land Use.

No remedial actions are required for sediment or surface water. Groundwater will be further evaluated under the RVAAP-66 Facility-wide Groundwater Monitoring Program.

3.2 REMEDIAL ACTION CLEANUP GOALS

The numerical criteria to be used for decision-making relative to the COCs established in the PP and ROD will correspond to the FWCUGs for lead and mercury (USACE, 2010), and the June 2017 USEPA residential soil RSLs for PAHs. Table 3-1 summarizes the FWCUGs and RSLs to be used as cleanup goals for the relevant COCs at this AOC, further incorporating remediation depths, locations, and volumes. As previously indicated, no COCs were identified in subsurface soil (1-13 feet [ft] bgs), sediment, or surface water for the resident receptor, thereby focusing remediation activities on surface soil (0 to 1-foot bgs) (Leidos, 2017).

It should be noted that despite the change in the USEPA's residential soil RSLs for PAHs between the PP and ROD phases, the anticipated volume of PAH-impacted soil requiring remediation at this AOC did not change, as benzo(a)pyrene remains elevated relative to both its historical FWCUG and the updated RSL at both sample locations within Area 2 (see Figure 1-4). Estimated remediation volumes for each Area are discussed in Section 5.2.1.

Table 3-1. Summary of Soil COCs, Cleanup Goals, and Remediation Volumes

Area	Chemical of Concern	FWCUG or Residential RSL [1] (mg/kg)	Depth (ft bgs)	Location	Excavated Disturbed Area (sq ft)	Volume (in-situ) (cubic yards)
Area 1	Lead	400	0-1	LL9ss-011	432	16
	Mercury	22.7				
Area 2	Benz(a)anthracene	11	0-1	LL9ss-096 and LL9ss-097	20,592	761
	Benzo(a)pyrene	1.1				
	Benzo(b)fluoranthene	11				
	Dibenz(a,h)anthracene	1.1				

[1] Cleanup goals based on a TRL = 1E-05 and HQ=1.0
ft bgs: feet below ground surface
HQ = Hazard Quotient
RSL = USEPA Residential Soil Regional Screening Level (June 2017)
TRL = Target Risk Level

4.0 CONSTRUCTION MOBILIZATION

This section describes site preparation and general construction activities required to implement this RD.

4.1 SITE PREPARATION

Site preparation activities consist of several elements designed to streamline work flow and prevent migration of contaminated soil during construction, including:

- Utility Clearance
- Site Access and Control; and
- Vegetation and Debris Site Clearing.

Given that the implementation of remedial activities at the Camp James A. Garfield are being performed under the CERCLA process, no air discharge permits will be necessary from county-level jurisdiction. All work will be performed in compliance with current Ohio state air quality rules and regulations.

4.1.1 Utility Clearance

Prior to initiating excavation activities, the Alaniz-Endpoint Team will notify the Camp James A. Garfield Department of Public Works and Utilities to allow sufficient time for OHARNG concurrence of the absence of known utilities in the excavation areas. In addition, utility clearance will be performed by a private utility contractor to ensure no utilities exist within the footprint of the excavation areas. All field activities, including excavation activities, will be supported by a SSHP incorporating activity hazard analyses, to be prepared under separate cover.

In the event an unmarked utility is discovered during remedial activities, all work will stop immediately and the ARNG/OHARNG Representative, USACE COR, and the Alaniz-Endpoint Team Project Manager will be notified. The aforementioned parties will discuss and develop any required actions. Remedial activities will not resume until approval by the ARNG/OHARNG has been granted.

4.1.2 Site Access and Site Control

Facility Access and Control

All personnel and vehicles will enter Camp James A. Garfield through the main entrance at 8451 State Route 5, Ravenna, OH 44266. Entering personnel and vehicles are subject to search and inspection. Access rosters for all personnel entering the site will be submitted to the Camp James A. Garfield Environmental Office 48 hours in advance of scheduled field work for appropriate coordination with the Camp James A. Garfield Range Operations. Sample Contractor Access Request Forms are provided in Attachment A. All personnel with prior approval to enter Camp James A. Garfield must provide a government-issued identification (e.g., driver’s license, passport) upon entering.

All field activities will be coordinated with Camp James A. Garfield Range Control on a daily basis (i.e., notification at the start and end of the work day, planned work locations and number of field personnel). Site work hours will be from 0730-1630 on weekdays. Work occurring on holidays or weekends must receive prior approval.

All Alaniz-Endpoint Team personnel will comply with all Ohio and Camp James A. Garfield traffic rules, including not exceeding the posted speed limit of 35 miles per hour (mph) during daylight hours and 25 mph at night while on Camp James A. Garfield main roads, except for the area near the Camp James A. Garfield Main Gate and training areas where they will observe a of 20 mph limit. Project access roads will have a speed limit of 10 mph. At no time will the Camp James A. Garfield main roads be blocked by Alaniz-Endpoint Team personnel during remediation activities. Prior to initiating any activity that will obstruct traffic flow of Camp James A. Garfield main roads, approval will be obtained from Camp James A. Garfield Range Control, the ARNG/OHARNG Representative, and the Alaniz-Endpoint Team Project Manager.

Site Access

The Load Line 9 project site will be accessed from Fuze & Booster Road, as shown on Figure 4-1. The Alaniz-Endpoint Team will maintain hauling roads (keep free of excess mud/debris) to allow hauling trucks and heavy equipment to travel safely and efficiently.

All workers, supervisors and site visitors must provide appropriate training records, as specified in the SSHP (to be submitted under separate cover), before entering the site. HAZWOPER certificates for all on site personnel will be provided to the ARNG and OHARNG representatives. Prior to entering the work area, site visitors/workers must receive a site-specific health and safety training from the SSHO.

Site Control

Prior to the start of work, the excavation boundaries within the AOC will be surveyed by a licensed surveyor and marked with white paint and flags, based on the approximate excavation dimensions shown on Figure 1-4 and benchmarks (i.e., coordinates) used for historical sampling. Additional mobilization activities to be implemented include establishing site controls required for the remedial activities, including:

- Temporary fencing to secure the excavation areas and temporary equipment/materials storage locations, site access/egress points, signs, barricades and warning tape for prohibited areas. The excavation pits will be fenced during off hours to ensure that all work areas remain safe and secure;
- Mobilization of equipment trailers, equipment/materials storage area, and connection to temporary utilities;
- Equipment/personnel decontamination areas and work zones. Further detail regarding decontamination procedures is discussed in Section 5.4;
- Equipment storage areas; and

- Sanitary facilities for site workers and visitors.

Anticipated locations and boundaries for the above-referenced site controls are graphically displayed on the Design Drawings included as Attachment B.

4.1.3 Vegetation and Debris Site Clearing

Herein, above-ground vegetation and debris refer to vegetation (i.e., trees, bushes, etc.) and debris or solid waste (i.e., large rocks, brick, concrete, metal debris, etc.) that have not been in contact with contaminated soil. Following coordination with the OHARNG and USACE LRL, the excavation areas will be surveyed to determine whether surrounding areas will require clearing of existing trees, bushes, other large vegetation and potential above-ground debris, to facilitate equipment access and surface soil removal activities. In addition, vegetation along the gravel haul route may require trimming to allow sufficient space for large haul trucks/equipment to travel along the access roads within this AOC. Any required vegetation clearing involving trees or branches with a 3-inch diameter will be removed between October 1st and March 31st. A vegetation removal plan will be submitted under separate cover to ARNG for review that details all vegetation clearing activities to be performed within all AOCs to be remediated under this contract. Vegetation clearing will be performed by the Alaniz-Endpoint Team prior to March 31, 2021.

The extent of anticipated vegetation clearing is provided on the Drawings in Attachment B. A power rake attached to a loader will be used to strip open areas covered in grass/weeds. A chainsaw and/or bush hog will be used to clear larger brush and trees. No removal of debris or solid waste is anticipated at this AOC; however, in the event that large debris or solid waste is discovered and requires disposal, 55-gallon drums or a roll-off bin will be utilized to temporarily store the waste prior to disposal. Prior to clearing vegetation, the approximate extent of the excavation areas will be marked in the field to determine the extent of vegetation clearing required. Above-ground vegetation that is removed from the AOC will be chipped/mulched onsite by the Alaniz-Endpoint team. The mulch will be temporarily stockpiled at the AOC and evenly spread across the site. Any removed vegetation that has been in contact with or is comingled with impacted soil (i.e., tree stumps or roots) shall be separated from above-ground vegetation and disposed or thermally treated.

4.2 STORMWATER POLLUTION PREVENTION

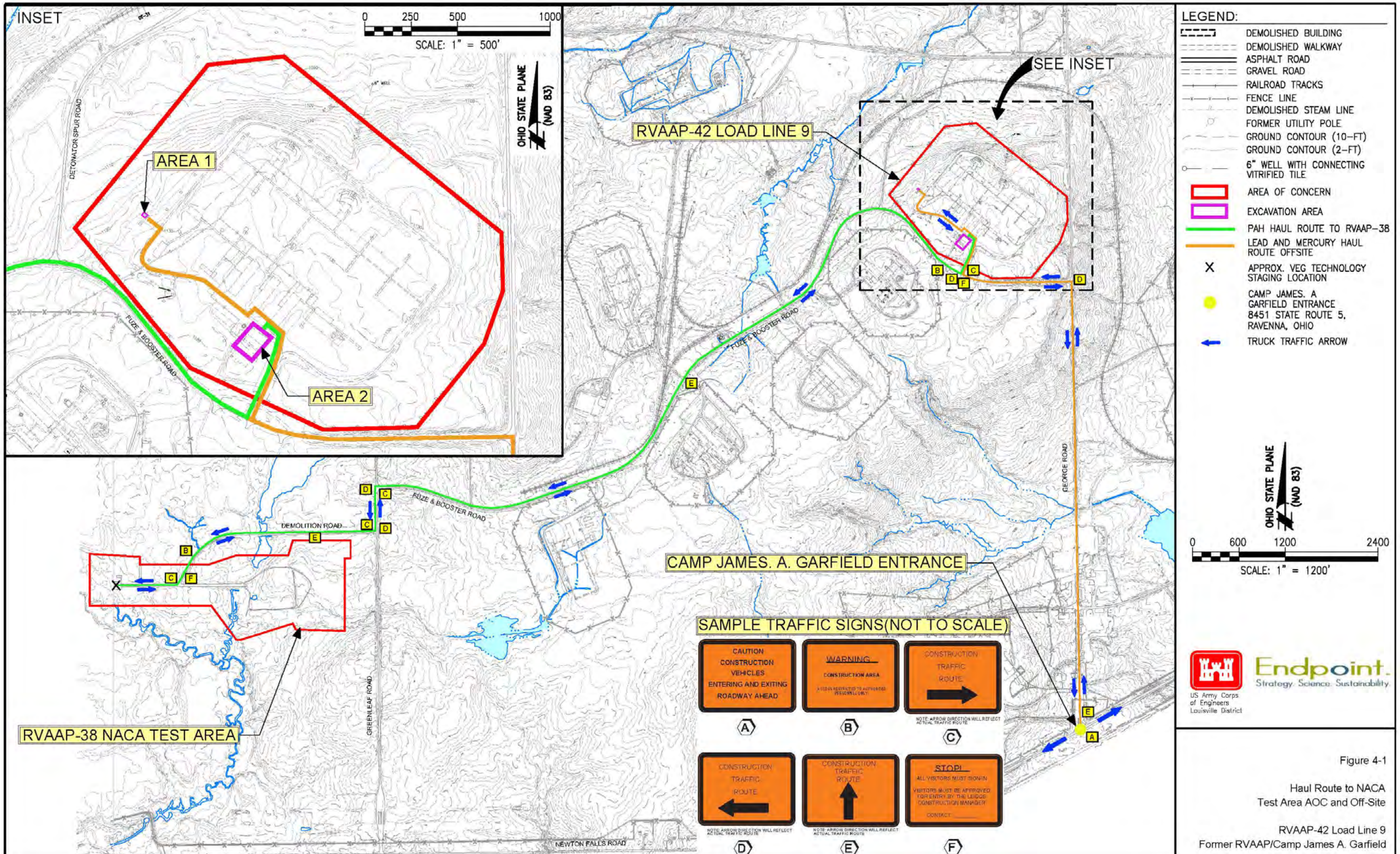
Planned excavations at the Load Line 9 AOC are being performed under the DFFO. The total area of construction, including staging, for the Load Line 9 AOC is below the 1-acre threshold requiring coverage with Ohio EPA Permit No. OHC000005 or the procurement of an individual National Pollutant Discharge Elimination System Permit for stormwater discharges. However, the project will be performed in accordance with the requirements for a Storm Water Pollution Prevention Plan per Ohio EPA Permit No. OHC000005, including the implementation of best management practices (BMPs) that are the minimum criteria for the overall control of soil and sediment erosion and storm water runoff during construction activities.

Erosion and sediment controls will be installed before beginning activities that have the potential to disturb soil and cause erosion and will be maintained for the duration of the excavation and restoration activities. These control features will be removed only after vegetation is established and disturbed areas are stabilized. Erosion and the transportation of sediment from storm water upgradient of each excavation will be controlled using silt fencing.

BMPs to be used during the remedial activities at Area 1 and 2 are discussed in Section 5.3. Inspection of the stormwater, BMPs, and erosion and sedimentation controls will be conducted in accordance with Section 9.4.2 and documented on the Stormwater Control Inspection Form (see Attachment A).

To further minimize the potential for erosion and sediment run-off, work will be limited during periods of severe weather, as determined by the Alaniz-Endpoint Team Project Manager.

The treatment of the contaminated soil will be conducted at the NACA site. The transportation of the contaminated soil will be on existing roads and these are not disturbed areas. The stockpile area for temporary storage of the contaminated soil and treated soil is approximately 15,000 square feet and the staging area is approximately 5,000 square feet



Basemap Source: Leidos, 2017. Final Proposed Plan for Soil, Sediment and Surface Water at RVAAP-42 Load Line 9. Drawn by P. Holm

5.0 EXCAVATION ACTIVITIES

This section describes remedial activities to be performed, including:

- Land Survey;
- Excavation;
- Best Management Practices; and
- Equipment Decontamination.

5.1 LAND SURVEY

The Alaniz-Endpoint Team will have the initial and final excavation boundaries surveyed by a registered surveyor. The survey will establish initial and final horizontal and vertical limits of the excavation area.

5.2 EXCAVATION

The excavation process will be conducted in a manner that minimizes contaminated soil handling. Conventional earth moving equipment such as excavators, front-end loaders, and haul trucks will be utilized to reduce site worker's exposure to contaminated soil and increase efficiency. All excavation work will be performed with a track-mounted backhoe. Alaniz will serve as the excavation contractor, holding a Class A – General Engineering Contractor license with OSHA HAZWOPER trained personnel. OSHA Excavation Safety Standards will be followed during the excavation activities. All activities will follow the requirements outlined in the SSHP.

The following excavation activities are discussed in more detail below:

- Area 1 - Lead- and Mercury-Impacted Soil;
- Area 2 – Ex-Situ Thermal Treatment of PAHs in Soil Using the VEG Technology
- Unforeseen Materials

5.2.1 Lead- and Mercury-Impacted Soil

Excavation Limits, Volumes and Waste Profiling

Area 1 encompasses an approximate surface area of 432 square feet, with an estimated 16 cubic yards (in-situ) of surface soil that exceed FWCUGs for lead and mercury (400 mg/kg and 22.7 mg/kg, respectively). Area 1 will initially be excavated to a depth of 1-foot surrounding sample location LL9ss-011 to the extents shown on Figure 1-4.

Lead- and mercury-impacted soil removed from Area 1, along with any potential impacted topsoil vegetation (i.e., COC-impacted vegetation) or debris, will be loaded directly into haul trucks for transportation and disposal at an approved off-site disposal facility (based on the approved waste profile) in accordance with Sections 5.2.2 and 7.0 herein.

Waste profile soil samples will be collected in-situ prior to commencing excavation activities in Area 1 and submitted to a fixed-based laboratory for analysis. The results of the analysis will be used to prepare the waste disposal profile of the metal impacted soil for disposal at an appropriate landfill ([non-hazardous for Waste Management American Landfill] or [hazardous soil for metals US Ecology of Ohio or US Ecology Michigan Disposal Inc]). Waste profile sampling and analysis will be in accordance with Section 6.1.1 and the Sampling and Analysis Plan in Appendix I.

Soil Stockpiling and Transportation

As previously indicated, metals-impacted soil excavated from Area 1 (and any co-mingled topsoil vegetation and/or debris) will be loaded directly into haul trucks which will transport the load directly to an approved off-site disposal facility (see Section 7.5). In the event that impacted soil needs to be stockpiled at the AOC (e.g., the haul truck is inoperable), the soil will be stockpiled within the limits of the excavation.

Care will be taken to avoid over filling the hauling trucks or spilling contaminated surface soil over the sides of the truck. Additional precautions will be employed, such as positioning haul trucks over plastic sheeting/tarps, to capture any surface soil that was spilled during loading. Haul trucks will be inspected per requirements discussed in Section 5.3.2.

Disposal of Lead- and Mercury-Impacted Soil

Thermal treatment of mercury, while feasible, is outside of the scope of this contract, and thermal treatment of lead may only stabilize lead in soil, rather than reducing total lead concentrations. Therefore, approximately 16 cubic yards of metals-impacted surface soil from Area 1 will be transported to an off-site permitted disposal facility under the appropriate manifest. If impacted soil is deemed hazardous waste, the soil will be transported by an approved Defense Reutilization Marking Office (DRMO) (or Defense Logistics Agency [DLA]) transporter to an approved DRMO hazardous waste disposal facility.

5.2.2 Ex-Situ Thermal Treatment of PAHs in Soil using the VEG Technology

Excavation Limits and Volumes

Area 2 encompasses an approximate surface area of 20,592 square feet, with an estimated 761 cubic yards (in-situ) of surface soil that exceed the residential soil RSLs for PAHs, including benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and dibenz(a,h)anthracene. Area 2 will initially be excavated to a depth of 1-foot surrounding sample locations LL9ss-096 and LL9ss-097 to the extents shown on Figure 1-4. Impacted soil and potential topsoil vegetation/debris will be loaded directly into haul trucks, transported to RVAAP-38 NACA Test Area AOC (see Section 5.2.2), and treated using the VEG Technology, in accordance to procedures in Section 5.2.4.

Soil Stockpiling and Transportation

PAH-impacted soil from Area 2 will be thermally treated using the VEG Technology. As previously mentioned in Section 1.0, the VEG remediation system will be staged at the RVAAP-38 NACA Test Area AOC for the duration of the project. Therefore, PAH-impacted soil and any potential co-mingled topsoil vegetation/debris from Area 2 will be loaded directly into haul trucks, covered with tarps and transported from the Load Line 9 AOC to the NACA AOC following the haul route provided on Figure 4-1. In the event that impacted soil requires stockpiling at the AOC (e.g., the haul truck is inoperable), the soil will be stockpiled within the limits of the excavation.

Care will be taken to avoid over filling the hauling trucks or spilling contaminated surface soil over the sides of the truck. Additional precautions will be employed, such as positioning haul trucks over plastic sheeting/tarps, to capture any surface soil that was spilled during loading. Haul trucks will be inspected per requirements discussed in Section 5.3.2.

At the NACA Test Area AOC, impacted soil will be unloaded on top of impermeable plastic sheeting/tarps within the designated stockpiling area to minimize contact between impacted and native soil at the ground surface (see Drawings in Attachment B). Any large solid waste (brick, concrete, other metal waste) which may be easily separated from soil will be removed and temporarily disposed in a roll-off bin prior to separating the soil into 100 cubic yard stockpiles. To ensure native soil beneath the plastic sheeting/tarps are not impacted, soil sampling beneath the stockpiling area will be performed at the end of all remedial activities and compared to native soil samples collected prior to stockpiling contaminated soil (see Section 6.4). Sand bags will be used to secure tarps if necessary. In addition, all exposed surface soil stockpiles in the NACA Test Area AOC will be covered at the end of each workday and during periods of severe weather.

Each AOC, or individual excavation areas within each AOC, will be assigned a sub-area within the designated stockpiling area located at the NACA VEG Treatment Area, as shown on the Drawings in Attachment B. Stockpiles will be placed in grid pattern that will generally follow the grid pattern below, oriented in the north-south direction with additional grid cells added should additional soil stockpiles be necessary:

R1C1	R1C2	R1C3	R1C4
R2C1	R2C2	R2C3	R2C4
R3C1	R3C2	R3C3	R3C4

Each stockpile will be labeled and covered prior to and after thermal treatment to minimize dust generation and cross-contamination between treated and un-treated stockpiles. Contaminated tarps previously in contact with pre-treated soil will be disposed of (in accordance with Section 7.0 herein) and replaced with new, clean tarps prior to covering treated soil stockpiles, minimizing potential cross-contamination. The ultimate fate of each treated stockpile (e.g., returned to the AOC and used as clean backfill or subjected to another round of thermal treatment) will be determined based on the results of post-treatment soil sampling. Detailed sampling procedures are specified in Section 4.2.2 of the SAP (Appendix I) and summarized briefly in Section 6.3 herein.

VEG Thermal Treatment Process

As previously implemented at a pilot-test scale at the RVAAP-50 Atlas Scrap Yard Site (Endpoint, 2015), the VEG Technology employs a low-temperature, indirect-fire (i.e., no incineration) approach to thermal treatment of PAHs in soil. At the core of the VEG treatment system is a highly efficient, patented mobile vapor energy generator, which initially utilizes propane, air, and water to generate steam at temperatures upward of 1,800 degrees (^{o}) Fahrenheit (F). A 4,000-gallon tank for storing water from a municipal source, a propane tank and a portable 100-kilowatt diesel generator will be maintained onsite (see Drawings in Attachment B) in support of steam generation, with ambient atmospheric air provided as the necessary air source.

The steam created through the VEG's vapor generator is in turn placed into contact with the impacted soil within a fully enclosed and sealed treatment chamber. Over time and as the steam comes into full contact with the soil, the steam serves to eliminate the soil moisture, thereby raising soil temperatures from ambient levels to the target temperature range of 500 to 700 ^{o}F, shown to be adequate for desorption of PAHs (and other fuels) from soil. Soil temperatures within the enclosed treatment chamber will be continuously monitored throughout the treatment process using thermocouples, demonstrating that soil have reached target treatment temperatures. It should be noted that the input steam temperature, target soil treatment temperature, and duration of treatment at the target soil treatment temperature to achieve the desired treatment for a similar soil types were previously identified during the pilot test performed at the RVAAP-50 Atlas Scrap Yard Site (Endpoint, 2015). During this pilot test the aforementioned parameters were determined to be approximately 1,400 ^{o}F (input steam temperature), 650 ^{o}F (target soil treatment temperature), and a treatment duration of 22 minutes; these parameters will be refined for Load Line 9 AOC treatment as part of the first few days of thermal treatment of Area 2 soil from this AOC.

Upon reaching target soil temperatures and as PAHs transition from solid phase adsorbed to soil to vapor phase, PAH concentrations remaining adsorbed to soil are significantly reduced or fully eliminated, rendering the soil adequate for reuse pending the results of post-treatment sampling outlined in Section 6.0 herein. Concurrent to the desorption process, a vacuum system internal to the sealed treatment chamber extracts and captures the PAH-laden vapors removed from the soil, where they are subjected to thermal oxidation for elimination of PAHs within a temperature range of 1300 ^{o}F to 1500 ^{o}F. The destruction efficiency of semi-volatile organic compounds within this range is 99.9%. It should be noted that prior to thermal oxidation, the PAH-laden vapors are routed through a designated enclosed filtration chamber, where the interaction between the carbon inherent to the PAH-laden vapors, steam, and hydrogen combine to form a synthetic gas (syngas), comprised largely of hydrogen, which is routed to the thermal oxidizer to supplement propane as a renewable source of fuel for ongoing treatment operations. Following treatment, thermally oxidized vapors will be discharged to the atmosphere.

Thermally oxidized vapors will be subject to routine sampling (hourly sampling using a photoionization detector [PID] to sample the influent (pre-oxidation) and effluent (post-oxidation) PAH concentrations, and bi-weekly sampling via polyurethane foam sorbent samples sent to the laboratory for analysis using USEPA Method Toxics Organics 13 (TO-13) to demonstrate a target destruction efficiency of 99%. The PID will be calibrated to isobutylene, which is close to the midpoint ionization point for most organic compounds and is not flammable or toxic at low concentrations used in calibration. In order to adapt the results for PAH readings, a response factor of 0.4 will be multiplied to the PID reading to obtain the corrected value for PAHs.

Additional information regarding the VEG technology can be found in the "*Implementation Report for Bench- and Pilot-Scale Testing Ex-Situ Thermal Treatment of Polycyclic Aromatic Hydrocarbons in Soils," (Endpoint, 2015) and* at http://www.endpoint-inc.com/wp-content/uploads/2012/06/VEG-Soil-Remediation-Technology-2015.pdf.

Thermal Treatment of Surface Soil

As previously indicated, Area 2 at the Load Line 9 AOC is characterized by an estimated 761 cubic yards of PAH-impacted surface soil near locations LL9ss-096 and LL9ss-097 (see Figure 1-4) targeted for thermal treatment using the VEG Technology. The ex-situ VEG system will be staged at the western end of the NACA VEG Treatment Area (Figure 4-1 and Attachment B), where excavated soil will be stockpiled in accordance with Section 5.2.2. Anticipated staging areas for the VEG system and related equipment is shown on the Drawings in Attachment B. In the case that staging areas require modification, all changes will be coordinated with and approved by OHARNG and USACE LRL.

Soil treatment and VEG operation will be performed using the following procedure:

- Stockpiles containing impacted soil, along with any co-mingled topsoil vegetation, will be uncovered and placed into the VEG treatment chamber using a front-end loader and sealed with a thermal vapor cap.
- After sealing the chamber, the system operator will turn on the system, initiating the flow of water, followed by the flow of propane to the igniter.
- Heated steam will be injected to the VEG treatment chamber through a manifold to distribute heat to all soil within the chamber. Vapors will be captured from the chamber via a collector manifold.
- The pile temperature will be monitored utilizing thermocouples within the chamber recording their data to a datalogger. The VEG system will be monitored by an operator who will record operating parameters of the system (e.g., temperature and PID readings) hourly during operation, and logged on the VEG monitoring log included in Attachment A.
- Soil treatment will be complete once the soil has been heated at the target temperature range (500 ^{o}F to 700 ^{o}F) for a minimum of 22 minutes.
- Following treatment, the system will be turned off. The treatment chamber will be unsealed after a brief cool down period and the soil will be transported to the stockpile area to be stored in 100 CY

stockpiles pending confirmation sampling. Dry soil may require wetting to reduce fugitive dust emissions.

Each stockpile of treated soil will be sampled as described above and in Section 6.3, to demonstrate efficacy of treatment. Upon demonstration of compliance with the residential soil RSLs, soil will be transported back to the Load Line 9 AOC for backfilling and compaction in accordance with procedures in Section 8.0. Any treated soil stockpiles not meeting the residential soil RSLs will be subject to retreatment and resampling per the procedures referenced above, until such time that the post-treatment stockpile concentrations meet the residential soil RSLs for all COCs.

5.2.3 Unforeseen Materials

In the event that an unsafe or unexpected material (e.g., explosive components, drums, cylinders, abandoned pipelines or utilities) is encountered during any phase of excavation, treatment or disposal activities, work will cease immediately and the Alaniz-Endpoint Team Project Manager, USACE COR, and ARNG/OHARNG Representative will be notified. A plan of action will be established and agreed upon by the appropriate parties. Excavation work will not resume until the approved plan has been implemented and approval has been granted by the USACE COR. If the discovery results in a change to the scope, objectives, or schedule of this RD, the Alaniz-Endpoint Team will notify the USACE COR. Additional revisions and/or corrective actions may be requested by the Alaniz-Endpoint Team to account for these unexpected changes.

With any ground disturbing activity, there is always the potential for an inadvertent discovery of human remains, funerary objects, or other potential historical or archaeological items. If such items are encountered during excavation activities, excavation will immediately stop and the OHARNG Cultural Resources Manager (CRM), Alaniz-Endpoint Project Manager, USACE COR, and ARNG/OHARNG Representative will be notified. If the CRM is not available, the discovery will be reported to the Camp James A. Garfield Range Control.

The CRM or Camp James A. Garfield Range Control will collect and retain any artifacts or remains, as appropriate. In the event that human remains are discovered, precautions will be taken to ensure that the remains are not removed or further disturbed. The OHARNG Standard Operation Procedures for inadvertent discovery of cultural material will be followed. Excavation activities will not resume until the project site has been released by the OHARNG CRM.

5.3 BEST MANAGEMENT PRACTICES

Best management practices are activities that will be conducted to prevent the migration of contaminated soil during excavation, transportation, and thermal treatment activities. The following BMPs will be conducted within each excavation area:

- Dust Control and Maintaining Roadways/Haul Routes;

- Haul Truck Inspection;
- Excavation Water and Stormwater Management; and
- Good Housekeeping.

5.3.1 Dust Control and Maintaining Roadways/Haul Routes

Dust may be generated during initial site clearing, excavation activities and during soil handling and transportation. Unnecessary dust will be avoided by maintaining vehicle traffic to within the posted speed limits and by applying water to dirt roads. A 4,000-gallon water truck will be available onsite for dust control and for further use by the VEG Technology for generation of steam necessary for thermal treatment. The project site and roadways will be maintained free of mud throughout construction activities by performing haul truck inspections per Section 5.3.2 and requiring trucks to drive through designated egress locations with track-out grates to collect excess dirt and mud prior to entering paved roadways. In addition, street sweepers will be used, if necessary, to clear any excess mud from Camp James A. Garfield roadways. As previously indicated, the haul route from the Load Line 9 AOC to the anticipated VEG Technology staging area at the NACA Test Area AOC and the haul route for transporting metals-impacted soil off-site are shown on Figure 4-1.

The presence of nuisance dust will be monitored throughout construction activities using a dust meter (mini-ram) by Alaniz-Endpoint Team personnel in compliance with Akron Air requirements. Dust measurements will be collected following continuous visible dust generation that lasts for a duration of 20 minutes. If dust readings exceed 1 milligram per cubic meter (mg/m3) at a distance of 200 feet downwind of construction activities, water will be applied to the soil to mitigate dust generation.

All soil piles created as a result of the remedial action described in this work plan are temporary and are associated with this remedial action. Stockpiled soil will be covered when not in use. In the event of fugitive dust releases being observed during transfer to and from the treatment system, water will be applied to suppress dust. Soil will be covered during treatment; thus, no dust is anticipated during this step.

During instances of high-velocity wind, additional dust measures may be implemented including covering soil stockpiles with tarps and temporarily suspending excavation or transportation activities. Visual dust monitoring will be conducted in accordance with the SSHP to be submitted under separate cover.

5.3.2 Haul Truck Inspection

The Alaniz-Endpoint Team will inspect haul trucks and fill out a Truck Inspection Form (Attachment A) prior to leaving the excavation area workspaces or entering paved roads. If necessary, mud will be cleaned off tires with hand tools (e.g., shovel, broom, brush). Trucks will also be inspected for surface soil on the exterior of the truck bed as a result from the loading process. Prior to exiting the loading area, any adhered contaminated surface soil will be brushed off of the haul truck onto the plastic sheeting beneath the truck loading area, collected and either added to the haul truck’s load or to the corresponding untreated surface soil stockpiles slated for thermal treatment.

5.3.3 Excavation Water and Stormwater Management

5.3.3.1 Excavation Water

Excavation water is considered any water that accumulates during excavation activities that has come into contact with contaminated surface soil (e.g., rainwater that collects within excavation areas or water from equipment decontamination, see Section 5.4). During severe weather (rain, high-velocity wind), measures will be taken to avoid generating excavation water. Such measures will be determined onsite and may include covering the open excavation areas with tarps weighted down with sandbags to prevent accumulation of excavation water and soil migration and diversion of off-site run-off away from the excavation.

In the event that excavation water is generated, the Alaniz-Endpoint Team will have a temporary water storage tank on standby at the NACA Test Area AOC, ready to mobilize to the appropriate excavation site when necessary. The Alaniz-Endpoint Team will be responsible for pumping excavation water to the temporary storage tank and ensuring that no leaks are present. Excavation water collected from Area 2 (PAH-impacted), will not require disposal as it will be transported to the NACA Test Area AOC and recycled within the VEG Technology's vapor generator for complete oxidation and transformation into a hot, clean steam to be used as the heat source in support of ongoing thermal treatment of soil (see Section 5.2.2). Any metals-impacted excavation water generated from Area 1, expected to be limited in volume due the small remediation volume and the use of disposable sampling equipment, will be disposed of within the truck bed transporting Area 1 soil for off-site disposal, assuming the amount of impacted-water does not exceed 30 gallons. In doing so, the Alaniz-Endpoint Team will ensure free water is not present in the haul trucks and there are no liquids escaping the truck bed.

If the volume of metals-impacted excavation water from Area 1 proves to be greater than what is manageable for disposal/transport within the truck bed, the water will be drummed (in DOT-approved, 55 gallon closed-top drums), labeled, profiled via the sample results used for metals-impacted soil, and disposed of off-site under a waste manifest, in accordance with methods described in Section 7.0 and Standard Operating Procedure -7 (SOP-7) of the SAP (Appendix I) and Section 7.0 herein. Similarly, in the event that metals-impacted excavation water is generated prior to completing soil excavation activities within Area 1 (e.g., rainwater collects within the partially excavated pit, despite minimizing the accumulation of such water by covering open pits with tarps), the excavation water will be pumped to and temporarily stored in open-top 55-gallon drums with sealed bung-top lids. Depending on the volume of excavation water collected, the water will either be added to the truck bed containing metals-impacted soil prior to disposal or temporarily stored, transported and disposed within a closed-top 55-gallon drum using the same profile as soil from Area 1 (see Section 7.5).

If confirmation sample results indicate additional soil requires excavation, storm water that collects in the excavation pit will be drummed as indicated above.

5.3.3.2 Stormwater

Stormwater is considered any water that accumulates that has not come in contact with contaminated soil, such as water that collects on top of tarps covering open excavations. Stormwater that has accumulated in low areas of the AOC may be discharged onsite over the ground surface in a manner that will avoid creating excess ponding and mud (e.g., discharged at a slow to moderate rate though a filter bag and on top of plywood in a well vegetated area). The Alaniz-Endpoint Team will track any non-contaminated stormwater releases on daily Quality Control (QC) forms and on an OHARNG Stormwater Release Form (Attachment A). Anticipated stormwater discharge locations are provided in Attachment B.

Stormwater run-on to the excavation areas will be controlled to prevent the transportation of sediment and mud to the excavation. Silt Fence will be used to reduce and/or divert the flow of stormwater from the excavation area, and capture sediment transported by stormwater. The installation of silt fence is described in further detail in the next section.

If confirmation samples results indicate the extent of the contaminated soil excavation is complete, any storm water collected within open excavations will be considered “clean” and can be pumped out of the excavation in accordance with the OHARNG Stormwater Release Form.

5.3.3.3 Sediment Management

Silt fence will be installed to prevent sediment from entering each excavation, and to divert upgradient stormwater away from the excavation. Silt fence will also be installed between working areas and surveyed wetlands to prevent potentially impacted soil migration. All silt fence will be maintained until post-construction vegetation is reestablished. The approximate location of silt fencing is provided in the design drawings included in Attachment B.

Silt fence will be installed by partially burying the fence material to prevent water from flowing under the fence and help anchor the fence. The fence will be installed in a trench 6 inches deep and secured to posts 10 feet apart. The fence will be installed on the side of stakes facing where water flow will come from. Fence material will be secured to posts using 3 to 5 staples from a heavy-duty staple gun, or equivalent. Once the silt fence is attached to the posts, the trench will be filled with the soil removed from the trench and tamped to compact the soil and secure the posts. Details of silt fence installation are provided on Figure B-3 in Attachment B.

5.3.4 Good Housekeeping

Good housekeeping practices are designed to maintain a clean and orderly work environment. Measures will include at a minimum:

- Regularly pick up and dispose of any garbage or construction waste;
- Maintain clear and organized work areas;

- Conduct daily equipment inspections; and
- Perform preventative maintenance on equipment to ensure it is in proper working condition.

The first equipment inspection shall be documented on a Safety Checklist for Machinery Form provided in Attachment A. Subsequent daily inspections will involve double-checking all items on the Safety Checklist, with any deviations immediately reported to the SSHO and the Alaniz-Endpoint Team Project Manager, followed by corrective action. Any implemented corrective actions will be noted on the Daily QC Report.

5.4 EQUIPMENT DECONTAMINATION

To further prevent migration of contaminated soil, measures will be implemented to minimize contact with impacted surface soil. In addition, disposable sampling equipment (e.g., foil pans and zip lock bags) and a step-probe sampler will be used for soil sampling, reducing the need to decontaminate sampling equipment. The step-probe sampler will be decontaminated after all aliquots have been collected for ISM/composite samples.

Near the location of each excavation, a decontamination pad will be installed and utilized as necessary for decontamination of equipment. Equipment used to excavate, load, or haul contaminated surface soil will be thoroughly decontaminated prior to contact with native sediments or treated surface soil, and prior to demobilization from the site or AOCs. In addition, equipment will be decontaminated prior to being used in other excavation areas/AOCs (e.g., equipment used in Area 1 will be decontaminated prior to use in Area 2). Equipment, including the backhoe bucket and other parts of equipment that come in contact with contaminated soil (tracks wheels, undercarriage of equipment, etc.), will be decontaminated by manual wiping or brushing off surfaces, followed by rinsing either by direct steam from the VEG system (if located at the NACA Test Area AOC) or rinsed using clean water (i.e., water obtained from an approved off-site source that has been previously sampled; the same water used for dust control). At the conclusion of all operations at the AOC, all equipment will be decontaminated, and the decontamination pad will be dismantled and placed, along with any fluids or collected soil, in the next load of waste to be hauled for disposal.

Decontamination of equipment in contact with PAH-impacted soil (i.e., Area 2) will be performed over a designated decontamination area (see Drawings in Attachment B) lined with impermeable plastic sheeting/tarps. The generated liquid investigation derived waste (IDW) will be collected and temporarily stored in the same tank used to store any generated PAH-impacted excavation water, and transported to the NACA Test Area AOC, where the liquid IDW will be recycled within the VEG Technology's vapor generator. If the volume of PAH-impacted decontamination/excavation water exceeds the temporary storage tank's capacity or the capacity of the VEG units, the water will be drummed, profiled in accordance with the SAP (Appendix I) and disposed under the appropriate manifest.

Decontamination of equipment in contact with metals-impacted soil (i.e., Area 1), will be performed over the haul truck bed containing impacted soil for off-site disposal. Due to the use of disposable sampling equipment, the anticipated volume of decontamination water added to the haul trucks will be minimal and the total amount of water added to the trucks will be confirmed to be less than 30 gallons. The water used for decontamination will not change the chemical profile of the soil. During both decontamination processes, the Alaniz-Endpoint Team will ensure no liquids escape the truck bed or decontamination areas.

If the volume of metals-impacted decontamination water proves to be greater than what is manageable for disposal/transport within the truck bed, the water will be drummed, profiled via sampling, and disposed of off-site under a waste manifest, in accordance with methods described in Section 7.0 of the SAP (Appendix I) and Section 7.0 herein. Management of non-liquid IDW is also discussed in Section 7.0 herein.

In the event of a release of untreated or untested decontamination water, the area of the release shall be investigated including collecting soil or sediment samples and analyzing for project COCs, quantify any impacts. Following any release (soil or liquid), the root cause of the release will be determined and steps taken to eliminate any future releases. Corrective measures that may be taken include an increase in the size of the stormwater control and/or a reduction in the volume of soil being stockpiled onsite for treatment.

6.0 WASTE PROFILE AND CONFIRMATION SAMPLING

This section describes the sampling process to be implemented in support of remediation activities at the Load Line 9 AOC. Specifically, the following types of sampling will be performed:

- Area 1 (lead and mercury) profile sampling and excavation pit confirmation sampling: profile sampling will be performed to determine the waste profile and identify the appropriate disposal facility for off-site transport and disposal. Excavation pit sampling will be performed to confirm soil remaining in place following excavation in Area 1 meet FWCUGs for lead and mercury;
- Area 2 (PAHs) excavation pit sampling: excavation pit confirmation sampling will be performed to confirm soil remaining in place following excavation in Area 2 meet USEPA RSLs;
- Thermally treated (PAH) soil stockpiles: post-treatment soil stockpile sampling will be performed to confirm COC concentrations in treated soil are protective of RSLs and may be reused as backfill for the excavation pits.;
- Native Soil Confirmation Sampling: surface soil beneath impacted-soil stockpiling locations will be sampled to confirm no impacts above RSLs for site related COCs; and
- Imported soil to be used as backfill for Area 1 (potential backfill source is Patrick Excavating and Trucking in Ravenna, Ohio): imported soil sampling will be performed, per the SAP to ensure no impacted material is introduced to the site. Results from the imported soil analysis must be at or below respective FWCUGs or residential RSLs and approved for use by the ARNG/OHARNG Representatives prior to being brought to Camp James A. Garfield.

6.1 AREA 1 CONFIRMATION AND PROFILE SAMPLING

6.1.1 Waste Profile Sampling

Prior to excavating metals-impacted soil from Area 1, one in-situ waste profile sample will be collected from within the Area 1 excavation limits. Profile samples will ensure that impacted soil slated for disposal, in addition to any impacted solid/liquid waste from Area 1 or Area 2, is properly handled, transported and disposed. Collecting profile samples prior to soil excavation will allow adequate time to receive profile sample results, ensuring waste disposal is not delayed and that impacted soil/waste are handled by the appropriate transporter (DRMO if hazardous) and disposed at the appropriate disposal facility. The results of the waste profile samples will be reviewed, approved and signed by the Camp James A. Garfield Environmental Office, prior to commencing excavation activities. All waste will be transported and disposed of in accordance with Section 7.5 herein.

One 8-point composite in-situ soil sample (with aliquots collected from the 0-1 ft bgs range) will be collected within the Area 1 metals-impacted soil excavation boundaries. The waste profile sample will be analyzed for toxicity characteristic leaching potential (TCLP) metals, TCLP semi-volatile organic compounds (SVOCs), TCLP pesticides, TCLP herbicides, total cyanide, PCBs, TCLP volatile organic compounds (VOCs), total sulfide, pH and flashpoint. A summary of analytical requirements and testing methods is provided in Table 6-1. Waste profile samples will be collected in accordance with the procedures outlined in Section 4.2.2.3 of the SAP (Appendix I) and labeled in accordance with the nomenclature for Category 3 soil provided in Section 4.2.1 of the SAP. Any additional analyses required by the disposal facility will also be performed.

Table 6-1. Waste Profile Sampling Analytical Requirements

Parameters [1]	Analytical Methods
TCLP (Metals, Pesticides, Herbicides, SVOCs)	SW-846 7470/8081/8270/1311/6010
TCLP (VOCs)	SW-846 1311/8260
Total Cyanide	SW-846 9012/9034
Total Sulfide	SW-846 9012/9034
PCBs	SW-846 8082
pH	SW-846 9040, 9045
Flashpoint	SW-846 1010

[1] Additional parameters may be required by the waste disposal facility. The waste disposal facility has not been selected at the time of this design.
PCB = Polychlorinated biphenyl
SVOC = Semi-volatile organic compound
TCLP = Toxic characteristic leaching procedure
VOC = Volatile organic compound

6.1.2 Excavation Pit Confirmation Sampling

The preliminary dimensions of the Area 1 excavation pit, as shown on Figure 1-4, are anticipated to approximate 24 feet (length) x 18 feet (width) x 1-foot (depth). Based on this initial excavation configuration, confirmation soil sampling of the Area 1 excavation pit will consist of collecting four ISM sidewall samples (one ISM sample per sidewall), as shown on Figure 6-1. Sidewall samples will consist of aliquots collected from varying depths along the side of the excavation pit. In addition, one ISM excavation bottom sample will be collected (see Figure 6-1). All ISM confirmation sampling will be conducted in accordance with procedures outlined in Section 4.2.2 of the SAP (Appendix I) and all samples will be labeled in accordance with the nomenclature for Category 1 soil provided in Section 4.2.1 of the SAP and further specified in Table 6-2 herein. Based on the aforementioned anticipated dimensions and specified sampling intervals, a minimum of 5 ISM samples are proposed. These samples will be analyzed for lead and mercury as indicated in the SAP in Appendix I.

Based on excavation pit confirmation sampling results and related comparison to the FWCUGs, further excavation in a given direction may be warranted. Subsequent step-out sampling will be used to determine whether excavation may be ceased or whether an additional excavation step out is necessary. If soil analytical results exceed FWCUGs along the southern side of the Area 1 excavation sidewall, as shown on Figure 6-1, the excavation pit will be laterally extended out to the limits of historical surface soil sample LL9ss-134 (see Figure 6-1), which was previously confirmed to be below site-specific FWCUGs, with the step-out area vertically extended 6-inches in depth. If analytical results exceed FWCUGs along the northern side of the Area 1 excavation sidewall, excavation step-outs to the north will be required. The first excavation step-out in the northern direction will approximate 5 feet laterally and 6-inch vertically. If the confirmation sample from the first northern step-out still remains in exceedance of FWCUGs, the excavation area will be laterally expanded to the limits of LL9ss-034, as shown on Figure 6-1. If confirmation sample results along the eastern or western side of the excavation sidewall are in exceedance of FWCUGs, the excavation pit will be expanded in the given direction in 5-foot lateral and 6-inch vertical step-outs, until sampling confirms that all COCs in exceedance of FWCUGs have been removed. Lastly, in the case that the bottom sample is in exceedance of FWCUGs, the depth of the entire excavation pit will step-down by 6-inch intervals.

6.2 AREA 2 EXCAVATION PIT CONFIRMATION SAMPLING

The dimensions of the Area 2 excavation pit are anticipated to approximate 176 feet (length) x 117 feet (width) x 1-foot (depth). Based on this initial excavation configuration, confirmation sampling at this location will consist of collecting ISM sidewall samples at intervals shown on Table 6-2. Sidewall samples will consist of aliquots collected from varying depths along the side of the excavation pit. In addition, two ISM excavation bottom samples will be collected; one sample for each approximate 88-foot by 117-foot surface area at the bottom of the excavation pit (see Figure 6-1). All sampling will be conducted in accordance with procedures outlined in Section 4.2.2.1 of the SAP (Appendix I) and will be labeled in accordance with the nomenclature for Category 1 soil provided in Section 4.2.1 of the SAP and specified in Table 6-1 herein. Based on the aforementioned anticipated dimensions and sampling intervals, a minimum of 6 sidewall and 2 bottom samples (total of 8 ISM samples) are proposed. These samples will be analyzed for PAHs and MOR indicated in the SAP in Appendix I.

Similar to sampling performed in Area 1, further excavation step-outs in a given direction may be warranted to determine whether excavation may be ceased or whether an additional excavation step out is necessary. If sidewall samples from any side of the Area 2 excavation pit report analytical results that exceed RSLs, a lateral step-out of 10 feet will be implemented, whereas if an excavation pit bottom sample exceed RSLs, the depth of the excavation pit sub-area, from which the ISM sample was collected, will be expanded down in 6-inch intervals until PAH concentrations are confirmed to be below respective RSLs.

The entire volume of PAH-impacted soil removed from Area 2 will be thermally treated and reused for site restoration.

Table 6-2. Sample Identification for Confirmation Sampling

Area	Station Location	Sample ID	Sample Description
Area 1	LL9cs-136M	LL9cs-136M-####SO	Northern Sidewall (Point 1 to 2)
	LL9cs-137M	LL9cs-137M-####SO	Eastern Sidewall (Point 2 to 3)
	LL9cs-138M	LL9cs-138M-####SO	Southern Sidewall (Point 3 to 4)
	LL9cs-139M	LL9cs-139M-####SO	Western Sidewall (Point 1 to 4)
	LL9cs-140M	LL9cs-140M-####SO	Excavation Bottom (Entire Floor)
Area 2	LL9cs-141M	LL9cs-141M-####SO	Northern Sidewall (Point 1 to 2)
	LL9cs-142M	LL9cs-142M-####SO	Eastern Sidewall-North (Point 2 to 3)
	LL9cs-143M	LL9cs-143M-####SO	Eastern Sidewall-South (Point 3 to 5)
	LL9cs-144M	LL9cs-144M-####SO	Southern Sidewall (Point 5 to 6)
	LL9cs-145M	LL9cs-145M-####SO	Western Sidewall-South (Point 4 to 6)
	LL9cs-146M	LL9cs-146M-####SO	Western Sidewall-North (Point 1 to 4)
	LL9cs-147M	LL9cs-147M-####SO	Excavation Bottom-North (Points 1, 2, 3 & 4)
	LL9cs-148M	LL9cs-148M-####SO	Excavation Bottom-South (Points 3, 4, 5 & 6)

cs: confirmation sample
M: Incremental Sampling Methodology
LL9: Load Line 9
SO: Soil Sample
Sample Identifier #### will be chosen during field implementation to ensure a duplicate number is not used.

6.3 THERMALLY TREATED SOIL STOCKPILE CONFIRMATION SAMPLING

Following VEG thermal treatment activities, treated soil stockpiles will be sampled per the procedures outlined in Section 4.2.2.2 of the SAP (Appendix I), including collection of one 8point composite sample per each 100-cubic yard treated stockpile. Based on the anticipated in-situ dimensions of Area 2 defined in the ROD, approximately 761 cubic yards of treated soil is anticipated, yielding approximately 8 composite post-treatment soil stockpile samples. As previously indicated in Section 5.2.4, any treated stockpiles reporting post-treatment concentrations above the RSLs will be retreated and accordingly resampled until the RSLs are met. Samples will be labeled in accordance with the nomenclature defined for thermally treated soil stockpile samples (Category 2) in Section 4.2.1 of the SAP. Treated soil stockpiles with confirmation sample results below the residential soil RSLs will be transported back to the AOCs and used as backfill for site restoration activities.

6.4 NATIVE SOIL CONFIRMATION SAMPLING

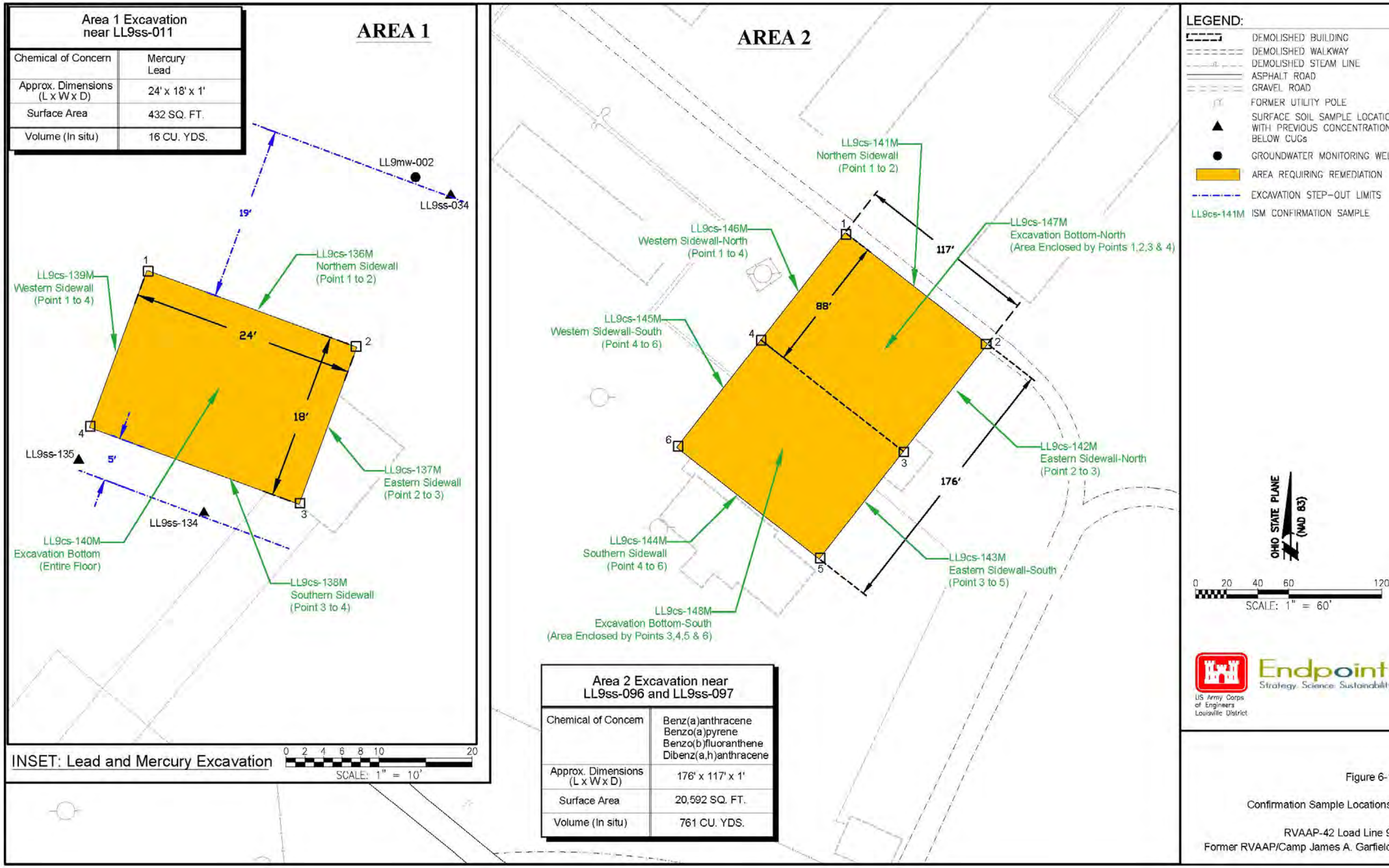
As mentioned in Section 5.2.2, before and after all remediation treatment activities at the NACA Test Area AOC, confirmation soil sampling will be performed within the footprint of the impacted-soil stockpile locations to confirm that native soil beneath the tarps underlying impacted-soil stockpiles is not affected. One ISM sample (with aliquots from the 0-1 ft bgs range) will be collected prior to stockpiling contaminated soil and one ISM sample will be collected once the soil stockpiling areas are no longer in use toward the end of the remedial action. The ISM soil sample will be collected in accordance with procedures specified in the SAP (Appendix I) and analyzed for all site-related COCs. In the event that soil beneath the tarps are found to be in exceedance of respective RSLs, one foot of soil beneath the former stockpiling area will be removed and disposed, followed by an additional ISM confirmation sample.

6.5 QA/QC SAMPLES

In addition to the samples referenced above, QC samples (including duplicate, matrix spike/matrix spike duplicate and USACE QA split samples) will be collected for each aforementioned location in accordance with the frequency, procedures and analysis outlined in Section 4.2.2.4 and indicated in the SAP (Appendix I). Data Quality Objectives and procedures for collecting excavation sidewall, excavation bottom, in-situ metals-impacted profile sampling, treated soil stockpile sampling and native soil confirmation sampling are also provided in the SAP (Appendix I).

6.6 SAMPLE ANALYSIS

All confirmation and profiling samples will be preserved and transported to Eurofins/Test America Laboratories in Savannah, Georgia, in accordance with Section 6.0 of the SAP (Appendix I). Confirmation sample results will be provided within 24-hours following receipt of samples. The Alaniz-Endpoint Team QA Manager will use laboratory results to confirm confirmation samples meet established FWCUGs/RSLs and to properly profile soil or any encountered vegetation/debris/solid waste slated for disposal. The USACE COR and ARNG/OHARNG Representative will be notified of the evaluations and results. If any sample does not meet FWCUGs/RSLs, the evaluation will include a description of the additional excavation based on the approach described in Sections 6.1 and 6.2. Sampling results will be included in the Remedial Action Completion Report (see Section 9.6.2).



Basemap Source: Leidos, 2017. Final Proposed Plan for Soil, Sediment and Surface Water at RVAAP-42 Load Line 9. Drawn by P. Holm

7.0 WASTE MANAGEMENT

This section describes waste profiling, transportation, and waste disposal activities that will be performed in response to remedial activities described in this RD. Waste is considered any indigenous IDW (e.g., excavated surface soil containing lead and mercury, excavation water) or non-indigenous IDW generated as part of remedial or sampling activities. All waste will be properly segregated, handled, characterized, managed, transported and disposed of in accordance with the federal, state and local laws, and in accordance with Section 7.0 and SOP-7 of the SAP (Appendix I), federal requirements, and the Camp James A. Garfield Waste Management Guidelines. All waste will be profiled and handled accordingly prior to project completion. Any transportation of solid or hazardous waste off-site will comply with all appropriate federal and state laws. Waste generated during the remedial action, including trees/vegetation that are mulched onsite, will be tracked using the Waste Tracking Form provided in Attachment A. This waste tracker will be submitted to the OHARNG at the completion of the remedial action. Table 7-1 presents each potential waste stream for this RD.

7.1 WASTE STREAM IDENTIFICATION

Waste generated within each AOC will be managed, such that the waste does not pose any threat of contamination (e.g., in liquid or solid form) to areas/media that is otherwise not contaminated. Waste is generally categorized as either indigenous or non-indigenous IDW. As mentioned in Section 6.1.1, in-situ profile samples will be collected from Area 1 prior to initiating excavation work. The results of these profile samples will be used to identify the correct transporter/disposal facility for the contaminated soil and debris (indigenous and non-indigenous IDW) from Area 1 at the Load Line 9 AOC. No profile samples will be collected from Area 2 as the PAH contaminated soil will be treated by the VEG Technology and minimal contact/sampling waste is anticipated. Profile samples will be collected and analyzed in accordance with the procedures outlined in Sections 4.2.2.2 and 4.2.2.3 of the SAP. For purposes of this RD, indigenous IDW includes the following:

- Metals-impacted soil removed from Area 1;
- Excavation water, if any; and
- Impacted topsoil vegetation or debris discovered during excavation, if any.

Whereas, non-indigenous IDW includes, but is not limited to the following:

- Disposable sampling equipment (e.g., foil pans and zip lock bags);
- Sanitary waste, trash, or solid waste (concrete, bricks, metal waste, etc.);
- Contact waste (e.g., personal protective equipment, plastic tarps/sheeting); and
- Decontamination fluids.

Non-indigenous and indigenous liquid IDW will be managed in accordance with Sections 5.3.3 and 5.4.

To this extent, liquid IDW requiring off-site disposal is not anticipated, with the exception of the anticipated small volumes of metals-impacted excavation/decontamination water, which will be added to the truck beds containing metals-impacted soil for off-site disposal. However, in the event that sufficient volume of impacted liquid IDW is generated (e.g., such a volume of PAH- or metals-impacted water that is not capable of being recycled within the VEG vapor generator or added to the trucks containing metals-impacted soil for disposal), the liquid waste will be drummed and disposed off-site based on the profile sampling results collected from Area 1.

In general, waste management minimization procedures will be implemented to limit the volume of waste produced, including reusing materials when appropriate, minimizing contact with contaminated materials, minimizing foot and vehicular traffic through potentially contaminated areas and employing general good housekeeping practices, such as those previously discussed in Section 5.3.4.

7.2 WASTE STREAM MANAGEMENT

Characteristics for each waste stream include: the point of generation, staging and processing, characterization, and waste handling. All IDW will be sampled and characterized in accordance with Section 7.0 of the SAP (Appendix I). Table 7-1 presents each potential waste stream for this RD.

7.3 IDW FIELD STAGING

An IDW Field Staging Area (FSA) to temporarily store 55-gallon drums containing solid and liquid IDW will be designated at each AOC (see Drawings in Attachment B) at the beginning of field activities, with the final location approved by the ARNG/OHARNG Representative. The FSA will be constructed using impermeable plastic lining with raised edges for secondary containment to prevent any potential spilled liquid from escaping. In addition, the FSA will have an orange construction fence surrounding it and it will be managed in accordance with Section 7.0 of the SAP (Appendix I) and the Camp James A. Garfield Waste Management Guidelines. Solid and liquid IDW drums stored at each AOC FSA will be removed within 30 days of generation. If non-hazardous IDW drums are not expected to be disposed off-site within 30 days of generation, they will be relocated and temporarily stored at Building 1036. If hazardous IDW drums are not expected to be disposed off-site within 30 days of generation, they will be relocated and temporarily stored at Building 1047.

Upon completion of excavation activities at the Load Line 9 AOC, any solid/liquid IDW drums will be transported to Building 1036/1047, where the waste will be temporarily stored. The location of the temporary IDW storage location at Building 1036/1047 will be specified by the OHARNG Representative and a containment area similar to the FSAs at each AOC will be constructed. Once all remedial work at each AOC has been completed and prior to final demobilization from the Camp James A. Garfield facility, the IDW stored at Building 1036/1047 will be transported and disposed off-site at the appropriate disposal facility.

Final inventories, in addition to container logs for IDW, will be taken and provided to the

ARNG/OHARNG/USACE LRL Representative by the Alaniz-Endpoint Team Project Manager. All identified hazardous waste containers will be disposed off-site within 90 days of the classification as hazardous waste. While a large volume of hazardous waste is not anticipated (due to direct loading of metals-impacted soil to hauling trucks and the anticipated small volume of contact waste generated from remediation of Area 1), in the event that sufficient hazardous waste is generated and requires onsite temporary storage, it will be stored at a Building 1047 and managed in accordance with Section 7.0 of the SAP (Appendix I). All non-hazardous liquid waste will have proper secondary containment and will be transported off the facility before project completion (i.e., prior to demobilization from Camp James A. Garfield). As mentioned in Section 9.4.1, hazardous waste storage areas will be inspected on a weekly basis to confirm spill equipment is maintained and no spills have occurred.

7.4 WASTE STORAGE CONTAINERS AND LABELING

Indigenous solid IDW (e.g., metals- or PAH-impacted surface soil, including any topsoil vegetation) will not require storage as these impacted media will be loaded directly into haul trucks and either transported to an approved off-site disposal facility, in accordance with Section 5.2.1 herein, or transported to the NACA Test AOC where the media will be thermally treated and reused for site restoration. All solid non-indigenous IDW (e.g., disposable sampling equipment, contact waste including tarps, and trash) will be segregated as non-contaminated and potentially contaminated material by visual inspection. Potentially contaminated material will be temporarily stored in open-top 55-gallon drums equipped with plastic drum liners and sealed with bung-top lids, as necessary. Non-contaminated sanitary waste will be temporarily stored in plastic lined trash cans with lids. IDW containers will be temporarily stored at each AOC during remedial activities for up to 30 days and non-hazardous IDW containers will be transported to the temporary storage location at Building 1036 upon completion of work at the AOC. Hazardous IDW containers will be transported to the temporary storage location at Building 1047 upon completion of work at the AOC. The IDW containers will be covered with a weatherproof tarp (weather permitting), and inspected on a weekly basis to ensure no leaks or releases occur during use. IDW storage containers will be properly labeled in accordance with Section 7.0 and SOP-7 of the SAP (Appendix I). Visually contaminated solid waste will either be added to the haul truck transporting metals-impacted soil for disposal, or disposed prior to project completion using the same profile sampling results as Area 1 soil. Non-contaminated solid IDW (sanitary trash) will be disposed off-site through a commercial municipal waste service.

The Alaniz-Endpoint Team will be responsible for providing new Department of Transportation (DOT)-approved drums. The Alaniz-Endpoint Team Project Manager will be responsible for labeling IDW containers and coordinating transportation and final disposal at a state of Ohio or federal approved treatment, storage, or disposal facility (possibly located outside of the state of Ohio). In accordance with Section 7.5 herein, if any waste is deemed hazardous, the transporter and disposal facility will be DRMO approved. The OHARNG Representative (or alternatively the ARNG Representative if waste is deemed non-hazardous) will sign all waste profiles and waste manifests for disposing project IDW at the approved location.

7.5 TRANSPORTATION AND DISPOSAL

The management, transportation, and disposal of all waste streams will be coordinated by the Alaniz-Endpoint Team Project Manager with the Camp James A. Garfield Environmental Office and performed in accordance with the Camp James. A Garfield Waste Management Guidelines and Section 7.0 of the SAP (Appendix I). All transportation paperwork for soil or possible liquid IDW (manifests or shipping papers) and on-road haul truck placards will be prepared by the Alaniz-Endpoint Team Project Manager in accordance with federal, state, and local regulatory requirements, and disposal facility requirements. The Camp James A. Garfield Environmental Office will be responsible for custody of manifest copies.

Contaminated IDW will be covered and transported by an appropriate licensed waste hauler to a licensed off-site disposal facility that has previously approved the profile of waste for disposal. Truck beds will be lined as required by state, DOT, or disposal facility requirements. As previously mentioned, if any waste is classified as hazardous waste, it will be transported by an approved DRMO or DLA transporter to an approved DRMO hazardous waste disposal facility, per the Camp James A. Garfield Waste Management Guidelines. Additional analysis may be performed based on disposal facility requirements. All manifests, shipping documents, and disposal facility approval letters will be provided to the Alaniz-Endpoint Team Project Manager and incorporated into the Remedial Action Completion Report (Section 9.6.2).

Table 7-1. Waste Stream Identification and Handling

Waste Stream	Point of Generation	Staging/Processing	Characterization	Waste Handling
Above-Ground Vegetation/Debris (i.e., not in contacted with contaminated soil)	Large vegetation (trees/bushes) or debris (large rocks/boulders and railroad ballast) generated within the excavation footprint and surrounding areas required to facilitate equipment access, haul routes and loading areas.	Trees/branches greater than 3-inches in diameter and other large woody vegetation shall be cut between Oct 1st and March 30th and chipped/mulched at the AOC. Mulch and any non-contaminated debris shall be temporarily stockpiled at the AOC.	None	Mulched vegetation and any non-contaminated debris (e.g., rocks/boulders) will be evenly spread across the AOC or disposed of by the Alaniz-Endpoint Team if too large to chip/mulch. Railroad ballast will be evenly spread across former railbeds/roads.
Topsoil Vegetation/Debris (i.e., COC-impacted vegetation)	Vegetation or debris (rocks, boulders, railroad ballast/aggregate) encountered below ground surface within the excavation footprint or other vegetation/debris that may have been in contact with impacted soil.	Area 1: Topsoil vegetation/debris will not be separated from metals-impacted soil. Soil and any topsoil vegetation/debris shall be loaded directly into haul trucks. Area 2: Topsoil vegetation/debris will not be separated from PAH-impacted soil. Soil and any topsoil vegetation/debris shall be loaded directly into haul trucks.	No additional characterization Soil profile samples collected from Area 1 shall be used to characterize all waste disposed off-site.	Area 1: After direct loading to haul trucks, metals-impacted soil and topsoil vegetation/debris shall be transported and disposed of at an approved off-site disposal facility. Area 2: After direct loading to haul trucks, PAH-impacted soil and topsoil vegetation/debris shall be transported to the NACA Test Area AOC, thermally treated and reused as backfill for site restoration at the AOCs.
Solid Waste (e.g., bricks, concrete, asphalt, rebar, other metal/solid waste)	Contaminated waste encountered below ground surface within the excavation footprint or non-contaminated waste that is removed during site clearing activities.	Area 1: Solid waste will not be separated from metals-impacted soil and will be loaded directly into haul trucks. Area 2: Solid waste will be separated from PAH-impacted soil to the extent practical and temporarily disposed in a roll-off bin or in 55-gallon drums, along with any other non-contaminated solid waste from Area 1 or Area 2.	No additional characterization Soil profile samples collected from Area 1 shall be used to characterize all waste disposed off-site.	Any solid waste containers will be transported and disposed at an approved off-site disposal facility.

Table 7-1. Waste Stream Identification and Handling (continued)

Waste Stream	Point of Generation	Staging/Processing	Characterization	Waste Handling
Excavated Surface Soil from Area 1	Generated from the Area 1 excavation containing lead and mercury impacted soil.	Lead- and mercury-impacted soil (including co-mingled topsoil vegetation/debris) will be loaded directly into haul trucks for disposal off-site. Haul truck beds will be lined as required by state, Federal Department of Transportation (DOT), or disposal facility requirements.	One 8-point composite profile soil sample shall be collected from Area 1 and used to profile all contaminated soil and debris (soil/topsoil vegetation/debris from Area 1) for off-site disposal. Profile samples will be TCLP analyzed to determine the classification of contaminated soil and debris (hazardous, non-hazardous).	If TCLP results indicate the contaminated soil is hazardous, a Defense Reutilization and Marketing Service (DRMO) (or other Defense Logistics Agency [DLA] entity) approved waste transporter will transport and dispose at an approved DRMO hazardous waste facility.If contaminated soil is deemed non-hazardous, the contaminated soil and debris from Area 1 will be transported and disposed at an approved off-site facility
Excavated Surface Soil from Area 2	Generated from the Area 2 excavation containing PAH impacted soil.	PAH-impacted soil will be thermally treated and reused onsite; thus, these soils are not considered waste.	None	Contaminated soil will be excavated and transported to the NACA area to be treated by the VEG Technology system. Following receiving the analytical results from the treated soil meeting the FWCUG or Residential RSL, the treated soil will be transported back to the site and will be used to backfill the excavation.
Contact Waste / Disposable Sampling Equipment from Area 1 (e.g., PPE, gloves, boot covers, plastic sheeting/tarps, foil pans and zip lock bags)	Generated by remedial activities/site personnel which come in contact with contaminated soil.	PPE and disposable sampling equipment will be identified based on a visual inspection (e.g., soiled versus non-soiled). Potentially contaminated contact waste will be containerized in accordance with Section 7.0 of the SAP (Appendix I) and stored in approved DOT open-top 55-gallon drums equipped with plastic liners and sealed with bung-top lids. Waste drums will be temporarily stored at the AOCs and transported to the temporary storage location at Building 1036/1047 upon completion of work at the AOC.	No additional characterization Soil profile samples collected from Area 1 shall be used to characterize contact waste / disposable sampling equipment disposed off-site.	Contact waste will be disposed in accordance with Section 7.0 of the SAP (Appendix I). It will be disposed as either sanitary waste, non-hazardous or hazardous waste at a permitted waste facility based on the soil profile results.

Table 7-1. Waste Stream Identification and Handling (continued)

Waste Stream	Point of Generation	Staging/Processing	Characterization	Waste Handling
Sanitary Waste / Trash Non-Contaminated from Area 1 and Area 2 (e.g., garbage, paper or plastic waste, PPE not in contact with contaminated soil)	Generated by site activities/personnel in which disposable equipment does not come in contact with contaminated soil.	Contact waste/disposable sampling equipment will be collected daily in plastic lined trash cans and stored in accordance with Section 7.0 of the SAP (Appendix I).	None	Sanitary waste/trash will be disposed off-site through a commercial municipal waste service.
Excavation Water (i.e., water that has come in contact with contaminated soil/equipment)	Water collected within excavation pits/boundaries during rainfall events or decontamination water.	Area 1: Metals-impacted excavation water will be collected and added to the truck bed transporting metals-impacted soil (if <30 gallons). Decontamination of equipment shall be performed over haul trucks containing soil for off-site disposal, ensuring that volume of the water is sufficiently small (< 30 gallons) such that the water does not escape the truck bed, nor does it change the quality of the soil being off hauled. Area 2: PAH-impacted excavation water will be pumped into a temporary water storage tank. Decontamination of excavation equipment from Area 2 will be conducted over a designated decontamination area lined with impermeable plastic sheeting, and the decontamination water will be added to the same temporary storage tank. Minimal excavation water is anticipated based on the depths/extents of excavation areas and the use of disposable sampling equipment and a step-probe sampler; however, in the event that the volume of excavation water from either remediation areas proves to be greater than what is manageable for disposal/transport within the truck bed or reuse by the VEG unit, the water will be stored in closed-top 55-gallon DOT-approved drums.	No additional characterization Soil profile samples collected from Area 1 shall be used to characterize all waste disposed off-site.	Area 1: Excavation water (including decontamination water) will be transported and disposed off-site along with metals-impacted soil. Area 2: Excavation water from PAH-impacted soil will be transferred from the temporary storage tank into the VEG system to be recycled within the VEG's vapor generator for complete oxidation and transformation into a hot, clean steam used at a heat source for the VEG's treatment chamber.

8.0 SITE RESTORATION

Site restoration will commence following analysis of confirmation sample analytical results and confirmation that AOC-related COC concentrations are at or below FWCUGs/RSLs. Site restoration activities will not begin until confirmation sample results have been provided to the USACE Representative, and approval to proceed has been granted. The Alaniz-Endpoint Team will restore the project sites to pre-construction conditions. At a minimum, site restoration activities will include:

- Re-grading and backfilling excavation pits and surrounding areas; and
- Re-vegetation of the disturbed area.

8.1 RE-GRADING AND BACKFILL

Upon confirmation that thermally treated soil concentrations are below respective RSLs, treated soil will be used to backfill the excavation pit in Area 2. Due to the disposal of lead- and mercury-impacted surface soil from Area 1, the excavation pit will be backfilled using imported soil from an approved local off-site source, such as Patrick Excavating and Trucking in Ravenna, Ohio (a source used in prior remediation efforts at the former RVAAP facility). Imported soil will be sampled and analyzed for the RVAAP full-suite of chemicals as outlined in the SAP (Appendix I) prior to backfilling. Sample results will be reviewed and approved by the ARNG/OHARNG Representatives, the USACE COR and the Ohio EPA prior to use. Where necessary, ruts and depressions within the project sites (e.g., unpaved access roads, truck loading area, equipment movement areas, and construction support area) will also be re-graded. Soil shall be compacted in place using successive horizontal layers of eight (8) inches (in areas where the excavation or rut is at least 8 inches deep) in loose depth for the full width of the excavation and compacted. Each layer shall be compacted before the overlying lift is placed. Compaction of the material shall be accomplished by a minimum of three passes of a tamping (sheepsfoot-type) roller or other approved compacting equipment routed over the entire surface of each layer in such a manner as to obtain a firm, dense, and uniform compaction across the entire width of the work area.

Final grading will be performed to match surrounding elevations and provide positive drainage to prevent future ponding or erosion. The final grade of each project site will be inspected and approved by the USACE COR prior to demobilization.

8.2 RE-VEGETATION

Disturbed work areas where remediation activities have temporarily ceased will be stabilized with temporary seed or mulch as described on Table 8-1 unless activities are to recommence within 21 days. Permanent cover for the disturbed areas will be seeded within seven days following excavation, backfilling, and final grading activities. Re-vegetation seeding will consist of the OHARNG approved seed mixes specified in Table 8-1. Seed mixes will be approved by the OHARNG Environmental Office and prepared for application at the site by the Ohio Prairie Nursery in Hiram, Ohio. The seed mix will be sown into the treated soil and covered with mulch. Restored areas will be inspected on a weekly basis and reported on a Site Restoration Inspection Form (Attachment A) until 70% vegetative cover is achieved. Although soil treated using the VEG Technology has not historically required fertilizers or other soil amendments prior to seeding for plant growth, following construction, the Alaniz-Endpoint Team will assess the need for soil amendments (e.g., adding fertilizers, etc.) to facilitate successful growth.

Table 8-1. Revegetation Guidance

NEED		SPECIES AND PROPORTION	APPLICATION
Temporary Cover for Ongoing Projects	Areas left idle for greater than 21 days, but scheduled for disturbance within the same summer growing season	100% Annual Ryegrass *(Lolium multiflorum)*	Broadcast at 40 pounds per acre. Drill at 30 pounds per acre. Mulch with a minimum of 3 bales of straw per 1000 ft^2 Use mulch netting instead of straw on slopes > 6%.
	Areas left idle for greater than 21 days, but scheduled for disturbance within the same fall growing season	100% Winter rye *(Secale cereal)*	Broadcast at 112 pounds per acre. Drill at 80 pounds per acre. Mulch with a minimum of 3 bales of straw per 1000 ft^2 Use mulch netting instead of straw on slopes > 6%.
	Areas left idle for greater than 21 days, but scheduled for disturbance within the same spring growing season	100% Oats *(Aveva sativa)*	Broadcast at 80 pounds per acre. Drill at 65 pounds per acre. Mulch with a minimum of 3 bales of straw per 1000 ft^2 Use mulch netting instead of straw on slopes > 6%.
	Areas that will remain unfinished indefinitely	40% Nodding Wild Rye (*Elymus Canadensis*) 40% Virginia wild rye (*Elymus virginicus*) 15% Partridge Pea (*Chamaecrista fasciculate*) 5% Black-eyed Susan (*Rudbeckia hirta*) Add 10 lbs/ac Annual Ryegrass *(Lolium multiflorum)*/acre	Broadcast at 35 pounds per acre. Drill at 25 pounds per acre. Mulch with a minimum of 3 bales of straw per 1000 ft^2 Use mulch netting instead of straw on slopes > 6%.
	Late Season (after 15 September) quick, temporary cover	23.5% Nodding Wild Rye (*Elymus Canadensis*) 25% Virginia wild rye (*Elymus virginicus*) 18.75% Partridge Pea (*Chamaecrista fasciculate*) 1.5% Black-eyed Susan (*Rudbeckia hirta*) 31.25% Little Bluestem (*Schizachyrium scoparium*) Add Annual Ryegrass *(Lolium multiflorum)*/acre: 20 lbs/ac for broadcast or 15 lbs/ac for drill	Broadcast at 25 pounds per acre. Drill at 18 pounds per acre. Mulch with a minimum of 3 bales of straw per 1000 ft^2 Use mulch netting instead of straw on slopes > 6%.
Permanent Cover for Site Closure	Open Areas	23.5% Nodding Wild Rye (*Elymus Canadensis*) 25% Virginia wild rye (*Elymus virginicus*) 22% Little Bluestem (*Schizachyrium scoparium*) 18.75% Partridge Pea (*Chamaecrista fasciculate*) 7.75% Thin-leaved Coneflower (*Rudbeckia triloba*) 1.5% Brown fox sedge (*Carex vulpinoidea*) 1.5% Black-eyed Susan (*Rudbeckia hirta*) Add Annual Ryegrass *(Lolium multiflorum)*/acre: 20 lbs/ac for broadcast or 15 lbs/ac for drill	Broadcast at 18 pounds per acre. Drill at 12 pounds per acre. Mulch with a minimum of 3 bales of straw per 1000 ft^2 Use mulch netting instead of straw on slopes > 6%.
	Shaded, Partial Sun, Openings In Woods	31% Deertongue (*Panicum clandestinum*) 25% Virginia wild rye (*Elymus virginicus*) 25% Nodding Wild Rye (*Elymus Canadensis*) 10% Big Bluestem (*Andropogon gerardii*) 9% Side-Oats Grama (*Bouteloua curtipendula*) Add Annual Ryegrass *(Lolium multiflorum)*/acre: 20 lbs/ac for broadcast or 15 lbs/ac for drill	Broadcast at 30 pounds per acre. Drill at 20 pounds per acre. Mulch with a minimum of 3 bales of straw per 1000 ft^2 Use mulch netting instead of straw on slopes > 6%.

9.0 CONSTRUCTION QUALITY ASSURANCE PLAN

This section presents the Alaniz-Endpoint Team Construction Quality Assurance Plan, which describes inspection procedures and documentation to ensure all remedial activities are implemented according to the requirements set forth in this RD.

In addition to the QA/QC procedures provided in the SAP, the following will be discussed:

- Responsibility and Authority;
- Personnel Qualifications;
- Daily Planned Briefings;
- Inspection Activities;
- Confirmation Requirements; and
- Documentation.

9.1 RESPONSIBILITY AND AUTHORITY

9.1.1 Responsibility

The organizational chart presented in Section 2.0 outlines the management structure that will be used to implement the excavation and remedial activities in accordance with this RD. The functional responsibilities of key personnel were described in Section 2.1. Personnel assignments to each position were based on the following:

- Qualifications;
- Experience; and
- Training.

The Alaniz-Endpoint Team QA Manager and Project Manager, in coordination with the USACE COR, will ensure that completed remedial activities conform to the RD. The Alaniz-Endpoint Team Project Manager will verify completion of these activities.

The Alaniz-Endpoint Team Project Manager will monitor excavation, thermal treatment, disposal, and site restoration activities. The Alaniz-Endpoint Team Project Manager or designee will be on site during work activities to ensure that all components of this RD are fulfilled.

9.1.2 Administration

The QA/QC organization is administered by the Alaniz-Endpoint Team QA Manager in concert with the Alaniz-Endpoint Team Project Manager. The Alaniz-Endpoint Team Project Manager will be supported by the FTL and technical staff (engineers, scientists, and technicians) as necessary.

All vendors supplying materials used for any aspect of the remediation or site restoration activities will supply such materials from manufacturing facilities with established QC programs. Results of the manufacturer QC procedures will be submitted to the Alaniz-Endpoint Team QA Manager for review, evaluation, and documentation prior to beginning field activities.

9.2 PERSONNEL QUALIFICATIONS

All QA/QC personnel will be properly trained for their job and hold HAZWOPER certifications. The Alaniz-Endpoint Team Project Manager will ensure that completed remedial activities conform to this RD and any necessary permit conditions. The Alaniz-Endpoint Team Project Manager will have demonstrated knowledge of specific construction practices relating to excavation procedures, observation and testing procedures, and documentation procedures. The Alaniz-Endpoint Team Project Manager will also be experienced in performing similar duties on previous jobs where comparable construction activities took place.

9.3 DAILY TAILGATE MEETINGS

At the start of the project, the Alaniz-Endpoint Team will participate in a pre-construction briefing on objectives, health and safety, proposed deviations from this RD, and project schedule.

In addition, all onsite personnel will participate in daily tailgate safety meetings led by the Alaniz-Endpoint Team Project Manager, or designee, to determine the plan of action for the work day and remind workers of health and safety topics. Topics discussed during these meetings will be recorded on Tailgate Safety Meeting Forms (Attachment A) and will include the following:

- A discussion of the planned activities for the work day, including the extent of planned excavation;
- Weather considerations;
- Safety reminders;
- Transportation and delivery schedule;
- Project schedule; and
- Any issues that may arise and how to resolve those issues.

The USACE COR and ARNG/OHARNG Representative, or authorized designees are invited to attend the pre-work briefing and any daily tailgate safety meetings. As previously mentioned, all field activities will be coordinated with Camp James A. Garfield Range Control on a daily basis (i.e., notification at the start and end of the work day, and number of field personnel). In the event that a deviation from the methods provided in this RD is required, the deviation will be documented on a Field Change Form (included in Attachment A), submitted and approved by the USACE COR and Ohio EPA prior to implementation.

9.4 INSPECTION ACTIVITIES

Inspections will be completed to verify acceptability of materials, prevent spills, and assess effectiveness of storm water and dust generation controls. The scope and frequency of each type of inspection is described below.

9.4.1 Spill Control

The Alaniz-Endpoint Team Project Manager will conduct weekly inspections of hazardous wastes storage and monthly inspections of non-hazardous waste storage to verify spill equipment is maintained and no spills have occurred. The Alaniz-Endpoint Team Project Manager will be notified if any visual or olfactory indicators of equipment leaks or spills are encountered during remediation activities. The Alaniz-Endpoint Team will provide all necessary onsite spill equipment (e.g., granulated clay, absorbent blankets, personal protective equipment, shovels, containers). The onsite spill kit will be utilized to clean up the spill or outside resources will be utilized in the event of a large or reportable quantity spill. All onsite workers will maintain good housekeeping practices (as discussed in Section 5.3.4). Spills will be responded to as presented in Section 12.1.2 of the FWSHP and the Camp James A. Garfield Spill Contingency Plan. In the event of a spill or leak, the employee making the discovery will immediately notify the Alaniz-Endpoint Team SSHO and the Alaniz-Endpoint Team Project Manager. These spills can include, but are not limited to, releases of fuels, lubricants, and hydraulic fluids.

The Alaniz-Endpoint Team Project Manager will ensure the spill is immediately reported via phone to the OHARNG and the Camp James A. Garfield Range Control. The Alaniz-Endpoint Team Project Manager will ensure the incident is documented on a Camp James A. Garfield Spill Incident Reporting Form and a First Responder Reporting Form (provided in Attachment A), and reported in accordance with the procedures noted on the Incident Reporting Form and the Camp James A. Garfield Waste Management Guidelines.

9.4.2 Stormwater/Excavation Water Controls

Site work will be planned using the weather forecast, with work being limited during severe storm events. In addition, all excavated soils, both treated and untreated, shall be managed in lined and covered stockpiles within the treatment area. The tarps covering each stockpile will be maintained in good condition and secured prior to the end of each workday and when rain events occur. In the event which weather conditions require stormwater/excavation water management, the Alaniz-Endpoint Team will install, inspect and document all storm water controls (e.g., covering excavation areas/pits with tarps, installing/inspecting silt fencing, divert off-site run-off away from the excavation) prior to and during remedial activities, per Section 5.3.3. Stormwater controls will be inspected and on a weekly basis and following any rain event resulting in one-half inch of rain or more, and documented on a Stormwater Control Inspection Form (see Attachment A). Collected stormwater not in contact with impacted soil shall be discharged onsite in accordance with Section 5.3.3.2 and reported on a Stormwater Release Form. Any water collected from within the excavation pit or in contact with impacted-soil (i.e., excavation water) shall be either recycled or disposed in accordance with Section 5.3.3.1 herein.

All employees will practice due diligence to prevent any damage to the stormwater control measures. The Alaniz-Endpoint team will conduct weekly inspections to evaluate the integrity of the storm water controls. Any deficiencies will be immediately corrected and documented in the daily report.

During rain events, minimal runoff of contact water is anticipated within the VEG treatment area located at the NACA Test Area and will be limited by tarps covering stockpiles and treatment equipment. BMPs installed around the perimeter of the NACA VEG treatment area will prevent sediment and contaminated soil from entering adjacent wetland areas.

In the event of a release of soil (contaminated or treated) beyond the silt fence, the soil will be excavated immediately and returned to the appropriate soil stockpile. If the release is from a contaminated soil stockpile, native soil and/or sediment sampling will be performed, and samples analyzed for project COCs to ensure that native soils are not in excess of residential land use criteria.

9.4.3 Dust Control

Dust generation may occur during excavation, soil transportation, equipment movement on paved and unpaved roads, and site restoration. Generation of dust will be eliminated by implementing construction procedures discussed in Section 5.3.1 and by keeping vehicles on improved roads, limiting speeds to a maximum of 10 mph on access roads, and applying water for dust suppression purposes as required. Water used for dust control will be clean (i.e., obtained from the Newton Falls Municipal Water Department and sampled and approved by the Army Representatives). Engineering controls will be implemented to minimize the potential for dust generation. An Alaniz-Endpoint Team member will conduct and report dust inspections on Daily QC reports, as described in the SSHP (to be prepared under separate cover).

9.4.4 Survey

As mentioned in Section 5.1, the initial and final excavation boundaries will be surveyed by a registered surveyor to document the vertical and horizontal extents of the remedial activities. Coordinates for the excavation extents will be included in the Remedial Action Completion Report (Section 9.6.2). The horizontal and vertical survey tolerance will be ±0.1 ft. The excavation coordinates will be reported in Ohio State North American Datum 83 ft.

9.4.5 Site Restoration

Once remedial activities have been completed and approved by the USACE COR, excavations will be backfilled and graded to match adjacent contours. Imported soil will be sampled by the Alaniz-Endpoint Project Manager in accordance with the procedures in Section 3.1 of the SAP prior to being delivered to the site. Sample results will be provided to the Army for approval, a minimum of seven days prior to placing materials. Backfilling and re-vegetation procedures will comply with Section 8.0 herein and will be overseen by the Alaniz-Endpoint Project Manager. In addition, restored areas will be inspected on a weekly basis and reported on a Site Restoration Inspection Form until 70% vegetation cover is achieved, after which any existing erosion control measures will be removed.

9.5 CONFIRMATION REQUIREMENTS

9.5.1 Confirmation Sampling

Confirmation sampling will be performed in accordance with Section 6.0 of this RD and the Section 4.2 of the SAP (Appendix I) to demonstrate achievement of the FWCUGs/RSLs. Confirmation samples from Area 1 will be analyzed for lead and mercury, and confirmation samples from Area 2 will be analyzed for site-specific PAHs. Analyses will be conducted by Eurofins/Test America Laboratories in Savannah, Georgia.

9.5.2 Verification of Achievement of Performance Criteria

The Alaniz-Endpoint QA Manager will confirm that confirmation sample results meet FWCUGs/RSLs, both relative to excavation pit/bottom sampling and post-treatment soil sampling results. The USACE COR and ARNG/OHARNG Representative will be notified of the evaluations and results. If any sample does not meet the FWCUGs/RSLs, the evaluation will include a description of the additional excavation and/or treatment based on the approaches described in Section 6.0. Confirmation sampling results will be included in the Remedial Action Completion Report (Section 9.6.2).

9.6 DOCUMENTATION

9.6.1 Field Documentation

Daily inspection and quality control reports will be completed, signed and dated by the Alaniz-Endpoint Team Project Manager, or designee.

Daily quality control reports shall include:

- Summary of activities performed at the project site;
- Daily inspection activities;
- Weather information and ground conditions
- Materials delivered or visitors to the site;
- Deviations from the approved RD (e.g., verbal instruction received from government);
- Problems encountered during field activities;
- Copies of Chain of Custody and summary of sampling performed; and
- Summary of confirmation or profiling sample results.

Copies of the Contractor's Quality Control Daily Report and Tailgate Safety Meeting Form are included in Attachment A. Sampling field forms are included in Attachment II of the SAP (Appendix I). Daily reports may be combined to form monthly reports for submittal to the Ohio EPA, by the Army, as required per

Section 5.4 of the SAP (Appendix I).

9.6.2 Remedial Action Completion Report

Upon completion of remedial activities, a Remedial Action Completion Report (RACR) will be prepared by the Alaniz-Endpoint Team. The RACR will document:

- Activities conducted to implement the remedial action
- Summary of sampling results, copies of field forms, waste trackers and waste manifests;
- Verification that the project was performed in accordance with this RD;
- Any approved field variances from this RD (e.g., unforeseen site conditions, change in scope);
- Corrective actions; and
- Achievement of FWCUGs/RSLs.

10.0 REFERENCES

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Attachment A
Field Forms

CAMP JAMES A. GARFIELD

Joint Military Training Center
8455 State Route 5
Ravenna, Ohio 44266-9244
(614) 336-6041

CONTRACTOR ACCESS REQUEST FORM

COMPANY NAME:

Project POC Name:

ADDRESS:

PHONE: [COMPANY PHONE NUMBER]

PROJECT NAME/AREA OF WORK:	
CJAG JMTC PROJECT POC/PHONE:	

PERSONNEL REQUIRING ACCESS TO FACILITY

LAST NAME	FIRST NAME	CELL PHONE #	LIC. PLATE #

START DATE:		**END DATE:**	

APPROVED BY:

SIGNATURE *PRINT NAME* *RANK* *DATE*

MAIN GATE ______ **EAST GATE** ______ **(# OF PAGES)** ______

ESCORT REQUIRED? **YES** **NO**

ESCORT POC: ______________________

NAME *PHONE #*

CAMP JAMES A. GARFIELD

PERSONNEL REQUIRING ACCESS TO FACILITY: CONT.	
COMPANY NAME:	
PROJECT NAME/AREA OF WORK:	

LAST NAME	FIRST NAME	CELL PHONE #	LIC. PLATE #

Construction Site Inspection Checklist for OHC000005

By making use of some simple Best Management Practices (BMPs) a construction site operator can do his or her share to protect Ohio's water resources from the harmful effects of sediment. The topography of the site and the extent of the construction activities will determine which of these practices are applicable to any given site, but the BMPs listed here are applicable to most construction sites. For details on the installation and maintenance of these BMPs, please refer to the current ***Rainwater and Land Development****, Ohio EPA's Standards for Storm Water Management Land Development and Urban Stream Protection*. The manual is available at http://epa.ohio.gov/dsw/storm/technical_guidance.

Temporary Stabilization

This is the most effective BMP. All disturbed areas that will lie dormant for over 14 days must be stabilized within 7 days of the date the area becomes inactive. The goal of temporary stabilization is to provide cover, quickly. Areas within 50 feet of a stream must be stabilized within 2 days of inactivity. This is accomplished by seeding with fast-growing grasses then covering with straw mulch. Apply only mulch between November 1 and March 31. To minimize your costs of temporary stabilization, leave natural cover in place for as long as possible. Only disturb areas you intend to work within the next 14 days.

Construction Entrances

Construction entrances are installed to minimize off-site tracking of sediments. A stone access drive should be installed at every point where vehicles enter or exit the site. Every individual lot should also have its own drive once construction on the lot begins.

Sediment Ponds

Sediment ponds are required for construction areas with concentrated runoff or when the design capacity of silt fence or inlet protection is exceeded. There are two types of sediment ponds: sediment basins and sediment traps. A sediment trap is appropriate where the contributing drainage area is 5 acres or less. The outlet is an earthen embankment with a simple stone spillway. A sediment basin is appropriate for drainage areas larger than 10 acres. The outlet is an engineered riser pipe with a skimmer or similar device used to dewater the pond at the surface. Often a permanent storm water management pond, such as a retention or detention basin, can be modified to act as a sediment basin during construction. All sediment ponds must be installed within 7 days of first grubbing the area they control, provide a minimum dewatering zone of 67 cubic yards per acre of total contributing drainage area and a sediment settling zone of 34 cubic yards per disturbed acre below the level of the outlet. Sediment basins must be designed to drain the dewatering zone over a 48-hour period.

Sediment Barriers

This is typically used at the perimeter of a disturbed area. It's only for small drainage areas on relatively flat slopes or around small soil storage piles. Not suitable where runoff is concentrated in a ditch, pipe or through streams. For large drainage areas where flow is concentrated, collect runoff in diversion berms or channels and pass it through a sediment pond prior to discharging it from the site. Combination barriers constructed of silt fence supported by straw bales or silt fence embedded within rock check dams may be effective within small channels. As with all sediment controls, sediment barriers must be capable of pooling runoff so that sediment can settle out of suspension. Sediment barriers must be installed within 7 days of first grubbing the area it controls.

Inlet Protection

This must be installed on all yard drains and curb drains when these inlets do not drain to a sediment trap or basin. Even if there is a sediment trap or basin, inlet protection is still recommended, as it will increase the overall sediment removal efficiency. These are best used on roads with little or no traffic. If working properly, inlet protection will cause water to pond. If used on curb inlets, streets will flood temporarily during heavy storms. Check with your municipality before installing curb inlet protection. They may prefer an alternate means of sediment control such as silt fence or ponds.

Permanent Stabilization

All areas at final grade must be permanently stabilized within 7 days of reaching final grade. This is usually accomplished by using seed and mulch, but special measures are sometimes required. This is particularly true in drainage ditches or on steep slopes. These measures include the addition of topsoil, erosion control matting, rock rip-rap or retaining walls. Permanent seeding should be done March 1 to May 31 and August 1 to September 30. Dormant seeding can be done from November 20 to March 15. At all other times of the year, the area should be temporarily stabilized until a permanent seeding can be applied.

Non-Sediment Pollution Control

Although sediment is the pollutant of greatest concern on most construction sites, there are other sources of pollution. Most of these BMPs are easy to implement with a little bit of planning and go a long way toward keeping your site clean and organized. Please be sure to inform all contractors how these BMPs affect their operations on the site, particularly those that will be working near a stream.

Inspection Sheet

INSPECTIONS MUST BE CONDUCTED ONCE EVERY 7 DAYS AND WITHIN 24 HOURS OF A 0.5" OR GREATER RAINFALL. ALL SEDIMENT CONTROLS MUST BE INSTALLED PRIOR TO GRADING AND WITHIN 7 DAYS OF FIRST GRUBBING

GENERAL INSPECTION INFORMATION

Construction Site Inspection Date: ______________ Inspector Name: ______________________________________

Inspector Title: ______________________________ Qualifications/Certifications: _____________________________

Storm Events of the Last 7 Days

Storm Event Date	Storm Event Time	Storm Event Duration	Total Rainfall Amount	Discharge Occur? (Y/N)
_______________	_______________	__________________	_________(inches)	___________________
_______________	_______________	__________________	_________(inches)	___________________
_______________	_______________	__________________	_________(inches)	___________________
_______________	_______________	__________________	_________(inches)	___________________

Weather Information at the Time of Inspection

Temperature _______ Climate (Sunny, Cloudy, Rain)? __________ Is Storm Water Being Discharged? __________

Sketch or Small Site Map

Along with a narrative inspection log, Ohio EPA recommends the inspector use a sketch or a reduced photocopy of the site plan showing the location of storm water outfalls and storm drain inlets as well as the location and types of control measures. Problems observed at these locations, or at other locations on the construction site, should be highlighted and any corrective measures undertaken should be drawn in and noted in detail on the front side of the sketch. This method will also be helpful as the permittee is required to update the SWP3 to reflect current site conditions.

CONSTRUCTION ENTRANCES

Key things to look for ...

	Yes	No
1. Has the drive been constructed by placing geotextile fabric under the stone?	☐	☐
2. Is the stone 2-inch diameter?	☐	☐
3. Has the stone been placed to a depth of 6 inches, with a width of 10 feet and a length of at least 50 feet (30 feet for entrances onto individual sublots)?	☐	☐
4. If the drive is placed on a slope, has a diversion berm been constructed across the drive to divert runoff away from the street or water resource?	☐	☐
5. If drive is placed across a ditch, was a culvert pipe used to allow runoff to flow across the drive?	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

SEDIMENT PONDS

Key things to look for ...

	Yes	No
1. Are concentrated flows of runoff directed to a sediment pond?	☐	☐
2. Is sheet-flow runoff from drainage areas that exceed the design capacity of silt fence (generally 0.25 acre or larger) directed to a sediment pond?	☐	☐
3. Is runoff being collected and directed to the sediment pond via the storm sewer system or via a network of diversion berms and channels?	☐	☐
4. Is the sediment pond dewatering zone appropriately sized (67 cubic yards per acre of total drainage area)?	☐	☐
5. Is the sediment pond sediment settling zone appropriately sized (34 cubic yards per acre of disturbed area)?	☐	☐
6. Is the sediment basin designed to be dewatered at the surface through the use of a skimmer or another similar surface water dewatering device?	☐	☐
7. Is the sediment basin designed so that the dewatering zone will drain in no less time than 48 hours?	☐	☐
8. Have the embankments of the sediment pond and the areas that lie downstream of the pond been stabilized?	☐	☐
9. For sediment traps, is there geotextile under the stone spillway and is the spillway saddle-shaped?	☐	☐
10. For sediment traps, which dewater 100% between storms, is the dewatering pipe end-capped, no larger than 6 inches in diameter, perforated and double-wrapped in geotextile?	☐	☐
11. Is the length-to-width ratio between inlet(s) and outlet at least 2:1? **NOTE**: If not, a baffle should be added to lengthen the distance.	☐	☐
12. Is the depth from the bottom of the basin to the top of the primary spillway no more than 3 to 5 feet?	☐	☐
13. For a modified storm water pond being used as a sediment pond, is the connection between the riser pipe and the permanent outlet water-tight?	☐	☐
14. Was the basin installed prior to grading the site?	☐	☐
15. Is it time to clean-out the sediment pond to restore its original capacity? Generally, sediment should be removed from the sediment settling zone once it's half-full. Stabilize the dredged sediments with seed and mulch.	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

SEDIMENT BARRIERS

Key things to look for ...

	Yes	No
1. Is the silt fence at least 4" to 6" into the ground?	☐	☐
2. Is the silt fence trench backfilled to prevent runoff from cutting underneath the fence?	☐	☐
3. Is the silt fence pulled tight so it won't sag when water builds up behind it?	☐	☐
4. Are the ends brought upslope of the rest of the silt fence so as to prevent runoff from going around the ends?	☐	☐
5. Is the silt fence placed on a level contour? If not, the fence will only act as a diversion.	☐	☐
6. Have all the gaps and tears in the silt fence been eliminated.	☐	☐
7. Is the sediment barrier controlling an appropriate drainage area? Refer to Chapter 6 of ***Rainwater*** manual. **RULE OF THUMB**: Design capacity for 100 linear feet of sediment barrier is 0.5 acres for slopes < 2%, 0.25 acres for slopes 2% to 20%, & 0.125 acres for slopes 20% or more. Generally, no more than 0.25 acres should lie behind 100 feet of sediment barrier at 2% to 20% slope, i.e., the distance between the barrier and the top of the slope behind it should be no more than 125 feet. The allowable distance increases on flatter slopes and decreases for steeper slopes. **All non-silt fence sediment barriers must be at least 12-inches in diameter.**	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

INLET PROTECTION

Key things to look for ...

	Yes	No
1. Does water pond around the inlet when it rains?	☐	☐
2. Has the fabric been replaced when it develops tears or sags?	☐	☐
3. For curb inlet protection, does the fabric cover the entire grate, including the curb window?	☐	☐
4. For yard inlet protection, does the structure encircle the entire grate?	☐	☐
5. Is the fabric properly entrenched or anchored so that water passes through it and not under it?	☐	☐
6. For yard inlet protection, is the fabric properly supported to withstand the weight of water and prevent sagging? The fabric should be supported by a wood frame with cross braces, or straw bales.	☐	☐
7. Is sediment that has accumulated around the inlet removed on a regular basis?	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

TEMPORARY STABILIZATION

Key things to look for ...

	Yes	No
1. Are there any areas of the site that are disturbed, but will likely lie dormant for over 14 days?	☐	☐
2. Have all dormant, disturbed areas been temporarily stabilized in their entireties?	☐	☐
3. Have disturbed areas outside the silt fence been seeded or mulched?	☐	☐
4. Have soil stockpiles that will sit for over 14 days been stabilized?	☐	☐
5. Has seed and mulch been applied at the proper rate? In general, seed is applied at 3 to 5 lbs per 1000 sq ft and straw mulch is applied at 2-3 bales per 1000 sq ft.	☐	☐
6. Has seed or mulch blown away? If so, repair.	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

PERMANENT STABILIZATION

Key things to look for ...

	Yes	No
1. Are any areas at final grade?	☐	☐
2. Has the soil been properly prepared to accept permanent seeding?	☐	☐
3. Has seed and mulch been applied at the appropriate rate (see Chapter 7 of the ***Rainwater*** manual)?	☐	☐
4. If rainfall has been inadequate, are seeded areas being watered?	☐	☐
5. For drainage ditches where flow velocity exceeds 3.5 ft/s from a 10-year, 24-hour storm has matting been applied to the ditch bottom?	☐	☐
6. If the flow velocity exceeds 5.0 ft/s, has the ditch bottom been stabilized with rock rip-rap? **NOTE**: Rock check dams may be needed to slow the flow of runoff.	☐	☐
7. Has rock rip-rap been placed under all storm water outfall pipes to prevent scouring in the receiving stream or erosion of the receiving channel?	☐	☐
8. For sites with steep slopes or fill areas, is runoff from the top of the site conveyed to the bottom of the slope or fill area in a controlled manner so as not to cause erosion?	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

NON-SEDIMENT POLLUTION CONTROL

Key things to look for ...

	Yes	No
1. Has an area been designated for washing out concrete trucks? Washings must be contained on site within a bermed area until they harden. The washings should never be directed toward a watercourse, ditch or storm drain.	☐	☐
2. Is waste and packaging disposed of in a dumpster? Do not burn them on site.	☐	☐
3. Are fuel tanks and drums of toxic and hazardous materials stored within a diked area or trailer and away from any watercourse, ditch or storm drain?	☐	☐
4. Are streets swept as often as necessary to keep them clean and free from sediment? NOTE: Sediment should be swept back onto the lot - not down the storm sewers.	☐	☐
5. Are stockpiles of soil or other materials stored away from any watercourse, ditch or storm drain?	☐	☐
6. Have stream crossings been constructed entirely of non-erodible material?	☐	☐
7. If an area of the site is being dewatered, is it being pumped from a sump pit or is the discharge directed to a sediment pond? **NOTE**: if you must lower ground water, the water may be discharged to the receiving stream as long as the water remains clean. Be sure not to co-mingle the clean ground water with sediment-laden water or to discharge it off-site by passing it over disturbed ground.	☐	☐

Note areas where repairs or maintenance is needed or where this practice needs to be applied:

Site Name: ______________________ Date: ______________________

Name (print)	Company	Time	
		In	Out

Comments: ______________________

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CONTRACTOR'S QUALITY CONTROL DAILY REPORT

REPORT NO. 1 SHEET 1 OF 1

PROJECT	CONTRACT NO.	DATE

CONTRACTOR'S REPRESENTATIVE ON THE JOB

WEATHER (Rain, Snow, Cloudy, Windy, etc.)	GROUND CONDITIONS (Dry, Damp, Wet, Frozen, etc.)

1. PRIME CONTRACTOR:

NO. EMPLOYEES BY JOB CATEGORIES (Arrival and Departure)	Hours	HEAVY EQUIPMENT ON JOB (Arrival and Departure)	NO. UNITS	HRS. WORKING		
				YES	NO	Comments

WORK PERFORMED BY PRIME CONTRACTOR:

MATERIALS DELIVERED (Arrival/MSDS)	OFFICIAL VISITORS TO SITE (Arrival and Departure)

2A. SUBCONTRACTOR,

NO. EMPLOYEES BY JOB CATEGORIES (Arrival and Departure)	Hours	HEAVY EQUIPMENT ON JOB (Arrival and Departure)	NO. UNITS	HRS. WORKING		
				YES	NO	Comments

WORK PERFORMED BY SUBCONTRACTOR:

3. SPECIFIC INSPECTIONS: (Inspections performed, results, and corrective actions)

4. TESTING: ☐1 Check if any testing was performed today. (Complete and attach Test Report Information Sheets.)

Type and Location of Testing:

5. CONSTRUCTION DEFICIENCIES OR RE-TESTING REQUIRED. AS A RESULT OF GOVERNMENT ONSITE QA:

6. HEALTH AND SAFETY OBSERVATIONS OR ACTIONS TAKEN:

7. CONTRACTOR DELAYS/PROBLEMS/DEFICIENCIES/CORRECTIVE ACTIONS:

8. REMARKS:

9. CERTIFICATION:

I certify that the above report is complete and correct and that I, or my authorized representative, have inspected all work performed this day by the prime contractor and each subcontractor and determined that all materials, equipment, and workmanship are in strict compliance with the RD, SAP/QAPP, and USACE requirements.

Contractor's Quality Control Representative

____

QRG 2.2 FIRST RESPONDER REPORTING FORM

Collect as much of the information on the top half of this form as possible before making initial notification. Complete the top and bottom of the form before turning in to Range Operations.

Name of individual reporting spill:____

When did the spill occur (Date and Time)? ____

Spill Location (Building or area name / number, indoors or out; if vehicle involved, type and bumper number):
____

What was spilled?____________________**How much was spilled?** ____________________

Rate at which material is currently spilling. ____

Extent of spill travel? ____

Did the spill reach water (ditch, creek, stream, pond, well head)? ______________________________

Number of injured personnel and type injuries, if applicable. ______________________________

Do you need the Fire Department to respond to protect life, property, and environment? ____________________

Unit:____________________**State:**__________ **Report Date & Time:**____________________

On Scene Coordinator Name and Grade:____________________**Phone:** ____________________

How did the spill occur (be specific)? ____
____

What remedial action was taken? ____
____

Was soil and absorbent material generated?__________**How much?** ______________________________

What is the location of the soil and absorbents? ____

Was the Environmental Office contacted (yes or No, date and time)? ______________________________

Who did you talk to in the Environmental Office? ____

Was the site cleared by the Env. Office (Yes or No, date and time)? ______________________________

Who cleared the site (name and grade, date and time)? ____

Initial information is critical. Get as much information as you can, but don't hesitate to make the initial notification if a spill is moving or worsening rapidly!

This form must be completed for all releases and turned-in to CJAG Range Operations within 24 hours.

FIRST RESPONDER SPILL/RELEASE RESPONSE ACTIONS

Units or contractors performing training or other operations at Camp James A. Garfield shall be responsible for adhering to the provisions identified in the Integrated Environmental Contingency Plans (IECP). A copy of the IECP may be obtained from the Camp James A. Garfield Environmental Supervisor. Following discovery of a spill (any size), the procedures outlined below shall be executed where applicable:

1. **If necessary, initiate evacuation of the immediate area.**
2. **Notify Camp James A. Garfield Range Operations via two-way radio or by calling (614) 336-6041, and report information contained on the "First Responder Reporting Form" if it is known or can reasonably be determined. This form has been copied on the opposite side of this page. If Range Operations cannot be reached, contact a Camp James A. Garfield OSC (listed below).**
3. **Stop spill flow when possible without undue risk of personal injury.**
4. **If trained, contain the spill using available spill response equipment or techniques.**
5. **Make spill scene OFF LIMITS to unauthorized personnel.**
6. **Restrict all sources of ignition when flammable substances are involved.**
7. **Report to the OSC upon his/her arrival to the scene. Turn in a completed copy of the Camp James A. Garfield First Responder Form to Range Operations for ALL releases, even ones cleaned up by the reporter.**

TELEPHONE NUMBER

When Camp James A. Garfield Range Operations is *not available*, the OSC *must be contacted* by the discoverer/first responder following a release if it is in water, at or above a reportable quantity (25 gallons or more of POL), a hazardous or extremely hazardous substance, a hazardous waste, or involves fire, explosion, or is otherwise a major incident.

NAME	JOB TITLE	OFFICE	24 HOUR
Camp James A Garfield Range Operations	Operations and Training	(614)336-6041	(614) 202-5783
Tim Morgan (Primary OSC)	Environmental Supervisor	(614)336-6568	(330)322-7098
Brad Kline (Alternate OSC)	Environmental Specialist	(614)336-4918	Contact Alternate
Katie Tait (Alternate OSC)	Environmental Specialist	(614)336-6136	Contact Alternate
Joint Forces Command (Alternate POC)	OHARNG Emergency Center	(888)637-9053	(888)637-9053

Off-site (from Camp James A. Garfield area code 614 phones)

Ravenna Dispatch 9-1-330 296-6486

SEE REVERSE FOR FIRST RESPONDER REPORTING FORM

FIELD CHANGE REQUEST

FCR NO. ______________________________ DATE INITIATED __________
PROJECT ______________________________
CONTRACT NO. __________________________

REQUESTOR IDENTIFICATION
NAME__________________________ ORGANIZATION ___________ PHONE __________

TITLE __________________________ SIGNATURE

BASELINE IDENTIFICATION
BASELINE(S) AFFECTED ☐ Cost ☐ Scope ☐ Milestone ☐ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION)

DESCRIPTION OF CHANGE:

JUSTIFICATION:

IMPACT OF NOT IMPLEMENTING REQUEST:

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

COST ESTIMATE ($) 0 ESTIMATOR SIGNATURE ______________________________
PHONE_________________ DATE ____________________

PREVIOUS FCR AFFECTED ☐ YES ☐ NO; IF YES, FCR NO. ___

USACE COR: ____ DATE: _________________

OHIO EPA PROJECT MANAGER: ________________________ DATE: __________________

ENDPOINT H&S MANGER: _________________________________ DATE: __________________

SAFETY CHECKLIST FOR MACHINERY, MECHANIZED EQUIPMENT, AND OTHER MOBILE EQUIPMENT

Project Name:
Contract Number:

Equipment Name and Number:
Owned or Leased?

Contractor:	Subcontractor:
Contractor Inspector:	Date Inspected:

CHECKLIST	Yes	No	N/A
1. Are initial and daily/shift inspection records available?			
2. Are only qualified operators assigned to operate equipment?			
3 Are sufficient lights provided for night operations?			
4. Does the unit have at minimum a 5-B:C fire extinguisher?			
5. Is there an effective working reverse alarm?			
6. Is the unit shut down for refueling?			
7. Are moving parts, shafts, sprockets, belts, etc., guarded?			
8. Is protection against hot surfaces, exhausts, etc., provided?			
9. Are fuel tanks located in a manner to prevent spills or overflow from running onto the engine exhaust or electrical equipment?			
10. Are exhaust discharges directed so they do not endanger persons or obstruct operator vision?			
11. Are seat belts provided for each person required to ride on the equipment?			
12. Is protection (grills, canopies, screens) provided to shield operators from falling or flying objects?			
13. Is roll-over protection provided (ROPS)?			

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SAFETY CHECKLIST FOR MACHINERY, MECHANIZED EQUIPMENT, AND OTHER MOBILE EQUIPMENT

CHECKLIST	Yes	No	N/A
14. Is a safe means of access to the cab provided (steps, grab bars, non-slip surfaces)?			
15. Are adequate head and taillights provided?			
16. Have the brakes been tested and found satisfactory?			
17. Does the unit have an emergency brake which will automatically stop the equipment upon brake failure? Is the system manually operable from the driver's position?			
18. Is all equipment with windshields equipped with powered wipers and defogging or defrosting system?			
19. Are all vehicles that will be parked or moving slower than normal traffic on haul roads equipped with a yellow flashing light or flashers visible from all directions?			
20. Is the slow moving emblem used on all vehicles which by design move at 25 MPH or less on public roads?			
21. Have air tanks been tested and certified?			
22. Is an air pressure gauge in working condition installed on the unit?			
23. Does the air tank have an accessible drain valve?			
24. Have the hydraulic/operating systems been checked for leaks?			
25. Remarks: (Enter action taken for all "No" answers)			

SSHO Signature:
Date:

RVAAP-42 Load Line 9
Site and Silt Fence Inspection Form

Date:____________________ Time: ______________________________

Weather: (include days since last rainfall and amount in inches of last rainfall)

____
____
____

SILT FENCE INSPECTION

Are silt fences intact? Yes ☐ No☐
If no, describe status when arrived at site and maintenance required for silt fences:

____
____
____
____
____
____

Percentage of grass coverage__________%

Where photos taken at the site ? Yes ☐ No☐

SITE INSPECTION

Is the site in good shape (e.g., no debris)? Yes ☐ No☐
If no, describe status when arrived at site and maintenance required to improve site condition:

____
____
____
____
____
____

If site requires additional actions beyond what can be done during the inspection, please contact the Project Manager immediately to coordinate site improvements.

ADDITIONAL COMMENTS

____
____
____
____

Recorded By:____**Date:**________________

QC Checked By:____**Date:**________________

U.S. Army Corps of Engineers

RVAAP-42 Load Line 9
Site Restoration Inspection Form

Endpoint. Strategy. Science. Sustainability.

Date/Time:________________________________ Completed by: __________________________________

SITE RESTORATION INSPECTION

Final grading completed?	Yes ☐ No ☐ N/A ☐
Has seeding been sown into soil?	Yes ☐ No ☐ N/A ☐
Has all equipment been removed from the site?	Yes ☐ No ☐ N/A ☐
Has all non-impacted vegetation been mulched?	Yes ☐ No ☐ N/A ☐
Have all vegetation mulch/rock been evenly spread across site?	Yes ☐ No ☐ N/A ☐
Temporary stormwater/erosion controls removed?	Yes ☐ No ☐ N/A ☐
Were all disturbed areas seeded within 7 days of excavation, backfilling/final grading?	Yes ☐ No ☐ N/A ☐
Is seed established? (70% coverage is required)	Yes ☐ No ☐ N/A ☐
Is silt fencing intact?	Yes ☐ No ☐ N/A ☐
Are there signs of erosion (cracks/ruts/gullies/minimal grass coverage/slope failure)?	Yes ☐ No ☐ N/A ☐
Have disturbed areas outside the silt fence been seeded or mulched?	Yes ☐ No ☐ N/A ☐
Has seed or mulch blown away? If so, repair.	Yes ☐ No ☐ N/A ☐

Maintenance required for above issues:

____

____

____

Date/Time:________________________________ Completed by: __________________________________

Initial Installation Inspection for Storm Water Controls

Is the silt fence at least 4 inches to 6 inches into the ground?	Yes ☐ No☐
Is the trench backfilled to prevent runoff from cutting underneath the silt fence?	Yes ☐ No☐
Is the silt fence pulled tight so it will not sag when water builds up behind it?	Yes ☐ No☐
Are the ends brought upslope of the rest of the silt fence so as to prevent runoff from going under the ends?	Yes ☐ No☐
Is the silt fence on a level contour?	Yes ☐ No☐
Have all gaps and tears in the silt fence been eliminated?	Yes ☐ No☐

Maintenance required for above issues:

____

____

____

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TAILGATE SAFETY MEETING FORM

Instructions
To be competed by supervisor prior to beginning of new job, when changes in work procedures occur, or when additional hazards are present.

NAME ,TYPE, LOCATION OF PROJECT OR WORK ACTIVITY:

TOPICS/HAZARDS DISCUSSED:

INFORMAL TRAINING CONDUCTED (Name, topics):

NAMES OF EMPLOYEES:

Supervisors Signature/Date: ______________________________

U.S. Army Corps of Engineers

RVAAP-42 Load Line 9
Truck Inspection Form

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Date/Time:_________________________ **Completed by:**____________________________

Truck/License Number:____________________ ***Trucking Company***:________________________

Type of Load Hazardous Waste Soil or Non-hazardous Waste Soil (circle one)

Is the truck lined (if required by disposal facility)? Yes ☐ No☐

Are all sides of truck and its wheels cleaned of all debris? Yes ☐ No☐
If no, describe actions taken.

Is the truck covered? Yes ☐ No☐

Is waste manifest (or shipping papers) completed and in the truck? Yes ☐ No☐

Comments:

CAMP RAVENNA WASTE MANAGEMENT GUIDELINES

PURPOSE: Guidelines to be followed by contractors working at Camp Ravenna Joint Military Training Center who are generating/shipping Hazardous, Non-Hazardous, Special or Universal Waste.

POLICY: The policy at Camp Ravenna is to comply with all local, state, federal and installation requirements. Contractor is responsible for waste minimization and is required to recycle materials if possible.

Restoration Program POC: Katie Tait (614) 336-6136 **Military & Non-Restoration POC: Brad Kline (614) 336-4918**

Coordination:

- Coordinate all waste generation and shipments with the appropriate Camp Ravenna POC listed above or the Environmental Supervisor in their absence at (614) 336-6568.
- Notify Camp Ravenna POC prior to waste sampling for characterization. Details about sampling activities must be included (i.e., number of sample, analyticals, etc.).
- All Hazardous and Non-Hazardous waste management storage locations must be pre-approved prior to generation.
- Ensure all labels include: Date, Contractor, and Waste Type.
- When contractors have waste onsite, a weekly Inspection inventory must be completed and submitted to the appropriate POC in the Camp Ravenna environmental office.
- All wastes shall be tracked and logged throughout the duration of the project. Contractor will provide Camp Ravenna POC with a monthly rollup report of all waste and recycled streams generated by no later than the 10th day of the following month.

Hazardous Waste Treatment, Storage and Disposal Facilities and Waste Haulers: Contractors are required to utilize hazardous waste haulers and Treatment, Storage, and Disposal Facilities on the latest Defense Reutilization Marketing Office (DRMO) approved list. The current qualified waste hauler and TSDF list can be viewed by following the "Qualified Facilities" and "Qualified Transporters" links found on the DLA Hazardous Waste Disposal Homepage, http://www.dla.mil/DispositionServices/Offers/Disposal/HazardousWaste/HazWasteDisposal.aspx.

Hazardous or Non-Hazardous manifest form, the following must be included:

- Military and non-restoration operations waste Site Name = Camp Ravenna Joint Military Training Center. Mailing and Site address: Camp Ravenna ENV, 1438 State Route 534 SW, Newton Falls, Ohio 44444, (614) 336-4918. Ohio EPA ID # – OHD981192925.
- Restoration Program waste Site Name = Former Ravenna Army Ammunition Plant. Mailing address is same as address above. Site address: 8451 State Route 5, Ravenna, Ohio 44266, (614) 336-6136. Ohio EPA ID # – OH5210020736.
- Contractor's shipping Hazardous Waste must provide a Land Disposal Restriction (LDR) in accordance with 40 CFR Part 268.
- Profiling:
  - The required shipping documentation (i.e. waste profile and executive summary of lab reports (if available)) need to be submitted to appropriate Camp Ravenna POC or designee(s) for approval and signature prior to shipping.
  - Results of characterization must be submitted to appropriate Camp Ravenna POC within 30 days after collecting sample.
- Manifests - Hazardous and Non-Hazardous:
  - The waste carrier/transporter provides appropriate manifest to the contractor.
  - The contractor is required to:
    - Ensure that Camp Ravenna POC or designee(s) is available to sign the manifest on the scheduled day of shipment;
    - Verify that each manifest is properly completed and signed by Camp Ravenna POC or designee(s);
    - Provide the Generator copy of the manifest to Camp Ravenna POC or designee(s); and
    - Ensure that the original Generator copy of the manifest signed by the treatment storage disposal facility is returned to Camp Ravenna within 30 days of the shipping date for Hazardous and Non-Hazardous Waste.
    - The use of a Bill of Lading, in lieu of a waste manifest, must be approved by the Camp Ravenna environmental office.

All satellite accumulation storage sites and containers will comply with 40CFR 262.34(c)(1):

- Any material that is subject to Hazardous Waste Manifest Requirements of the US Environmental Protection Agency must comply with 40 CFR Part 262.
- From the time any waste is placed in a satellite storage container, proper labeling must be on the container (proper labeling includes date, contractors name and product type).
- Pending analysis label is to be used from the time the sample is taken until the results are received.
- In no case will waste labeled pending analysis exceed 45 days.

All Camp Ravenna Hazardous and Non-Hazardous records are maintained at the Camp Ravenna environmental office, point of contacts are Katie Tait at (614) 336-6136 and Brad Kline at (614) 336-4918.

CAMP RAVENNA WEEKLY NON-HAZARDOUS & HAZARDOUS WASTE INSPECTION/INVENTORY SHEET

Contractor: ______________ Month: ___________________ Year: _____________ Waste Description: _____________

Container Nos. ____

	WEEK 1	WEEK 2	WEEK 3	WEEK 4
	Date: **Time:**	**Date:** **Time:**	**Date:** **Time:**	**Date:** **Time:**
Point of Contact (Name / Number)				
Project Name:				
Contracting Agency and POC:				
Waste Determination: Pending Analysis, Hazardous, Non-Hazardous, etc.				
*Location on installation:				
Date Generated:				
Projected date of disposal:				
Non-Haz, Satellite, 90 day storage area				
Waste generation site:				
Number of Containers (size / type):				
Condition of Container:				
Containers closed, no loose lids, no loose bungs?	yes / no	yes / no	yes / no	yes / no
Waste labeled properly and visible (40 CFR 262.34 (c) (1):	yes / no	yes / no	yes / no	yes / no
Secondary containment	yes / no	yes / no	yes / no	yes / no
Incompatibles stored together?	yes / no	yes / no	yes / no	yes / no
Any spills?	yes / no	yes / no	yes / no	yes / no
Spill kit available?	yes / no	yes / no	yes / no	yes / no
Fire extinguisher present and charged?	yes / no	yes / no	yes / no	yes / no
Containers grounded if ignitables?	yes / no / na	yes / no / na	yes / no / na	yes / no / na
Emergency notification form/info present?	yes / no	yes / no	yes / no	yes / no
Container log binder present?	yes / no	yes / no	yes / no	yes / no
Signs posted if required?	yes / no	yes / no	yes / no	yes / no
Photo's submitted	yes / no	yes / no	yes / no	yes / no
Printed Name:				
Signature:				

This form is required for Non-Hazardous and Hazardous waste including PCB and special waste.

CONTRACTORS ARE REQUIRED TO SUBMIT THIS FORM WEEKLY TO THE CAMP RAVENNA ENV OFFFICE WHEN WASTE IS STORED ON SITE.

CONTRACTORS ARE ENCOURAGED TO INCLUDE PHOTOS WITH EACH WEEKLY INSPECTION SHEET WHEN WASTE IS STORED ON SITE.

*Draw detailed map showing location of waste within the site.

Construction/Demolition Diversion and Waste Disposal Form

Project Title **Multiple AOCs at Camp James A. Garfield**

Date	Area of Concern	Material Type*	Material Description**	Total Quantity of Material	Tons/lbs/CY/each	Disposal Facility Name/City/State	Total Number of Manifest/Disposal Tickets Attached

***Material Type:** Debris, Recyclable/Reutilized Material, Universal Waste,

****Material Description:** Debris (wood, glass, asphalt, concrete, soil, plastic etc…)
Recyclable Material (scrap metal and concrete etc….)
Universal Waste (Sampling Equipment, PPE, sanitary trash)

DUST MONITORING RECORD
RAM/MiniRAM MEASUREMENTS

Time	Date	LOCATION (upwind/ downwind, reference figure for station location)	INSTRUMENT RAM/MiniRAM	Concentration (mg/ m^3)	Recorded by

VEG MONITORING LOG

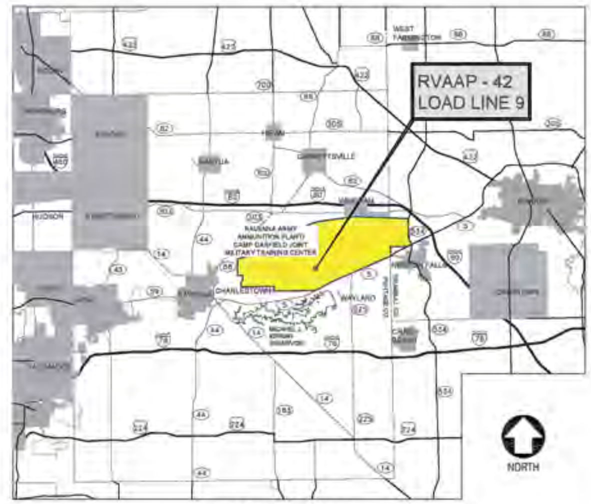
Time	Date	VEG Temperature (ºF)	VEG Flow (cfm)	ThermOx Temperature (ºF)	ThermOx Flow (cfm)	ThermOx Influent PID (ppm)	ThermOx Effluent PID (ppm)	Recorded by

ºF = degrees Farenheit
cfm = cubic feet per minute
ppm = parts per million

Attachment B
Design Drawings

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
FORMER RAVENNA ARMY AMMUNITION PLANT - CAMP JAMES A.GARFIELD (CJAG)
RVAAP-42 LOAD LINE 9

LOCATION MAP
NOT TO SCALE



VICINITY MAP

THIS REMEDIAL DESIGN ADDRESSES THE EXCAVATION AND TREATMENT OR OFF-SITE DISPOSAL OF CONTAMINATED SOILS FROM THE RVAAP-42 LOAD LINE 9 AREA OF CONCERN AT THE FORMER RAVENNA ARMY AMMUNITION PLANT (RVAAP)/CAMP GARFIELD JOINT MILITARY TRAINING CENTER IN RAVENNA, OHIO.

APPROXIMATELY 940 CUBIC YARDS (EX SITU) OF POLYCYCLIC AROMATIC HYDROCARBON (PAH) IMPACTED SOIL WILL BE EXCAVATED AND THERMALLY TREATED USING ENDPOINT'S PATENTED VAPOR ENERGY GENERATOR (VEG) TECHNOLOGY. APPROXIMATELY 24 CUBIC YARDS (EX SITU) OF METALS IMPACTED SOILS WILL BE EXCAVATED AND DISPOSED OFFSITE.

SCOPE OF WORK

US Army Corps of Engineers
Louisville District

U.S. Army Engineer District
Corps of Engineers
Louisville, Kentucky

REMEDIAL DESIGN
RVAAP-42 LOAD LINE 9

TITLE SHEET

US Army Corps of Engineers
Former Ravenna Army
Ammunition Plant/CJAG
Portage and Trumbull Counties, Ohio

Endpoint
Strategy. Science. Sustainability.

B-1

Basemap Source: Leidos, 2014. Remedial Design for Soil, Sediment and Surface Water at RVAAP-13 Building 1200 and RVAAP-48 Anchor Test Area. Drawn by P. Holm

GENERAL NOTES

1. HEREINAFTER, THE TERM "ALANIZ-ENDPOINT TEAM" IN THESE DRAWINGS SHALL REFER TO ALL ALANIZ-ENDPOINT TEAM PERSONNEL AND/OR ITS SUBCONTRACTORS IMPLEMENTING THE RVAAP-42 LOAD LINE 9 REMEDIAL DESIGN (RD), UNLESS OTHERWISE NOTED.
2. THE ALANIZ-ENDPOINT TEAM SHALL COMPLETE ALL ACTIVITIES ASSOCIATED WITH THE PROJECT IN COMPLIANCE WITH APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS AND REQUIREMENTS.
3. THE ALANIZ-ENDPOINT TEAM SHALL PERFORM ALL REMEDIAL ACTIVITIES IN COMPLIANCE WITH THE RD DESIGN DRAWINGS, SPECIFICATIONS AND ATTACHMENTS.
4. THE ALANIZ-ENDPOINT TEAM SHALL SUPPLY ALL EQUIPMENT, MATERIALS AND LABOR TO PERFORM THE CONTRACT REQUIREMENTS INCLUDING WORKER SAFETY EQUIPMENT.
5. THE ALANIZ-ENDPOINT TEAM SHALL COMPLY WITH SITE ACCESS PROTOCOLS.
6. ALL ALANIZ-ENDPOINT TEAM PERSONNEL AND ANY VISITORS TO THE SITE SHALL SIGN IN AND SIGN OUT ON THE DAILY SITE LOG UPON ARRIVAL AND DEPARTURE FROM THE PROJECT AREA.
7. THE ALANIZ-ENDPOINT TEAM AND ANY VISITORS TO THE SITE MUST ATTEND A DAILY HEALTH AND SAFETY TAILGATE MEETING PRIOR TO THE START OF THE DAY'S CONSTRUCTION ACTIVITIES OR PRIOR TO ENTERING THE PROJECT AREA. THESE TAILGATE MEETINGS WILL BE RUN BY THE ALANIZ-ENDPOINT TEAM CONSTRUCTION MANAGER, WHO WILL DISCUSS THE EXPECTED ACTIVITIES FOR THE DAY, POTENTIAL HAZARDS, ANTICIPATED WEATHER CONDITIONS AND ANY ADDITIONAL SAFETY TIPS OR REMINDERS. THE ALANIZ-ENDPOINT TEAM CONSTRUCTION MANAGER IS RESPONSIBLE FOR DOCUMENTING THE TAILGATE MEETING AND OBTAINING SIGNATURES FROM ALL PERSONNEL WHO HAVE BEEN BRIEFED.
8. ACCESS TO THE FORMER RVAAP/CAMP JAMES A. GARFIELD JOINT MILITARY TRAINING CENTER SHALL BE THROUGH THE MAIN GATE LOCATED OFF STATE ROUTE 5. THIS GATE IS GUARDED AND SHALL REQUIRE ADDITIONAL TIME TO GAIN ACCESS. THE ALANIZ-ENDPOINT TEAM SHALL BE REQUIRED TO ALLOW FOR DELAYS WITHOUT ADDITIONAL CHARGES.
9. TOPOGRAPHIC MAPPING DATA IS BASED ON SURVEY AND AERIAL PHOTOGRAPH INFORMATION PROVIDED IN PRIOR SITE-RELATED DOCUMENTS PREPARED BY LEIDOS. MINOR DISCREPANCIES BETWEEN DRAWINGS AND ACTUAL FIELD CONDITIONS MAY BE ENCOUNTERED AND SHALL NOT CAUSE FOR ADDITIONAL CHARGES. THE ALANIZ-ENDPOINT TEAM SHALL VERIFY EXISTING CONDITIONS, ELEVATIONS AND DIMENSIONS PRIOR TO THE START OF CONSTRUCTION.
10. THE ALANIZ-ENDPOINT TEAM SHALL CONTACT OHARNG PRIOR TO COORDINATING AND CONDUCTING UTILITY SURVEY AND CLEARANCES.
11. STORMWATER CONTROLS SHALL BE INSTALLED PRIOR TO INITIATION OF ANY CONSTRUCTION ACTIVITY THAT MAY CAUSE EROSION OR SEDIMENTATION. STORMWATER CONTROL MEASURES SHALL BE MAINTAINED AND REINSTALLED AS NECESSARY FOR THE DURATION OF CONSTRUCTION AND RESTORATION ACTIVITIES. STORMWATER CONTROLS SHALL BE INSPECTED WEEKLY AND FOLLOWING RAIN EVENTS WITH RAINFALL TOTALING ½ INCH OR MORE.
12. EROSION CONTROL MEASURES SHALL BE PLACED WHERE INDICATED ON THE DRAWINGS, UNLESS FIELD OBSERVATIONS RESULT IN A MODIFICATION (ADDITIONAL LOCATIONS OR ELIMINATING THE NEED FOR ALTOGETHER) OF STORMWATER CONTROLS. EROSION CONTROL MEASURES SHALL MEET ALL FEDERAL AND STATE REQUIREMENTS.
13. IF UNEXPECTED MATERIALS, SUCH AS EXPLOSIVE COMPONENTS, DRUMS, CYLINDERS, ABANDONED PIPELINES, UTILITIES, ARCHEOLOGICAL ARTIFACTS OR HUMAN REMAINS ARE DISCOVERED DURING THE REMEDIAL ACTIVITIES, WORK SHALL CEASE IMMEDIATELY AND THE ALANIZ-ENDPOINT TEAM SHALL NOT RESUME WORK UNTIL APPROVAL IS GRANTED BY USACE, OHARNG OR THE OHARNG CULTURAL RESOURCE MANAGER AND THE ALANIZ-ENDPOINT TEAM CONSTRUCTION MANAGER.
14. NO WORK SHALL TAKE PLACE DURING INCLEMENT WEATHER (AS DETERMINED BY THE ALANIZ-ENDPOINT JV CONSTRUCTION MANAGER) TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT RUNOFF.
15. DURING PERIODS OF HIGH WINDS, WHICH MAY RESULT IN EXCESSIVE DUST, ADDITIONAL DUST CONTROLS OR CEASING WORK MAY BE REQUIRED AS DETERMINED BY THE ALANIZ-ENDPOINT TEAM CONSTRUCTION MANAGER.
16. ALL ON-ROAD HAUL TRUCKS WILL ADHERE TO OHIO DOT TRANSPORTATION GUIDELINES. THE ALANIZ-ENDPOINT TEAM SHALL ENSURE TRUCKS DO NOT LEAVE THE PROJECT SITE IN EXCESS OF 80,000 LBS GROSS WEIGHT.
17. THE ALANIZ-ENDPOINT TEAM SHALL INSPECT HAUL TRUCKS WITHIN THE INSPECTION AREA PRIOR TO LEAVING EXCAVATION/PROJECT AREAS TO ENSURE NO SOIL/MUD IS TRACKED ONTO PUBLIC OR OHARNG ROADWAYS. ALL HAUL TRUCKS LOADS SHALL BE COVERED PRIOR TO DEPARTING PROJECT AREAS.
18. THE ALANIZ-ENDPOINT TEAM IS RESPONSIBLE FOR REMOVING ANY MATERIAL AND SPILLED OR TRACKED ON ROADWAYS.
19. ALL METALS-IMPACTED SOILS SHALL BE DISPOSED AT AN APPROVED OFFSITE DISPOSAL FACILITY.
20. THE ALANIZ-ENDPOINT TEAM SHALL BE RESPONSIBLE FOR FOLLOWING ALL OHARNG, FEDERAL, STATE AND LOCAL SAFETY REQUIREMENTS FOR THE PROTECTION OF ALL PERSONS AND PROPERTY. THE ALANIZ-ENDPOINT TEAM SHALL ALSO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS AND PRECAUTIONS IN ACCORDANCE WITH THE SITE SAFETY AND HEALTH PLAN (SSHP).
21. A FIRST AID KIT AND HOSPITAL ROUTE MAP SHALL BE MAINTAINED ON-SITE BY THE ALANIZ-ENDPOINT TEAM DURING CONSTRUCTION ACTIVITIES.
22. THE ALANIZ-ENDPOINT TEAM SHALL ENSURE THIS RD AND THE SSHP IS PRESENT ON-SITE AT ALL TIMES DURING CONSTRUCTION ACTIVITIES.
23. ALL EXCAVATION AREAS SHALL BE BACKFILLED WITH EITHER TREATED SOIL OR CLEAN SOIL IMPORTED FROM AN OFF-SITE APPROVED SOURCE AND GRADED TO MATCH EXISTING SITE CONTOURS. ALL DISTURBED AREAS SHALL BE RE-SEEDED ACCORDING TO TABLE 8-1 OF THE RVAAP-42 LOAD LINE 9 REMEDIAL DESIGN.

MATERIAL NOTES

1. EROSION AND SEDIMENTATION CONTROL PLACEMENT AND ANCHORING SHALL BE COMPLETED IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDATIONS AND ANY RELEVANT STATE OF OHIO REQUIREMENTS.

LEGEND FOR ALL DRAWINGS

TREE LINE
ASPHALT ROADWAY
UNPAVED/GRAVEL ROAD
GROUND CONTOUR (10-FT)
GROUND CONTOUR (2-FT)
MONITORING WELL LOCAITION
RAILROAD TRACKS
AOC BOUNDARY
PROJECT SITE
SILT FENCE
HAUL ROUTE
AREAS TO BE CLEARED AS NEEDED FOR ACCESS
SOIL EXCAVATION AREA
1 / B-3 DETAIL WITH DRAWING SHEET NUMBER

DRAWING INDEX

DRAWING NO.	DRAWING TITLE
B-1	TITLE SHEET
B-2	GENERAL NOTES
B-3	RVAAP-42 LOAD LINE 9 SITE PREPARATION AND EXCAVATION PLAN
B-4	STAGING AREAS AT NACA TEST AOC

LIST OF SUBMITTALS

1. SITE SAFETY AND HEALTH PLAN (SSHP)
2. ACCIDENT PREVENTION PLAN (APP)
3. WASTE PROFILES

MEDIA, CHEMICALS OF CONCERN, AND CLEANUP GOALS

AREA	MEDIA	CHEMICALS OF CONCERN
1	SURFACE SOIL (0-1 ft. bgs)	LEAD AND MERCURY
2	SURFACE SOIL (0-1 ft. bgs)	PAHs

NOTE:
CHEMICALS OF CONCERN WERE NOT IDENTIFIED FOR SUBSURFACE SOIL (1-13 FT BGS), SEDIMENT, OR SURFACE WATER.

ESTIMATED SOIL TREATMENT/WASTE QUANTITIES

AREA	APPROXIMATE EXCAVATION AREA SQ. FT.	ESTIMATED TREATMENT VOLUME CU. YD.	ESTIMATED WASTE VOLUME CU. YD.	ESTIMATED IMPORTED CLEAN FILL CU. YD.
1 - LEAD AND MERCURY	432	NA	24 (ex-situ)	24
2 - PAHs	20,562	940 (ex-situ)	NA	NA

NOTES:
1. ESTIMATED QUANTITIES MAY CHANGE DUE TO CONFIRMATION SAMPLING.
2. THE ALANIZ-ENDPOINT TEAM SHALL VERIFY QUANTITIES.

PROJECT: REMEDIAL DESIGN
RVAAP-42 LOAD LINE 9

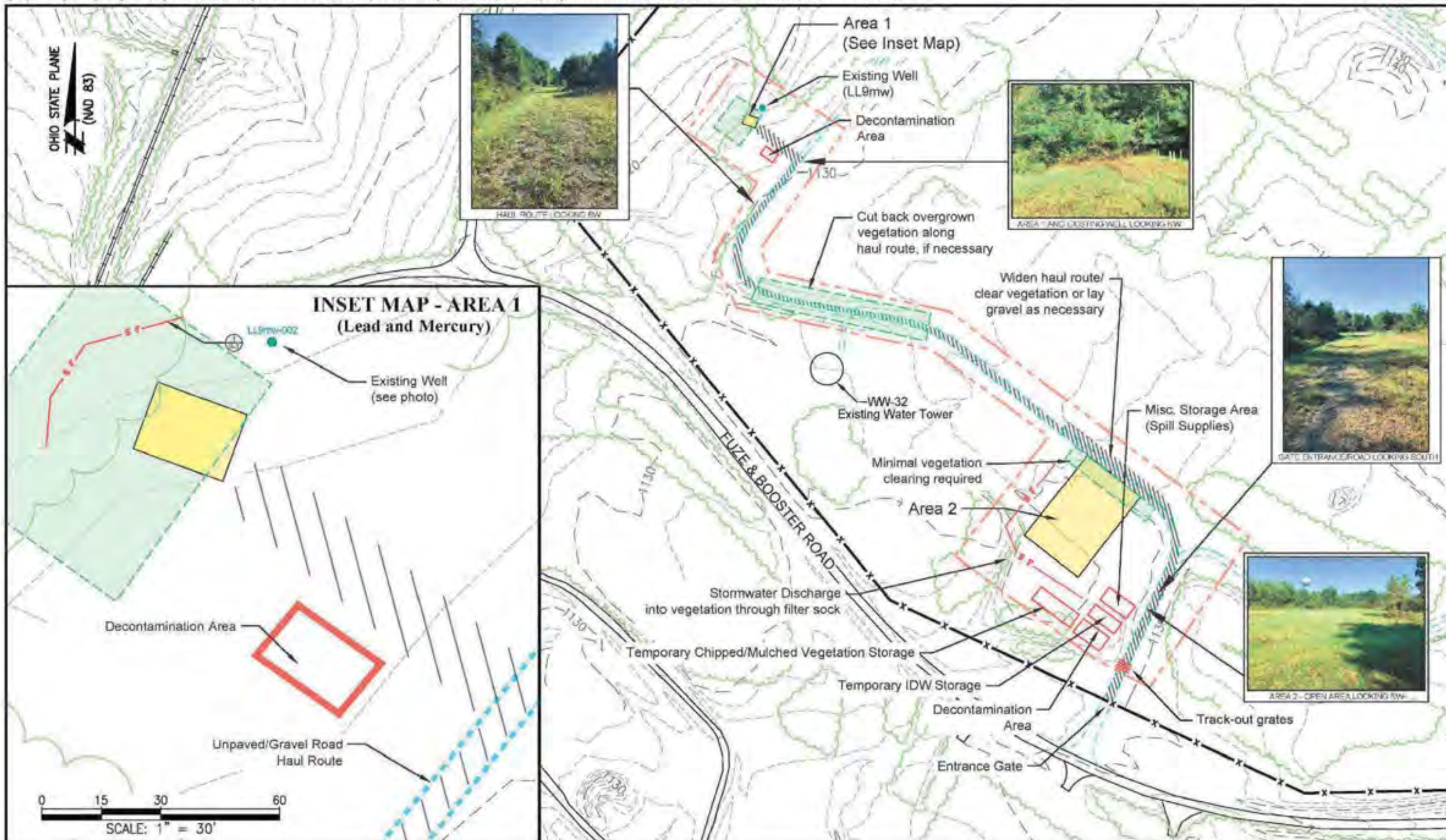
DRAWING TITLE: GENERAL NOTES

US Army Corps of Engineers Louisville District

CLIENT: US Army Corps of Engineers
Former Ravenna Army Ammunition Plant/CJAG
Portage and Trumbull Counties, Ohio

Endpoint
Geology Science Sustainability

B-2



LEGEND:

- TREE LINE
- ASPHALT ROADWAY
- UNPAVED/GRAVEL ROAD
- GROUND CONTOUR (10-FT)
- GROUND CONTOUR (2-FT)
- MONITORING WELL LOCAITION
- RAILROAD TRACKS
- AOC BOUNDARY
- PROJECT SITE
- SILT FENCE
- HAUL ROUTE
- AREAS TO BE CLEARED AS NEEDED FOR ACCESS
- SOIL EXCAVATION AREA

SITE PREPARATION

1. DRAWINGS AND NOTES SERVE ONLY AS GUIDLINES. ALL STORMWATER CONTROLS SHALL MEET OHIO'S "RAINWATER AND LAND DEVELOPMENT" STANDARDS.

2. THE ALANIZ-ENDPOINT TEAM WILL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL STORMWATER CONTROLS. WEEKLY INSPECTIONS AND INSPECTIONS WITHIN 24 HOURS OF A STORM EVENT GREATER THAN 0.5 INCHES SHALL BE CONDUCTED BY THE ALANIZ-ENDPOINT TEAM.

3. SILT FENCING LOCATIONS MAY BE REVISED AT THE DISCRETION OF THE ALANIZ-ENDPOINT TEAM CONSTRUCTION MANAGER BASED ON SITE CONDITIONS AND REMEDIAL DESIGN SAMPLING RESULTS.

4. ACCESS IMPROVEMENTS TO PREVENT EXCESS DUST, TIRE RUTTING, AND MUD SHALL BE REQUIRED AS NEEDED TO SUPPORT CONSTRUCTION ACTIVITIES.

5. THE ALANIZ-ENDPOINT TEAM SHALL CLEAR TREES AND VEGETATION ALONG THE GRAVEL ROAD/HAUL ROUTE AND SURROUNDING EXCAVATION AREAS. ALL TREES GREATER THAN 3 IN. IN DIAMETER THAT REQUIRE REMOVAL SHALL BE CUT BETWEEN THE MONTHS OF OCTOBER AND MARCH.

6. TREES LESS THAN 4 IN. IN DIAMETER AND OTHER VEGETATION NOT IN CONTACT WITH IMPACTED SOILS SHALL BE CHIPPED/MULCHED AND SPREAD ACROSS THE SITE AND SURROUNDING AREAS FOLLOWING CONSTRUCTION ACTIVITIES. TREES GREATER THAN 4 IN. IN DIAMETER SHALL BE TEMPORARILY STORED IN THE DESIGNATED LOCATION AND DISPOSED OFFSITE WITH IMPACTED SOILS.

7. ALL TREE/VEGETATION STAGING AND REMOVAL SHALL BE COORDINATED WITH OHARNG.

8. THE ALANIZ-ENDPOINT TEAM SHALL TAKE CARE TO PROTECT THE EXISTING MONITORING WELL AND WILL BE RESPONSIBLE TO REPAIR ANY DAMAGE TO THE WELL AS A RESULT OF CONSTRUCTION ACTIVITIES.

SOIL REMOVAL ACTIVITIES

1. UTILITY CLEARANCE WILL BE CONDUCTED WITHIN THE EXCAVATION BOUNDARIES.

2. EXCAVATION BOUNDARIES WILL BE SURVEYED PRIOR TO SOIL REMOVAL.

3. WASTE PROFILE SAMPLES WILL BE COLLECTED FROM THE EXCAVATION AREAS PRIOR TO EXCAVATION ACTIVITIES.

4. IMPACTED SOILS/TOPSOIL VEGETATION FROM AREA 1 WILL BE LOADED DIRECTLY INTO HAULING TRUCKS FOR OFFSITE DISPOSAL.

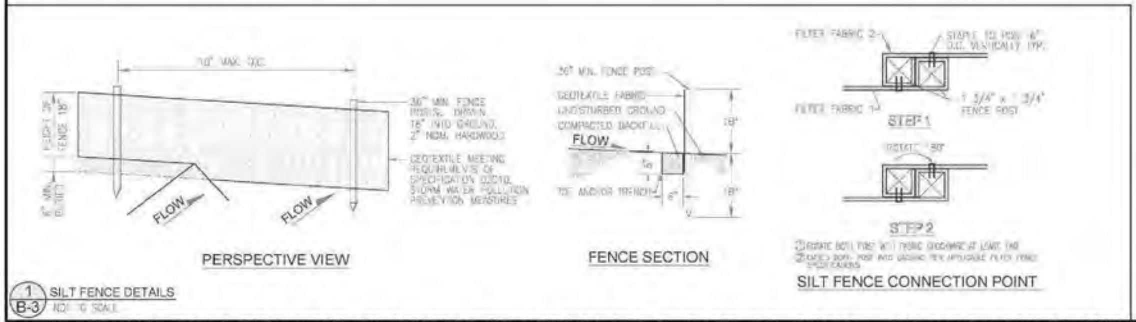
SITE RESTORATION ACTIVITIES

1. FINAL EXCAVATION BOUNDARIES WILL BE SURVEYED.

2. EXCAVATION PITS WILL BE BACKFILLED USING CLEAN IMPORTED SOIL FOR AREA 1 AND TREATED SOIL FOR AREA 2. BACKFILLING AREAS WILL BE RE-GRADED TO MATCH SURROUNDING ELEVATIONS.

3. PERFORM BACKFILLING/RE-VEGETATION IN ACCORDANCE WITH RD.

4. OHARNG WILL APPROVE FINAL SITE RESTORATION.



1 / B-3 SILT FENCE DETAILS
NOT TO SCALE

HISTORICAL SAMPLE COORDINATES

SAMPLE NO.	EASTING (X) COORDINATE	NORTHING (Y) COORDINATE
LL9ss-011	[illegible]	[illegible]
LL9ss-099	2356433.42	556003.45
LL9ss-007	2356487.61	556077.84

NOTES:

1. INITIAL EXCAVATION BOUNDARIES TO BE DETERMINED AND STAKED IN THE FIELD USING HISTORICAL SAMPLE COORDINATES AND APPROXIMATE EXCAVATION EXTENTS SHOWN ON FIGURES.

2. EXCAVATION EXTENTS ARE SUBJECT TO CHANGE BASED ON CONFIRMATION SAMPLING RESULTS.

REMEDIAL DESIGN
RVAAP-42 LOAD LINE 9

SITE PREPARATION AND EXCAVATION PLAN

US Army Corps of Engineers
Former Ravenna Army Ammunition Plant/CJAG
Portage and Trumbull Counties, Ohio

US Army Corps of Engineers Louisville District

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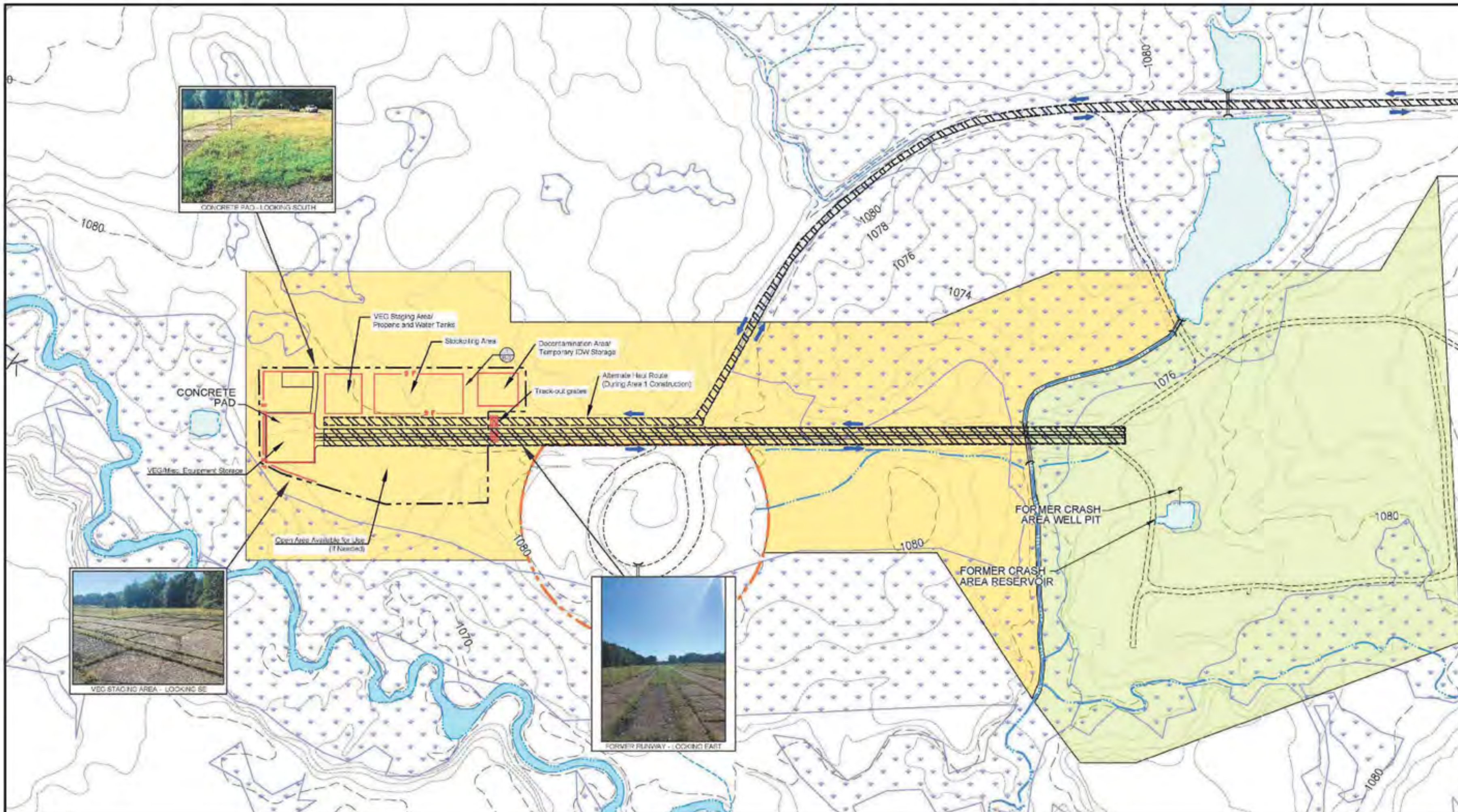
B-3
DRAWING NUMBER



LEGEND:

- GRAVEL ROAD
- SURFACE WATER
- WETLAND (2014 INRMP)
- INTERMITTENT STREAM
- GROUND CONTOUR (10-FT)
- GROUND CONTOUR (2-FT)
- APPROXIMATE OPEN DEMOLITION AREA #1 AOC BOUNDARY
- CONSTRUCTION STAGING AREA
- SILT FENCING
- TRUCK TRAFFIC ARROW

SOIL AGGREGATES

- FORMER PLANE REFUELING AND CRASH STRIP AREA
- FORMER CRASH AREA

OHIO STATE PLANE (NAD 83)

0 100 200

SCALE: 1" = 200'

REMEDIAL DESIGN
RVAAP-42 LOAD LINE 9

STAGING AREAS AT
NACA TEST AREA AOC

US Army Corps of Engineers
Former Ravenna Army
Ammunition Plant/CJAG
Portage and Trumbull Counties, Ohio

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B-4

Attachment C
Ohio EPA Correspondence

Ohio Environmental Protection Agency

Mike DeWine, Governor
John Husted, Lt. Governor
Laurie A. Stevenson, Director

July 2, 2020

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859264

Mr. Kevin Sedlak
Army National Guard
Installation and Environment
Clean-up Branch
IPA Designation
1438 State Route 534 SW
Newton Falls, OH 44444

TRANSMITTED ELECTRONICALLY

Subject: Receipt and Review of the "Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42)," Dated May 18, 2020

Dear Mr. Sedlak:

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, "Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42)" (draft RD work plan). This document, received by Ohio EPA's NEDO on May 21, 2020, was prepared for the U.S. Army Corps of Engineers (USACE), Louisville District, by Endpoint Consulting, Inc., 5 South Linden St., Suite 2, South San Francisco, CA 94080 and Alaniz Associates Corp., 21334 East Cloverton St., Covina, CA 91724.

Comment 1: Section 4.0 Construction Mobilization.

In the draft RD work plan for Load Lines 1-4 and 12, Section 7 Environmental Management indicated that "a separate vegetation removal plan will be submitted under separate cover to describe this activity." We understand that the vegetation removal activities at Load Lines 1-4 and 12 occurred prior to March 31, 2020.

Were the vegetation and debris clearing activities conducted at Load Line 9 (LL9) as well and were they completed by the same contractor that completed the clearing activities on Load Lines 1-4 and 12?

RECEIVED
JUL 02 2020

Comment 2: Section 4.2 Storm Water Pollution Prevention

Based on the report and figures provided in the draft RD work plan for LL9, contaminated soil will be taken to and treated at the NACA site. Much of the area around the proposed NACA Vapor Energy Generation (VEG) soil processing area appears to be wetland.

Installing, monitoring, and promptly repairing storm water pollution prevention controls is even more important due to the proximity of the wetland and the stream. There is a Decontamination Area noted on Figure B-4 that is immediately adjacent to the wetland. It is not clear from the figure if this area would involve power washing activities. Stockpiled contaminated and treated soils will be placed in a 15,000-square foot area at NACA and there is also a 5,000-square foot staging area. An estimated 761 cubic yards of soil from LL9 will be taken to NACA for treatment.

The draft RD work plan for LL9 notes that the storm water pollution prevention plan was prepared in accordance with the Ohio EPA Permit No. OHC000005. Best management practices (BMPs) will be implemented, and inspections of storm water controls will be conducted in accordance with Section 9.4.2 and documented on the storm water inspection form found in Attachment A.

Ohio EPA is concerned with the proximity of the wetland area to the NACA-VEG soil treatment area. Provide details on the water management plan that is in place for the handling of decontamination water as well as storm water management at NACA during the VEG. How will contractors ensure that soils that have been treated and soils that are being stockpiled for treatment will be managed to prevent runoff from these staging areas into the nearby wetland? What steps will be taken if there is a release of soils or release of untreated or untested decontamination water?

Comment 3: Section 5.2.2 Ex-Situ Thermal Treatment of PAH soils – VEG Technology

The draft RD work plan did not include details of the VEG technology that is proposed.

The RD work plan should include information or at a minimum a reference on where the operating information can be found on the VEG from previous correspondence or reports that are a part of the public record. Ohio EPA received information about the VEG for the pilot study, but the information regarding the VEG should be included in the RD work plans.

How will operations and emission of the VEG be monitored and recorded? The draft RD work plan only notes that the thermally oxidized vapors will be subject to routine sampling, hourly with a photoionization detector (PID). Is there a form you will be using to record observations/results? What are the circumstances that may require shut down, maintenance or repair?

Comment 4: Section 5.2.2 VEG Thermal Treatment Process and Section 5.3 Best Management Practices-Dust Control: Air Permitting

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) exemption does not apply to the existing facility roadways. Akron Air indicated they would need to be provided a roadway installation date to determine if the particulate emission (PE) limit applies to this project. If you will be adding new roadways this would be considered a modification, assuming the roadway remains after this remedial activity is completed.

  Include more in the draft RD work plan on how you will address fugitive dust to address the substantive requirements of the regulation. The draft RD work plan suggests that a dust monitoring information will be submitted under separate cover. (Section 5.3.1, page 27)

  The draft RD work plan notes that emissions of fugitive dust from roadways and construction activities will be minimized using water. Clarify under what conditions may work be stopped to address fugitive dust issues and who conducts the monitoring and at what frequency will you monitor fugitive dust at roadways, parking areas, soil piles and at the thermal treatment area.

  Confirm any soil piles created as a result of the remedial action described in this work plan are temporary and are associated to this remedial action. Please describe work practices to be implemented to mitigate against fugitive dust releases at all stages/locations of the remedy, and controlling waterborne runoff, etc.

- Will there be a backup generator and if so, how will it be powered: propane, diesel or electric?

- The substantive requirements for the VEG will need to be met. Ohio Administrative Code 3745-17-07 (A)(1)(a) indicates that visible particulate emissions for any stack shall not exceed twenty per cent opacity, as a six-minute average. Please include the OEM documentation on volatile organic compound destruction efficiency at the 950° F operating temperature.

Comment 5: Treatment Verification

The Quality Assurance Project Plan (QAPP) indicates that Test America, Savannah, GA will be receiving the samples for Load Line 9 for analysis. Confirm that the lab, Test America, Savannah, GA, can achieve the necessary detection limits necessary.

Comment 6: Backfill and Site Restoration

- Will soils treated from Area 2 be placed back in the same excavation area where it originated?
- What is the timing for re-grading and backfilling?
- Are roll-off boxes transporting the untreated soil decontaminated if they will be used to transport treated soil or are there clean and dirty roll-off boxes?
- Section 8.2 notes Ohio Prairie Nursery will provide the seed mixes. Following thermal treatment, soils may need fertilizer and organic matter in addition to good seed and mulch in order to grow. The draft RD work plan did not mention if this was included to ensure successful plant growth.

Comment 7: Attachment A – Field Forms

Do you have field forms for the VEG and fugitive dust monitoring?

Comment 8: Attachment B – Design Drawings

Figure B-4: According to this drawing there will be only one stockpiling area. Is this the "clean – treated soil" pile? What is anticipated as the potential use of the open area?

Comment 9: Appendix I SAP

The draft RD work plan includes a Sampling and Analysis Plan (SAP) that covers five areas of concern (AOCs) (see Appendix I in the Draft RD for RVAAP-42 Load Line 9). The five AOCs included in the SAP are as follows: Load Line 9, Depot Area, Sand Creek, and NACA and Wet Storage Area.

Ohio EPA is currently commenting on the SAP proposal for Load Line 9 only. Ohio EPA may have future comments regarding this SAP as it applies to the other AOCs.

One area will be remedied to address lead and mercury in surface soils and another area will be remedied to address polycyclic aromatic hydrocarbon (PAH)-impacted surface soil. Section 1 notes that an SAP is included in Appendix I. The SAP is dated May 15, 2020. Section 3.5.1 of the SAP states that incremental sampling methodology (ISM) sampling will be used. Waste profile sampling will also include discrete sampling in addition to ISM. The 2020 draft RD work plan for Load Lines 1-4 and 12 references a Leidos 2011 Standard Operation Procedure (SOP) will be used as guidance for conducting ISM sampling activities. Based on our May 27, 2020 call with your team to discuss our preliminary comments on the draft work plan for Load Lines 1-4 and 12, we learned that the contractor, CH2MHill, had identified a different ISM sampling approach in a QAPP.

Action Item: If you will be using ISM, Ohio EPA recommends using the most current ITRC ISM sampling guidance.

Ohio EPA requests the comments above be addressed prior to submitting the final version of the document. If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1235.

Sincerely,

Sue Netzly-Watkins

Sue Netzly-Watkins
Site Coordinator
Division of Environmental Response and Revitalization

SNW/sc

ec: Katie Tait, OHARNG RTLS
Nat Peters, USACE
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NATIONAL GUARD BUREAU
111 SOUTH GEORGE MASON DRIVE
ARLINGTON VA 22204-1373

August 19, 2020

Ohio Environmental Protection Agency
DERR-NEDO
Attn: Sue Netzly-Watkins
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, Response to Comments on Draft Remedial Design for RVAAP-42 Load Line 9 (Ohio EPA Work Flow Activity #267000859264)

Dear Ms. Netzly-Watkins:

The U.S. Army National Guard (ARNG), Louisville District has reviewed comments provided for the *Draft Remedial Design for Soil, Sediment and Surface Water at RVAAP-42 Load Line 9* (RD work plan), presented by The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) in a letter dated July 2, 2020. This letter documents ARNG response to Ohio EPA comments. The written responses include each comment provided by Ohio EPA, followed by the written response.

Comment 1: Section 4.0 Construction Mobilization.

In the draft RD work plan for Load Lines 1-4 and 12, Section 7 Environmental Management indicated that "a separate vegetation removal plan will be submitted under separate cover to describe this activity." We understand that the vegetation removal activities at Load Lines 1-4 and 12 occurred prior to March 31, 2020.

Were the vegetation and debris clearing activities conducted at Load Line 9 (LL9) as well and were they completed by the same contractor that completed the clearing activities on Load Lines 1-4 and 12?

Response 1:

Remediation activities at LL 9 are being performed under a separate contract and different contractor than work completed at Load Lines 1-4 and 12. Vegetation and debris clearing have not yet been conducted at LL9. Prior to March 31, 2021, the Alaniz-Endpoint Team will survey all proposed remediation areas and assess the level of vegetation clearing required for the remedial action. An independent vegetation clearing plan will be submitted under separate cover to ARNG for review and all vegetation clearing will be performed between October 1, 2020 and March 31, 2021.

In response to this comment, the first paragraph of Section 4.1.3 of the Final RD workplan has been revised to the following:

> *"Herein, above-ground vegetation and debris refer to vegetation (i.e., trees, bushes, etc.) and debris or solid waste (i.e., large rocks, brick, concrete, metal debris, etc.) that have not been in contact with contaminated soil. Following coordination with the OHARNG and USACE LRL, the excavation areas will be surveyed to determine whether surrounding areas will require clearing of existing trees, bushes, other large vegetation and potential above-ground debris, to facilitate equipment access and surface soil removal activities. In addition, vegetation along the gravel haul route may require trimming to allow sufficient space for large haul trucks/equipment to travel along the access roads within this AOC. Any required vegetation clearing involving trees or branches with a 3-inch diameter will*

be removed between October 1st and March 31st. A vegetation removal plan will be submitted under separate cover to ARNG for review that details all vegetation clearing activities to be performed within all AOCs to be remediated under this contract. Vegetation clearing will be performed by the Alaniz-Endpoint Team prior to March 31, 2021."

Comment 2: Section 4.2 Storm Water Pollution Prevention

Based on the report and figures provided in the draft RD work plan for LL9, contaminated soil will be taken to and treated at the NACA site. Much of the area around the proposed NACA Vapor Energy Generation (VEG) soil processing area appears to be wetland.

Installing, monitoring, and promptly repairing storm water pollution prevention controls is even more important due to the proximity of the wetland and the stream. There is a Decontamination Area noted on Figure B-4 that is immediately adjacent to the wetland. It is not clear from the figure if this area would involve power washing activities. Stockpiled contaminated and treated soils will be placed in a 15,000-square foot area at NACA and there is also a 5,000-square foot staging area. An estimated 761 cubic yards of soil from LL9 will be taken to NACA for treatment.

The draft RD work plan for LL9 notes that the storm water pollution prevention plan was prepared in accordance with the Ohio EPA Permit No. OHC000005. Best management practices (BMPs) will be implemented, and inspections of storm water controls will be conducted in accordance with Section 9.4.2 and documented on the storm water inspection form found in Attachment A.

Ohio EPA is concerned with the proximity of the wetland area to the NACA-VEG soil treatment area. Provide details on the water management plan that is in place for the handling of decontamination water as well as storm water management at NACA during the VEG. How will contractors ensure that soils that have been treated and soils that are being stockpiled for treatment will be managed to prevent runoff from these staging areas into the nearby wetland? What steps will be taken if there is a release of soils or release of untreated or untested decontamination water?

Response 2:

As described in Section 4.2, site work will be planned using the weather forecast, with work being limited during severe storm events. As described in Section 9.4.2, inspections of the stormwater controls within the treatment area will be performed weekly, or within 24 hours of a rain event of 1/2 inch or more, with repairs made immediately to any control found to be deficient. The following has been added to the first paragraph of Section 9.4.2 in the Final RD work plan:

> *"Site work will be planned using the weather forecast, with work being limited during severe storm events. In addition, all excavated soils, both treated and untreated, shall be managed in lined and covered stockpiles within the treatment area. The tarps covering each stockpile will be maintained in good condition and secured prior to the end of each workday and when rain events occur."*

No release of contaminated soil from soil treatment operations is anticipated. The following language has been added to Section 9.4.2 of the Final RD work plan to address Ohio EPA comments regarding steps taken to prevent sediment and soil from leaving the VEG treatment area and the management of a soil or water release:

> *"During rain events, minimal runoff of contact water is anticipated within the VEG treatment area located at the NACA Test Area and will be limited by tarps covering stockpiles and treatment equipment. BMPs installed around the perimeter of the NACA VEG treatment area will prevent sediment and contaminated soil from entering adjacent wetland areas.*
>
> *In the event of a release of soil (contaminated or treated) beyond the silt fence, the soil will be excavated immediately and returned to the appropriate soil stockpile. If the release is from a contaminated soil stockpile, native soil and/or sediment sampling will be performed, and samples analyzed for project COCs to ensure that native soils are not in excess of residential land use criteria.*
>
> *"*

Near the location of each excavation, a decontamination pad will be installed and utilized as necessary for decontamination of equipment to remove any excess materials prior to Site departure. Based on the size of the excavation, it is anticipated that earth moving equipment will have to enter the area of excavation; thus; tracks, wheels and undercarriage of equipment will require decontamination. All trucks and heavy equipment leaving the sites will be decontaminated prior to departure to prevent release of contaminated materials to the environment.

The second paragraph in Section 5.4 has been amended to the following decontamination procedures:

> *"Near the location of each excavation, a decontamination pad will be installed and utilized as necessary for decontamination of equipment. Equipment used to excavate, load, or haul contaminated surface soil will be thoroughly decontaminated prior to contact with native sediments or treated surface soil, and prior to demobilization from the site or AOCs. In addition, equipment will be decontaminated prior to being used in other excavation areas/AOCs (e.g., equipment used in Area 1 will be decontaminated prior to use in Area 2). Equipment, including the backhoe bucket and other parts of equipment that come in contact with contaminated soil (tracks wheels, undercarriage of equipment, etc.), will be decontaminated by manual wiping or brushing off surfaces, followed by rinsing either by direct steam from the VEG system (if located at the NACA Test Area AOC) or rinsed using clean water (i.e., water obtained from an approved off-site source that has been previously sampled; the same water used for dust control). At the conclusion of all operations at the AOC, all equipment will be decontaminated, and the decontamination pad will be dismantled and placed, along with any fluids or collected soil, in the next load of waste to be hauled for disposal."*

An update to Figure B-3, indicating the approximate location of decontamination pads near each excavation, is provided in Attachment A to this response, and included in the Final RD Work Plan in Attachment B.

Minimal decontamination water will be generated or stored in the NACA-VEG soil treatment area (<300 gallons). All decontamination water generated in this area will be captured on plastic sheeting, contained, and transferred to untreated soil stockpiles or pumped into the on-site 4,000-gallon water tank for use in the VEG treatment system, following filtration of solids.

In response to the comment regarding release of untested or untreated water the following has been added to Section 5.4:

> *"In the event of a release of untreated or untested decontamination water, the area of the release shall be investigated including collecting soil or sediment samples and analyzing for project COCs, quantify any impacts. Following any release (soil or liquid), the root cause of the release will be determined and steps taken to eliminate any future releases. Corrective measures that may be taken include an increase in the size of the stormwater control and/or a reduction in the volume of soil being stockpiled onsite for treatment."*

In response to Ohio EPA comments regarding the location of the VEG treatment system and stockpiles, the planned staging and decontamination areas at the NACA VEG Treatment Area have been moved further east to eliminate the possibility of contaminated runoff impacting the wetlands. An update to Figure B-4, showing the updated VEG Treatment Area layout, is provided in Attachment A to this response, and included in the Final RD Work Plan in Attachment B.

Comment 3: Section 5.2.2 Ex-Situ Thermal Treatment of PAH soils — VEG Technology

The draft RD work plan did not include details of the VEG technology that is proposed.

The RD work plan should include information or at a minimum a reference on where the operating information can be found on the VEG from previous correspondence or reports that are a part of the public record. Ohio EPA received information about the VEG for the pilot study, but the information regarding the VEG should be included in the RD work plans.

How will operations and emission of the VEG be monitored and recorded? The draft RD work plan only notes that the thermally oxidized vapors will be subject to routine sampling, hourly with a photoionization detector (PID). Is there a form you will be using to record observations/results? What are the circumstances that may require shut down, maintenance or repair?

Response 3:

Information provided in RD work plan Section 5.2.2 describes the operation of the VEG system. Additional information is available in the "Implementation Report for Bench- and Pilot-Scale Testing Ex-Situ Thermal Treatment of Polycyclic Aromatic Hydrocarbons in Soils" referenced in Section 5.2.2.

The following reference has been added to the RD work plan Section 5.2.2:

> *"Additional information regarding the VEG technology can be found in the "Implementation Report for Bench- and Pilot-Scale Testing Ex-Situ Thermal Treatment of Polycyclic Aromatic Hydrocarbons in Soils," (Endpoint, 2015) and at http://www.endpoint-inc.com/wp-content/uploads/2012/06/VEG-Soil-Remediation-Technology-2015.pdf."*

Additionally, the RD work plan Section 5.2.2 has been amended to include the following language regarding site VEG operations:

> *"Soil treatment and VEG operation will be performed using the following procedure:*
>
> - *Stockpiles containing impacted soil, along with any co-mingled topsoil vegetation, will be uncovered and placed into the VEG treatment chamber using a front-end loader and sealed with a thermal vapor cap.*
> - *After sealing the chamber, the system operator will turn on the system, initiating the flow of water, followed by the flow of propane to the igniter.*
> - *Heated steam will be injected to the VEG treatment chamber through a manifold to distribute heat to all soil within the chamber. Vapors will be captured from the chamber via a collector manifold.*
> - *The pile temperature will be monitored utilizing thermocouples within the chamber recording their data to a datalogger. The VEG system will be monitored by an operator who will record operating parameters of the system (e.g., temperature and PID readings) hourly during operation, and logged on the VEG monitoring log included in Attachment A.*
> - *Soil treatment will be complete once the soil has been heated at the target temperature range (500°F to 700°F) for a minimum of 22 minutes.*
> - *Following treatment, the system will be turned off. The treatment chamber will be unsealed after a brief cool down period and the soil will be transported to the stockpile area to be stored in 50 CY stockpiles pending confirmation sampling. Dry soil may require wetting to reduce fugitive dust emissions."*

Operation of the VEG treatment system is monitored continuously by a technician trained to operate the equipment. The thermal treatment system includes a temperature monitor as well as a PID. Readings are gathered and documented on a monitoring log hourly during operation of the system. The monitoring log (form) is included in Attachment B of this response and Attachment A of the Final RD work plan.

Comment 4: Section 5.2.2 VEG Thermal Treatment Process and Section 5.3 Best Management Practices-Dust Control: Air Permitting

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) exemption does not apply to the existing facility roadways. Akron Air indicated they would need to be provided a roadway installation date to determine if the particulate emission (PE) limit applies to this project. If you will be adding new roadways this would be considered a modification, assuming the roadway remains after this remedial activity is completed.

  Include more in the draft RD work plan on how you will address fugitive dust to address the substantive requirements of the regulation. The draft RD work plan suggests that a dust monitoring information will be submitted under separate cover. (Section 5.3.1, page 27)

  The draft RD work plan notes that emissions of fugitive dust from roadways and construction activities will be minimized using water. Clarify under what conditions may work be stopped to address fugitive dust issues and who conducts the monitoring and at what frequency will you monitor fugitive dust at roadways, parking areas, soil piles and at the thermal treatment area.

Confirm any soil piles created as a result of the remedial action described in this work plan are temporary and are associated to this remedial action. Please describe work practices to be implemented to mitigate against fugitive dust releases at all stages/locations of the remedy, and controlling waterborne runoff, etc.

- Will there be a backup generator and if so, how will it be powered: propane, diesel or electric?
- The substantive requirements for the VEG will need to be met. Ohio Administrative Code 3745-17-07 (A)(1)(a) indicates that visible particulate emissions for any stack shall not exceed twenty per cent opacity, as a six-minute average. Please include the OEM documentation on volatile organic compound destruction efficiency at the 950° F operating temperature.

Response 4:

- *No new roadways will be constructed during the execution of this scope. All existing roadways were constructed in the 1940s; exact construction dates are not available.*

  The following has been added to Section 5.3.1 of the RD work plan to describe fugitive dust management per Akron Air requirements:

  > *"The presence of nuisance dust will be monitored throughout construction activities using a dust meter (mini-ram) by Alaniz-Endpoint Team personnel in compliance with Akron Air requirements. Dust measurements will be collected following continuous visible dust generation that lasts for a duration of 20 minutes. If dust readings exceed 1 milligram per cubic meter (mg/m^3) at a distance of 200 feet downwind of construction activities, water will be applied to the soil to mitigate dust generation.*
  >
  > *All soil piles created as a result of the remedial action described in this work plan are temporary and are associated with this remedial action. Stockpiled soil will be covered when not in use or during periods of high-velocity wind. In the event of fugitive dust releases being observed during transfer to and from the treatment system, water will be applied to suppress dust. Soil will be covered during treatment; thus, no dust is anticipated during this step."*

  Though not expected, waterborne runoff in the NACA-VEG soil treatment area will be managed per the response to Comment #2.

- *The VEG treatment system will require one portable 100-KW diesel generator. The system does not require a backup power supply. If power supply to the treatment system is limited or cut, the system will be deenergized and the deficiency will be identified and addressed. The following reference to the requirement for a diesel generator has been added to Section 5.2.2 of the Final RD work plan, under "VEG Thermal Treatment Process":*

  > *"A 4,000-gallon tank for storing water from a municipal source, a propane tank and a portable 100-kilowatt diesel generator will be maintained onsite (see Drawings in Attachment B) in support of steam generation, with ambient atmospheric air provided as the necessary air source."*

- *The comment regarding Ohio Administrative Code 3745-17-07 (A)(1)(a) is noted. The opacity of emissions from the VEG treatment system are expected to be <5% based on previous operations. The thermal oxidizer operating temperature range is 1300°F to 1500°F. The destruction efficiency of semi-volatile organic compounds within this range is 99.9%, as described in section 5.2.2 of the RD work plan. Section 5.2.2 in the RD work plan has been amended with the following clarification:*

  > *"Concurrent to the desorption process, a vacuum system internal to the sealed treatment chamber extracts and captures the PAH-laden vapors removed from the soil, where they are subjected to thermal oxidation for elimination of PAHs within a*

> *temperature range of 1300°F to 1500°F. The destruction efficiency of semi-volatile organic compounds within this range is 99.9%."*

Comment 5: Treatment Verification

The Quality Assurance Project Plan (QAPP) indicates that Test America, Savannah, GA will be receiving the samples for Load Line 9 for analysis. Confirm that the lab, Test America, Savannah, GA, can achieve the necessary detection limits necessary.

Response 5:

The limits of detection and reporting limits are described in "Table 4-2. Laboratory Detection Limits" in the QAPP. The laboratory confirmed in correspondence on August 6, 2020 that reporting limits guaranteed by the laboratory are equal to or less than the Facility Wide Clean-up Goal (FWCUG) for each of the chemicals of concern (COCs). "Table 4-2. Laboratory Detection Limits" has been updated with laboratory provided Method Detection Limits and Limits of Detection in the final QAPP. The updated table has also been included as Attachment C to this response.

Comment 6: Backfill and Site Restoration

- Will soils treated from Area 2 be placed back in the same excavation area where it originated?
- What is the timing for re-grading and backfilling?
- Are roll-off boxes transporting the untreated soil decontaminated if they will be used to transport treated soil or are there clean and dirty roll-off boxes?
- Section 8.2 notes Ohio Prairie Nursery will provide the seed mixes. Following thermal treatment, soils may need fertilizer and organic matter in addition to good seed and mulch in order to grow. The draft RD work plan did not mention if this was included to ensure successful plant growth.

Response 6:

- *Following treatment, soils can be used as backfill at any excavation.*
- *Backfilling is scheduled to be completed within weeks of excavation.*
- *Trucks or containers used to transport treated soil or clean backfill will be decontaminated prior to use if also used to transport contaminated soil as stated in Section 5.4, "Equipment used to excavate, load or haul contaminated surface soil will be thoroughly decontaminated prior to contact with native sediments or treated surface soil, and prior to demobilization from the site or AOCs".*
- *Soil treated using the VEG system has not historically required fertilizers or other soil amendments prior to seeding for plant growth. The Alaniz-Endpoint Team will assess the need for soil amendments to facilitate successful plant growth during site revegetation inspections. The following has been added to Section 8.2 of the RD work plan:*

  > *"Although soil treated using the VEG Technology has not historically required fertilizers or other soil amendments prior to seeding for plant growth, following construction, the Alaniz-Endpoint Team will assess the need for soil amendments (e.g., adding fertilizers, etc.) to facilitate successful growth."*

Comment 7: Attachment A — Field Forms

Do you have field forms for the VEG and fugitive dust monitoring?

Response 7:

Field forms for VEG monitoring and fugitive dust monitoring have been added to Attachment B of this response and to Attachment A of the Final RD Work Plan.

Comment 8: Attachment B — Design Drawings

Figure B-4: According to this drawing there will be only one stockpiling area. Is this the "clean — treated soil" pile? What is anticipated as the potential use of the open area?

Response 8:

The stockpile area will be used to manage both contaminated and treated soil. At the present time there are no plans for use of the open area beyond vehicle parking.

Per response to Comment 2 above, an update to Figure B-4 is provided in Attachment A of this response, and included in the Final RD Work Plan in Attachment B.

Comment 9: Appendix I SAP

The draft RD work plan includes a Sampling and Analysis Plan (SAP) that covers five areas of concern (AOCs) (see Appendix I in the Draft RD for RVAAP-42 Load Line 9). The five AOCs included in the SAP are as follows: Load Line 9, Depot Area, Sand Creek, and NACA and Wet Storage Area.

Ohio EPA is currently commenting on the SAP proposal for Load Line 9 only. Ohio EPA may have future comments regarding this SAP as it applies to the other AOCs.

One area will be remedied to address lead and mercury in surface soils and another area will be remedied to address polycyclic aromatic hydrocarbon (PAH)-impacted surface soil. Section 1 notes that an SAP is included in Appendix I. The SAP is dated May 15, 2020. Section 3.5.1 of the SAP states that incremental sampling methodology (ISM) sampling will be used. Waste profile sampling will also include discrete sampling in addition to ISM. The 2020 draft RD work plan for Load Lines 1-4 and 12 references a Leidos 2011 Standard Operation Procedure (SOP) will be used as guidance for conducting ISM sampling activities. Based on our May 27, 2020 call with your team to discuss our preliminary comments on the draft work plan for Load Lines 1-4 and 12, we learned that the contractor, CH2MHill, had identified a different ISM sampling approach in a QAPP.

Action Item: If you will be using ISM, Ohio EPA recommends using the most current ITRC ISM sampling guidance.

Response 9:

Comments noted. Please note that remediation activities at LL9 are being performed under a separate contract and different contractor utilizing a different technology than work completed at Load Lines 1-4 and 12.

The final SAP has been reviewed and we confirmed that the ISM sampling methodology described is compliant with the most current ITRC ISM sampling guidance provided in the January 2020 amendment to the "ITRC 2012 ISM-1 Guidance."

Please contact the undersigned at 614-336-6000 Ex 2053 or kevin.m.sedlak.civ@mail.mil if there are issues or concerns with this submission.

Sincerely,

SEDLAK.KEVIN.MICHAEL.1254440171 Digitally signed by SEDLAK.KEVIN.MICHAEL.1254440171 Date: 2020.08.20 07:27:03 -04'00'

Kevin Sedlak
RVAAP Restoration Program Manager
Army National Guard Directorate

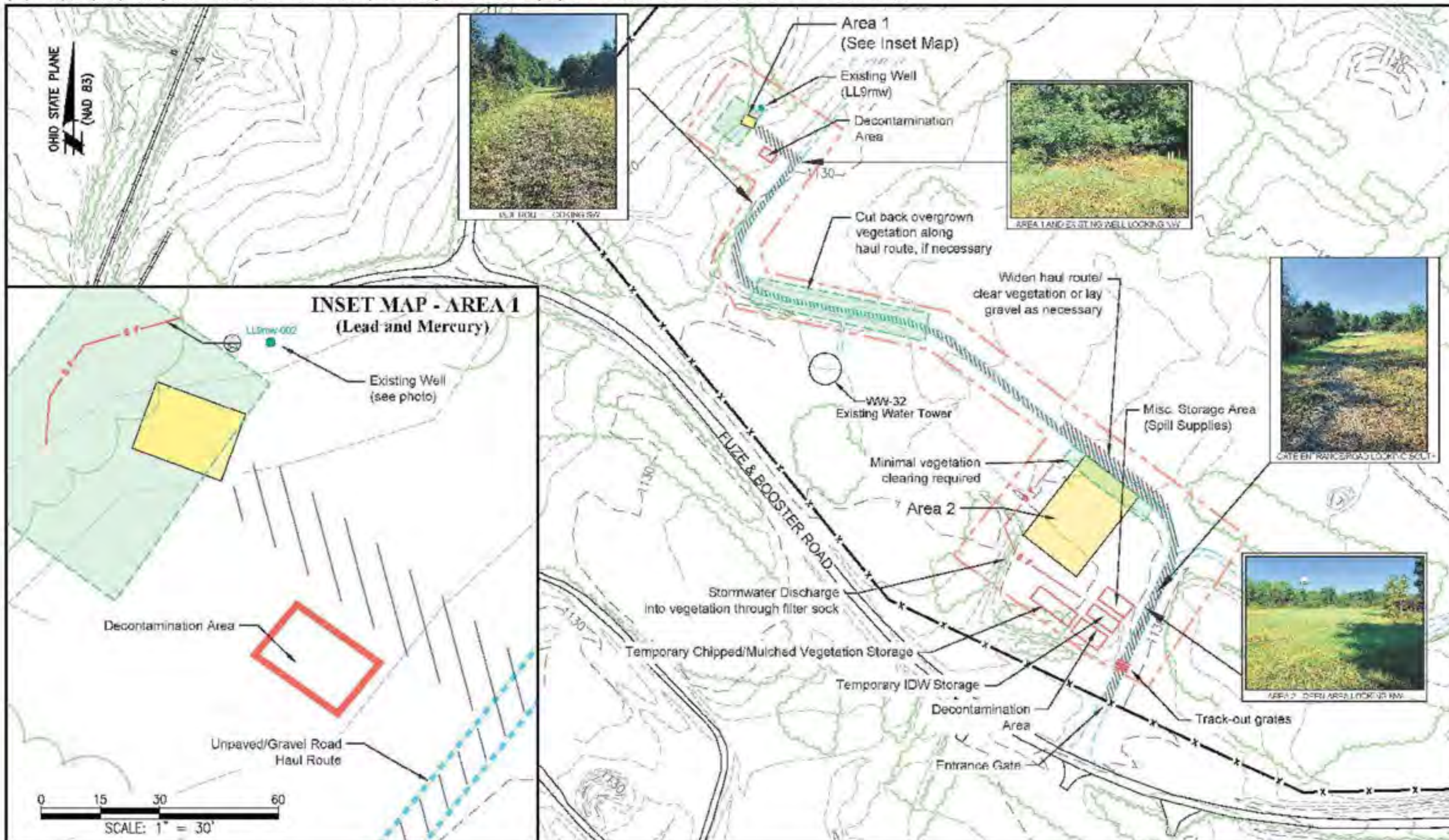
cc: Bob Princic, Ohio EPA, NEDO, DERR
Tom Schneider, Ohio EPA, SWDO, DERR
Tim Christman, Ohio EPA, NEDO, DERR
Natalie Oryshkewych, Ohio EPA, NEDO, DERR
Duane LaClair, Akron Regional Air Quality Management District
Kelly Kanoza, Akron Regional Air Quality Management District
Katie Tait, OHARNG, Camp James A. Garfield
Craig Coombs, USACE Louisville
Nathaniel Peters, USACE Louisville
Rebecca Shreffler, Chenega
Jennifer Tierney, Vista Sciences Corporation
Pat Ryan, Leidos – REIMS

Attachment A – Figures B-3 and B-4
Attachment B – VEG and Dust Monitoring Forms
Attachment C – QAPP Table 4-2

Attachment A

Figures B-3 and B-4

8/13/20 C:\USERS\DEVIL\DROPBOX\ENDPOINT PROJECTS\RAVENNA-USACE LOUISVILLE\RAVENNA SITES\RVAAP-42 LOAD LINE 9\CAD\APPENDIX B-DESIGN DRAWINGS APP B-3_SITE PREPARATION AND EXCAVATION PLAN



SITE PREPARATION

1. DRAWINGS AND NOTES SERVE ONLY AS GUIDLINES. ALL STORMWATER CONTROLS SHALL MEET OHIO'S "RAINWATER AND LAND DEVELOPMENT" STANDARDS.

2. THE ALANIZ-ENDPOINT TEAM WILL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL STORMWATER CONTROLS. WEEKLY INSPECTIONS AND INSPECTIONS WITHIN 24 HOURS OF A STORM EVENT GREATER THAN 0.5 INCHES SHALL BE CONDUCTED BY THE ALANIZ-ENDPOINT TEAM.

3. SILT FENCING LOCATIONS MAY BE REVISED AT THE DISCRETION OF THE ALANIZ-ENDPOINT TEAM CONSTRUCTION MANAGER BASED ON SITE CONDITIONS AND REMEDIAL DESIGN SAMPLING RESULTS.

4. ACCESS IMPROVEMENTS TO PREVENT EXCESS DUST, TIRE RUTTING, AND MUD SHALL BE REQUIRED AS NEEDED TO SUPPORT CONSTRUCTION ACTIVITIES.

5. THE ALANIZ-ENDPOINT TEAM SHALL CLEAR TREES AND VEGETATION ALONG THE GRAVEL ROAD/HAUL ROUTE AND SURROUNDING EXCAVATION AREAS. ALL TREES GREATER THAN 3 IN. IN DIAMETER THAT REQUIRE REMOVAL SHALL BE CUT BETWEEN THE MONTHS OF OCTOBER AND MARCH.

6. TREES LESS THAN 4 IN. IN DIAMETER AND OTHER VEGETATION NOT IN CONTACT WITH IMPACTED SOILS SHALL BE CHIPPED/MULCHED AND SPREAD ACROSS THE SITE AND SURROUNDING AREAS FOLLOWING CONSTRUCTION ACTIVITIES. TREES GREATER THAN 4 IN. IN DIAMETER SHALL BE TEMPORARILY STORED IN THE DESIGNATED LOCATION AND DISPOSED OFFSITE WITH IMPACTED SOILS.

7. ALL TREE/VEGETATION STAGING AND REMOVAL SHALL BE COORDINATED WITH OHARNG.

8. THE ALANIZ-ENDPOINT TEAM SHALL TAKE CARE TO PROTECT THE EXISTING MONITORING WELL AND WILL BE RESPONSIBLE TO REPAIR ANY DAMAGE TO THE WELL AS A RESULT OF CONSTRUCTION ACTIVITIES.

SOIL REMOVAL ACTIVITIES

1. UTILITY CLEARANCE WILL BE CONDUCTED WITHIN THE EXCAVATION BOUNDARIES.

2. EXCAVATION BOUNDARIES WILL BE SURVEYED PRIOR TO SOIL REMOVAL.

3. WASTE PROFILE SAMPLES WILL BE COLLECTED FROM THE EXCAVATION AREAS PRIOR TO EXCAVATION ACTIVITIES.

4.. IMPACTED SOILS/TOPSOIL VEGETATION FROM AREA 1 WILL BE LOADED DIRECTLY INTO HAULING TRUCKS FOR OFFSITE DISPOSAL.

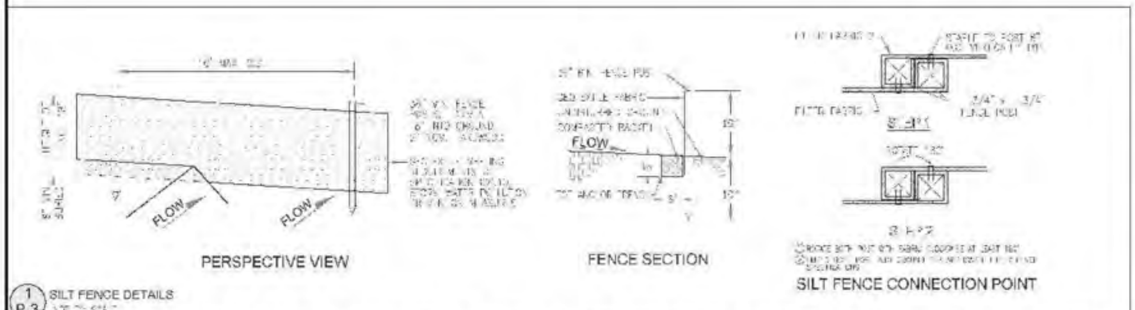
SITE RESTORATION ACTIVITIES

1. FINAL EXCAVATION BOUNDARIES WILL BE SURVEYED.

2. EXCAVATION PITS WILL BE BACKFILLED USING CLEAN IMPORTED SOIL FOR AREA 1 AND TREATED SOIL FOR AREA 2. BACKFILLING AREAS WILL BE RE-GRADED TO MATCH SURROUNDING ELEVATIONS.

3. PERFORM BACKFILLING/RE-VEGETATION IN ACCORDANCE WITH RD.

4. OHARNG WILL APPROVE FINAL SITE RESTORATION.



HISTORICAL SAMPLE COORDINATES		
SAMPLE NO.	EASTING (X) COORDINATE	NORTHING (Y) COORDINATE
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

NOTES:

1. INITIAL EXCAVATION BOUNDARIES TO BE DETERMINED AND STAKED IN THE FIELD USING HISTORICAL SAMPLE COORDINATES AND APPROXIMATE EXCAVATION EXTENTS SHOWN ON FIGURES.

2. EXCAVATION EXTENTS ARE SUBJECT TO CHANGE BASED ON CONFIRMATION SAMPLING RESULTS.

REMEDIAL DESIGN
RVAAP-42 LOAD LINE 9

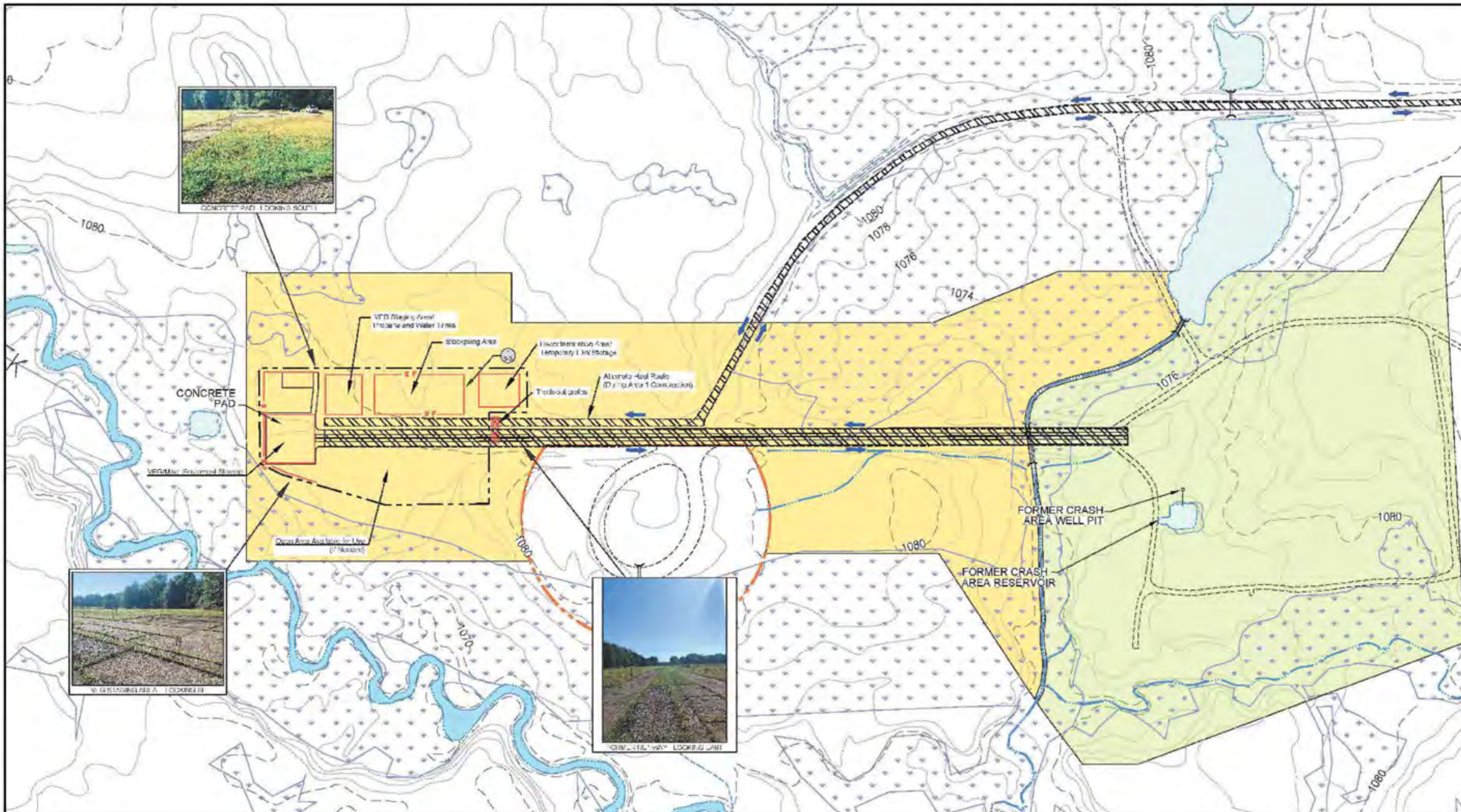
SITE PREPARATION AND EXCAVATION PLAN

US Army Corps of Engineers
Former Ravenna Army Ammunition Plant/CJAG
Portage and Trumbull Counties, Ohio

Endpoint
Strategy. Science. Sustainability.

B-3

Basemap Source: Leidos, 2014. Remedial Design for Soil, Sediment and Surface Water at RVAAP-13 Building 1200 and RVAAP-48 Anchor Test Area. Drawn by P. Holm and Leidos, 2017. Final Proposed Plan for Soil, Sediment and Surface Water at RVAAP-42 Load Line 9. Drawn by P. Holm



REMEDIAL DESIGN
RVAAP-42 LOAD LINE 9

STAGING AREAS AT
NACA TEST AREA AOC

US Army Corps of Engineers
Former Ravenna Army
Ammunition Plant/CJAG
Portage and Trumbull Counties, Ohio

Endpoint.
Strategy. Science. Sustainability.

B-4

LEGEND:

- GRAVEL ROAD
- SURFACE WATER
- WETLAND (2014 INRMP)
- INTERMITTENT STREAM
- GROUND CONTOUR (10-FT)
- GROUND CONTOUR (2 FT)
- APPROXIMATE OPEN DEMOLITION AREA #1 AOC BOUNDARY
- CONSTRUCTION STAGING AREA
- SILT FENCING
- TRUCK TRAFFIC ARROW

SOIL AGGREGATES

- FORMER PLANE REFUELING AND CRASH STRIP AREA
- FORMER CRASH AREA

OHIO STATE PLANE (NAD 83)

0 100 200

SCALE: 1" = 200'

Attachment B

VEG and Dust Monitoring Forms

VEG MONITORING LOG

Time	Date	VEG Temperature (°F)	VEG Flow (cfm)	ThermOx Temperature (°F)	ThermOx Flow (cfm)	ThermOx Influent PID (ppm)	ThermOx Effluent PID (ppm)	Recorded by

°F = degrees Farenheit
cfm = cubic feet per minute
ppm = parts per million

DUST MONITORING RECORD
RAM/MiniRAM MEASUREMENTS

Time	Date	LOCATION (upwind/ downwind, reference figure for station location)	INSTRUMENT RAM/MiniRAM	Concentration (mg/ m^3)	Recorded by

Attachment C

QAPP Table 4-2

Table 4-2. Laboratory Reporting Limits

Former RVAAP Site, Portage and Trumbull Counties, OH

Chemical of Concern	Laboratory Limits						FWCUG or Updated Residential RSL (1E-05 TRL, HQ=1.0) (mg/kg)
	RL (mg/kg)	MDL (mg/kg)	LOD (mg/kg)	LCS-Low (%)	LCS-High (%)	LCS-RPD (%)	
Benz(*a*)anthracene	0.067	0.033	0.067	49	126	20	11
Benzo(*a*)pyrene	0.067	0.012	0.033	45	129	20	1.1
Benzo(*b*)fluoranthene	0.067	0.033	0.067	45	132	20	11
Dibenz(*a,h*)anthrancene	0.067	0.033	0.067	45	134	20	1.1
Indeno(1,2,3-*cd*)pyrene	0.067	0.028	0.067	45	133	20	11
Arsenic	0.3	0.1	0.3	82	118	20	4.25
Lead	0.2	0.05	0.15	84	118	20	400
Mercury	0.1	0.02	0.06	74	126	20	22.7
Chemical of Concern	**RL (mg/L)**	**MDL (mg/L)**	**LOD (mg/L)**	**LCS-Low (%)**	**LCS-High (%)**	**LCS-RPD (%)**	**TCLP Criteria (mg/L)**
TCLP (arsenic)	0.200	0.200	0.200	86	113	0.2	5
TCLP (lead)	0.200	0.200	0.200	87	113	0.2	5
TCLP (mercury)	0.02	0.02	0.02	82	119	0.2	0.2
Benz(*a*)anthracene	0.05	0.00280	0.0100	58	125	20	NA
Benzo(*a*)pyrene	0.05	0.00360	0.0100	54	128	20	NA
Benzo(*b*)fluoranthene	0.05	0.0130	0.0250	53	131	20	NA
Dibenz(*a,h*)anthrancene	0.05	0.005	0.01	51	134	20	NA
Indeno(1,2,3-cd)pyrene	0.05	0.005	0.01	52	134	20	NA

FWCUG = Facility Wide Cleanup Goal
RSL = USEPA Residential Soil Regional Screening Level (June 2017)
NA = Not Applicable
TRL = Target Risk Level
HQ = Hazard Quotient
RL = Reporting limit
MDL= Method detection limit
LOD= Limit of detection

Ohio Environmental Protection Agency

Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

October 6, 2020

TRANSMITTED ELECTRONICALLY

Mr. Kevin Sedlak
Restoration Program Manager
ARNG-ILE Clean Up
Camp James A Garfield JTC
1438 State Route 534 SW
Newton Falls, OH 44444

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859264

Subject: Request for an Extension for the Review of the "Response to Comments on Draft Remedial Design for RVAAP-42 Load Line 9"

Dear Mr. Sedlak:

On August 21, 2020, the Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) received the "Response to Comments on Draft Remedial Design for RVAAP-42 Load Line 9." Ohio EPA is finalizing its review of the response to comments.

Ohio EPA recently approved the remedial design (RD) for the remedy at Load Lines 1-4 and 12 and we are comparing the quality control measures outlined in the Quality Assurance Project Plan (QAPP) for Load Lines 1-4 and 12 to those proposed at Load Line 9 to ensure consist quality control process is in place.

This letter requests an extension of 30 days from today, October 6, 2020 to ensure a proper review of the document. Ohio EPA respectfully requests your review and approval of this extension request pursuant to the Orders.

As a precautionary response to COVID-19, Ohio EPA is currently operating with most staff working remotely. During this time, we will not be issuing hard-copy mail. This letter is an official response from Ohio EPA that will be maintained as a public record.

RECEIVED
OCT 06 2020

If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1267, or by email at Natalie.Oryshkewych@epa.ohio.gov.

Sincerely,

Natalie Oryshkewych

Natalie Oryshkewych
Manager
Division of Environmental Response and Revitalization

NO/sc

ec: Rebecca Shreffler, Chenega Tri-Services, LLC
Katie Tait, OHARNG RTLS
Bob Princic, Ohio EPA, NEDO, DERR
Thomas Schneider, Ohio EPA, SWDO, DERR
Brian Tucker, Ohio EPA, CO, DERR

Ohio Environmental Protection Agency

Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

October 9, 2020

TRANSMITTED ELECTRONICALLY

Mr. Kevin Sedlak
Army National Guard
Installation and Environment
Clean-up Branch
IPA Designation
1438 State Route 534 SW
Newton Falls, OH 44444

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859264

Subject: Response to Comments on the Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42), Dated August 19, 2020

Dear Mr. Sedlak:

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) reviewed and commented on the document entitled "Draft Remedial Design for RVAAP Load Line 9." On August 21, 2020, Ohio EPA received your response to our June 30, 2020 comments on this document. You have adequately addressed Comments 1 through 8.

We have a follow-up comment to Comment 9, regarding Appendix I.

Appendix I Quality Assurance Project Plan (QAPP) Table 4-1: The Draft Remedial Design (RD) for RVAAP-42 Load Line 9 includes a Sampling and Analysis Plan (SAP) that covers five areas of concern (AOCs), see Appendix I in the Draft RD for RVAAP -42 Load Line 9.

The process to verify remediation goals are met at the AOCs should be undertaken consistently. Revise Table 4-1 to be consistent with the Load Line 1-4 and 12 data quality objectives (DQOs) for field and laboratory verification. Specifically, the relative percent difference (RPD) should not be used and removed from the document. The relative standard deviation (RSD) of 30-35% should replace the RPD as the criteria for DQO objectives.

Action Item: Please adjust this QAPP to be consistent with the revisions that were made to Load Line 1-4 and 12 QAPP to ensure remediation goals are met with a high level of confidence that field sampling errors and laboratory analysis errors have been minimized.

RECEIVED
OCT 09 2020

As a precautionary response to COVID-19, Ohio EPA is currently operating with most staff working remotely. During this time, we will not be issuing hard-copy mail. This letter is an official response from Ohio EPA that will be maintained as a public record.

If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1201.

Sincerely,

Sue Netzly-Watkins

Sue Netzly-Watkins
Site Coordinator
Division of Environmental Response and Revitalization

SNW/sc

ec: Katie Tait, OHARNG RTLS
Nat Peters, USACE
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Kelly Kanoza, Akron Regional Air Quality Management District

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

November 3, 2020

Ohio Environmental Protection Agency
DERR-NEDO
Attn: Sue Netzly-Watkins
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, Response to Comments on Draft Remedial Design for RVAAP-42 Load Line 9, SAP and QAPP (Ohio EPA Work Flow Activity #267000859264)

Dear Ms. Netzly-Watkins:

The Army National Guard (ARNG) has reviewed comments provided for the *Draft Remedial Design for Soil, Sediment and Surface Water at RVAAP-42 Load Line 9* (RD work plan) by the Ohio Environmental Protection Agency (Ohio EPA) in a letter dated October 9, 2020.

The responses on the attached comment resolution table reflect Ohio EPA comments received on October 9, 2020 regarding Appendix I - Quality Assurance Project Plan (QAPP) for the subject RD work plan. Per the October letter, the Ohio EPA confirmed that comments 1 through 8 provided by the Ohio EPA in a letter dated June 30, 2020 were adequately addressed in the responses provided August 21, 2020.

Please contact the undersigned at 614-336-6000 Ext 2053 or kevin.m.sedlak.ctr@mail.mil if there are issues or concerns with this submission.

Sincerely,

SEDLAK.KEVIN.MICHAEL.1254440171 Digitally signed by SEDLAK.KEVIN.MICHAEL.1254440171 Date: 2020.11.04 07:21:01 -05'00'

Kevin M. Sedlak
RVAAP Restoration Program Manager
Army National Guard Directorate

cc: Bob Princic, Ohio EPA, NEDO, DERR
Tom Schneider, Ohio EPA, SWDO
Tim Christman, Ohio EPA, NEDO, DERR
Natalie Oryshkewych, Ohio EPA, NEDO, DERR
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Steven Kvaal, USACE Louisville
Nathaniel Peters, USACE Louisville
Rebecca Shreffler, Chenega
Jennifer Tierney, Vista Sciences Corporation
Pat Ryan, Leidos – REIMS

Comment Resolution Table

Installation: Camp James A. Garfield/Former RVAAP
Document: Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42), Dated August 19, 2020
Reviewer(s): Sue Netzly-Watkins (SNW), Site Coordinator, Ohio EPA (330-963-1235 or Susan.Netzly-Watkins@epa.ohio.gov);
Comments received October 9, 2020
Date: November 3, 2020

Cmt. No.	Page or Sheet	Comment and Recommendation	Response
Ohio EPA 1	Table 4-1	Revise Table 4-1 to be consistent with the Load Line 1-4 and 12 data quality objectives (DQOs) for field and laboratory verification. Specifically, the relative percent difference (RPD) should not be used and removed from the document. The relative standard deviation (RSD) of 30-35% should replace the RPD as the criteria for DQO objectives.	The requested change has been made. Table 4-1 was updated in the QAPP and has been provided as an attachment to this comment resolution table.
Ohio EPA 2	QAPP Section 4	Please adjust this QAPP to be consistent with the revisions that were made to Load Line 1-4 and 12 QAPP to ensure remediation goals are met with a high level of confidence that field sampling errors and laboratory analysis errors have been minimized.	The following was added to the QAPP following review of the Load Line 1-4 and 12 data quality objectives (DQOs) for field and laboratory verification: "4.5 Initial Data Review For excavation confirmation samples collected using the Incremental Sampling Methodology (ISM), the first three ISM samples will be collected in triplicate. Following review of the triplicate data for the first three confirmation samples, additional ISM field triplicates will be collected such that 1 in 10 excavation confirmation samples are collected in triplicate overall. The results of the initial ISM field triplicate samples and the results of the associated laboratory subsample replicates will be submitted to Ohio EPA for a 48-hour review of the following DQOs: • For ISM laboratory subsample replicate results greater than the Limits of Quantitation (LOQ) (duplicates for PAHs and Metals; one per laboratory batch of up to 20 samples for each analytical group), an RPD of less than or equal to 20% as a goal. If this DQO is not met, a J-flag will be applied to the associated data. • For the field ISM triplicates, an RSD of less than or equal to 30 to 35% as a goal (RSD less than or equal to 35%) will be incorporated into sample data evaluations. If this DQO is not met for the ISM field triplicate samples, then Ohio EPA will work with the Army to determine whether there are concerns with the data quality, using Table 1 of the Ohio EPA Field Standard Operating

			Procedure (FSOP) as a guide (see Attachment 1). If there are concerns with the data quality, then the Army, Ohio EPA and Endpoint will work together to determine the path forward, following the guidance below excerpted from the Hawai'i Department of Health Technical Guidance Manual Section 4.2.7.3 "Evaluation of Data Representativeness, Table 4-2 Recommended Adjustment of Multi Increment Data for Decision Making Based on RSD of Replicate Samples", http://hawaiidoh.org/tgm-pdfs/TGM.pdf (HDOH, 2016): Good Precision (RSD <35%) • Compare unadjusted ISM sample data directly to cleanup goal for decision making (for RVAAP, the maximum field replicate value will be used to compare to the cleanup goal); • Data can be used for confirmation purposes without the need for additional sampling, if cleanup goals are met. Moderate Precision (RSD >35% but <50%) • Review and discuss field sampling methods and laboratory processing and analysis methods and discuss potential sources of error (e.g., improper increment collection methods, inadequate number or mass of increments, unrepresentative laboratory subsampling methods, etc.); • Compare unadjusted ISM sample data directly to cleanup goal for decision making (for RVAAP, the maximum field replicate value will be used to compare to the cleanup goal); • Additional confirmation sampling recommended following remediation of decision units (DUs) that exceed cleanup goals, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples.

			Poor Precision (RSD >50% but <100%) • Review and discuss field sampling methods and laboratory processing and discuss potential sources of error in report; • If the large majority of total error is attributable to laboratory subsampling and analysis error, request laboratory to subsample and analyze the batch of DU samples again using correct techniques, and include additional subsampling replicates; • Compare the 95% UCL (Chebyshev method) for replicate data to 150% of the cleanup goal for decision making; • Estimate a 95% UCL for DUs where replicates were not collected based on the 95% UCL and mean calculated for the replicate data; Compare results to 150% of the cleanup goal; • Provide additional, multiple lines of evidence for acceptance (or rejection) of the data for decision making purposes including knowledge of the site history and the anticipated potential for contamination above cleanup goal, the adequacy of the methods used to collect, process and analyze samples, and the approximation of the data to cleanup goal; • Additional confirmation sampling recommended following remediation of DUs that exceed cleanup goal, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples. Very Poor Precision (RSD >100%) • If the large majority of total error is attributable to laboratory subsampling and analysis error, request laboratory to subsample and analyze the batch of DU samples again using correct techniques, and include additional subsampling replicates; • Review and discuss field sampling methods and laboratory processing and analysis methods and discuss potential sources of error in report;

			• Consider re-sampling of DU(s) most suspect for contamination using a larger number of increments and/or smaller DUs; • If one or more of the replicate samples exceeds the cleanup goal then remediation of the DU should be considered, even if the mean concentration is well below the cleanup goal. Remediation of associated DUs where replicate samples were not collected should also be considered; • If all replicate samples are below the cleanup goal, then compare the 95% UCL (Chebyshev method) for replicate data to the unadjusted cleanup goal for decision making; • If all replicate samples are below the cleanup goal, estimate a 95% UCL for DUs where replicates were not collected based on the 95% UCL and mean calculated for the replicate data and compare results to unadjusted cleanup goal; • Provide additional, multiple lines of evidence for acceptance (or rejection) of the data for decision making purposes including knowledge of the site history and the anticipated potential for contamination above cleanup goal, the adequacy of the methods used to collect, process and analyze samples and the approximation of the data to cleanup goal; • Additional confirmation sampling recommended following remediation of DUs that exceed cleanup goal, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples. If field triplicate samples are being collected for a particular DU, the aliquots will be collected from completely independent systematic random locations in the grid (i.e., aliquots for the field triplicate samples will not be collected around a single grid point used for the parent sample since this may not adequately test small-scale variability within the DU) (HDOH, 2016)."
Ohio EPA 2	SAP Table 4-1		Added the following note to Table 4-1 of the SAP: "For excavation confirmation samples collected using ISM, the first three ISM samples will be collected in triplicate. Following review of the triplicate data for the first three

Comment Resolution Table

Installation: Camp James A. Garfield/Former RVAAP
Document: Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42), Dated August 19, 2020
Reviewer(s): Sue Netzly-Watkins (SNW), Site Coordinator, Ohio EPA (330-963-1235 or Susan.Netzly-Watkins@epa.ohio.gov);
Comments received October 9, 2020
Date: November 3, 2020

			confirmation samples, additional ISM field triplicates will be collected such that 1 in 10 excavation confirmation samples are collected in triplicate overall. The results of the initial ISM field triplicate samples and the results of the associated laboratory subsample replicates will be submitted to Ohio EPA for a 48-hour review of the DQOs outlined in the QAPP."
Ohio EPA 2	Att. 2		SOP-1 for ISM sampling was updated in the SAP to match the RD workplan for Load Lines 1-4 and 12 and has been provided as an attachment to this comment resolution table.
Ohio EPA 2	SAP and QAPP		Updated the following sampling methodologies to match the RD workplan for Load Lines 1-4 and 12: • In-situ waste profile sampling – one 8-point composite for every 250 cubic yards (in-situ). • Import soil – one discrete sample per 4,000 cubic yards. • Treated soil confirmation sampling – one 8-point composite per every 100 cubic yards.

Attachment 1

QAPP Table 4-1

Table 4-1. Data Quality Objectives Summary for Soil Sampling
Former RVAAP Site, Portage and Trumbull Counties, OH

USEPA Analytical Method	SampleType	Precision (RSD or RPD)		Accuracy (Laboratory)	Completeness
		Field	Laboratory		
8270D	ISM and Composite	<35%RSD	<20%RPD	45-134%	90%
60 I0C	ISM and Composite	<35%RSD	<20%RPD	81-112%	90%
7471B	ISM and Composite	<35%RSD	<20%RPD	82-119%	90%
1311	ISM and Composite	<35%RSD	<20%RPD	82-119%	80%

Attachment 2

SOP-1 Incremental Sampling Method (ISM)

SOP-1 Incremental Sampling Method (ISM)

The purpose of this standard operating procedure (SOP) is to summarize requirements for the effective field implementation of increment sampling method (ISM) for soil undertaken as part of site characterization at contaminated sites. The ISM soil sampling process provides a view of mean contaminant concentrations over the area of a DU.

This SOP applies to all Endpoint personnel and subcontractors who perform ISM activities, and is limited to describing methods for obtaining surface soil samples (considered less than 1-foot below ground surface) for non-volatile, semi-volatile and inorganic analyses using ISM techniques. ISM techniques have been developed for volatile organic compounds and subsurface soil, however, they are not included in this SOP. This SOP was developed according to the following reference documents:

- *American Society for Testing and Materials (ASTM) D-6323-98. 2003 (re-approved). Standard Guide for Laboratory Subsampling of Media Related to Waste Management Activities.*
- *Hawaii State Department of Health (HDOH). 2020. Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan. Office of Hazard Evaluation and Emergency Response. Sections 3.4 and 4.2.*
- *ITRC. February 2012. Technical and Regulatory Guidance, Incremental Sampling Methodology. The Interstate Technology & Regulatory Council Incremental Sampling Methodology Team.*
- *Alaska Department of Environmental Conservation (ADEC). March 2009. Draft Guidance on Multi-Increment Soil Sampling. State of Alaska Department of Environmental Conservation Division of Spill Prevention and Response Contaminated Sites Program. Ramsey, C. and A. Hewitt (Ramsey, et. al.). 2005. A Methodology for Assessing Sample Representativeness, Environmental Forensics. 6:71-75.*
- *Pitard, Francis F. Pierre Gy's. Sampling Theory and Sampling Practice. 1993. 2nd edition. CRC Press.*
- *U.S. Environmental Protection Agency (USEPA). November 2003. Guidance for Obtaining Representative Laboratory Analytical Subsamples from Particulate Laboratory Samples. R.W. Gerlach and J.M. Nocerino, EPA/600/R-03/027. http://www.cluin.org/download/char/epa_subsampling_guidance.pdf.*

This SOP focuses on the most commonly used ISM soil sampling tasks and applications anticipated at a field site and should be used in conjunction with other applicable project SOPs.

General

The objective of ISM is to reduce the variability created by taking discrete samples, and improve the reliability and representativeness of environmental data by obtaining multiple sub-samples (sample increments) over a decision unit (DU) (defined as the area or volume in question). These "increments" are combined into one bulk ISM sample, which is submitted to the laboratory, resulting in a better representation of actual mean concentrations in a DU.

The DU encompasses the area or volume about which a decision is necessary (e.g., deciding whether risks are acceptable or not). Appropriate decision units must be identified for ISM to be valid. Therefore, the identification of decision units is one of the most important factors when using ISM. Identification and delineation of the decision units should be conducted during project planning and identified in a client and regulatory approved Workplan prior to obtaining ISM samples. Since ISM sampling provides an "average" concentration of a DU, agreement on the DU boundaries is extremely important prior to collecting the "bulk increment sample".

The number of increments incorporated into the bulk ISM, and the overall size of the ISM collected are not dependent on the size of the decision unit. The sampling theory is based on an assumption (and empirical observations) that 30 to 100 increments from a given decision unit of any size will result in a sample that is adequately representative of the average contaminant level in the decision unit as a whole. If the decision unit is the size of a small backyard garden, then 30 to 100 increments are collected. If the decision unit is a 10-acre, neighborhood-size area in a former agricultural field, then 30 to 100 increments of a similar mass are likewise collected.

If the contaminant distribution is expected to be very heterogeneous, it may be preferable to increase the number of increments collected to the recommended maximum of 100 for larger DUs. This may help to reduce field sampling error and minimize the variation between replicate samples used to evaluate the precision of the data collected. It has been reported that increasing the number of increments from 30 up to 100 may improve the reproducibility of data collected, and since the ISM sample is submitted as one sample, the number of increments collected does not typically increase analytical costs except that a small fee may be added for the excess sample mass management in the laboratory.

This SOP describes procedures for selecting sampling locations, marking field sampling locations, collecting incremental soil samples, and submitting these samples for laboratory analyses. This SOP assumes that the DU, and method for selecting increment locations within the DU has already been determined in the project work plan or project Quality Assurance Project Plan (QAPP), and that analyses and the laboratory conducting the analyses have been identified in the QAPP.

Sample Collection

ISM samples are prepared by typically collecting 30 to 50 small increments (samples) (up to 100 may be needed if a soil at the DU is determined to be very heterogeneous) of soil from systematic random locations within a specified decision unit and combining these increments into a single sample, referred to as the "bulk ISM sample." Individual soil increments typically weigh between 30 and 50 grams, with bulk ISM typically weighing between 900 and 2,500 grams. The mass of the final bulk ISM depends on the number of increments collected and the size of the sample collection tool utilized. However, a minimum final sample size should not be less than 1 kilogram as a general guideline.

The corners (or boundaries) of each of the designated ISM areas will be located using digital global positioning system and marked using wooden stakes or pin flags. Approximately equal sample volume aliquots will be collected using a step probe sampler, per the procedure outlined below. A sufficient number of aliquots will be collected to provide statistical confidence that the average concentration of a particular constituent within a designated area is represented by the ISM sample. No less than 30 aliquots for each sample will be collected to provide the requisite statistical confidence (95%).

Once the DU has been delineated with flags in the field collection of sample increments may begin.

Use flags or survey twine to define the edges of each grid cell and complete construction of the ISM sample grid similar to those depicted in the figures below.

Figures Illustrating Systematic Random Sampling Method

(Source: HDOH Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan, 2020)

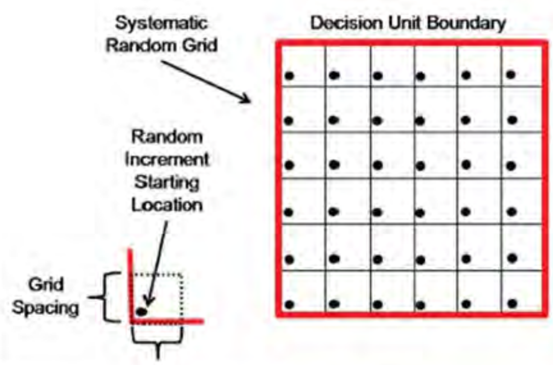

Figure 4-9. Example Increment Collection Locations Based on a Systematic Random Grid Scheme
Grid spacing determined based on DU area and number of desired increments. Initial increment location selected from random location, subsequent increments collected at uniform spacing within DU.

Figure 4-11. Systematic Increment Locations for Odd Shaped DUs (compare to Figure 4-9)
The number of increments collected within grid rows can vary in different areas of the DU.

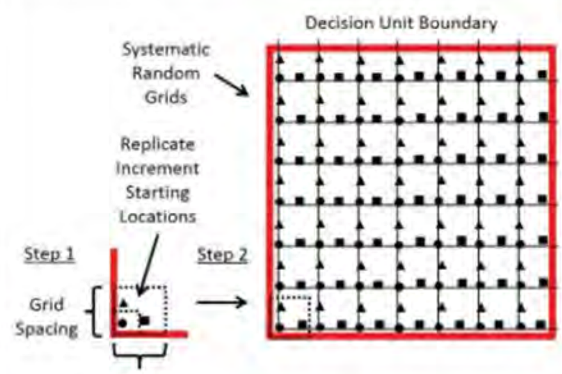

Figure 4-12. Example Collection of Increment Location Points for Triplicate Multi Increment Samples
Increments collected in a systematic random method. Circles, triangles and squares depict increment collection locations for three, respective Multi Increment samples (increments collected halfway between initial increment grid point locations).

Sketch the ISM sample grid design, orientation (compass bearing), overall dimensions, cell dimensions, nearby features, and any other valuable information in the field notebook. Photograph the completed sample grid for future reference. Survey the center and corner stake locations of the DU or record them with a GPS unit.

If using stratified random sampling mode, a grid is set up over the DU making each part of the grid equal size, and one increment is collected at random from each subunit of the grid. If using systematic random sampling mode, select a random starting point in one subunit, then collect an increment sample at this location, and the same location at each subsequent subunit of the DU.

In either mode the following procedures should be followed:

- Sampling tools shall be new or decontaminated prior to use according to the project planning documents.
- Sampling tools need not be decontaminated between each sample increment, but shall be decontaminated or discarded prior to sampling a new DU.
- Test the proposed sampling tool(s), and determine what tool(s) will provide the best sample increments.
- Samples should be collected from the same depth at all incremental sampling locations.
- Larger sized particles (rocks, cobbles, and coral) and roots should be avoided or discarded prior to transferring the sample into the bulk ISM container.
- The laboratory is going to sieve out anything >2 millimeters (mm), so collect enough sample at each increment such that there will still be sample for analysis after the portion > 2mm has been sieved out. This may require collection of multiple aliquots per increment if ISM samples are collected using a small diameter coring device.
- The sample collector will describe and classify soils collected according to Universal Soil Classification System (USCS) nomenclature. At a minimum, this will be done for the final bulk ISM sample after all the increments have been collected. Additionally, during collection of increments, the soil will be described at each significant change in lithology type encountered across the DU. Soil descriptions and classifications will be recorded in the field logbook.
- Individual increments collected are placed into a single sample container to produce the bulk ISM.
- If replicates and triplicates are being collected (strongly recommended), replicate increments may be collected from near the normal sample location by pacing off a few feet from the normal sample collection and obtaining a replicate increment. The triplicate increment may be collected by pacing another few feet from the duplicate increment sampling location.
- Store bulk ISM samples as required by the project planning documents.
- Pack and ship samples to the laboratory in accordance with the project planning documents.

Field instruments (e.g., PID, flame ionization detector, and XRF) will not be used to measure chemical concentrations or bias sample collection, unless it is determined that chemical concentration measurements are needed for the protection of workers' health and safety.

Collection of Field Replicate ISM Samples

To statistically evaluate sampling precision for each DU, replicate ISM samples are collected from selected decision units. Typically two replicate increments are collected from the same depth as the normal sample in different locations. A different random starting location is determined for each replicate collected in the selected DU(s). Replicate sample increments are generally collected along the same approximate directional lines established through the DU for the initial ISM samples, though at different systematic random locations than initially used. This is accomplished by pacing off the replicate increments from a different random starting location on the first line/row of the DU, and continuing to sample at this different random interval throughout the DU.

Replicate samples may be collected by establishing rows for increment collection that run perpendicular to or at a 45 degree angle to the direction used to collect the initial ISM. Another option is to use the same rows but collect increments in between the locations used for the initial sample. Replicate samples should be sent to the laboratory as "blind" samples, meaning the laboratory does not know they represent replicate samples of the initial ISM.

The replicate samples are prepared and analyzed in the same manner as carried out for the initial sample. Triplicate samples (i.e., initial ISM plus two replicates) are preferred and more useful than just duplicates for statistical analysis. If only one DU is being investigated, triplicate samples are recommended. If multiple DUs are being investigated, it may not be necessary to collect triplicates at all DUs.

Laboratory Processing of ISM Samples

The bulk ISM is submitted to the laboratory for analysis. Careful planning with the laboratory for processing of ISM samples by the Project Chemist prior to sample collection is essential to obtain meaningful results. Details of project requirements will be described in the project planning documents.

It is important to note that, while the laboratory is receiving a bulk sample of up to 2,500g, it will only analyze a subset of this sample. One issue discussed in both the Environmental Protection Agency (EPA) and American Society of Testing Materials (ASTM) guidance documents is the choice of a minimum subsample mass for extraction/analysis of soil samples in order to reduce "Fundamental Error" of the lab analyses to approximately 15% or less. The minimum appropriate mass is based on the maximum particle size in the soil samples. For samples with a maximum particle size of <2mm, the minimum analysis mass is 10 grams. If the analytical method to be used typically calls for sample extraction/analysis mass of less than 10 grams, the method should be modified to increase extraction/analysis mass to at least 10 grams for samples with maximum particle sizes of <2mm (larger mass could be beneficial for some analyses). For analyses of fine particulates (e.g., <250 µm), a onegram sub-sample may be adequate to reduce Fundamental Error below 15%; however a larger mass may be reliably run by the method (e.g., 2-10 grams).

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

December 8, 2020

Ohio Environmental Protection
Agency DERR-NEDO
Attn: Sue Netzly-Watkins
2110 East Aurora Road
Twinsburg, OH 44087-
1924

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, Response to Comments on Draft Remedial Design for RVAAP-42 Load Line 9, SAP and QAPP (Ohio EPA Work Flow Activity #267000859264)

Dear Ms. Netzly-Watkins:

In a letter dated November 3, 2020, the Army responded to review comments provided by Ohio EPA on the *Draft Remedial Design for Soil, Sediment and Surface Water at RVAAP-42 Load Line 9*. The Ohio EPA comment letter was dated October 9, 2020.

On November 10, 2020, the Army received emailed questions regarding our November 3 response. The questions pertained to the Sampling and Analysis Plan (SAP) that was attached to the Load Line 9 Remedial Design (RD) prepared by Endpoint. The SAP is intended to capture the generic sampling and analysis procedures that will be common to all areas of concern (AOCs) being remedied by the Vapor Energy Generator (VEG) process, and it will be considered an attachment to all of those RDs.

On November 17,2020, I provided the email shown in Attachment 1 to this letter as a response to your emailed questions.

On November 19, 2020, during our monthly call to update the schedule, the Ohio EPA indicated that you had concerns with our responses dated November 17. I think the question Brian Tucker had was "why did you go back to RPD instead of RSD?" The Army team was a bit confused because we weren't expecting the question and were not sure exactly what he was asking about. This letter is an attempt to clarify the situation and capture the email correspondence for the Administrative Record.

The Army understands that the Ohio EPA is trying to ensure that requirements for the SAP for the ex-situ thermal treatment by the VEG process, to be conducted by Endpoint, are consistent with requirements that have been placed on the ex-situ thermal treatment being conducted at Load Lines 1 – 4 & 12 by CH2M. It should be noted that the RD for Load Lines 1 – 4 & 12 has been approved and treatment has started at those AOCs. The Army believes that RD was revised such that we are doing what was asked of us. We are doing field triplicates for ISMs at the agreed upon frequency and when there are triplicates, the comparison calculation will be RSD. Also, for every batch of samples that has field replicates, there will be laboratory sub-sampling replicates. These replicates may not be on the same primary sample, but they will be from the same batch of samples. This is detailed in CH2M's QAPP. If a Contaminant of Concern is an explosive constituent, the laboratory method calls for the subsampling replicates to be triplicates. As with field triplicates, for laboratory triplicates the comparison calculation will be RSD. For all other

Contaminants of Concern, the laboratory subsampling replicates will be duplicates, consistent with the applicable laboratory methods. For duplicates, the comparison calculation is RPD. Calculating an RSD with less than three samples does not really work.

Regarding the SAP prepared by Endpoint for the Load Line 9 Remedial Design, the AOCs scheduled to be remedied by the VEG process do not have explosives as Contaminants of Concern. Consequently, there are no references to laboratory subsampling triplicates in the document. Since the laboratory replicates will be duplicates, the comparison calculation will be RPD.

This is consistent with what was approved for Load Lines 1 - 4 & 12. There will be field triplicates at the agreed upon frequency and again the comparison calculation will be RSD.

Finally, it has been agreed that if any sample replicate (field or laboratory) fails to meet the cleanup criteria, the whole sample will be considered to have failed. This fact seems to render the comparison calculation moot, whether it is RSD or RPD.

In conclusion, the Army stands by our previously submitted written responses. We would also suggest that any disagreement about a technical detail in the Endpoint SAP need not delay your review of subsequent Remedial Designs for the VEG process, because the details of how the samples are going to be collected, processed, and analyzed are contained in the SAP. Each RD contains details that are unique to that AOC.

Please contact the undersigned at 614-336-6000 Ext 2053 or kevin.m.sedlak.ctr@mail.mil if there are issues or concerns with this submission.

Sincerely,

SEDLAK.KEVIN.MICHAEL.1254440171 Digitally signed by SEDLAK.KEVIN.MICHAEL.1254440171 Date: 2020.12.08 16:20:07 -05'00'

Kevin M. Sedlak
RVAAP Restoration Program Manager
Army National Guard Directorate

cc: Bob Princic, Ohio EPA, NEDO, DERR Tom Schneider, Ohio EPA, SWDO
Tim Christman, Ohio EPA, NEDO, DERR
Natalie Oryshkewych, Ohio EPA, NEDO, DERR Brian Tucker, Ohio EPA
Kelly Kanoza, Akron Regional Air Quality Management District
Katie Tait, OHARNG, Camp James A. Garfield
Steven Kvaal, USACE Louisville
Nathaniel Peters, USACE Louisville Rebecca Shreffler, Chenega
Jennifer Tierney, Vista Sciences Corporation
Pat Ryan, Leidos – REIMS
Mark Leeper, ARNG

Attachment 1

From: Sedlak, Kevin M CTR NG OHARNG (USA)
<kevin.m.sedlak.ctr@mail.mil>
Sent: Tuesday, November 17, 2020 6:50 AM
To: Susan.Netzly-Watkins@epa.ohio.gov; Bob.Princic@epa.ohio.gov; Brian.Tucker@epa.ohio.gov; Ed.Damato@epa.ohio.gov;
(Thomas.Schneider@epa.ohio.gov) <Thomas.Schneider@epa.ohio.gov>
Cc: Peters, Nathaniel II CIV USARMY CELRL (USA) <Nathaniel.Peters.II@usace.army.mil>; Tait, Kathryn S NFG NG OHARNG (USA) <kathryn.s.tait.nfg@mail.mil>; Leeper, Mark S CIV NG NGB (USA) <mark.s.leeper.civ@mail.mil>; Kvaal, Steven LRL <Steven.Kvaal@usace.army.mil>
Subject: Responses to Ohio EPA Comments Received on November 10, 2020

ALCON: Below are the response to the comments sent by email on November 10, 2020. Please let me know if the responses are acceptable or if you would like to set up a call to further discuss the responses. Thank you.

CMT NO 1: You indicated that Table 4-1 would be revised. However, Attachment 1: QAPP Table 4-1 still states you will be applying the RPD for laboratory. We were wondering if this was perhaps a typo, or do you have other rational for keeping the RPD and why?

Thank you for the review and comment. This is not a typo.
The QAPP, including Table 4-1, was updated to incorporate feedback provided by Ohio EPA on Load Lines 1-4 and 12. Inclusion of RPD for laboratory duplicates was based on the following taken from Load Line 1-4 and 12 QAPP, Worksheet 11, Table 11-1, Step 5:

"ISM samples collected for confirmation will include 30 to 50 aliquots per sample, incorporating duplicate and triplicate sample collection for one per 10 ISM samples along with one laboratory duplicate to verify the subsampling precision. Analytical testing will be for COCs associated with each respective excavation area (see Table 2-1 of the RD Work Plan and Worksheet #18 of this QAPP). An RSD of less than or equal to 30 to 35% as a goal (RSD less than or equal to 35%) will be incorporated into the ISM field primary, duplicate and triplicate data evaluations. An RSD/RPD of less than or equal to 20% will be the goal for ISM laboratory subsample replicates (triplicates for explosives, duplicates for PAHs and PCBs; one per laboratory batch of up to 20 samples for each analytical group)." The scope of the SAP/QAPP prepared by Endpoint does not include explosives, therefore only laboratory duplicates are proposed. Per the Load Line 1-4 and 12 QAPP, Worksheet 37 (Page 66 of the QAPP), under Precision: "For ISM laboratory subsample replicates a control limit RSD/RPD of 20 percent will be used. For ISM field triplicate results, the precision is measured using the RSD and the control limit for that will be less than or equal to 30 to 35 percent as a goal (RSD less than or equal to 35 percent)."
No change is recommended.

CMT NO 2: You note you will be submitting lab data to Ohio EPA for a 48 hour review of the DQOs outlined in the QAPP. Please update us on the progress you are making. The holidays and deer hunting season is quickly moving upon us and our staff may be unavailable on some of the upcoming days. We are happy to discuss with you further. We have time this Friday or next week, Wednesday - Friday. Construction and sampling under this QAPP scope is planned for mid-2021. Confirmation sample data generated during construction and sampling in 2021 will be submitted to Ohio EPA for 48 hour review to confirm the CUGs/RSLs and DQOs are met in order to keep field work moving. We will coordinate with the Ohio EPA as field work gets closer.

NOTE: NEW EMAIL ADDRESS kevin.m.sedlak.ctr@mail.mil Kevin Sedlak, PG, MS Restoration

Project Manager IPA Designation Camp James A. Garfield JTC
1438 State Route 534 SW
Newton Falls, OH 44444
ARNG-IES-D Clean Up
Office Phone 614-336-6000 Ex 2053
e-mail to:kevin.m.sedlak.ctr@mail.mil
Please note, any communication generated through this correspondence does not coincide with any contract modifications, specifications, clarifications, or corrections unless a formal document is attached designating the like.

Ohio Environmental Protection Agency

Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

December 28, 2020

TRANSMITTED ELECTRONICALLY

Mr. Kevin Sedlak
Restoration Program Manager
ARNG-ILE Clean Up
Camp James A. Garfield JTC
1438 State Route 534 SW
Newton Falls, OH 44444

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859264

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Response to Comments dated December 8, 2020 for Draft Remedial Design for RVAAP-42 Load Line 9, SAP and QAPP- Clarification

Dear Mr. Sedlak:

Our overall goal for the sampling and analysis plans (SAPS) for the remedial design (RD) projects that are being implemented by Alaniz-Endpoint and CH2M Hill is to be able to confirm that the incremental sampling methodology (ISM) samples demonstrate that the excavation areas meet the cleanup standards. The Hawaii ISM sampling guidance is being applied to the ISM sampling efforts.

Ohio EPA requested to be involved in the review of the quality control confirmation step for at least the first couple excavation areas and when a new contractor, or new field sampling crew is being used. This was to be assured that the field team and lab were providing reliable data that show if cleanup goals had been achieved prior to filling the excavations.

Use Relative Standard Deviation (RSD) not Relative Percent Difference (RPD)

When the RSD reflects good precision (RSD<35%) then the decision unit (DU) can be assumed to demonstrate the cleanup standards were met, assuming the concentrations are below the cleanup number.

In the Hawaii technical guidance manual (TGM) for the use of multi increment samples to characterize DUs, Section 4.2.7.1 notes that triplicate samples should be collected to evaluate the precision of field sampling methods used. Section 4.2.7.2 notes triplicate samples should be collected to evaluate the precision of the lab subsampling methods used.

In the December 8 RVAAP-42 Load Line 9 SAP and quality assurance project plan (QAPP) letter to Ohio EPA, you noted that triplicates will not be collected when the chemicals of concern (COCs) are not explosives. **It is not clear why triplicates are not being done for other COCs.**

Unless triplicates are collected and triplicates are run at the lab, it will be challenging to tell where error(s) are occurring.

- Is there a problem with the field sampling crew's sample collection methods?
- Is the DU too large?
- Is there still contaminated media that exceed cleanup goals that require more removal?
- Is there an issue with the lab's ISM processing techniques?
- Is there an issue with the lab's analytical method or equipment?

Evaluation of Data Representativeness

The Hawaii guidance, Section 4.2.7.3 states that the RSD represents the ratio of the standard deviation of the replicate set over the mean of the replicate set, expressed as a percentage.

We are looking for an RSD less than 35%. The higher the RSD, the less confidence there is that the mean contaminant concentrations estimated for any individual DU is representative for the true mean for the DU.

Table 4-2 in the Hawaii guidance provides a recommended approach for evaluation of DU data.

Table 4-2. Recommended Adjustment of Multi Increment Data for Decision Making Based on Relative Standard Deviation (RSD) of Replicate Samples.

RSD Data	Decision Unit Data Adjustment
Good Precision (RSD ≤35%)	• DU-MIS samples should be collected, processed, and tested in an unbiased manner; • Compare unadjusted MI data directly to target action level for decision making (use arithmetic mean for replicate sample sets); • Data can be used for confirmation purposes without the need for additional sampling, if action levels are met.
Moderate Precision (RSD >35% but ≤50%)	• Review and discuss field sampling methods and laboratory processing and analysis methods and discuss potential sources of error (e.g., improper increment collection methods, inadequate number or mass of increments, unrepresentative laboratory subsampling methods, etc.);

	• Compare unadjusted MI data directly to target action level for decision making (use the arithmetic mean for the replicate sample sets); • *Additional confirmation sampling recommended following remediation of DUs that exceed action levels*, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples.
Poor Precision (RSD >50% but ≤100%)	• Review and discuss field sampling methods and laboratory processing and discuss potential sources of error in report; • If the large majority of total error is attributable to laboratory subsampling and analysis error, request laboratory to subsample and analyze the batch of DU samples again using correct techniques, and include additional subsampling replicates; • *Compare the 95% UCL* (Chebyshev method) *for replicate data to 150% of the target action level for decision making*; • Estimate a 95% UCL for DUs where replicates were not collected based on the 95% UCL and mean calculated for the replicate data; Compare results to 150% of the target action level; • Provide additional, multiple lines of evidence for acceptance (or rejection) of the data for decision making purposes including knowledge of the site history and the anticipated potential for contamination above levels of concern, the adequacy of the methods used to collect, process and analyze samples, and the approximation of the data to action levels; • Additional confirmation sampling *recommended following remediation of DUs that exceed action level*, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples.
Very Poor Precision (RSD ≥100%)	• *Data should be considered suspect.* • If the large majority of total error is attributable to laboratory subsampling and analysis error, request laboratory to subsample and analyze the batch of DU samples again using correct techniques, and include additional subsampling replicates; • Review and discuss field sampling methods and laboratory processing and analysis methods and discuss potential sources of error in report; • *Consider re-sampling of DU(s) most suspect for contamination using a larger number of increments and/or smaller DUs;* • If one or more of the replicate samples exceeds the target action level then remediation of the DU should be considered, even if the mean concentration is well below the target action level. Remediation of associated DUs where replicate samples were not collected should also be considered; • If all replicate samples are below the Action Level, *then compare the 95% UCL* (Chebyshev method) *for replicate data to the* unadjusted *target action level for decision making*;

	• If all replicate samples are below the Action Level, estimate a 95% UCL for DUs where replicates were not collected based on the 95% UCL and mean calculated for the replicate data and compare results to *unadjusted* target action levels; • Provide additional, multiple lines of evidence for acceptance (or rejection) of the data for decision making purposes including knowledge of the site history and the anticipated potential for contamination above levels of concern, the adequacy of the methods used to collect, process and analyze samples and the approximation of the data to action levels; • Additional confirmation sampling *recommended following remediation of DUs that exceed action levels*, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples.

Use of 95% Upper Confidence Limit (UCL)

Multiple approaches are available for calculation of UCL values, based in part on the variance between individual replicate sample data. An increase in variance between replicate samples will cause a similar increase in confidence intervals and a less precise estimate of the mean. Two equations can be used to bracket the range of UCL values that might be calculated from a set of multi increment replicate samples, the Student's-t UCL and the Chebyshev UCL (ITRC, 2012).

Calculation of a 95% Upper Confidence Limit (UCL) of the mean contaminant concentration for a DU is not required if the RSD for replicate data is equal to or less than 35% (see Table 4-2). If use of a 95% UCL is required for risk assessment or other purposes outside of the Hazard Evaluation and Emergency Response (HEER) Office (and RSD is equal to or less than 35%), then use of the Student's-t method is recommended (see ITRC 2012). This method assumes a normal distribution of replicate data with a UCL calculated as follows:

$$95\%\ UCL = mean + t_{(1-\alpha)(r-1)} \times \frac{SD}{\sqrt{r}} \qquad \text{Eq. 3)}$$

where
mean = arithmetic mean of replicate samples;
SD = standard deviation of replicate samples;
r = number of replicate samples; and
α = acceptable level of potential decision error (e.g., 0.05 or 5% for a 95% UCL);
t = $(1-\alpha)^{th}$ quantile of the Student's-*t* distribution with (r-1) degrees of freedom.

The Chebyshev method is considered to be most appropriate for estimation of a 95% UCL when the variance between replicate samples is high (e.g., >35%; after ITRC 2012).

This method assumes a non-normal or skewed, nonparametric distribution of data and is calculated as follows:

$$95\%\ UCL = mean + (\sqrt{\frac{1}{\alpha} - 1} \times \frac{SD}{\sqrt{r}}) \qquad \text{Eq. 4)}$$

where the symbol α is again the acceptable level of potential decision error.

Please note that U.S. EPA's ProUCL software has multiple approaches for calculating a 95% UCL of the mean. Please ensure the appropriate methods are selected per the HI Guidance. ProUCL can be found here:

ProUCL Software | Land and Waste Management Research | US EPA

ProUCL Software | Land and Waste Management Research | US EPA

ProUCL version 5.0.00 (5.0) is the latest update of the ProUCL statistical software package for analysis of environmental data sets with and without nondetect (ND) observations.

www.epa.gov

The need for replicate data and calculation of a 95% UCL should be evaluated as part of the systematic planning process described in Section 3. A 95% UCL should ideally be calculated based on replicate sample data specific to the DU in question. If replicate data are not available for a DU, then the 95% UCL value should be estimated based on replicate data collected for a similar DU at the site. This is done by multiplying the contaminant concentration reported for that DU by the ratio of the 95% UCL and the mean for the replicate data set. **Please contact Ohio EPA if this approach is desired for a specific set of data**.

As a precautionary response to COVID-19, Ohio EPA is currently operating with most staff working remotely. During this time, we will not be issuing hard-copy mail. This letter is an official response from Ohio EPA that will be maintained as a public record.

If you have any questions regarding this letter please contact me via email at Susan.Netzly-Watkins@epa.ohio.gov.

Sincerely,

Sue Netzly-Watkins

Sue Netzly-Watkins
Site Coordinator
Division of Environmental Response and Revitalization

SNW/sc

ec: Katie Tait, OHARNG RTLS
Nat Peters, USACE
Steve Kvaal, USACE
Rebecca Shreffler, Chenega
Natalie Oryshkewych, Ohio EPA, NEDO, DERR
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NATIONAL GUARD BUREAU
111 SOUTH GEORGE MASON DRIVE
ARLINGTON VA 22204-1373

January 13, 2021

Ohio Environmental Protection Agency
DERR-NEDO
Attn: Sue Netzly-Watkins
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, Response to Comments on Draft Remedial Design for RVAAP-42 Load Line 9, SAP and QAPP (Ohio EPA Work Flow Activity #267000859264)

Dear Ms. Netzly-Watkins:

The Army National Guard (ARNG) has reviewed comments provided for the Response to Comments letter dated December 8, 2020 for the Draft Remedial Design for RVAAP-42 Load Line 9, Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) by the Ohio Environmental Protection Agency (Ohio EPA) in a letter dated December 28, 2020.

The responses on the attached comment resolution table reflect Ohio EPA comments received on December 28, 2020 regarding the SAP/QAPP. The Ohio EPA confirmed that previous comments provided by the Ohio EPA regarding the SAP/QAPP were adequately addressed in a letter dated October 9, 2020.

Please contact the undersigned at 614-336-6000 Ext 2053 or kevin.m.sedlak.ctr@mail.mil if there are issues or concerns with this submission.

Sincerely,
SEDLAK.KEVIN.MICHAEL.1254440171 Digitally signed by SEDLAK.KEVIN.MICHAEL.1254440171 Date: 2021.01.13 08:52:55 -05'00'
Kevin M. Sedlak
RVAAP Restoration Program Manager
Army National Guard Directorate

cc: Bob Princic, Ohio EPA, NEDO, DERR
Tom Schneider, Ohio EPA, SWDO
Tim Christman, Ohio EPA, NEDO, DERR
Natalie Oryshkewych, Ohio EPA, NEDO, DERR
Brian Tucker, Ohio EPA
Kelly Kanoza, Akron Regional Air Quality Management District
Katie Tait, OHARNG, Camp James A. Garfield
Steven Kvaal, USACE Louisville
Nathaniel Peters, USACE Louisville
Rebecca Shreffler, Chenega
Jennifer Tierney, Vista Sciences Corporation
Pat Ryan, Leidos – REIMS

Attachment 1

QAPP Table 4-1

Table 4-1. Data Quality Objectives Summary for Soil Sampling
Former RVAAP Site, Portage and Trumbull Counties, OH

USEPA Analytical Method	Sample Type	Field & Laboratory Precision (RSD)	Accuracy (Laboratory)	Completeness
8270D	ISM and Composite	<35%RSD	45-134%	90%
60 I0C	ISM and Composite	<35%RSD	81-112%	90%
7471B	ISM and Composite	<35%RSD	82-119%	90%
1311	ISM and Composite	<35%RSD	82-119%	80%

Comment Resolution Table

Installation: Camp James A. Garfield/Former RVAAP
Document: Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42), Dated August 19, 2020
Reviewer(s): Sue Netzly-Watkins (SNW), Site Coordinator, Ohio EPA (330-963-1235 or Susan.Netzly-Watkins@epa.ohio.gov); Comments received December 28, 2020
Date: January 11, 2021

Cmt. No.	Page or Sheet	Comment and Recommendation	Response
Ohio EPA 1	QAPP Section 4	When the RSD reflects good precision (RSD<35%) then the decision unit (DU) can be assumed to demonstrate the cleanup standards were met, assuming the concentrations are below the cleanup number. In the Hawaii technical guidance manual (TGM) for the use of multi increment samples to characterize DUs, Section 4.2.7.1 notes that triplicate samples should be collected to evaluate the precision of field sampling methods used. Section 4.2.7.2 notes triplicate samples should be collected to evaluate the precision of the lab subsampling methods used. In the December 8 RVAAP-42 Load Line 9 SAP and quality assurance project plan (QAPP) letter to Ohio EPA, you noted that triplicates will not be collected when the chemicals of concern (COCs) are not explosives. It is not clear why triplicates are not being done for other COCs.	The requested change has been made to reflect field and laboratory triplicates will be analyzed. The following was added to the QAPP for field and laboratory verification: "4.5 Initial Data Review For excavation confirmation samples collected using the Incremental Sampling Methodology (ISM), the first three ISM samples at the first excavation performed under this QAPP will be collected in triplicate. The triplicates will be analyzed along with laboratory subsample triplicates. The results of the initial ISM field triplicate samples and associated laboratory subsample triplicates will be submitted to Ohio EPA for a 48-hour review of the following DQOs: For the field and laboratory triplicates, an RSD of less than or equal to 30 to 35% as a goal (RSD less than or equal to 35%) will be incorporated into sample data evaluations. If this DQO is not met for the ISM field triplicate samples, then Ohio EPA will work with the Army to determine whether there are concerns with the data quality, using Table 1 of the Ohio EPA Field Standard Operating Procedure (FSOP) as a guide (see Attachment 1). If the laboratory triplicate DQO is not met, a J-flag will be applied to the associated data. If there are concerns with the data quality, then the Army, Ohio EPA and Endpoint will work together to determine the path forward, following the guidance below excerpted from the Hawai'i Department of Health Technical Guidance Manual Section 4.2.7.3 "Evaluation of Data Representativeness, Table 4-2 Recommended Adjustment of Multi Increment Data for Decision Making Based on RSD of Replicate Samples", http://hawaiidoh.org/tgm-pdfs/TGM.pdf (HDOH, 2016): Good Precision (RSD <35%) • Compare unadjusted ISM sample data directly to cleanup goal for decision

			making (for RVAAP, the maximum field replicate value will be used to compare to the cleanup goal); • Data can be used for confirmation purposes without the need for additional sampling, if cleanup goals are met. Moderate Precision (RSD >35% but <50%) • Review and discuss field sampling methods and laboratory processing and analysis methods and discuss potential sources of error (e.g., improper increment collection methods, inadequate number or mass of increments, unrepresentative laboratory subsampling methods, etc.); • Compare unadjusted ISM sample data directly to cleanup goal for decision making (for RVAAP, the maximum field replicate value will be used to compare to the cleanup goal); • Additional confirmation sampling recommended following remediation of decision units (DUs) that exceed cleanup goals, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples. Poor Precision (RSD >50% but <100%) • Review and discuss field sampling methods and laboratory processing and discuss potential sources of error in report; • If the large majority of total error is attributable to laboratory subsampling and analysis error, request laboratory to subsample and analyze the batch of DU samples again using correct techniques, and include additional subsampling replicates; • Compare the 95% UCL (Chebyshev method) for replicate data to 150% of the cleanup goal for decision making;

			• Estimate a 95% UCL for DUs where replicates were not collected based on the 95% UCL and mean calculated for the replicate data; Compare results to 150% of the cleanup goal; • Provide additional, multiple lines of evidence for acceptance (or rejection) of the data for decision making purposes including knowledge of the site history and the anticipated potential for contamination above cleanup goal, the adequacy of the methods used to collect, process and analyze samples, and the approximation of the data to cleanup goal; • Additional confirmation sampling recommended following remediation of DUs that exceed cleanup goal, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples. Very Poor Precision (RSD > 100%) • If the large majority of total error is attributable to laboratory subsampling and analysis error, request laboratory to subsample and analyze the batch of DU samples again using correct techniques, and include additional subsampling replicates; • Review and discuss field sampling methods and laboratory processing and analysis methods and discuss potential sources of error in report; • Consider re-sampling of DU(s) most suspect for contamination using a larger number of increments and/or smaller DUs; • If one or more of the replicate samples exceeds the cleanup goal then remediation of the DU should be considered, even if the mean concentration is well below the cleanup goal. Remediation of associated DUs where replicate samples were not collected should also be considered; • If all replicate samples are below the cleanup goal, then compare the 95% UCL (Chebyshev method) for replicate data to the unadjusted cleanup goal for decision making;

			• If all replicate samples are below the cleanup goal, estimate a 95% UCL for DUs where replicates were not collected based on the 95% UCL and mean calculated for the replicate data and compare results to unadjusted cleanup goal; • Provide additional, multiple lines of evidence for acceptance (or rejection) of the data for decision making purposes including knowledge of the site history and the anticipated potential for contamination above cleanup goal, the adequacy of the methods used to collect, process and analyze samples and the approximation of the data to cleanup goal; • Additional confirmation sampling recommended following remediation of DUs that exceed cleanup goal, including use of smaller DUs and/or a larger number of increments. Following review of the triplicate data for the initial three confirmation samples, additional field triplicates will be taken at 10% of the project ISM sample locations. Laboratory triplicates will be taken at the same frequency as field triplicates, but not necessarily at the same sample location. If field triplicate samples are being collected for a particular DU, the aliquots will be collected from completely independent systematic random locations in the grid (i.e., aliquots for the field triplicate samples will not be collected around a single grid point used for the parent sample since this may not adequately test small-scale variability within the DU) (HDOH, 2016)." If replicate data for ISM samples that exceed cleanup goals are not available for an individual DU, then the 95% UCL value will be estimated based on replicate data collected for a similar DU at the site by multiplying the contaminant concentration reported for that DU by the ratio of the 95% UCL and the mean for the replicate data set." Table 4-1 was updated in the QAPP to reflect these changes and has been provided as an attachment to this comment resolution table.

Ohio EPA 2	QAPP Section 4	The need for replicate data and calculation of a 95% UCL should be evaluated as part of the systematic planning process described in Section 3. A 95% UCL should ideally be calculated based on replicate sample data specific to the DU in question. If replicate data are not available for a DU, then the 95% UCL value should be estimated based on replicate data collected for a similar DU at the site. This is done by multiplying the contaminant concentration reported for that DU by the ratio of the 95% UCL and the mean for the replicate data set. Please contact Ohio EPA if this approach is desired for a specific set of data.	As discussed in the previous response, the Chebyshev method for calculating the 95% UCL will be used when the variance between replicate samples is high (e.g., poor precision >50%). If replicate data for ISM samples that exceed cleanup goals are not available for an individual DU, then the 95% UCL value will be estimated based on replicate data collected for a similar DU at the site by multiplying the contaminant concentration reported for that DU by the ratio of the 95% UCL and the mean for the replicate data set. We would like approval from Ohio EPA to proceed with this approach on all DUs where no replicates will be collected.
Ohio EPA 2	SAP Table 4-1		Added the following note to Table 4-1 of the SAP: "For excavation confirmation samples collected using ISM, the first three ISM samples at the first excavation performed under this SAP will be collected in triplicate. The triplicates will be analyzed along with laboratory subsample triplicates. The results of the initial ISM field triplicate samples and associated laboratory subsample triplicates will be submitted to Ohio EPA for a 48-hour review of the DQOs outlined in the QAPP. Following review of the field and laboratory triplicate data for the first three confirmation samples, additional field triplicates will be taken at 10% of the project ISM sample locations. Laboratory triplicates will be taken at the same frequency as field triplicates, but not necessarily at the same sample location."

Ohio Environmental Protection Agency

Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

March 2, 2021

TRANSMITTED ELECTRONICALLY

Mr. Kevin Sedlak
Army National Guard
Installation and Environment
Clean-up Branch
IPA Designation
1438 State Route 534 SW
Newton Falls, OH 44444

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859120

Subject: Receipt and Review of the Response to Comments, Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42), Dated January 13, 2021

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received and reviewed the January 13, 2021 "Response to Comments on Draft Remedial Design for RVAAP-42 Load Line 9, SAP and QAPP."

The Draft Remedial Design (RD) for RVAAP-42 Load Line 9 (LL9) includes a sampling and analysis plan (SAP) that covers five Areas of Concern (AOCs), in Appendix I in the Draft RD for RVAAP-42 LL9. The SAP is dated May 15, 2020.

The five AOCs included in the SAP are as follows: LL9, Depot Area, Sand Creek, NACA and Wet Storage Area.

Comment 1: Quality Assurance Project Plan (QAPP) and Incremental Sampling Methodology (ISM) Sampling

The January 11, 2021 response to comments (RTC) confirms the LL9 QAPP will be revised to include the Hawaii Technical Guidance Manual (TGM) for using ISM to characterize decision units. Like the RD for LL 1-4 and 12, the Draft LL9 RD is using ISM sampling to verify when a remediation area has met the remediation goals.

During the implementation of the RD for LL 1-4 and 12, that together with the Army and its contractor we have adjusted and improved the initial ISM process through change orders. Below we have noted several key matters that have been addressed through our discussions on the LL 1-4 and 12 RD that should apply to the SAP for the AOCs being addressed through the LL9 SAP.

Received
2 MAR 2021

1) The relative standard deviation (RSD) and evaluation approach for replicates

Ohio EPA concurs with the general approach being applied for the LL 1-4 and 12 RD; a mix of qualitative (including the narratives and photographs) and quantitative approaches (e.g., RSD goal of 35% and use of 95% Upper Confidence Limit (UCL) when appropriate) for evaluating triplicate ISM results with elevated RSD values and the decision of needing, or not, additional soil removals to meet cleanup goals (CUGs).

2) Including metal analysis for future explosive ISM samples

The January 12, 2021 email from Sue Netzly-Watkins with the subject of LL 1-4 and 12 RD requested the Army to consider adding metal analysis to triplicate ISM samples for explosives. This was based on the general concern of explosive ISM sample results not meeting RSD goals and the recent understanding by all parties of the thermal sensitivity of explosives (e.g., TNT, RDX).

The SAP for LL9 should require metals be included in the initial triplicate samples for new projects to ensure that all teams and laboratories can meet RSD goals for ISM samples. These results would also aide in clarifying the uncertainty for the thermal destruction of explosives by all parties. Once it is demonstrated that the field team and laboratory are producing ISM results that reflect reliable data to verify that the remedy goal was met, future ISM confirmation samples do not need to include the additional metal analysis for triplicate samples.

3) Low Recovery and Low Bias for Explosives

Recently, during our January 7, 2021 call to discuss the failure of meeting the 35% RSD goal for TNT and RDX, Ohio EPA was informed that the reason was the thermal instability of explosives during the grinding procedure for ISM soil samples. The grinding procedure produces heat and destroys a percentage of the explosives. Recovery of spiked soil was noted as low as 11% in Excavation Report No. 8 when soil samples were compared to similar but ground up samples. This reduction in explosive concentrations is inconsistent and thus increases the RSD values for triplicate samples to much above the goal of the project. Ohio EPA was also informed that even though the loss of explosives during sample preparation was inconsistent, it was generally near a 25% reduction of the true average concentration of explosives.

Triplicate ISM samples provide additional information not so by single ISM results to make decisions on data use, including the use of maximum values or 95% UCL values of the data set for meeting cleanup goals (i.e., less than or equal to the appropriate CUGs). However, with single ISM sample results and the known high RSD for explosives, one cannot determine if a value is on the high or low end of the range (e.g., two orders of magnitude have been demonstrated), and at a minimum, the reported value is likely 25% lower than the true mean value. Given this “consistent” loss of contaminant during sample preparation, please provide a discussion on why the CUGs for TNT and RDX for single ISM results should not be reduced to compensate for these low biased results.

In addition, single ISM results that are near an explosive CUG (e.g., < 25%), should be evaluated and likely considered a failure of meeting an appropriate CUG for explosives.

This has not been an issue thus far for LL 1-4 and 12 as failures to meet, or confirmation of expected results, have been reasonably clear. However, future results should be evaluated and the approach added to the final report and draft LL9 Remedial Action work plan.

Comment 2: Waste profiling

The May 15, 2020 SAP notes that waste profile sampling will also include discrete sampling in addition to ISM sampling. We had a discussion with other Ohio EPA staff regarding the Sand Creek RD.

The Sand Creek review team expressed concern that an appropriate number of samples were not being collected from the population without an adequate explanation for the proposed waste characterization strategy. The Army's response to the comment was "Prior to receipt of this comment, and at the request of the Ohio EPA, the ARNG modified the procedure for waste profile sampling outlined in the project Sampling and Analysis Plan and Quality Assurance Project Plan. In response to this comment, and to coincide with Ohio EPA approved changes for the Load Line 9 Remedial Design, Sampling and Analysis Plan (e.g., waste profile samples will consist of an 8-point composite sample, rather than ISM)."

> **ACTION ITEM:** Generally, when composite sampling is conducted to profile waste, as a data quality check the composite value is multiplied by the number of individual samples collected to make the composite; if that value is over a risk value each individual composite is analyzed to determine if any of those are above a risk value. If it is determined via the composite sampling the waste is hazardous waste and LDR sample is needed, please confirm if the stated waste profiling change is being made across the board for all five AOCs under the SAP included in the LL9 RD. If so, please revise the SAP accordingly and provide the details on how the composite sampling will be conducted.

As a precautionary response to COVID-19, Ohio EPA is currently operating with most staff working remotely. During this time, we will not be issuing hard-copy mail. This letter is an official response from Ohio EPA that will be maintained as a public record.

Ohio EPA requests the comments above be addressed prior to submitting the final version of the document. If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1235.

Sincerely,

Sue Netzly-Watkins

Sue Netzly-Watkins
Site Coordinator
Division of Environmental Response and Revitalization

SNW/sc

ec: Katie Tait, OHARNG RTLS
Nat Peters, USACE
Steve Kvaal, USACE
Rebecca Shreffler, Chenega
Natalie Oryshkewych, Ohio EPA, NEDO, DERR
Bob Princic, Ohio EPA, NEDO, DERR
Tom Schneider, Ohio EPA, SWDO, DERR
Brian Tuckerman, Ohio EPA, CO, DERR
Carrie Rasik, Ohio EPA, CO, DERR

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

March 16, 2021

Ohio Environmental Protection Agency
DERR-NEDO
Attn: Sue Netzly-Watkins
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, Response to Comments on Draft Remedial Design for RVAAP-42 Load Line 9, SAP and QAPP (Ohio EPA Work Flow Activity #267000859264)

Dear Ms. Netzly-Watkins:

The Army National Guard (ARNG) has reviewed comments provided for the Response to Comments letter dated March 2, 2021 for the Draft Remedial Design for RVAAP-42 Load Line 9, Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) by the Ohio Environmental Protection Agency (Ohio EPA) in a letter dated January 11, 2021.

The responses on the attached comment resolution table reflect Ohio EPA comments received on January 11, 2021 regarding the SAP/QAPP. The Ohio EPA confirmed that previous comments provided by the Ohio EPA regarding the SAP/QAPP were adequately addressed in letters dated October 9, 2020 and December 28, 2020.

ARNG confirmed with Bob Princic (Ohio EPA) that the Final Remedial Design for RVAAP-42 Load Line 9, SAP and QAPP will be submitted concurrent with the submittal of this letter. This document will be submitted separately.

Please contact the undersigned at 614-336-6000 Ext 2053 or kevin.m.sedlak.ctr@mail.mil if there are issues or concerns with this submission.

Sincerely,

SEDLAK.KEVIN.MICHAEL.1254440171 Digitally signed by SEDLAK.KEVIN.MICHAEL.1254440171 Date: 2021.03.17 06:52:18 -04'00'

Kevin M. Sedlak
RVAAP Restoration Program Manager
Army National Guard Directorate

cc: Bob Princic, Ohio EPA, NEDO, DERR
Tom Schneider, Ohio EPA, SWDO
Tim Christman, Ohio EPA, NEDO, DERR
Natalie Oryshkewych, Ohio EPA, NEDO, DERR
Kevin Palombo, Ohio EPA, DERR
Brian Tucker, Ohio EPA
Kelly Kanoza, Akron Regional Air Quality Management District
Katie Tait, OHARNG, Camp James A. Garfield
Steven Kvaal, USACE Louisville
Nathaniel Peters, USACE Louisville
Rebecca Shreffler, Chenega
Jennifer Tierney, Vista Sciences Corporation
Pat Ryan, Leidos – REIMS

Comment Resolution Table

Installation: Camp James A. Garfield/Former RVAAP
Document: Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42), Dated August 19, 2020
Reviewer(s): Sue Netzly-Watkins (SNW), Site Coordinator, Ohio EPA (330-963-1235 or Susan.Netzly-Watkins@epa.ohio.gov);
Comments received March 2, 2021
Date: March 15, 2021

Cmt. No.	Page or Sheet	Comment and Recommendation	Response
Ohio EPA 1.1	QAPP/ SAP	The relative standard deviation (RSD) and evaluation approach for replicates Ohio EPA concurs with the general approach being applied for the LL 1-4 and 12 RD; a mix of qualitative (including the narratives and photographs) and quantitative approaches (e.g., RSD goal of 35% and use of 95% Upper Confidence Limit (UCL) when appropriate) for evaluating triplicate ISM results with elevated RSD values and the decision of needing, or not, additional soil removals to meet cleanup goals (CUGs).	We concur with the comment. This change was already incorporated into the SAP/QAPP following a previous response to Ohio EPA comments, per the letter dated January 13, 2021. No change will be made to the SAP/QAPP.
Ohio EPA 1.2	QAPP/ SAP	The SAP for LL9 should require metals be included in the initial triplicate samples for new projects to ensure that all teams and laboratories can meet RSD goals for ISM samples. These results would also aide in clarifying the uncertainty for the thermal destruction of explosives by all parties. Once it is demonstrated that the field team and laboratory are producing ISM results that reflect reliable data to verify that the remedy goal was met, future ISM confirmation samples do not need to include the additional metal analysis for triplicate samples.	We concur with the comment. This project does not contain any explosive Chemicals of Concern (COCs). The following change was made to the notes on the SAP Table 4-1: "For excavation confirmation samples collected using ISM, the first three ISM samples at the first excavation performed under this SAP will be collected in triplicate and analyzed for SVOCs <u>and Metals</u>."

Comment Resolution Table

Installation: Camp James A. Garfield/Former RVAAP
Document: Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42), Dated August 19, 2020
Reviewer(s): Sue Netzly-Watkins (SNW), Site Coordinator, Ohio EPA (330-963-1235 or Susan.Netzly-Watkins@epa.ohio.gov);
Comments received March 2, 2021
Date: March 15, 2021

Ohio EPA 1.3	QAPP/ SAP	Triplicate ISM samples provide additional information not so by single ISM results to make decisions on data use, including the use of maximum values or 95% UCL values of the data set for meeting cleanup goals (i.e., less than or equal to the appropriate CUGs). However, with single ISM sample results and the known high RSD for explosives, one cannot determine if a value is on the high or low end of the range (e.g., two orders of magnitude have been demonstrated), and at a minimum, the reported value is likely 25% lower than the true mean value. Given this "consistent" loss of contaminant during sample preparation, please provide a discussion on why the CUGs for TNT and RDX for single ISM results should not be reduced to compensate for these low biased results. In addition, single ISM results that are near an explosive CUG (e.g., < 25%), should be evaluated and likely considered a failure of meeting an appropriate CUG for explosives.	We concur with the comment. This project does not contain any explosive COCs. No change will be made to the SAP/QAPP.

Comment Resolution Table

Installation: Camp James A. Garfield/Former RVAAP
Document: Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42), Dated August 19, 2020
Reviewer(s): Sue Netzly-Watkins (SNW), Site Coordinator, Ohio EPA (330-963-1235 or Susan.Netzly-Watkins@epa.ohio.gov);
Comments received March 2, 2021
Date: March 15, 2021

Ohio EPA 2	QAPP/ SAP	Generally, when composite sampling is conducted to profile waste, as a data quality check the composite value is multiplied by the number of individual samples collected to make the composite; if that value is over a risk value each individual composite is analyzed to determine if any of those are above a risk value. If it is determined via the composite sampling the waste is hazardous waste and LDR sample is needed, please confirm if the stated waste profiling change is being made across the board for all five AOCs under the SAP included in the LL9 RD. If so, please revise the SAP accordingly and provide the details on how the composite sampling will be conducted.	The waste profiling procedure will be utilized for all five AOCs under this SAP. Per Section 3.6 of the SAP, as amended following the response to comments (November 3, 2020) approved by Ohio EPA (December 28, 2021), all composite samples will be analyzed for Land Disposal Restriction criteria (e.g., TCLP). For your reference, the following text was previously amended in Section 3.6 of the SAP: "Category 3: Waste profile sampling of impacted soil will consist of one 8-point composite sample per every 250 cubic yards of metals impacted soil (in-situ) to be excavated in each AOC prior to beginning excavation activities. The samples will be collected within the anticipated excavation area at depths ranging between ground surface and the anticipated total depth of the excavation. Collecting waste profile samples prior to soil excavation will allow adequate time to receive sample results, ensuring waste disposal is not delayed and that impacted soil/waste are handled by the appropriate transporter (DRMO if hazardous) and disposed at the appropriate disposal facility. Waste profile soil samples under this category will be subjected to TCLP analysis for metals, herbicides, pesticides, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), as well as total sulfide/cyanide, polychlorinated biphenyls (PCBs), flashpoint and pH. Analysis will be done using the methods provided in Table 3-1, plus any additional analyses as required by the disposal facility. The results of the waste profile analysis will be used to determine which of the facilities the soil will be disposed, based on the landfill permit requirements. Soil will be disposed at Waste Management American Landfill for non-hazardous and US Ecology of Ohio or US Ecology Michigan Disposal Inc for hazardous."

Ohio Environmental Protection Agency

Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

April 1, 2021

TRANSMITTED ELECTRONICALLY

Mr. Kevin Sedlak
Army National Guard
Installation and Environment
Clean-up Branch
IPA Designation
1438 State Route 534 SW
Newton Falls, OH 44444

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859120

Subject: Receipt and Review of the Response to Comments Draft Remedial Design Work Plan for RVAAP Load Line 9 (RVAAP-42), Dated March 16, 2021

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received and reviewed the March 13, 2021 "Response to Comments on Draft Remedial Design for RVAAP-42 Load Line 9, SAP and QAPP." The Response to Comments (RTC) was received on March 19, 2021.

The Draft Remedial Design (RD) for RVAAP-42 Load Line 9 (LL9) includes a sampling and analysis plan (SAP) that covers five Areas of Concern (AOCs), in Appendix I in the Draft RD for RVAAP-42 Load Line 9. The SAP is dated May 15, 2020. The five AOCs included in the SAP are as follows: LL 9, Depot Area, Sand Creek, NACA and Wet Storage Area.

Comment 1: Quality Assurance Plan (QAPP) and Incremental Sampling Methodology (ISM).

The RTC noted that the Final LL 9 QAPP was revised to include the Hawaii technical guidance manual (TGM) for using ISM to characterize decision units. The Final LL 9 RD was submitted on March 19, 2021. The March RTC addressed our February 2021 ISM comments, and the final LL 9 RD includes references and excerpts from the Hawaii TGM.

Comment 2: Waste profiling

The March 2021 RTC and our telephone call on March 24, 2021 answered much of this comment. Ohio EPA noted during this telephone call that there was a typo in the QAPP, Table 2-1 regarding waste characterization. This table noted 50 vs. 250 cubic yards was the waste sampling frequency.

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APR 0 1 2021

ACTION ITEM: A page change should be adequate to address this edit. Please include on the revised Table 2-1 page the information that Endpoint discussed during our call that it had obtained from the landfill receiving the waste, affirming this sampling frequency meets the landfill's requirements.

As a precautionary response to COVID-19, Ohio EPA is currently operating with most staff working remotely. During this time, we will not be issuing hard-copy mail. This letter is an official response from Ohio EPA that will be maintained as a public record.

Ohio EPA requests the comment above be addressed as noted in the Action Item. If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1235.

Sincerely,

Sue Netzly-Watkins

Sue Netzly-Watkins
Site Coordinator
Division of Environmental Response and Revitalization

SNW/sc

ec: Nat Peters, USACE
Steve Kvaal, USACE
Katie Tait, OHARNG RTLS
Rebecca Shreffler, Chenega
Natalie Oryshkewych, Ohio EPA, NEDO, DERR
Bob Princic, Ohio EPA, NEDO, DERR
Tom Schneider, Ohio EPA, SWDO, DERR
Brian Tucker, Ohio EPA, DERR, CO
Carrie Rasik, Ohio EPA, DERR, CO

Ohio Environmental Protection Agency

Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

May 4, 2021

TRANSMITTED ELECTRONICALLY

Mr. Kevin Sedlak
Army National Guard
Installation and Environment
Clean-up Branch
IPA Designation
1438 State Route 534 SW
Newton Falls, OH 44444

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859264

Subject: Receipt and Review of the Final Remedial Design for RVAAP-42 Load Line 9, Dated March 17, 2021

Dear Mr. Sedlak:

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 Remedial Design for RVAAP-42 Load Line 9." This document, received by Ohio EPA's NEDO on April 9, 2021, was prepared for the U.S. Army Corps of Engineers (USACE) Louisville District, and by Endpoint Consulting, Inc., 5 South Linden Street, Suite 2, South San Francisco, CA 94080, and Alaniz Associates Corp., 21334 East Colverton St., Covina, CA 91724.

Comment 1: In the January 13, 2021 Response to Comments (RTC) you had agreed to making changes to Table 4-1 in the quality assurance project plan (QAPP). The revised table was not in the March 17, 2021 Final RD QAPP.

> **ACTION ITEM**: Please replace QAPP Table 4-1 in the March 17, 2021 Final Remedial Design with the QAPP Table 4-1 included in the January 13, 2021 RTC.

Once the above comment has been addressed, Ohio EPA concurs with the Final Remedial Design for RVAAP-42 Load Line 9.

As a precautionary response to COVID-19, Ohio EPA is currently operating with most staff working remotely. During this time, we will not be issuing hard-copy mail. This letter is an official response from Ohio EPA that will be maintained as a public record.

RECEIVED
MAY 04 2021

If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1201, or via email at Susan.Netzly-Watkins@epa.ohio.gov.

Sincerely,

Sue Netzly-Watkins

Sue Netzly-Watkins
Site Coordinator
Division of Environmental Response and Revitalization

SNW/sc

ec: Katie Tait, OHARNG RTLS
Nat Peters, USACE
Steve Kvaal, USACE
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Tom Schneider, Ohio EPA, SWDO, DERR
Brian Tucker, Ohio EPA, CO, DERR
Kelly Kanoza, Akron Regional Air Quality Management District

Appendix I
Sampling and Analysis Plan

FINAL
SAMPLING AND ANALYSIS PLAN

REMEDIATION COMPLETION OF MULTIPLE AREAS OF CONCERN USING VAPOR ENERGY GENERATOR (VEG) THERMAL DESORPTION TECHNOLOGY

FORMER RAVENNA ARMY AMMUNITION PLANT
PORTAGE AND TRUMBULL COUNTIES, OH

March 17, 2021

Contract Number: W912QR17C0045

Prepared for:

U.S. ARMY CORPS OF ENGINEERS, LOUISVILLE DISTRICT
600 Dr. Martin Luther King Pl, Room 821
Louisville, KY 40202

Prepared by:
Endpoint Consulting, Inc.
5 South Linden Street, Suite 2
South San Francisco, CA 94080

Prepared with:
Alaniz Associates Corporation
21334 East Cloverton Street
Covina, CA 91724

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REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1. REPORT DATE *(03-17-20)*

2. REPORT TYPE
Final

3. DATES COVERED *(From - To)*
January 2020 through March 2021

4. TITLE AND SUBTITLE

Final
Sampling and Analysis Plan
Remediation Completion of Multiple Areas of Concern Using Vapor Energy Generator (VEG) Thermal Desorption Technology

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

5a. CONTRACT NUMBER
W912QR17C0045

5b. GRANT NUMBER
NA

5c. PROGRAM ELEMENT NUMBER
NA

6. AUTHOR(S)

Tim Naughton, PE
Ramirez, Kaylyn, EIT

5d. PROJECT NUMBER
NA

5e. TASK NUMBER
Task 2.01

5f. WORK UNIT NUMBER
NA

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

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5 South Linden Street, Suite 2
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Alaniz Associates Corporation
21334 East Cloverton Street
Covina, CA 91724

8. PERFORMING ORGANIZATION REPORT NUMBER
NA

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

USACE – Louisville District
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600 Martin Luther King Jr. Place
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Louisville, Kentucky 40202-0059

10. SPONSOR/MONITOR'S ACRONYM(S)

USACE

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

12. DISTRIBUTION/AVAILABILITY STATEMENT

Reference distribution page.

13. SUPPLEMENTARY NOTES

None

14. ABSTRACT

This Sampling and Analysis Plan (SAP) outlines the sampling approach and procedures to be implemented by the Alaniz-Endpoint join venture team for this task order under the requirements of the Revised Performance Work Statement dated December 2018 and amended on November 21, 2019. Specifically, this SAP sets forth details of soil sampling to be implemented in support of excavation and onsite thermal treatment of soil, and in support of profiling soil/waste in support of off-site disposal for the five areas of concern (AOCs) covered under this contract.

15. SUBJECT TERMS
Sampling and Analysis Plan, sampling approach and procedures

16. SECURITY CLASSIFICATION OF: a. REPORT	b. ABSTRACT	c. THIS PAGE	17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
U	U	U	U	134	Nathaniel Peters, Ph.D., PE

19b. TELEPHONE NUMBER *(Include area code)*
502-315-2624

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

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Disclaimer Statement

This report is a work product prepared for the United States Government by the Alaniz Associates Corporation (Alaniz)-Endpoint Consulting, Inc. (Endpoint) Joint Venture (Alaniz-Endpoint Team). In no event shall either the United States Government nor the United States Army Corps of Engineers (USACE) have any responsibility or liability for any consequences of any use, misuse, inability to use, or reliance on the information contained herein, nor does either warrant or otherwise represent in any way the accuracy, adequacy, efficacy, or applicability of the contents hereof.

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FINAL
SAMPLING AND ANALYSIS PLAN

REMEDIATION COMPLETION OF MULTIPLE AREAS OF CONCERN USING VAPOR ENERGY GENERATOR (VEG) THERMAL DESORPTION TECHNOLOGY

FORMER RAVENNA ARMY AMMUNITION PLANT PORTAGE AND TRUMBULL COUNTIES, OH

March 17, 2021

Contract Number: W912QR17C0045

Prepared for:

U.S. ARMY CORPS OF ENGINEERS, LOUISVILLE DISTRICT
600 Dr. Martin Luther King Pl, Room 821
Louisville, KY 40202

Prepared by:
Endpoint Consulting, Inc.
5 South Linden Street, Suite 2
South San Francisco, CA 94080

Prepared with:
Alaniz Associates Corporation
21334 East Cloverton Street
Covina, CA 91724

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Document Distribution for
Final Sampling and Analysis Plan
for Remediation Completion of Multiple Areas of Concern using Vapor Energy Generator (VEG) Thermal Desorption Technology
Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Name/Organization	Number of Printed Copies	Number of Electronic Copies
Sue Netzly-Watkins, Ohio EPA DERR	1	1
Tom Schneider, Ohio EPA SWDO	Transmittal letter only	
Bob Princic, Ohio EPA DERR	Transmittal letter only	
Mark Leeper, ARNG	0	1
Kevin Sedlak, ARNG	0	1
Katie Tait, OHARNG	0	1
Steeve Kvaal, USACE LRL	Transmittal letter only	
Nat Peters, USACE LRL	0	1
Jennifer Tierney, RVAAP Administrative Record	2	2
Pat Ryan, Leidos-REIMS	Transmittal letter only	

ARNG = Army National Guard
OHARNG = Ohio Army National Guard
Ohio EPA CO = Ohio Environmental Protection Agency, Central Office
Ohio EPA DERR = Ohio Environmental Protection Agency, Division of Environmental Response and Revitalization
Ohio EPA SWDO = Ohio Environmental Protection Agency, Southwest District Office
REIMS = Ravenna Environmental Information Management System
USACE = United States Army Corps of Engineers

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Certification 4

CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Endpoint Consulting, Inc., has completed the preparation and review of this Sampling and Analysis Plan for the Remediation Completion of Multiple Areas of Concern Using Vapor Energy Generator (VEG) Thermal Desorption Technology at the former 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 independent technical review included evaluation of data quality objectives; technical assumptions; methods, procedures, and material to be used in analyses; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing USACE policy.

Scott A. Nesbit

____________________________________ 3-15-2021

Scott Nesbit, PE — Date

Quality Assurance Manager

Tim Naughton

____________________________________ 2-15-2021

Tim Naughton, P.E. — Date

Director of Operations & Engineering

Significant concerns and explanation of the resolution are documented within the project file. As noted above, all concerns resulting from independent technical review of the project have been considered.

Manuel C Pestana

____________________________________ 3-15-2021

M. Chris Pestana — Date

Program Manager

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FINAL

SAMPLING AND ANALYSIS PLAN

REMEDIATION COMPLETION OF MULTIPLE AREAS OF CONCERN USING VAPOR ENERGY GENERATOR (VEG) THERMAL DESORPTION TECHNOLOGY

FORMER RAVENNA ARMY AMMUNITION PLANT
PORTAGE AND TRUMBULL COUNTIES, OHIO

Contract Number: W912QR17C0045

Reviewed and Approved by:

Tim Naughton, P.E.
Director of Operations & Engineering
Endpoint Consulting, Inc.

M. Chris Pestana
Program Manager
Alaniz Associates Corporation

The Alaniz-Endpoint Joint Venture (Alaniz-Endpoint Team) has prepared this report under the direction of USACE Louisville District (LRL). This document should be used only with the approval of USACE LRL. This report is based in part on information provided in other documents and is subject to the limitations and qualifications presented in the referenced documents.

March 2021

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LIST OF ABBREVIATIONS AND ACRONYMS

AOC	Areas of Concern
APP	Accident Prevention Plan
ARNG	Army National Guard
bgs	Below ground surface
CCQC	Contractor Chemical Quality Control
CJAG	Camp James A, Garfield Joint Military Training Center
COC	Chemical of Concern
DFFO	Director’s Final Findings and Orders
DLA	Defense Logistics Agency
DoD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
EE/CA	Engineering Evaluation/Cost Evaluation
FCR	Field Change Request
FTL	Field Task Leader
FWCUGs	Facility-Wide Cleanup Goals
FWQAPP	Facility-Wide Quality Assurance Project Plan
FWSAP	Facility-Wide Sampling and Analysis Plan
FWSHP	Facility-Wide Safety and Health Plan
GPS	Global Positioning System
IDW	Investigation Derived Waste
ISM	Incremental Sampling Methodology
LRL	Louisville District
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NACA	National Advisory Committee on Aeronautics
NCR	Nonconformance Reports
NELAP	National Environmental Laboratory Accreditation Program
NTCRA	Non-Time-Critical Removal Action
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environnemental Protection Agency
PAH	Polycyclic Aromatic Hydrocarbon
PP	Proposed Plan
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RD	Remedial Design
RI	Remedial Investigation
RSL	Regional Screening Level
RVAAP	Ravenna Army Ammunition Plant
SAP	Sampling Analysis Plan
SSHO	Site Safety and Health Officer
TCLP	Toxicity Characteristic Leaching Procedure
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VEG	Vapor Energy Generator
VOCs	Volatile Organic Compounds
WP	Work Plan

1.0 INTRODUCTION

1.1 Project Description

The Alaniz-Endpoint Team has prepared this Sampling and Analysis Plan (SAP) in support of sampling to be performed as part of soil remediation activities planned for multiple Areas of Concern (AOCs) at the Former Ravenna Army Ammunition Plant (RVAAP), now known as Camp James A. Garfield Joint Military Training Center (CJAG), located in Portage and Trumbull Counties, Ohio (see Figure 1-1). Soil remediation activities at each AOC will consist of either excavation and disposal or excavation and thermal treatment using Endpoint's patented Vapor Energy Generator (VEG) Technology. This document has been prepared under Contract No. W912QR17C0045, issued by the U.S. Army Corps of Engineers (USACE), Louisville District (LRL) on July 31, 2017 and amended on November 21, 2019.

The five AOCs covered by this SAP are listed below and depicted on Figure 1-2.

- RVAAP-42 Load Line 9
- CC RVAAP-76 Depot Area
- RVAAP-34 Sand Creek Disposal Road Landfill
- RVAAP-38 NACA Test Area
- RVAAP-45 Wet Storage Area

Based on the planned remediation activities at the five AOCs, the Standard Operating Procedures (SOPs) and sampling covered by this SAP will be limited to:

- Waste Profile Sampling: Soil from within the excavation boundaries at each AOC will be sampled in-situ prior to ground disturbance and subjected to Toxicity Characteristic Leaching Procedure (TCLP) analysis, allowing for appropriate handling, transporting and disposal;

- Excavation Pit Soil Confirmation Sampling: Confirmation soil samples will be collected from the sidewalls and bottom of each excavation pit within each AOC, in order to confirm that cleanup goals have been met at each AOC. It should be noted that the sample quantities, specific nomenclature and anticipated sampling locations for all confirmation samples to be collected within each AOC is documented within the remedial design (RD) or non-time-critical removal action (NTCRA) work plans (WPs) pertaining to each AOC. All other information related to the excavation pit confirmation sampling, including procedures for sample collection and analysis, data quality objectives, and other components inherent to the SAP process are included in this SAP;

- Post-Treatment Soil Confirmation Sampling: Soil sampling will be conducted following onsite thermal treatment of impacted soil via the VEG Technology, confirming treated soil meet cleanup goals and may be reused onsite as backfill without restrictions; and

Sampling of imported soil to be used as additional backfill, ensuring no impacted material is introduced to the site.

This SAP has been prepared based on specific requirements necessary to implement the planned soil remediation activities at CJAG and on the guidance provided in the Facility-Wide Sampling and Analysis Plan (FWSAP) for Environmental Investigations at the former RVAAP (SAIC, 2011a). The FWSAP, which includes the Facility-Wide Quality Assurance Project Plan (FWQAPP), provides the base documentation (i.e., technical and investigative protocols) for conducting the remedial action under the Comprehensive Environmental Response, Compensation and Liability Act at the former RVAAP. This SAP includes the AOC-specific planned field and sampling and analysis activities for the five aforementioned AOCs and is accordingly appended by relevant site-specific quality assurance project plan (QAPP) components, referenced herein as QAPP.

1.2 Facility Description and History

The former RVAAP facility consists of 21,683 acres located in northeastern Ohio within Portage and Trumbull counties, approximately 4.8 km (3 miles) east/northeast of the City of Ravenna and approximately 1.6 km (1-mile) northwest of the City of Newton Falls. It consists of a parcel approximately 17.7 km (11 miles) long and 5.6 km (3.5 miles) wide and is bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad on the south; Garret McCormick, and Berry roads to the west; the Norfolk Southern Railroad on the north; and State Route 534 on the east (see Figure 1-1). The former RVAAP facility was used as a load, assemble, and pack facility for munitions production.

As of September 2013, administrative control of the 21,683-acre facility has been transferred to the United States Property and Fiscal Officer for Ohio and subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a military training site (Camp James A. Garfield).

During the RVAAP operational years, prior to CJAG, the entire 21,683- acre property was a government-owned, contractor-operated industrial facility. The RVAAP Restoration Program encompasses investigation and cleanup of past activities over the entire 21,683 acres of the former RVAAP; therefore, references to the RVAAP in this document are considered to be inclusive of the historical extent of the former RVAAP and CJAG, unless otherwise specifically stated.

The Army National Guard (ARNG) is the lead agency for remediation, decisions, and applicable cleanup within the former RVAAP facility. The Ohio Environmental Protection Agency (Ohio EPA) is supporting state regulatory agency. The USACE-LRL is the contracting agency hired by the ARNG and OHARNG and is responsible for implementation and technical oversight of remedial activities. It is important to note that the RVAAP Restoration Program is bound to the Director’s Final Findings and Orders (DFFO) issued June 10, 2004 by the Ohio EPA pursuant to the authority vested under Chapters 3734, 3745, and 6111 of the Ohio Revised Code. The objective of the DFFO is to ensure that the public health, safety, and welfare, as well as the environment, are protected from the disposal, discharge, or release of contaminants.

As previously indicated, the RVAAP Restoration Program has identified several AOCs at CJAG, which require soil remediation for various contaminants, with polycyclic aromatic hydrocarbons (PAHs) being the predominant chemical of concern (COC). A recent onsite pilot study overseen by USACE-LRL and the Ohio EPA performed by Endpoint at the Atlas Scrap Yard (RVAAP-50) site at CJAG demonstrated the efficiency and effectiveness of the VEG Technology for remediating PAH-contaminated soil to unrestricted reuse levels. Recognizing the wide geographic distribution of the various AOCs included in this contract, the full-scale application of the VEG Technology is considered most feasible and cost-effective if it can be set up in one onsite location and used without having to mobilize to individual AOCs. As such, this SAP covers sampling associated with remediation efforts associated with use of the VEG Technology at the five AOCs referenced earlier herein. The planned remediation involves establishing VEG system setup at one AOC and importing soil from the remaining AOCs to be remediated at the VEG setup location; the VEG system setup location will be at RVAAP-38.

1.3 Remediation Areas of Concern

A brief background on each of the AOCs covered by this SAP is summarized below, with AOC locations depicted on Figure 1-2. Additional site background and investigation details for each AOC will be included within individual RD or NTCRA WPs for each site. The summary below is focused on identification of COCs, and the estimated extent and volumes of soil anticipated as warranting remediation based on past investigations and existing decision documents. It should be noted that the soil volumes referenced herein largely correspond to those outlined in background documents (e.g., Proposed Plans [PPs], Records of Decision [RODs] or Engineering Evaluation/Cost Analysis [EE/CA]) available for each AOC. Importantly, these soil volume estimates were developed based on the Facility-Wide Cleanup Goals (FWCUGs) for metals (USACE, 2010), and the June 2017 US Environmental Protection Agency (USEPA) residential soil Regional Screening Levels (RSLs) for PAHs based on a target risk level of 1E-5 and target hazard of 1.0. Specific PAHs and metals included as COCs (using the FWCUGs for metals and June 2017 residential soil RSLs for PAHs) for each AOC are summarized in Table 1-1.

1.3.1 RVAAP-42 Load Line 9

Load Line 9 is a 69-acre, fenced AOC formerly known as the detonator line and is located in the central portion of the former RVAAP site (see Figure 1-2). Between 1941–1945, Load Line 9, was operated to produce fuze component parts for artillery projectiles. In 1945, Load Line 9 was deactivated, with all 54 process and support buildings, slabs and foundations demolished and removed in 2003 and 2007. Following demolition activities, the site was regraded and vegetated. Current features remaining at the site include an elevated water tank and a perimeter fence. The water tank is no longer connected to a water distribution system. Gravel perimeter roads, two dirt mounds and small construction drainage ditches are also present. The rest of the Load Line 9 AOC remains as open space and is currently overgrown with grass, trees, and scrub vegetation.

As indicated in the PP (Leidos, 2017) and ROD (Leidos, 2019a) for Load Line 9, soil in two separate areas of the AOC require excavation. As shown on Figure 1-3, an approximate 16 cubic yards of lead and mercury-impacted soil require excavation within Area 1, while an approximate 761 cubic yards of PAH-impacted soil require excavation from Area 2. Both areas have an anticipated excavation depth of one foot; however, the final extent of soil to be remediated will be determined based on excavation pit sidewall and bottom confirmation samples (Section 4.2.2.1 herein). Metals-impacted soil will be excavated and disposed at an approved off-site disposal facility, while PAH-impacted soil will be thermally treated using the VEG Technology and reused onsite as backfill.

1.3.2 RVAAP-45 Wet Storage Area

From 1941-1945 the Wet Storage Area, located in the central portion of the former RVAAP site (see Figure 1-2), was used to store explosives within six storage igloos; four of the igloos were removed in 2003-2004. Remaining features at this AOC include two storage igloos (WS-3 and WS-3A), access roads that enter the AOC from the south, and a fence that is not currently maintained. Small construction drainage ditches border the access roads near the igloo locations. The remaining area within the AOC is forested (see Figure 1-4).

Based on the PP (Leidos, 2018) and ROD (Leidos, 2019b) for this AOC, two excavations (i.e., WSA Area 1 and WSA Area 2), each 1-foot deep and spanning an approximate surface area of 918 square feet, are anticipated for remediating PAH-impacted surface soil at this AOC. These excavation dimensions correspond to an anticipated 70 cubic yards of PAH-impacted soil requiring remediation relative to the June 2017 residential soil RSLs (see Figure 1-4). Ultimately, excavation pit sidewall and bottom soil confirmation samples collected following soil excavation will define the final volume of soil to be remediated at this AOC. Specific PAHs included as soil COCs at this AOC are summarized in Table 1-1.

1.3.3 CC RVAAP-76 Depot Area

The Depot Area is an approximately 170-acre area located in the western portion of the facility (see Figure 1-2). Based on the Final Historical Records Review (HHR) (SAIC, 2011b) and the Final Remedial Investigation/Feasibility Study (USACE, 2016) report for this AOC, historical operations conducted at this AOC included fueling operations, locomotive repair, petroleum, oil and lubricant storage, solid waste incinerator activities, and vehicle repair and maintenance. Munitions demilitarization activities occurred in Building U-10. Operations at this AOC began during World War II (circa 1941) and continued through the Vietnam War era. Currently this AOC is utilized by the OHARNG for storage and training purposes. Many of the original structures still remain today and are mostly used for storage.

Based on the PP (Parsons, 2018) and ROD (Parsons, 2019), PAH-impacted soil within the 0-1 foot bgs range surrounding Building U-4 and Building U-5 require remediation (see Figures 1-5 and 1-6). It is anticipated that 1,133 cubic yards of PAH-impacted soil will be excavated and disposed off-site at an approved disposal facility. Ultimately, excavation pit sidewall and bottom soil confirmation samples collected following soil excavation will define the final volume of soil to be remediated at this AOC

1.3.4 RVAAP-34 Sand Creek Disposal Road Landfill

The Sand Creek Disposal Road Landfill spans approximately 1 acre, and is located in the central eastern portion of the former RVAAP (see Figure 1-2). As summarized in the Final Engineering Evaluation/Cost Analysis (EE/CA) (USACE, 2019), the site was used as an open dump area, but information on its operational history and disposal activities is incomplete. Construction and demolition debris were delivered to the site and dumped over an embankment located immediately adjacent to Sand Creek (see Figure 1-). The dump site extended along the embankment for approximately 1,200 feet and varied in width from 20 to 40 feet from the top of the bank to the bottom. The bank slopes from east to west toward Sand Creek at 40 to 60 degrees from the horizontal and surface water runoff flows in a westerly direction toward the creek. A narrow floodplain occupies the land between the bottom of the embankment and Sand Creek. The site is currently undeveloped; however, several former Sand Creek Sewage Treatment Plant buildings remain northeast of the site.

The areal footprint of soil impacts above background levels or residential soil RSLs which require remediation at this AOC is depicted on Figure 1-7, with COCs summarized in Table 1-1. Soil slated for excavation reside in the northern portion of the site and include arsenic-impacted soil to be disposed off-site and PAH-impacted soil which will be thermally treated prior to reuse as backfill. As specified in the Final EE/CA, a total anticipated volume of 157 cubic yards of soil requires excavation, with excavation depths ranging from 1 to 10-foot-deep in the areas shown on Figure 1-7.

1.3.5 RVAAP-38 NACA Test Area

As summarized in the PP (Leidos, 2019c), the NACA Test Area AOC was designed and used by the National Advisory Committee on Aeronautics (NACA) from 1947–1953. The AOC is located in the southwestern portion of the former RVAAP site (Figure 1-2) and was used to conduct experimental crash tests of excess military aircraft in order to develop explosion-proof fuel tanks and fuel for aircraft. Seventeen excess aircraft were reportedly used and crashed into a concrete barrier at speeds from 80–105 miles per hour. During the tests, high-speed films were made to study fuel spillage, generation of ignition sources, flame front progression, and toxic gas generation, among other parameters. Aircraft that were significantly damaged were stripped of instrumentation and salvageable parts, and some of the airplanes were moved and stored at the northeast portion of the site; however, despite pervious documentation suggesting the aircraft were buried onsite, recent investigations have determined this to not be accurate. Today, the site remains an active military training area.

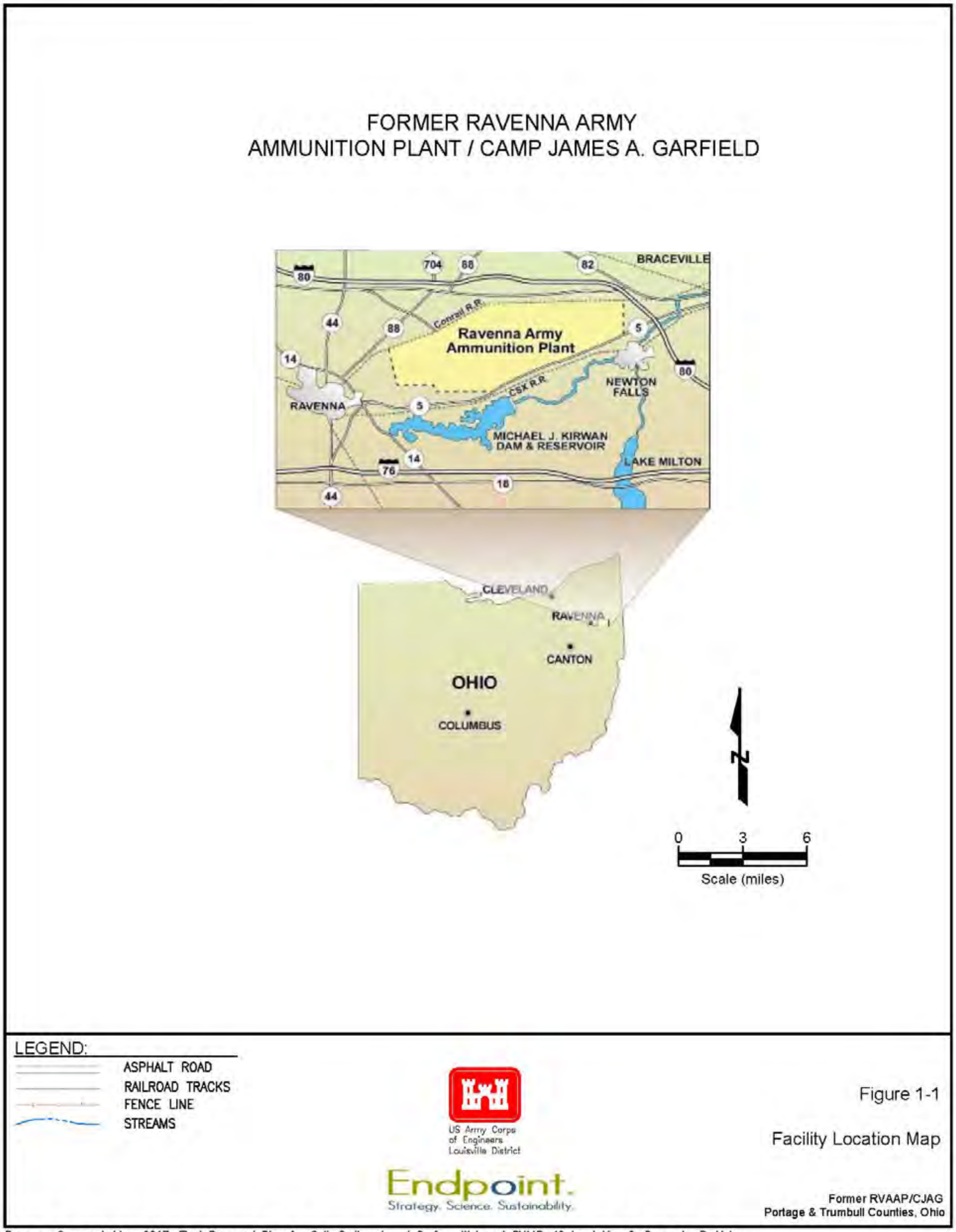
Based on the PP (Leidos, 2019c) and ROD (Leidos, 2019d) for this AOC, three areas of excavation (i.e., Area 1, Area 2 and Area 3) have been delineated at the site (see Figure 1-8). Specifically, the Area 1 excavation extends 1 foot deep with an approximate surface area of 8,590 square feet along former plane refueling/crash strip. The Area 2 excavation extends 1 foot deep with an approximate surface area of 4,130 square feet in the former plane refueling area. Lastly, the former crash area (i.e., Area 3) excavation extends 1 foot deep with an approximate surface area of 10,000 square feet at the east end of the crash strip; combined, these excavations correspond to an approximate in-situ volume of 840 cubic yards (1,270 cubic yards ex-situ) of PAH-impacted soil warranting remediation relative to the June 2017 residential RSLs. Less than 0.15 cubic yards of lead-impacted soil is also anticipated for removal and off-site disposal, based on past investigation efforts (see Figure 1-8). Specific PAHs and metals included as COCs at this AOC are summarized in Table 1-1.

The Well Pit and Production Well will be properly abandoned and all concrete structures removed. Specific details and a well destruction SOP will be provided with the respective remedial workplan for RVAAP-38. The pit and well will be abandoned in accordance with Ohio Environmental Protection Agency Technical Guidance Manual. In general, the static water level and total well depth will be gauged and the well will be sanitized. The borehole will be sealed with bentonite grout. The grout will be placed under pressure using a tremie pipe filling the borehole from the bottom up as the tremie pipe is removed to approximately two to three feet from the surface. Water that comes out of the well during grouting operations will be collected and containerized. After 24 hours, the grout plug will be inspected and if needed, grout will be added to the boring. Surface finishing will include removing all above ground structures, removing the well casing will down to 3 ft below ground surface and backfilling with material appropriate for the site. Once abandoned, the well abandonment log for the well will be submitted to the Ohio EPA and Ohio Department of Natural Resources (ODNR) per Ohio Revised Code 1521.05(B)(9) within 30 days. The well sealing reports are eforms that are submitted following abandonment.
Field use version can be obtained at
https://apps.ohiodnr.gov/water/maptechs/sealing/eSealingLog_Field_Use.pdf

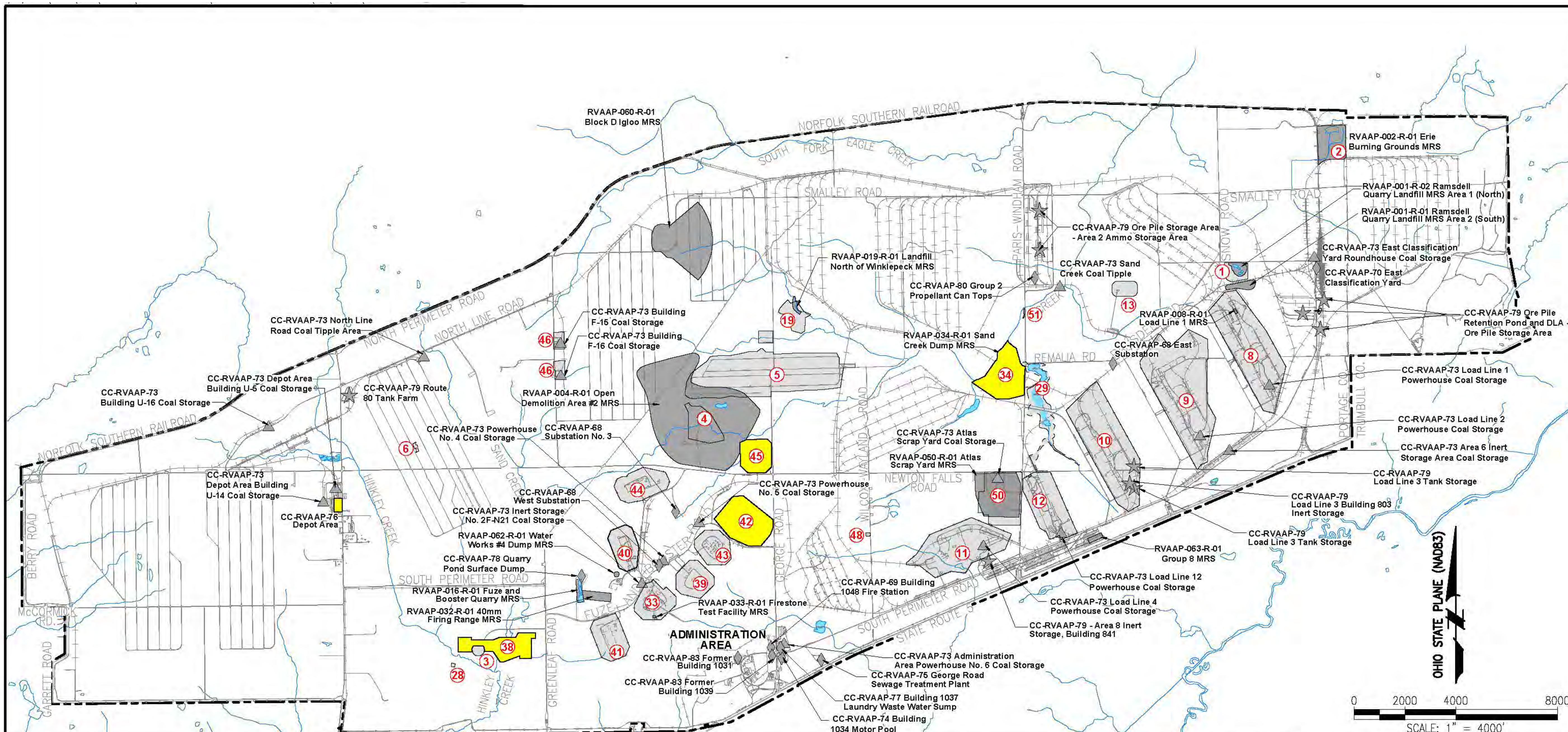
Table 1-1. Soil Chemicals of Concern
FORMER RVAAP SITE, PORTAGE AND TRUMBULL COUNTIES, OH

AOC	COC	Maximum COC Concentration (mg/kg)	FWCUG or Residential RSL (1E-05 TRL, HQ=1.0) (mg/kg)
RVAAP-42 Load Line 9	Benz(a)anthracene	17	11
	Benzo(a)pyrene	15	1.1
	Benzo(b)fluoranthene	20	11
	Dibenz(a,h)anthracene	2.2	1.1
	Lead	1,330	400
	Mercury	882	22.7
CC RVAAP-76 Depot Area	Benz(a)anthracene	58	11
	Benzo(a)pyrene	51	1.1
	Benzo(b)fluoranthene	80	11
	Dibenz(a,h)anthracene	7.2	1.1
RVAAP-34 Sand Creek Disposal Road Landfill	Benzo(a)pyrene	17	1.1
	Mercury	24.6	22.7
	Arsenic	182	4.25
RVAAP-38 NACA Test Area	Benz(a)anthracene	36	11
	Benzo(a)pyrene	41	1.1
	Benzo(b)fluoranthene	54	11
	Dibenz(a,h)anthracene	5.7	1.1
	Indeno (1,2,3-ed)pyrene	24	11
	Lead	13,200	400
RVAAP-45 Wet Storage Area	Benzo(a)pyrene	5.5	1.1

RSL = USEPA RESIDENTIAL SOIL REGIONAL SCREENING LEVEL (UPDATED IN JUNE 2017)
TRL = TARGET RISK LEVEL
HQ = HAZARD QUOTIENT



Basemap Source: Leidos, 2017. Final Proposed Plan for Soil, Sediment and Surface Water at RVAAP-42 Load Line 9. Drawn by P. Holm



IRP SITES - CERCLA

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

COMPLIANCE RESTORATION SITES (13 SITES)

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

MMRP SITES (14 SITES)

RVAAP-001-R-02.......................... RAMSDELL QUARRY LANDFILL AREA 1 (NORTH)
RVAAP-001-R-01.......................... RAMSDELL QUARRY LANDFILL AREA 2 (SOUTH)
RVAAP-002-R-01............ERIE BURNING GROUNDS MRS
RVAAP-004-R-01.........OPEN DEMOLITION AREA #2 MRS
RVAAP-008-R-01.........................LOAD LINE 1 MRS
RVAAP-016-R-01........FUZE AND BOOSTER QUARRY MRS
RVAAP-019-R-01... LANDFILL NORTH OF WINKLEPECK MRS
RVAAP-032-R-01............... 40MM FIRING RANGE MRS
RVAAP-033-R-01............FIRESTONE TEST FACILITY MRS
RVAAP-034-R-01.................SAND CREEK DUMP MRS
RVAAP-050-R-01.................ATLAS SCRAP YARD MRS
RVAAP-060-R-01.................... BLOCK D IGLOO MRS
RVAAP-061-R-01.............. BLOCK D IGLOO – TD MRS
RVAAP-062-R-01............WATER WORKS #4 DUMP MRS
RVAAP-063-R-01.......................... GROUP 8 MRS

OTHER REGULATORY - RCRA

4 RVAAP-04 .....OPEN DEMOLITION AREA #2

LEGEND:

.........................COMPLIANCE RESTORATION SITES – APPROVED
........DLA ORE STORAGE AREAS (7 SITES)
.... COAL STORAGE AREAS (17 SITES)
................AREAS OF CONCERN
.... MMRP SITES
.....AOC SITES (ADDRESSED IN SAP)
................RAILROAD TRACKS
.........................FENCELINE
...............STREAM OR CREEK

US Army Corps of Engineers Louisville District

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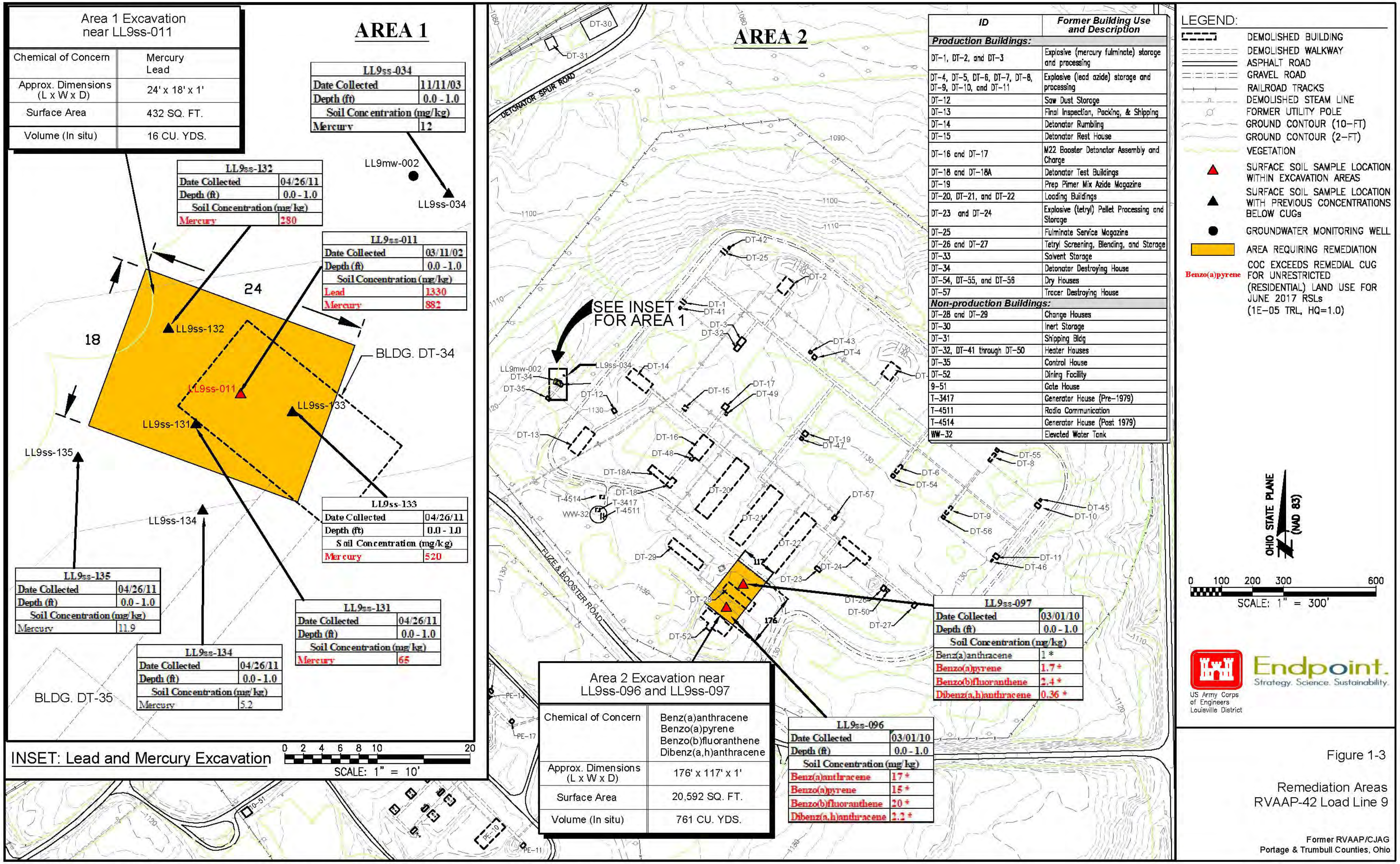
Figure 1-2

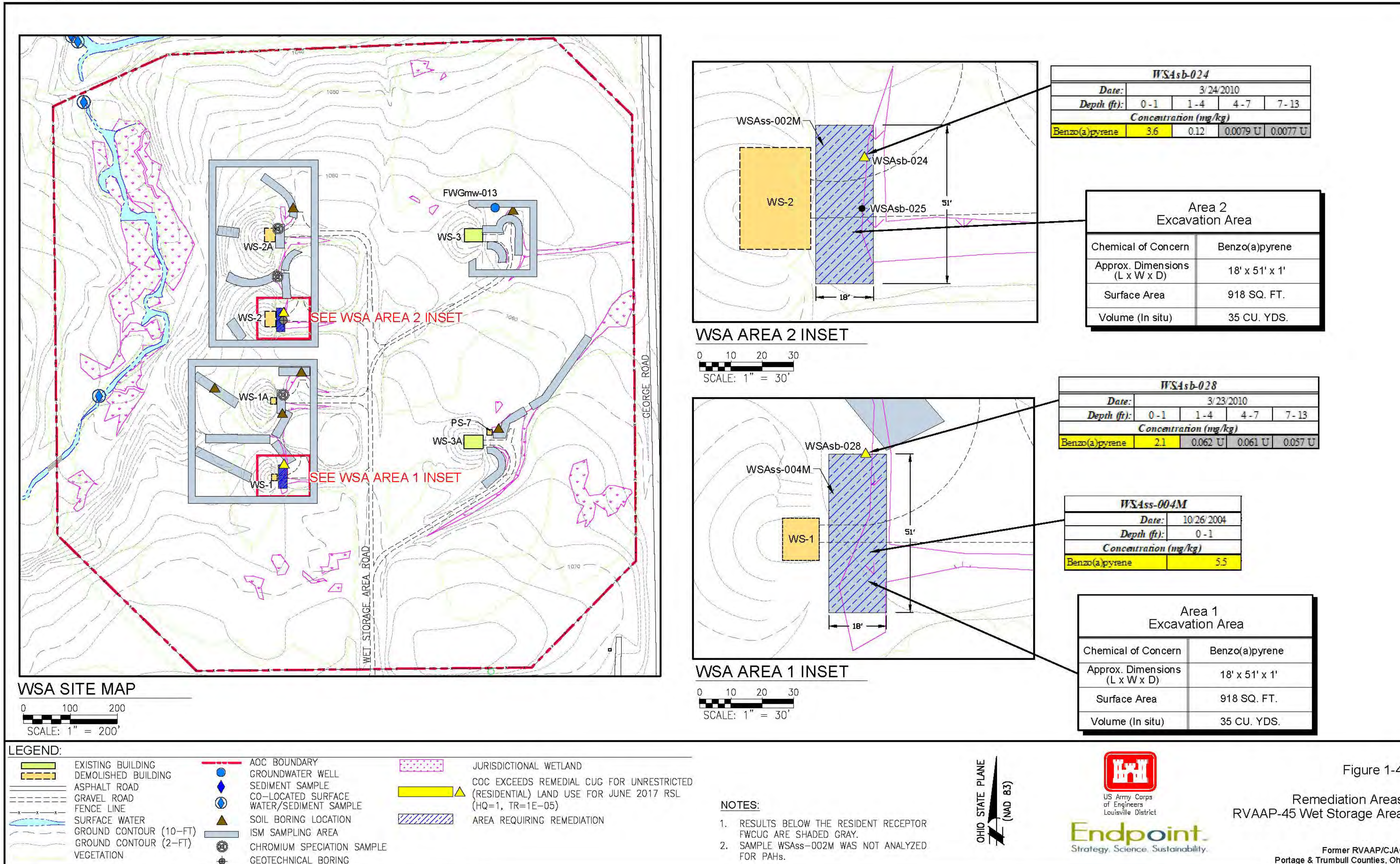
AOC Location Map

Former RVAAP/CJAG
Portage & Trumbull Counties, Ohio

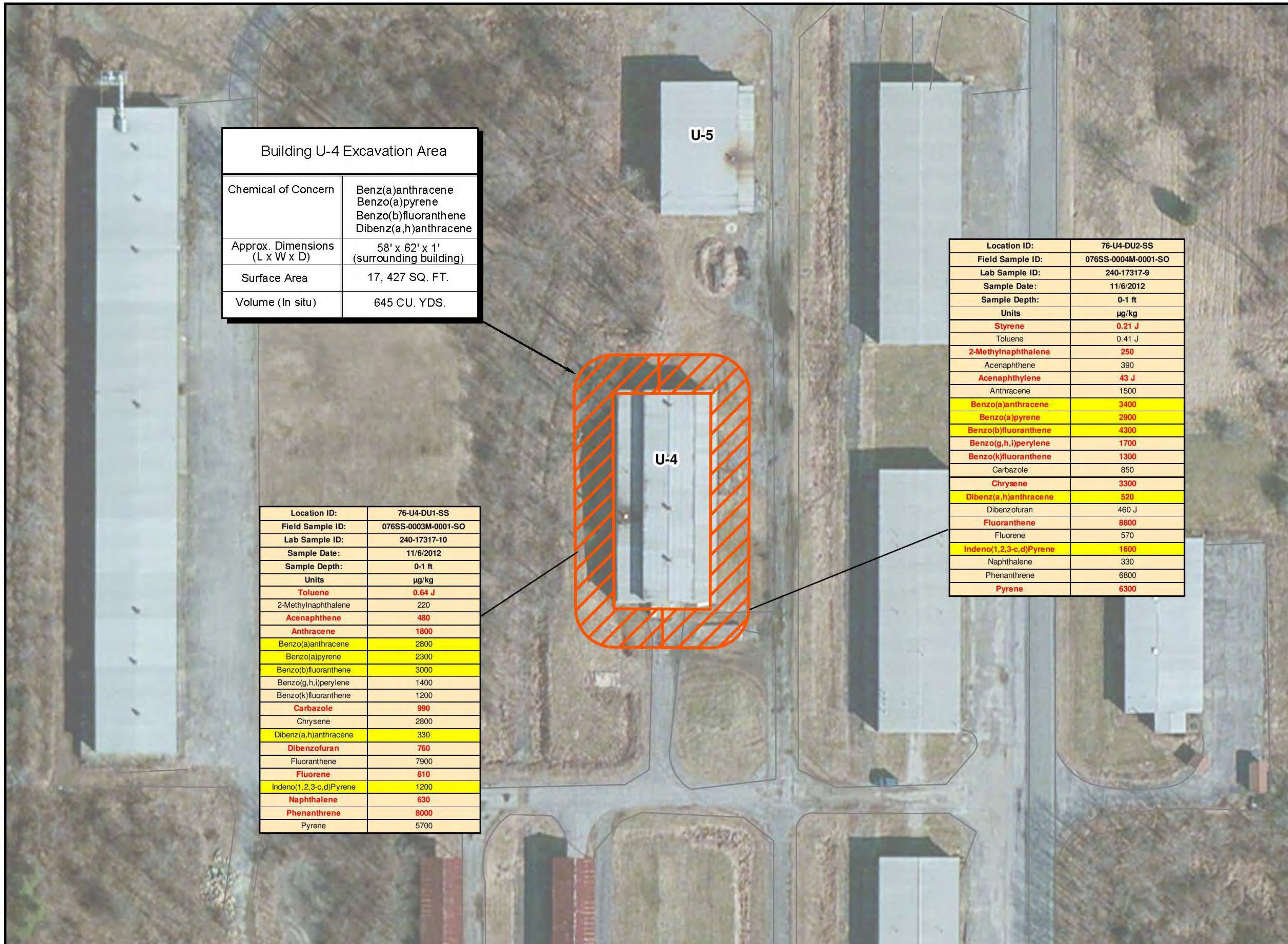
Basemap Source: Leidos, 2016. Revised Draft Phase II Remedial Investigation Report and Feasibility Study for Soil, Sediment and Surface Water at RVAAP-38 NACA Test Area



Basemap Source: Leidos, 2017. Final Proposed Plan for Soil, Sediment and Surface Water at RVAAP-42 Load Line 9. Drawn by P. Holm



Basemap Source: Leidos, 2018. Final Proposed Plan for Soil, Sediment and Surface Water at RVAAP-45 Wet Storage Area. February. Drawn by P. Holm



Building U-4 Excavation Area	
Chemical of Concern	Benz(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene
Approx. Dimensions (L x W x D)	58' x 62' x 1' (surrounding building)
Surface Area	17, 427 SQ. FT.
Volume (In situ)	645 CU. YDS.

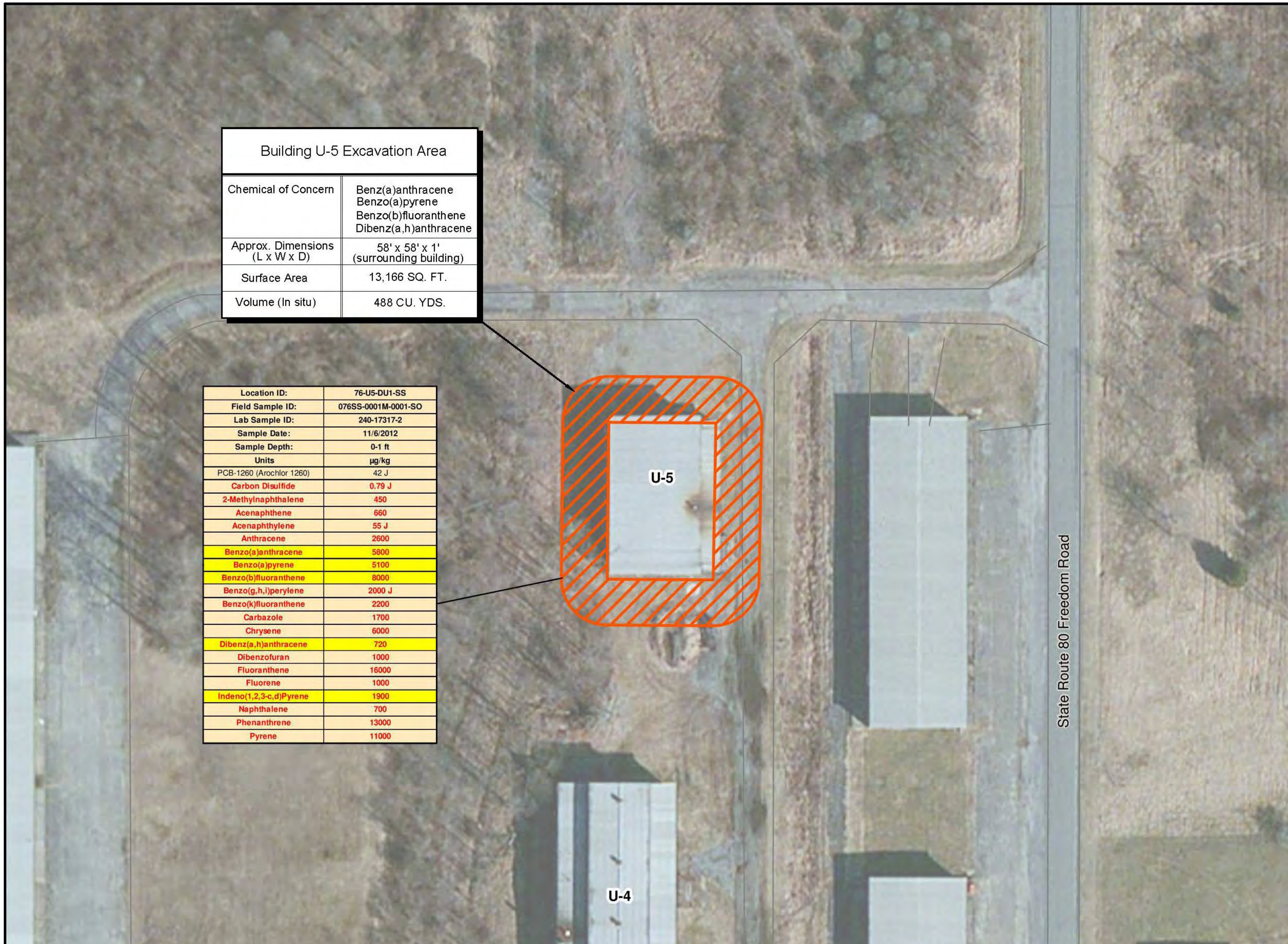
Location ID:	76-U4-DU1-SS
Field Sample ID:	076SS-0003M-0001-SO
Lab Sample ID:	240-17317-10
Sample Date:	11/6/2012
Sample Depth:	0-1 ft
Units	µg/kg
Toluene	0.64 J
2-Methylnaphthalene	220
Acenaphthene	480
Anthracene	1800
Benzo(a)anthracene	2800
Benzo(a)pyrene	2300
Benzo(b)fluoranthene	3000
Benzo(g,h,i)perylene	1400
Benzo(k)fluoranthene	1200
Carbazole	990
Chrysene	2800
Dibenz(a,h)anthracene	330
Dibenzofuran	760
Fluoranthene	7900
Fluorene	810
Indeno(1,2,3-c,d)Pyrene	1200
Naphthalene	630
Phenanthrene	8000
Pyrene	5700

Location ID:	76-U4-DU2-SS
Field Sample ID:	076SS-0004M-0001-SO
Lab Sample ID:	240-17317-9
Sample Date:	11/6/2012
Sample Depth:	0-1 ft
Units	µg/kg
Styrene	0.21 J
Toluene	0.41 J
2-Methylnaphthalene	250
Acenaphthene	390
Acenaphthylene	43 J
Anthracene	1500
Benzo(a)anthracene	3400
Benzo(a)pyrene	2900
Benzo(b)fluoranthene	4300
Benzo(g,h,i)perylene	1700
Benzo(k)fluoranthene	1300
Carbazole	850
Chrysene	3300
Dibenz(a,h)anthracene	520
Dibenzofuran	460 J
Fluoranthene	8800
Fluorene	570
Indeno(1,2,3-c,d)Pyrene	1600
Naphthalene	330
Phenanthrene	6800
Pyrene	6300

Figure 1-5
Remediation Areas
Building U-4
CC RVAAP-76 Depot Area

Former RVAAP/CJAG
Portage & Trumbull Counties, Ohio

Basemap Source: USACE, 2016. Final Remedial Investigation/Feasibility Study CC RVAAP-76 Depot Area. November.



Building U-5 Excavation Area	
Chemical of Concern	Benz(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene
Approx. Dimensions (L x W x D)	58' x 58' x 1' (surrounding building)
Surface Area	13,166 SQ. FT.
Volume (In situ)	488 CU. YDS.

Location ID:	**76-U5-DU1-SS**
Field Sample ID:	**076SS-0001M-0001-SO**
Lab Sample ID:	**240-17317-2**
Sample Date:	**11/6/2012**
Sample Depth:	**0-1 ft**
Units	**µg/kg**
PCB-1260 (Arochlor 1260)	42 J
Carbon Disulfide	**0.79 J**
2-Methylnaphthalene	**450**
Acenaphthene	**660**
Acenaphthylene	**55 J**
Anthracene	**2600**
Benzo(a)anthracene	**5800**
Benzo(a)pyrene	**5100**
Benzo(b)fluoranthene	**8000**
Benzo(g,h,i)perylene	**2000 J**
Benzo(k)fluoranthene	**2200**
Carbazole	**1700**
Chrysene	**6000**
Dibenz(a,h)anthracene	**720**
Dibenzofuran	**1000**
Fluoranthene	**16000**
Fluorene	**1000**
Indeno(1,2,3-c,d)Pyrene	**1900**
Naphthalene	**700**
Phenanthrene	**13000**
Pyrene	**11000**

LEGEND:

ROAD

AREA REQUIRING REMEDIATION

CONCENTRATION EXCEEDS REMEDIAL CUG FOR UNRESTRICTED (RESIDENTIAL) LAND USE FOR JUNE 2017 RSLs (HQ=1, TRL=1E−05)

NOTE:
SAMPLE RESULTS REPRESENT ISM SAMPLES

OHIO STATE PLANE (NAD 83)

0 40 80

SCALE: 1" = 80'

US Army Corps of Engineers Louisville District

Endpoint. Strategy. Science. Sustainability.

Figure 1-6
Remediation Areas
Building U-5
CC RVAAP-76 Depot Area

Former RVAAP/CJAG
Portage & Trumbull Counties, Ohio

Basemap Source: USACE, 2016. Final Remedial Investigation/Feasibility Study CC RVAAP−76 Depot Area. November.

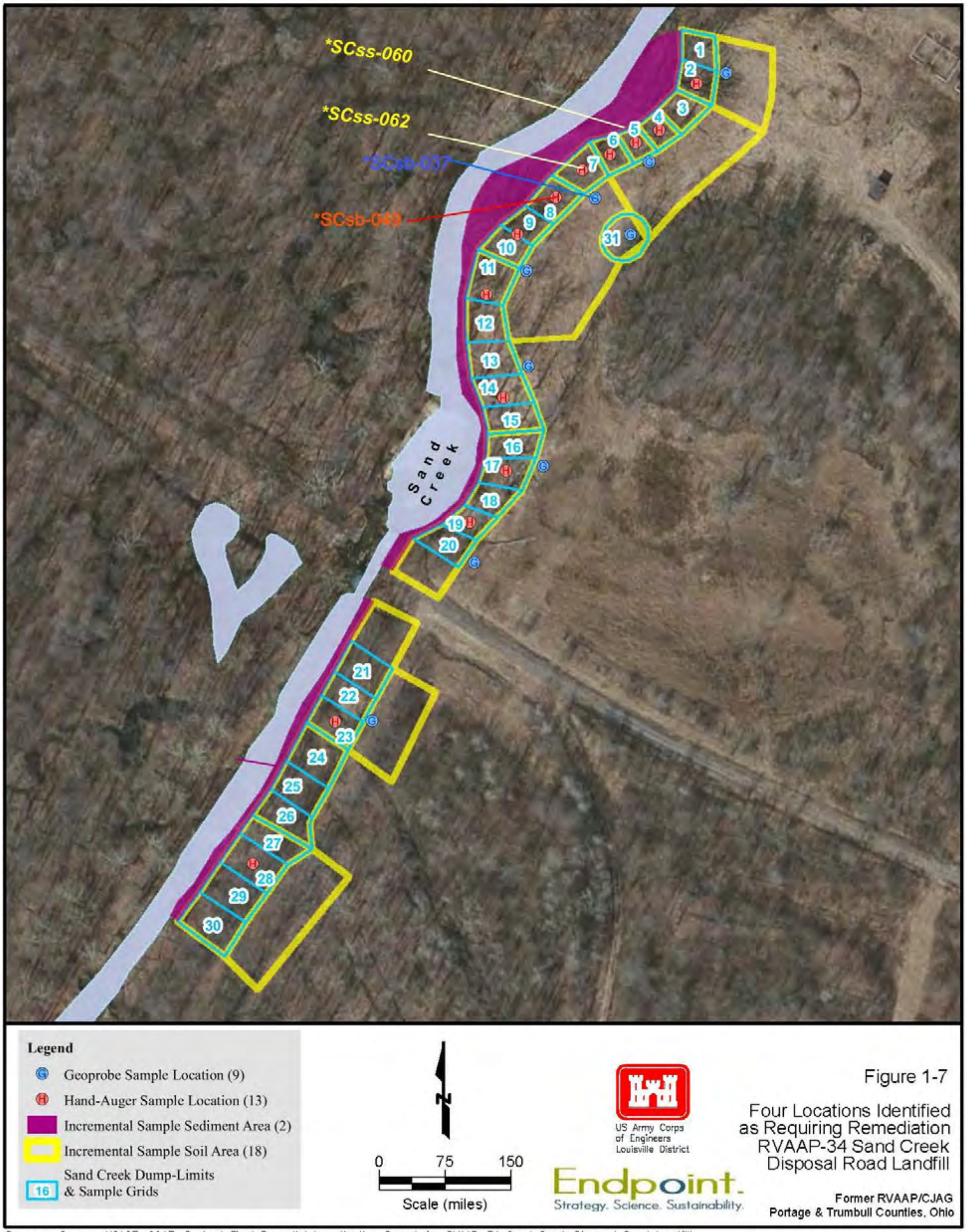
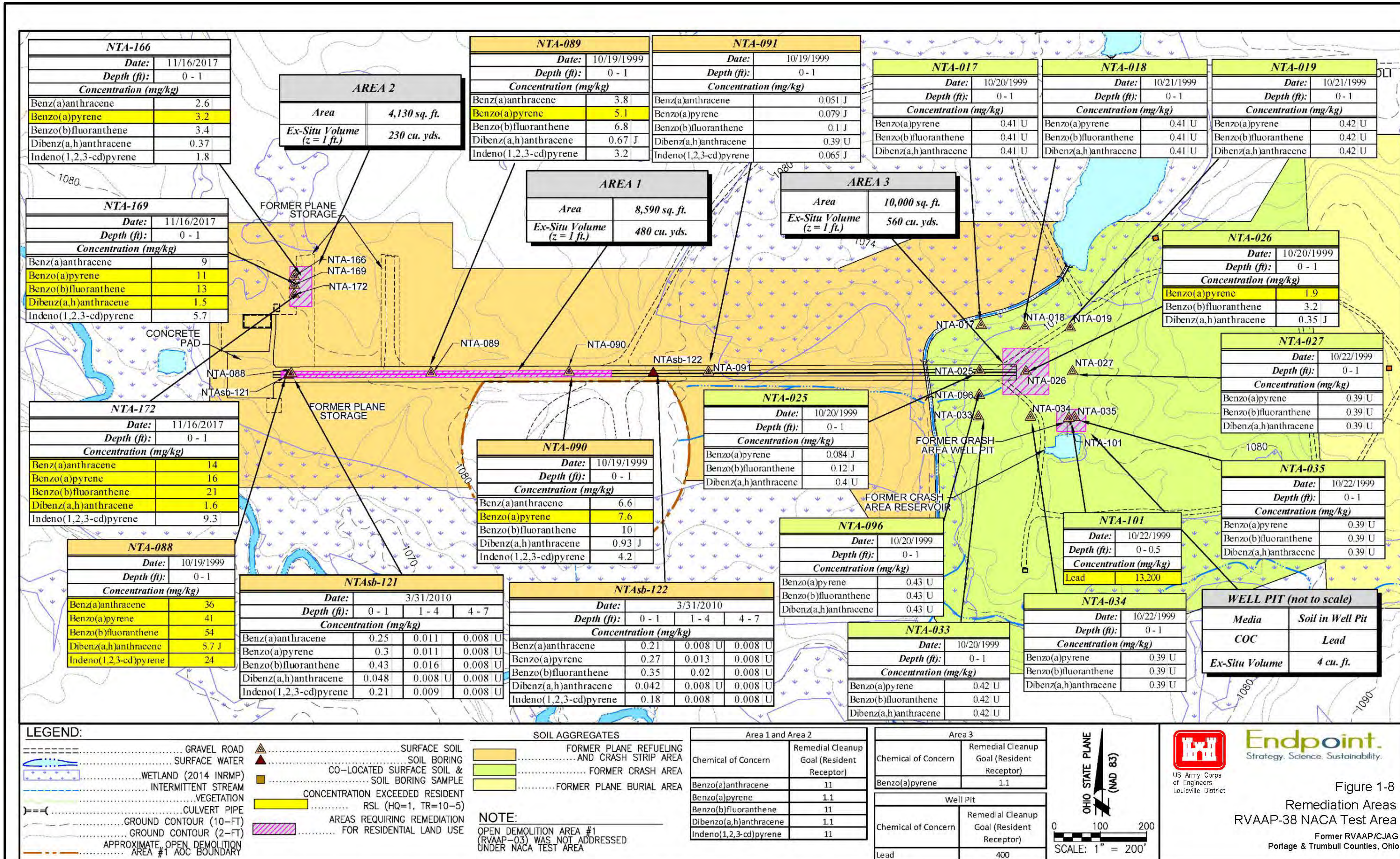


Figure 1-7

Four Locations Identified as Requiring Remediation RVAAP-34 Sand Creek Disposal Road Landfill

Basemap Source: USACE, 2017. Revised Final Remedial Investigation Report for RVAAP-34 Sand Creek Disposal Road Landfill



NTA-166

Date:	11/16/2017
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benz(a)anthracene	2.6
Benzo(a)pyrene	3.2
Benzo(b)fluoranthene	3.4
Dibenz(a,h)anthracene	0.37
Indeno(1,2,3-cd)pyrene	1.8

AREA 2

Area	4,130 sq. ft.
Ex-Situ Volume (z = 1 ft.)	230 cu. yds.

NTA-089

Date:	10/19/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benz(a)anthracene	3.8
Benzo(a)pyrene	5.1
Benzo(b)fluoranthene	6.8
Dibenz(a,h)anthracene	0.67 J
Indeno(1,2,3-cd)pyrene	3.2

NTA-091

Date:	10/19/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benz(a)anthracene	0.051 J
Benzo(a)pyrene	0.079 J
Benzo(b)fluoranthene	0.1 J
Dibenz(a,h)anthracene	0.39 U
Indeno(1,2,3-cd)pyrene	0.065 J

NTA-017

Date:	10/20/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benzo(a)pyrene	0.41 U
Benzo(b)fluoranthene	0.41 U
Dibenz(a,h)anthracene	0.41 U

NTA-018

Date:	10/21/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benzo(a)pyrene	0.41 U
Benzo(b)fluoranthene	0.41 U
Dibenz(a,h)anthracene	0.41 U

NTA-019

Date:	10/21/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benzo(a)pyrene	0.42 U
Benzo(b)fluoranthene	0.42 U
Dibenz(a,h)anthracene	0.42 U

AREA 1

Area	8,590 sq. ft.
Ex-Situ Volume (z = 1 ft.)	480 cu. yds.

AREA 3

Area	10,000 sq. ft.
Ex-Situ Volume (z = 1 ft.)	560 cu. yds.

NTA-169

Date:	11/16/2017
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benz(a)anthracene	9
Benzo(a)pyrene	11
Benzo(b)fluoranthene	13
Dibenz(a,h)anthracene	1.5
Indeno(1,2,3-cd)pyrene	5.7

NTA-026

Date:	10/20/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benzo(a)pyrene	1.9
Benzo(b)fluoranthene	3.2
Dibenz(a,h)anthracene	0.35 J

NTA-027

Date:	10/22/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benzo(a)pyrene	0.39 U
Benzo(b)fluoranthene	0.39 U
Dibenz(a,h)anthracene	0.39 U

NTA-172

Date:	11/16/2017
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benz(a)anthracene	14
Benzo(a)pyrene	16
Benzo(b)fluoranthene	21
Dibenz(a,h)anthracene	1.6
Indeno(1,2,3-cd)pyrene	9.3

NTA-025

Date:	10/20/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benzo(a)pyrene	0.084 J
Benzo(b)fluoranthene	0.12 J
Dibenz(a,h)anthracene	0.4 U

NTA-090

Date:	10/19/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benz(a)anthracene	6.6
Benzo(a)pyrene	7.6
Benzo(b)fluoranthene	10
Dibenz(a,h)anthracene	0.93 J
Indeno(1,2,3-cd)pyrene	4.2

NTA-035

Date:	10/22/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benzo(a)pyrene	0.39 U
Benzo(b)fluoranthene	0.39 U
Dibenz(a,h)anthracene	0.39 U

NTA-096

Date:	10/20/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benzo(a)pyrene	0.43 U
Benzo(b)fluoranthene	0.43 U
Dibenz(a,h)anthracene	0.43 U

NTA-101

Date:	10/22/1999
Depth (ft):	0 - 0.5
Concentration (mg/kg)	
Lead	13,200

NTA-088

Date:	10/19/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benz(a)anthracene	36
Benzo(a)pyrene	41
Benzo(b)fluoranthene	54
Dibenz(a,h)anthracene	5.7 J
Indeno(1,2,3-cd)pyrene	24

NTAsb-121

Date:	3/31/2010		
Depth (ft):	0 - 1	1 - 4	4 - 7
Concentration (mg/kg)			
Benz(a)anthracene	0.25	0.011	0.008 U
Benzo(a)pyrene	0.3	0.011	0.008 U
Benzo(b)fluoranthene	0.43	0.016	0.008 U
Dibenz(a,h)anthracene	0.048	0.008 U	0.008 U
Indeno(1,2,3-cd)pyrene	0.21	0.009	0.008 U

NTAsb-122

Date:	3/31/2010		
Depth (ft):	0 - 1	1 - 4	4 - 7
Concentration (mg/kg)			
Benz(a)anthracene	0.21	0.008 U	0.008 U
Benzo(a)pyrene	0.27	0.013	0.008 U
Benzo(b)fluoranthene	0.35	0.02	0.008 U
Dibenz(a,h)anthracene	0.042	0.008 U	0.008 U
Indeno(1,2,3-cd)pyrene	0.18	0.008	0.008 U

NTA-033

Date:	10/20/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benzo(a)pyrene	0.42 U
Benzo(b)fluoranthene	0.42 U
Dibenz(a,h)anthracene	0.42 U

NTA-034

Date:	10/22/1999
Depth (ft):	0 - 1
Concentration (mg/kg)	
Benzo(a)pyrene	0.39 U
Benzo(b)fluoranthene	0.39 U
Dibenz(a,h)anthracene	0.39 U

WELL PIT (not to scale)

Media	Soil in Well Pit
COC	Lead
Ex-Situ Volume	4 cu. ft.

LEGEND:

- GRAVEL ROAD
- SURFACE WATER
- WETLAND (2014 INRMP)
- INTERMITTENT STREAM
- VEGETATION
- CULVERT PIPE
- GROUND CONTOUR (10-FT)
- GROUND CONTOUR (2-FT)
- APPROXIMATE OPEN DEMOLITION AREA #1 AOC BOUNDARY
- SURFACE SOIL
- SOIL BORING
- CO-LOCATED SURFACE SOIL & SOIL BORING SAMPLE
- CONCENTRATION EXCEEDED RESIDENT RSL (HQ=1, TR=10−5)
- AREAS REQUIRING REMEDIATION FOR RESIDENTIAL LAND USE

SOIL AGGREGATES

- FORMER PLANE REFUELING AND CRASH STRIP AREA
- FORMER CRASH AREA
- FORMER PLANE BURIAL AREA

NOTE:
OPEN DEMOLITION AREA #1 (RVAAP-03) WAS NOT ADDRESSED UNDER NACA TEST AREA

Area 1 and Area 2

Chemical of Concern	Remedial Cleanup Goal (Resident Receptor)
Benzo(a)anthracene	11
Benzo(a)pyrene	1.1
Benzo(b)fluoranthene	11
Dibenzo(a,h)anthracene	1.1
Indeno(1,2,3-cd)pyrene	11

Area 3

Chemical of Concern	Remedial Cleanup Goal (Resident Receptor)
Benzo(a)pyrene	1.1

Well Pit

Chemical of Concern	Remedial Cleanup Goal (Resident Receptor)
Lead	400

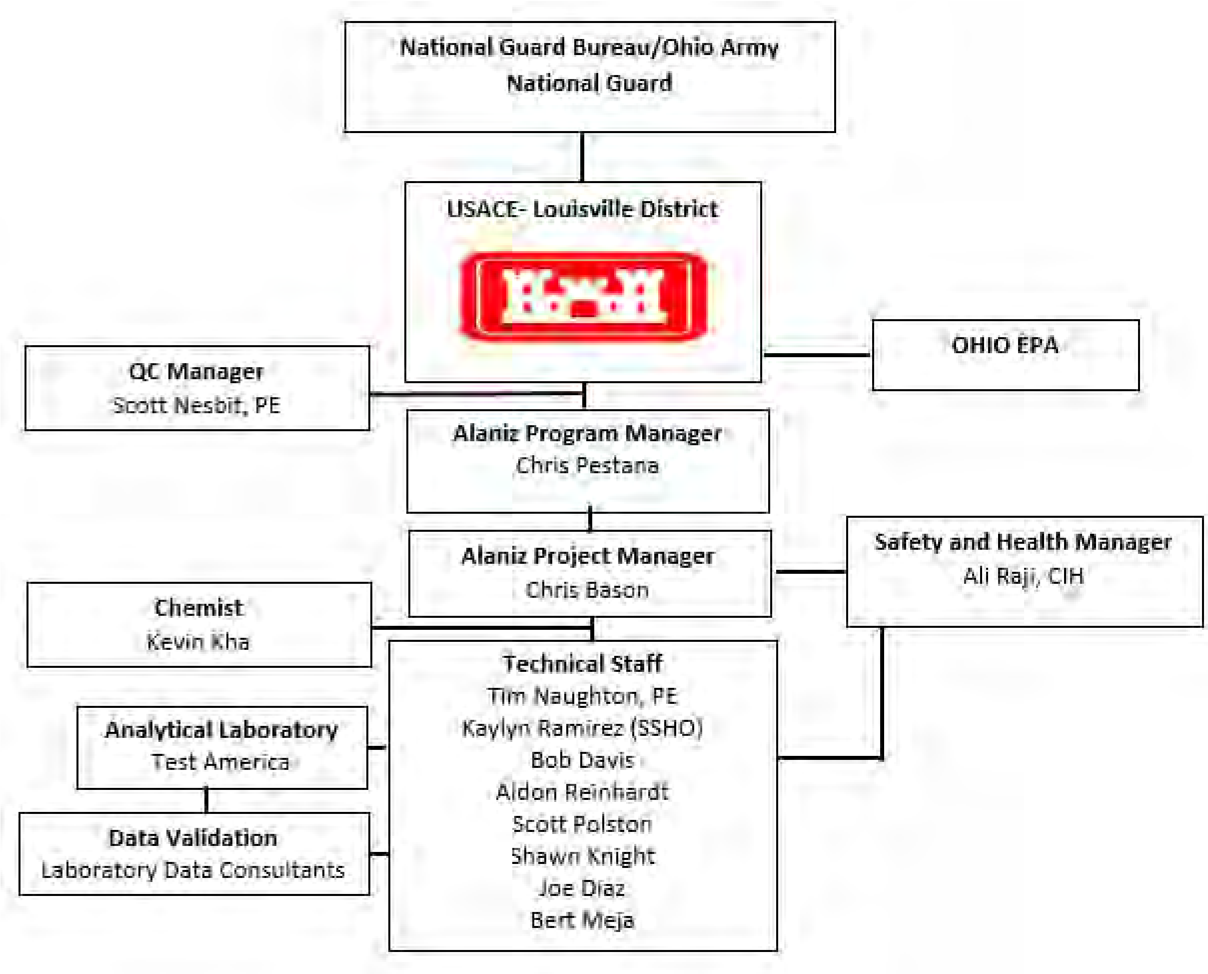
Figure 1-8
Remediation Areas
RVAAP-38 NACA Test Area
Former RVAAP/CJAG
Portage & Trumbull Counties, Ohio

Basemap Source: Leidos, 2016. Revised Draft Phase II Remedial Investigation Report and Feasibility Study for Soil, Sediment and Surface Water at RVAAP-38 NACA Test Area

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organization and responsibilities identified in this SAP are based on the generic functional roles necessary to implement the field activities for Remedial Completion of Multiple AOCs using VEG Thermal Desorption Technology and do not include specific names of organizations or individuals. Project-specific organization and responsibilities will be included in the respective RD or NTCRA WP for each AOC to identify individual responsibilities and any new roles that may be appropriate for a specific investigation.

The below organization chart outlines the generic management structure to be used when implementing remedial activities at the former RVAAP. The functional responsibilities of key personnel are described in the following sections. Specific assignment of personnel to each of these positions will be based on a combination of (1) experience in the type of work to be performed, (2) experience working with government personnel and procedures, (3) a demonstrated commitment to high quality, and (4) staff availability.



2.1 Contractor Program Manager

The Contractor Program Manager ensures the overall management and quality of all project activities performed at the former RVAAP under the general contract. This individual ensures that all project goals and objectives are met in a high-quality and timely manner. QA and nonconformance issues will be addressed by this individual, in coordination with the Contractor Project Manager, for corrective action.

2.2 Contract Project Manager

The Contractor Project Manager provides overall project management and has direct responsibility for implementing a specific project, including all phases of work plan development, field activities, data management, and report preparation. These activities involve coordinating all personnel working on the project, interfacing with U.S. Army project personnel, and tracking project budgets and schedules. The Contractor Project Manager develops, monitors, and fills project staffing needs; delegates specific responsibilities to project team members; and coordinates with administrative staff to maintain a coordinated and timely flow of all project activities. The Project Manager reports directly to the Program Manager.

2.3 Contractor Quality Assurance (QA) Manager

The Contractor QA Manager is responsible for the project quality assurance/quality control (QA/QC) in accordance with this SAP and the requirements of the QAPP (Attachment I), and appropriate management guidance. This individual participates in the project field activity readiness review; approves variances before work proceeds; approves, evaluates, and documents the disposition of Nonconformance Reports (NCRs); oversees and approves any required project training; and designs audit and surveillance plans followed by supervision of these activities. This individual will serve as the main point of contact with USACE, the ARNG, and the OHARNG regarding technical matters.

2.4 Field Task Leader

The Field Task Leader (FTL) implements all field activities in accordance with this SAP. This individual ensures technical performance of all field sampling activities; adheres to required sample custody and other related QA/QC field procedures; coordinates field subcontractor personnel activities; manages project investigation derived waste (IDW); performs QA checks of all field documentation; and prepares Field Change Orders, if required.

2.5 Site Safety and Health Officer

The Site Safety and Health Officer (SSHO), in additional to the Corporate Safety Officer, will ensure that health and safety procedures designed to protect personnel are maintained throughout all field activities conducted at the former RVAAP by adhering to the site-specific Accident Prevention Plan (APP) and the Facility-Wide Safety and Health Plan (FWSHP). This individual, has the authority to halt fieldwork if health and/or safety issues arise that are not immediately resolvable in accordance with this SAP and reports directly to the Contractor Program Manager but also informs the Contractor Project Manager of all information and decisions reported.

2.6 Data Validation Chemist

The Data Validation Chemist is responsible for validation of all data reported by the laboratory. The Data Validation Chemist confirms that all samples and QC samples were analyzed in accordance to this SAP and ensures that all analytical results for both field and QC samples were accurately reported by laboratory in the required format.

2.7 Laboratory Project Manager

Analytical laboratories will be subcontracted to perform off-site chemical analysis for all media sampled. The subcontract laboratory will be accredited in accordance with the United States Department of Defense (DoD) National Environmental Laboratory Accreditation Program (NELAP). The subcontracted laboratory's Project Manager is responsible for delivering analytical services, and laboratory QA/QC. The Laboratory Project Manager handles and documents samples received by the laboratory, ensures that all samples are analyzed in accordance with required and approved methodologies, ensures that instrument calibration is performed properly and documented, ensures that field and internal laboratory QC samples are analyzed and documented, and ensures that all analytical results for both field and QC samples are reported in the required format. The Laboratory Project Manager also ensures laboratory NCRs are processed in a timely manner and makes decisions regarding cost and schedule related to processing NCRs and implementing Corrective Action Report recommendations and/or requirements. This individual will work with Endpoint's Project Chemist and the Data Validation Chemist, and reports directly to the Contractor QA Manager.

3.0 DATA QUALITY OBJECTIVES

The data quality objective for the sampling covered by this SAP is to provide sufficient high-quality data to address the project objectives identified in Section 3.1 below.

3.1 Scope and Objectives of Sampling

The sampling covered by this SAP will be performed in support of thermal treatment of PAH-impacted soil from multiple AOCs, with treatment to occur at the NACA Test Area AOC (RVAAP-38). PAH-impacted soil from each AOC will be stockpiled, treated, and subjected to post-treatment sampling prior to transport back to each AOC in support of backfilling/reuse. Additional sampling will be performed in support of waste profiling and off-site transportation and disposal of metals-impacted soil not subjected to thermal treatment. Therefore, the problem to be addressed by the sampling covered under this SAP is twofold:

1) To confirm that soil impacted by COCs at each of the five AOCs are excavated to the extent necessary and adequately remediated onsite relative to FWCUGs/residential soil RSLs.

2) To confirm that metals-impacted soil/waste to be removed from the site are properly profiled in support of transport and disposal at the appropriate permitted facility.

To address the above, the sampling to be performed under this SAP has been discretized into the following categories:

Category 1: Confirmation soil sampling from excavation sidewalls and bottoms within the five AOCs, in order to confirm the required limits of soil excavation at each AOC. As previously indicated, the number and location of excavation pit confirmation samples for each AOC will be documented in the RD or NTCRA WPs pertaining to each site.

Category 2: Confirmation soil sampling from post-treatment soil stockpiles following onsite thermal treatment of impacted soil using the VEG Technology, confirming the treated soil may be used to backfill onsite excavations.

Category 3: Waste profile sampling and analysis for soil slated for excavation and disposal, performed in-situ, prior to commencing excavation activities ensuring adequate handling, transportation, and off-site disposal.

Category 4: Sampling of imported backfill soil to be used for remediation purposes, ensuring no impacted material is introduced to the site.

Section 3.6 herein summarizes the sampling design for each of the aforementioned categories.

3.2 Study Boundaries

The spatial boundaries of the Category 1 and Category 3 sampling covered by this SAP corresponds to the estimated footprint of soil warranting remediation at each AOC, as previously summarized in Section 1.3 and depicted on Figures 1-3 through 1-8. As discussed in more detail in Section 3.6 herein, stockpile sampling under Category 2 will consist of samples collected from 100-cubic yard soil stockpiles, thereby defining the spatial boundary for this category.

3.3 Decision Rules

Decision rules guide the soil sampling effort, helping define the level of characterization necessary for decision making. The primary decision rule governing the soil sampling to be performed under sample Categories 1 and 2 pertains to determination of the extent of COCs remaining in soil. This is achieved by comparing the soil analytical data from excavation pit sidewall and bottom samples (Category 1) and from post-treatment soil stockpiles samples (Category 2) to chemical-specific screening criteria.

The screening criteria to be used for decision-making relative to Category 1 and 2 samples correspond to the FWCUGs for metals developed in the Facility-Wide Human Health Cleanup Goals Report (USACE, 2010), and USEPA residential soil RSLs for PAHs. Table 1-1 summarizes the FWCUGs/RSLs for the COCs identified for the AOCs covered by this SAP.

Under Category 1, soil samples with COC concentrations at or below their respective FWCUGs/RSLs will support determination of adequate excavation in each excavation pit sidewall/bottom direction. Samples with COC concentrations exceeding their respective FWCUGs/RSLs will trigger the need for additional excavation and step-out confirmation sampling in the direction of the sample triggering exceedance, as outlined in the AOC-specific RD or NTCRA WP. Under Category 2, soil samples with COC concentrations at or below their respective RSLs will support decisions that treated soil stockpiles may be reused onsite without any restrictions. Samples with COC concentrations above the RSLs will trigger the need for further treatment of soil until such time that subsequent post-treatment soil samples are below the RSLs and the soil may be reused onsite without restrictions.

With select AOCs having distinct areas of metals-impacted soil, which will not be subject to onsite thermal treatment, the primary decision rule for samples to be collected under Category 3 pertains to the need for TCLP analyses in support of profiling soil/waste slated for disposal at the appropriate landfill ([non-hazardous Waste Management American Landfill] or [hazardous soil for metals US Ecology of Ohio or US Ecology Michigan Disposal Inc.]). TCLP results will be used to profile the soil/waste, and to identify the appropriate transporter (Defense Reutilization Marketing Office [DRMO]) if hazardous, and the appropriate permitted landfill; both the profile and the disposal facility will be approved by the Army prior to off-site transport and disposal of metals COCs. Additional analyses, such as ignitability, reactivity, and pH, may be performed based on disposal facility requirements.

Lastly, the primary decision rule for samples to be collected under Category 4 pertains to analyzing imported backfill soil (Patrick Excavating and Trucking in Ravenna, Ohio) for the previously defined RVAAP full-suite of chemicals. If analytical results for imported soil are at or below respective FWCUGs/residential RSLs and background soil characteristics, it is acceptable for use at the site.

3.4 Inputs to the Decision

Decision inputs for the proposed sampling pertains to the sample analytical results for each category of sampling covered by this SAP. Sampling under Category 1 will consist of soil samples collected from the sidewalls and bottom of the excavation pit, as described in Section 3.6, using the Incremental Sampling Methodology (ISM), as defined in the Interstate Technology & Regulatory Council (ITRC) "ITRC 2012 ISM-1 Guidance," updated January 22, 2020 (ITRC 2020). These samples will serve as the decision inputs to be compared with the aforementioned FWCUGs/RSLs established in decision documents. These ISM samples will confirm that the contaminated soil has been excavated and the limits of excavation have been defined and met.

Decision inputs under Category 2 sampling will consist of composite soil samples for each 100 cubic yards of treated soil to be collected from each post-treatment soil stockpile. The results from these samples will confirm that treated soil meets respective PAH residential RSLs and may be used to backfill open excavation pits within the AOCs. The rationale behind the number of soil sample specimen/aliquots for ISM and composite samples is discussed further in Section 3.5.1 herein.

Sampling under Category 3 will consist of one 8-point composite soil sample per 250 cubic yards collected in-situ within the anticipated excavation boundaries at each AOC. TCLP waste profile results will serve as decision inputs for Category 3 sampling, determining proper classification of the waste, and ensuring proper handling, transportation and disposal.

Sampling under Category 4 will consist of one discrete soil sample collected for each 4,000 cubic yards of imported soil or change in the source of the imported soil that will be used during the remedial action. Results from the imported soil analysis will reviewed by the Army, ARNG, and OHARNG to serve as decision inputs to use the imported soil as additional backfill for each AOC.

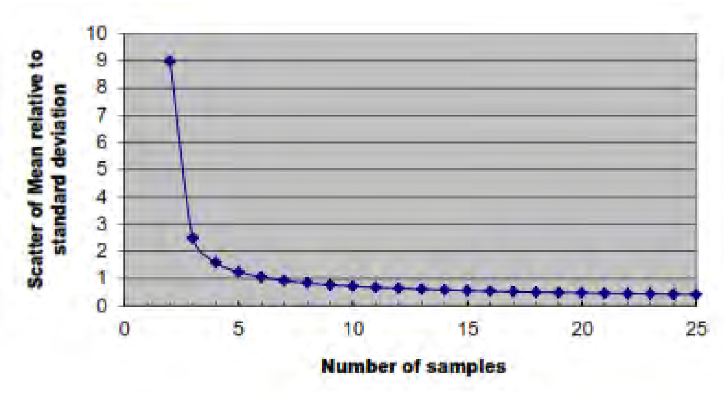
3.5 Specify Limits on Decision Errors

Remedial action decisions may eventually need to be made for individual AOCs based on the results of the data assessment and baseline risk assessment. Controlling the potential for making a wrong decision begins by identifying what types of errors may be introduced during sample collection and data assessment and attempting to limit those errors. The following sections provide a summary of errors, including sampling and measurement errors, that may contribute to decision error, and ways to minimize the potential for errors during sample collection and reporting.

3.5.1 Sampling Errors

Sampling locations and frequencies to be implemented per this SAP will be identified using the knowledge of the AOC and the lateral and vertical extent of chemical impacts as defined by past investigation efforts. The sampling plan attempts to avoid the potential of a false-positive error (i.e., avoid concluding that wastes do not pose a risk when they actually do). The sampling plans will be documented in the RDs or NTCRA WPs for each relevant AOC.

Consistent with excavation pit sampling practices and soil profiling implemented at other AOCs at the former RVAAP, confirmation sampling of the excavation pit sidewall and bottom will incorporate ISM sampling, with a minimum of 30 aliquots collected per ISM sample to provide the requisite statistical confidence (95%). Post-treatment stockpile confirmation samples will conservatively utilize 8-point composite sampling method for each 100 cubic yards stockpile of treated soil, geared toward minimizing sampling error. The following graph (Source: Ohio EPA, 2015) depicts the relationship between the number of sample specimens/aliquots and the corresponding mean of a composite test sample. In short, when the number of sample specimens exceeds seven or eight, the potential scatter of the sample mean reduces significantly. Hence, the proposed use of an 8-point composite is expected to yield an indicated value of the mean that will closely approximate the true value; the same sampling approach was used during pilot testing of the VEG Technology at the Atlas Scrap Yard site at former RVAAP (Endpoint, 2015).



3.5.2 Measurement Errors

Measurement errors in laboratory data will be minimized through proper planning, implementing applicable laboratory QC, and data verification and validation procedures. A primary focus of the review, verification, and validation process will be to avoid the potential for false-positive errors (i.e., avoiding the potential of finding no risk when a risk actually exists) and ensuring that precision, accuracy, sensitivity, and completeness of the analytical data are adequate for their intended use. Analyses of soil samples will be performed by the U.S. DoD NELAP-certified Test America Laboratories (Test America) in Savannah, Georgia. This laboratory has been used to analyze samples from multiple past applications of the VEG Technology on other USACE projects, and provides the added resources necessary to analyze samples on rushed (i.e., 24-hour) turnaround times, thereby allowing timely decision-making relative to the ability for soil to be reused or retreated.

Analytical project-reporting levels provided by Test America for each COC to be analyzed are presented in QAPP included herein as Attachment I, confirming that reporting limits remain well below chemical-specific FWCUGs. As discussed further in the QAPP, Level 4 analytical reports and data generated by Test America will be subject to initial review by Test America prior to the results being reported as definitive data. Independent verification of the analytical data will be performed by laboratory data consultants in accordance with the process outlined in the 2017 DoD Quality Systems Manual, version 5.1 (DoD, 2017), and Contract Laboratory Program National

Functional Guidelines for Organic Data Review (USEPA, 2017), focusing on the usability of the data to support the project data interpretation and decision-making process. The validation will meet S2bVEM as per Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (USEPA, 2009).

The greatest uncertainty in a measurement is often a result of the sampling process, the inherent variability of the matrix, or the environmental population. Verification will focus at a level necessary to minimize the potential of using false-positive or false-negative concentrations in the decision-making process (i.e., first priority will be to assure accurate identification of detected versus non-detected analytes). Validation is accomplished by comparing the contents of the data packages and the QA/QC results to the requirements contained in the analytical methods employed by the laboratory. In general, verification and validation support staff conduct a systematic review of data for compliance with the established QC criteria based on the following categories:

- Holding times
- Blanks
- Laboratory control samples
- Calibration
- Surrogate recovery (organic methods)
- Internal standards (primarily organic methods)
- Matrix spike/matrix spike duplicate (MS/MSD) and duplicate results
- Sample re-analysis
- Secondary dilutions
- Laboratory case narrative
- Serial dilutions
- Post digestion spikes

This review, together with USACE's own QC sampling (via collection of split samples as they see fit) provides the basis for an overall data quality assessment by the U.S. Army.

3.6 Sample Design

As previously indicated, there are four categories of soil sampling that will be conducted under this SAP, as summarized below:

> Category 1: Confirmation soil sampling from excavation pit sidewalls and bottoms within each AOC. The quantity and specific locations for excavation pit confirmation samples for each AOC will be documented in the RD or NTCRA WPs pertaining to each AOC. However, in general, excavation pit sidewall confirmation soil samples will correspond to ISM soil samples, comprised of a minimum of 30 aliquots, with each sample collected along one of the four sidewalls of the excavation area using the procedures outlined in Section 4.2.2.1 herein. Similarly, ISM soil samples will also be collected from defined boundaries across the bottom of the excavation pit. The proposed lateral and vertical distances for excavation step-out sampling will be based on the anticipated length and depth of each excavation area and the results of historical soil sampling collected beyond and in the near vicinity of the proposed excavation boundary. Similarly, the ISM sampling

boundaries across the bottom of the excavation pits within each AOC will account for site-specific data and the size of each planned excavation; these details will be outlined in the RD or NTCRA WPs pertaining to each AOC, with sampling procedures summarized herein in Section 4.2.2.

Soil samples under this category will be analyzed for the specific chemicals listed in Table 1-1 as AOC-specific COCs using USEPA Methods 8270D (for PAHs), 6010C (for arsenic and lead) and 7471B (for mercury). The QAPP provides additional details on analytical parameters and methods (see Attachment I). Container requirements, minimum sample sizes and sampling preservation requirements are provided in Table 5-1 of the QAPP.

<u>Category 2</u>: Confirmation soil sampling from stockpiles containing thermally treated soil will be conducted, confirming the treated soil meet respective FWCUGs/residential RSLs and may be used to backfill open excavation pits within the AOCs. As previously indicated, one 8-point composite sample will be collected for each 100-cubic yard (or smaller) treated soil stockpile. Equal aliquots from each of the eight locations will be placed in a disposable foil pan, homogenized per the procedures in SOP-3 and placed in an 8-ounce glass jar, serving as a composited sample (see Section 4.2.2 herein). The aliquots will be collected from the top center, middle center, bottom center, together with four perimeter locations corresponding to the four (north, south, east, and west) boundaries of a given stockpile.

Soil samples under this category will be analyzed for the AOC-specific COCs (PAHs) as listed in Table 1-1 using USEPA Method 8270D.

Category 3: Waste profile sampling of impacted soil will consist of one 8-point composite sample per every 250 cubic yards of metals impacted soil (in-situ) to be excavated in each AOC prior to beginning excavation activities. The samples will be collected within the anticipated excavation area at depths ranging between ground surface and the anticipated total depth of the excavation. Collecting waste profile samples prior to soil excavation will allow adequate time to receive sample results, ensuring waste disposal is not delayed and that impacted soil/waste are handled by the appropriate transporter (DRMO if hazardous) and disposed at the appropriate disposal facility.

Waste profile soil samples under this category will be subjected to TCLP analysis for metals, herbicides, pesticides, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), as well as total sulfide/cyanide, polychlorinated biphenyls (PCBs), flashpoint and pH. Analysis will be done using the methods provided in Table 3-1, plus any additional analyses as required by the disposal facility. The results of the waste profile analysis will be used to determine which of the facilities the soil will be disposed, based on the landfill permit requirements. Soil will be disposed at Waste Management American Landfill for non-hazardous and US Ecology of Ohio or US Ecology Michigan Disposal Inc for hazardous.

Category 4: Sampling of import soil sources will be performed to confirm imported materials are acceptable to be used at CJAG. Sampling of imported soil used as supplemental backfill will consist of one discrete sample for each 4,000 cubic yards of imported soil. An additional sample will be collected if the source of the imported soil changes throughout the duration of the project, such as soil provided from a different quarry. Soil samples will be analyzed for the RVAAP full-suite analysis.

An approved water supply with documented current analytical data will be used without additional analyses. Field personnel will transport and store the approved water required for investigation needs in a manner to avoid the chemical contamination or degradation of the approved water once obtained.

Table 3-1. Waste Profile Sampling Analytical Requirements

FORMER RVAAP SITE, PORTAGE AND TRUMBULL COUNTIES, OH

Parameters [1]	Analytical Methods
TCLP (Metals, Pesticides, Herbicides, SVOCs)	SW-846 7470/8081/8270/1311/6010
TCLP (VOCs)	SW-846 1311/8260
Total Cyanide	SW-846 9012/9034
Total Sulfide	SW-846 9012/9034
PCBs	SW-846 8082
pH	SW-846 9040, 9045
Flashpoint	SW-846 1010

[1] Additional parameters may be required by the waste disposal facility. The waste disposal facility has not been selected at the time of this design.
PCB = Polychlorinated biphenyl
SVOC = Semi-volatile organic compound
TCLP = Toxic characteristic leaching procedure
VOC = Volatile organic compound

4.0 PROJECT ACTIVITIES

This section summarizes project activities relative to implementation of the sampling referenced herein. Specific project activities relative to site preparation/implementation of excavation, treatment, and/or off-site transport of soil are covered in detail within the individual RDs or NTCRA WPs for each AOC.

Prior to initiation of sampling activities, a field kick-off meeting will be held between the Alaniz-Endpoint field personnel, USACE, ARNG, and/or OHARNG personnel as necessary in order to discuss project objectives and planned activities, relevant facility operations (past and present), individual's roles and responsibilities, regulatory requirements, and health and safety matters. This kick-off meeting will serve to confirm the project activities and related safety requirements.

4.1 Pre-Sampling Activities

Pre-sampling activities to be implemented prior to initiation of sampling include: limited site clearing of above-ground vegetation/debris within each AOC as needed in support of accessing excavation areas, staking and surveying of sampling locations, obtaining utility clearance from a private utility contractor, establishing work zones and a decontamination area, and procuring field equipment and supplies.

4.1.1 Limited Clearing of AOCs for Site Access

Above-ground (i.e., not in contact with contaminated soil) vegetation, such as trees and large bushes, and debris (e.g., large rocks, brick, concrete, metal debris, etc.) will be removed so personnel and equipment can safely access the designated excavation areas. Any required vegetation clearing involving trees with a 3-inch diameter at 2-feet above the ground surface will be removed between October 1st and March 31st. The vegetation will be chipped/mulched onsite and temporarily stockpiled at the AOC during remedial activities, after which it will be evenly spread across the AOC during site restoration. In the event that large debris or solid waste is discovered and requires disposal, 55-gallon drums or a roll-off bin will be utilized to temporarily store the waste prior to disposal.

4.1.2 Identify Utilities

Prior to initiating excavation activities, the Alaniz-Endpoint Team will notify the Camp James A. Garfield Joint Military Training Center (CJAG JMTC) Department of Public Works and Utilities to allow sufficient time for OHARNG concurrence of the absence of known utilities in the excavation areas. In addition, utility clearance will be performed by a private utility contractor to ensure no utilities exist within the footprint of the excavation areas. If necessary, sampling locations will be adjusted to avoid both overhead and underground structures and utilities.

4.1.3 Staking and Surveying of Sample Locations

Stakes will be placed at the approximate corners of the ISM shallow soil sampling areas in support of collection of excavation sidewall and bottom samples (extents of ISM areas are defined within individual RD or NTCRA WPs for each AOC). The corner locations will be surveyed via a hand-held Global Positioning System (GPS) unit per the procedures in Section 4.2.2.1 herein.

Composite stockpile soil sample locations will be noted via a detailed description on field forms, providing measured dimensions relative to the boundaries and ends of a given treated soil stockpile.

4.1.4 Establish Work Zones

Work zones for sampling will largely correspond to those to be established for soil excavation and VEG remediation activities described in AOC-specific RDs or NTCRA WPs, and within the site-specific APP. To summarize, the Alaniz-Endpoint Team will establish the work zone (exclusion zone) and delineate it via use of fencing, delineators, and/or yellow DO NOT ENTER caution tape. Based on the COCs and associated concentrations, a contamination reduction zone and a support zone will not be required. The SSHO will maintain the access logs for the work zones.

Services such as water and sanitary, which will be provided by Alaniz for remediation activities (see RDs and/or NTCRA WPs for each AOC) will be used for periods of sampling. Cellular telephones will be used for communications and emergency notifications.

4.1.5 Temporary Decontamination Area

A temporary decontamination area will be constructed at each AOC to facilitate decontamination of equipment. Anticipated decontamination areas will be specified on the design drawings for each AOC provided within each respective RD or NTCRA WP. Disposable sampling equipment, including sterile plastic spoons and foil pans will be used to collect discrete soil samples and ISM/composite soil sample aliquots will be collected with a step-probe sampler; therefore, minimal decontamination of sampling equipment will be required. The step-probe sampler will be decontaminated after all aliquots have been collected for ISM/composite samples.

4.2 Sampling Activities

The following sections summarize field methods and procedures applicable to each of the four categories of sampling covered by this SAP. Guidelines for sample types and frequencies are provided in Table 2-1 of the QAPP (Attachment I).

4.2.1 Sample Numbering System

Specific sampling nomenclature to be used for excavation pit sidewall and bottom confirmation sampling (i.e., Category 1 samples) is outlined in the RDs or NTCRA WPs associated with each AOC. However, to the extent practicable and in general, a unique sample numbering scheme will be used to identify each sample designated for laboratory analysis. The purpose of this numbering scheme is to provide a tracking system for the retrieval of analytical and field data for each sample. Sample identification numbers will be used on all sample labels or tags, field forms, chain-of-custody records, and all other applicable documentation used during the project. A listing of all sample identification numbers will be maintained in the field forms and Daily QC reports.

The sample numbering scheme used for field samples also will be used for duplicate samples so that the sample type will not be discernible by the laboratory. However, other types of field QC samples (e.g., trip blank) will be named so that they can be readily identified from other sample types. For each AOC, numbering will begin with sample number that follow the last number in the sequence from the previous phase of work at that AOC, as documented in previous investigation documents. If a sample is not collected or is re-assigned to a different location, a specific reason and notation will be noted on field forms and in the Daily QC reports submitted to the Army.

Sampling nomenclature formats for each Category of sampling covered in the SAP are shown below:

<u>Category 1: Excavation Pit Sidewall and Bottom Confirmation Soil Samples</u>

XXXmm - NNN(n) - ####tt

where,

XXX =	AOC designator
mm =	Sample location type (e.g., cs = confirmation sample)
NNN =	Unique, sequential number (e.g., 001-999)
(n) =	Special identifier (e.g., M = Incremental Sampling Method Sample)
#### =	Sequential Sample Identification Number (e.g., unique, sequential number verified with REIMS database administrator [e.g., 0001-9999])
tt =	Sample Type (e.g., SO = Soil Sample or FD = Field Duplicate)

<u>Category 2: Treated Soil Stockpile Confirmation Soil Samples</u>

SSP# - PT(n)

where,

SSP# =	Soil stockpile number, with each stockpile having been linked to a given AOC
PT =	Post-treatment sample
(n) =	Treatment round (typically will be limited to one treatment round, but allows for designation of samples from stockpiles that may require more than one round of treatment).

Category 3: In-Situ Soil Profile Samples

SP# - PRO(n)

where,

SP# =	Soil profile number, with each profile having been linked to a given AOC
PRO =	Profile sample
(n) =	Special identifier (e.g., C = Composite Sample)

Category 4: Imported Soil and Water Sources

XXX – mm##

where,

XXX =	AOC designator
mm =	Sample location type (e.g., SS = soil source sample, WP = water source sample)
## =	Sequential Sample Identification Number

4.2.2 Soil Sample Collection Procedures

Generic sample collection procedures, as referenced in this Section, are provided in detail within the SOPs of Attachment II. A summary of sampling SOPs is provided in the following sections, as necessary, in addition to identifying any deviations in the sample collection process, such as the use of disposable sampling equipment.

4.2.2.1 Excavation Pit Confirmation ISM Soil Sample Collection

The excavation depths at four of the five AOCs covered by this SAP are expected to be limited to approximately 1-foot bgs. At those locations, excavation sidewall and bottom samples will be collected using the ISM method as described in the sampling SOPs provided herein at Attachment II, and placed in a labeled zip lock bag for shipment to the laboratory. Samples will be collected in a manner that minimizes volatilization during the sample collection process.

Each ISM sample will consist of no less than 30 aliquot samples, providing a 95% statistical confidence level that the analytical result represents a mean concentration for that area. The corners (or boundaries) of each designated ISM sample area will be located using a digital GPS system and marked using wooden stakes or pin flags.

All excavation pit confirmation ISM samples will include equal sample volume aliquots collected randomly using a step probe sampler, yielding a total soil weight of 900 to 2,500 grams per sample to ensure an adequate amount of soil is available for the analyses proposed herein, and further withstanding the possibility of debris/rocks potentially present within the sample. The step probe will be advanced into the soil to the required depth designated for the sampling location. Sample locations will be selected per SOP-1.

Sample aliquots collected from each ISM sample area will be placed in a container (i.e., zip lock bag) for transport to the approved offsite laboratory. Processing of the ISM samples will take place at the laboratory, where each ISM sample will be dried, sieved, and finely ground by the off-site laboratory and then analyzed for the specified constituents previously referenced herein.

At the AOCs where excavations may extend to 13 feet bgs (RVAAP-34), sidewall soil and bottom samples will be accessed through the use of excavation equipment (i.e., excavator buckets) bringing soil from depth to the ground surface or via bucket hand augers following the procedures in SOP-2 of Attachment II. Individual core samples will be brought to the surface from random depths across the entire vertical interval of the excavation sidewall. ISM soil samples will be collected from the bucket using the step probe per the procedures in SOP-1 (Attachment II) and transferred to a zip lock bag. Processing of these samples will be performed at the laboratory, where each ISM sample will be dried, sieved, finely ground, and analyzed by the laboratory. As previously indicated, the number/frequency and location of excavation pit confirmation samples will be defined in the AOC-specific RDs and NTCRA WPs.

A summary of proposed sampling and analysis for each of the AOCs is presented on Table 4-1.

4.2.2.2 Treated Soil Stockpile Composite Sample Collection

Collection of 8-point composite samples from 100-cubic yard or smaller thermally treated soil stockpiles will involve the stainless-steel trowel/spoon method (SOP-3 of Attachment II); however, disposable plastic spoons or a step probe will be used instead of stainless-steel trowels/spoons. Each stockpile composite soil sample will correspond to an 8-point composite sample, typically processed by the laboratory. Standard composite sample processing procedures are as follows: An equal quantity of each of the 8 aliquots (approximately 1 ounce each) will be placed into a decontaminated disposable foil pan. The total quantity of the discrete samples selected for compositing will be sufficient to perform all required laboratory analyses. The soil placed into the foil pan will initially be split into quarters, and each quarter will be mixed thoroughly in the center of the foil pan using a disposable plastic spoon. All four quarters will be mixed together until the single composite sample has a consistent physical appearance. Upon completion of the compositing process, the sample will be divided in half and containers filled by scooping sample material alternately from each half.

4.2.2.3 In-situ Waste Profile Soil Sample Collection

Collection of waste profile soil samples will involve one 8-point composite profile soil sample collected per the procedures presented in Section 4.2.2.1 herein. In summary, composite samples will entail a minimum of 8 points sampled at a random basis over the ground surface of the decision. Any point on the ground surface within the boundary of the ISM area is a possible sample location. Equal sized samples will be collected using a step probe and combined in foil pans prior to being transferred a zip lock bag. If the ground surface is too hard to use a step probe for sample collection, a hand auger will be used for sample collection, decontaminated after all 8 samples are collected. The total weight of each composite sample will be approximately 60 ounces to ensure an adequate volume of sample is provided to the laboratory for the analyses to be performed, and to account for the possibility of debris/rocks captured within the sample.

4.2.2.4 Field QC Sampling Procedures

In concert with the procedures outlined in SOP-4 (Attachment II), collection of QC samples, including duplicate and MS/MSD samples, will be performed in association with the primary excavation pit, stockpile sample collection, or waste profile soil sample collection referenced above; this information is further summarized in Section 4.2 and Table 2-1 of the QAPP.

To summarize, duplicate and MS/MSD samples will be collected during the removal actions using the same ISM and/or composited material as the primary sample, and using procedures defined for field samples in SOP-1 through SOP-3 (Attachment II). Following guidelines in SOP-4 of Attachment II herein, the number of duplicate samples for each of the four sample categories will correspond to 10% of the total number of each sample type collected at each AOC or excavation area, while the number of MS/MSD samples will correspond to 5% of the total number of samples for each sample type/category.

As indicated in Section 4.1.5 herein and in more detail within the RDs or NTCA WPs for the AOCs, disposable field sampling equipment will be used to the extent practicable, such that decontamination of sampling equipment (and associated rinsate sampling) is minimal, as shown on Table 2-1 of the QAPP and discussed in Section 7.0 herein.

Method blanks and laboratory control samples will be initiated by Test America per their standard QC process. Trip blank samples will not be initiated in the absence of VOCs as COCs.

4.2.2.5 Chemical Analysis of Samples

As previously indicated, soil COCs present at above FWCUGs or residential RSLs across the five AOCs covered by this SAP include the select PAHs and metals listed in Table 1-1. Additional information related to chemical analyses is provided in the QAPP, included as Attachment I herein.

Table 4-1. Proposed Sampling and Analysis for Each AOC
FORMER RVAAP SITE, PORTAGE AND TRUMBULL COUNTIES, OH

Site	Sampling					
	Category 1 Excavation[1]	Category 2 Post-Treatment Soil[1]	Category 3 Metal-Impacted Soil (Waste Profile)	Category 4 Soil Source Samples	QA/QC[2]	MS/MSD
RVAAP-42 Load Line 9	ISM (Sidewall & Bottom) Pb & Hg and PAHs	8-point composite (1 per 100 yd^3) for PAHs	1 In-situ 8-point composite per every 250 cubic yards for TCLP SVOC, Pesticides, Herbicides, PCBs, Metals, Total Cyanide and Sulfide, Flashpoint, pH 1 In-situ Discrete for TCLP VOCs	1 discrete per 4000 yd^3 for VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals	Duplicates of 10% of Samples in Categories 1 and 2 for each Excavation	5% of Samples in Categories 1 and 2
CC RVAAP-76 Depot Area	ISM (Sidewall & Bottom) for PAHs	0	1 In-situ 8-point composite per every 250 cubic yards per Building for TCLP SVOC, Pesticides, Herbicides, PCBs, Metals, Total Cyanide and Sulfide, Flashpoint, pH 1 In-situ Discrete per Building for TCLP VOCs	1 discrete per 4000 yd^3 for VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals	Duplicates of 10% of Samples in Categories 1 and 2	5% of Samples in Categories 1 and 2
RVAAP-34 Sand Creek Disposal Road Landfill	ISM (Sidewall & Bottom) for PAHs and As	8-point composite (1 per 100 yd^3) for PAHs	1 In-situ 8-point composite per every 250 cubic yards for TCLP SVOC, Pesticides, Herbicides, PCBs, Metals, Total Cyanide and Sulfide, Flashpoint, pH 1 In-situ Discrete for TCLP VOCs	1 discrete per 4000 yd^3 for VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals	Duplicates of 10% of Samples in Categories 1 and 2 for each Excavation	5% of Samples in Categories 1 and 2
RVAAP-38 NACA Test Area	ISM (Sidewall & Bottom) Pb and PAHs	8-point composite (1 per 100 yd^3) for PAHs	0	1 discrete per 4000 yd^3 for VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals	Duplicates of10% of Samples in Categories 1 and 2 for each Excavation	5% of Samples in Categories 1 and 2
RVAAP-45 Wet Storage Area	ISM (Sidewall & Bottom) for PAHs	8-point composite (1 per 100 yd^3) for PAHs	0	1 discrete per 4000 yd^3 for VOCs, SVOCs, Pesticides, Herbicides, PCBs, Metals	Duplicates of 10% of Samples in Categories 1 and 2	5% of Samples in Categories 1 and 2

[1] Specific sample quantities and locations provided in the RD/NTCRA for each AOC.
[2] For excavation confirmation samples collected using ISM, the first three ISM samples at the first excavation performed under this SAP will be collected in triplicate and analyzed for SVOCs and Metals. The triplicates will be and analyzed along with laboratory subsample triplicates. The results of the initial ISM field triplicate samples and associated laboratory subsample triplicates will be submitted to Ohio EPA for a 48-hour review of the DQOs outlined in the QAPP. Following review of the field and laboratory triplicate data for the first three confirmation samples, additional field triplicates will be taken at 10% of the project ISM sample locations. Laboratory triplicates will be taken at the same frequency as field triplicates, but not necessarily at the same sample location.

5.0 SAMPLE CHAIN OF CUSTODY/DOCUMENTAION

Guidelines relevant to the sampling covered by this SAP will be followed for project documentation, chain of custody, and related QA/QC sampling requirements. These guidelines are summarized below.

5.1 Field Forms

Field forms documenting the four categories of sampling discussed herein will serve as the primary form of documentation to be performed under this SAP. The field forms will be bound in a three-ring binder or equivalent and remain in the possession of field personnel responsible for sampling, or in a secure place when not being used during fieldwork. Field forms will be submitted daily, as applicable, in the form of attachments to the daily QC report. Sample field forms to be used in support of the sampling covered by this SAP is included as Attachment III.

5.2 Photographs

Use of photographs in support of the excavation sidewall and bottom, and stockpile confirmation sampling covered by this SAP will be periodically used for summarizing field activities on daily QC forms. For each photograph, the date, name of the AOC, a brief description and the general direction faced will be noted.

5.3 Sample Documentation

With sample numbering following the approach summarized in Section 4.2.1 herein, sample documentation will follow the procedures summarized in SOP-5 of Attachment II, which also includes procedures for sample labels and chain of custody forms. A sample chain of custody form from Test America is included in Attachment III herein.

5.4 Daily and Monthly Reports

As outlined in the RDs or NTCRA WPs for the five AOCs and in Section 9.0 herein, daily QC reports will be prepared, summarizing all remediation activities, including sampling efforts. Daily QC reports will include copies of chains of custody and a summary of sampling performed at each AOC. Once available, sample results supporting decision making relative to confirming the extent of excavation, suitability of reuse of soil, and profiling of soil stockpiles will also be presented in the QC reports.

A daily QC report template is included in Attachment III herein. Daily reports may be combined to form monthly reports for submittal to the Ohio EPA, by the Army, as required in SOP-5 (Attachment II).

6.0 SAMPLING PREPARTION, PACKAGING AND SHIPPING

Packaging and shipment of samples will directly follow the procedures outlined in SOP-6 of Attachment II.

7.0 INVESTIGATION-DERIVED WASTE

IDW includes all materials generated during remedial activities that cannot be effectively reused, recycled, or decontaminated in the field. IDW consists of materials that could potentially pose a risk to human health and the environment (e.g., sampling and decontamination wastes) as well as materials that have little potential to pose risk to human health and the environment (e.g., sanitary solid wastes). Two types of IDW are generated during the implementation of environmental field activities: indigenous and non-indigenous. All IDW, personal protective equipment (PPE), disposable sampling equipment, and decontamination fluids will be segregated, handled, labeled, characterized, managed, and disposed in accordance with the federal, state, and local laws and regulations, and in accordance with procedures in SOP-7 of Attachment II. In the absence of drilling activities and given that the VEG Technology will be used to treat all PAH-impacted soil (with the exception of PAH-impacted soil from CC RVAAP-76), indigenous soil IDW will only be generated from AOCs containing metals-impacted soil (and soil from CC RVAAP-76) slated for disposal. Impacted-soil slated for disposal will be excavated and loaded directly into plastic-lined hauling trucks and will be transported and disposed at the appropriate off-site disposal facility based on the results of in-situ profile samples collected prior to excavation.

All non-indigenous solid IDW (e.g., expendable sampling equipment, PPE, and trash) will be segregated, containerized, and managed per the specific requirements set forth in SOP-7 (Attachment II). An IDW field staging area will be designated at each AOC to temporarily store any solid or liquid IDW, with IDW transported and temporarily stored at Building 1036 (non-hazardous) and Building 1047 (hazardous) upon completion of remedial work at each AOC, but prior to project completion. Off-site disposal of IDW will ensure that all treatment, storage, and disposal facilities are in good standing with environmental regulatory agencies. Off-site nonhazardous and hazardous disposal facilities will be approved for use by the Army, as referenced in the CJAG Waste Management Guidelines. DRMO (or Defense Logistics Agency [DLA] Disposition Services) approved facilities and transporters will be used for all hazardous waste.

As previously indicated, minor volumes of liquid IDW consisting of decontamination water from excavation equipment will be generated from the planned remediation efforts. Most of the liquid derived from decontamination of excavation equipment used on PAH-impacted soil will be recycled within the VEG Technology’s vapor generator, where such liquids are instantaneously oxidized (destroying any chemicals dissolved in the water), and thereby transformed into a clean, hot steam subsequently used for thermal treatment of soil within the VEG Technology’s treatment process. Metals-impacted liquid IDW will be minimal in volume (< 30 gallons) and disposable within the same truck load which will transport the metals-impacted soil off-site. The liquid IDW will not change the chemical profile of the soil and the Alaniz-Endpoint Team will ensure no liquids escape the truck bed. If the volume of liquid IDW proves to be greater than what is manageable for disposal/transport within the truck bed, the water will be drummed, profiled via prior in-situ sampling at each AOC, and disposed of off-site under a waste manifest, in accordance with methods described in SOP-7. A more detailed description of this process will be provided within the RDs and NTCRA WPs for the various AOCs.

8.0 CONTRACTOR CHEMICAL QUALITY CONTROL

The Contractor chemical quality control (CCQC) program to be utilized for the remedial activities outlined by this SAP will consist of three phases (preparatory, initial, and follow-up), all of which will be performed by contractors whether or not an U.S. Army representative is present. The Alaniz-Endpoint Team Project Manager will serve as the CCQC representative responsible for implementing and documenting the CCQC program in strict accordance to the procedures herein.

The preparatory phase of the CCQC program will be conducted by the CCQC representative before beginning each definable feature of work. A summary of all activities performed during each preparatory phase meeting will be documented by the CCQC representative in a meeting minutes record. Each preparatory phase meeting will address the following:

- Review of all pertinent sections of this SAP to ensure that all field personnel are cognizant of the overall project DQOs, specific project activities to be accomplished, and specific sampling and analysis requirements.

- Actual calibration of all instruments to be used for measurement of field parameters using certified calibration standards and gases.

- Physical examination of all materials and equipment required to accomplish the specific project activities.

- Demonstration of equipment decontamination procedures, if applicable, in accordance with this SAP.

- Demonstration of how each sample type is to be collected, containerized, documented, and packaged.

- Demonstration of proper IDW management and documentation.

- Demonstration of the procedure for completing all required information to be recorded on sample custody forms and discussion of the project sample numbering system. Completed examples of a Chain-of-Custody form, sample container label, and IDW drum label will be provided to the field personnel for reference.

- Demonstration/discussion of any other activities to be performed as deemed necessary by the CCQC representative.

- Examination of the work area(s) to ascertain if all preliminary work is complete. In addition to the activities noted above, the CCQC representative will ensure that the USACE QA laboratory has been contacted to schedule receipt and analysis of the U.S. Army QA samples. This will be accomplished by review of the telephone log used to document the laboratory contact.

The initial phase of the CCQC program will be conducted by the CCQC representative and will include the following:

- Oversight of excavation and/or sampling activities and review of this work to ensure compliance with delivery order requirements.
- Inspection of individual sample labels and COC forms for accuracy, completeness, and consistency.
- Inspection of sample packaging and shipping activities.
- Observation, verification, and documentation of initial and ongoing field instrument calibration.
- Inspection of field data sheets and other field records/sketches to ensure that all pertinent data are recorded in accordance with delivery order requirements.
- Inspection of the QA sample match-up table to ensure that all samples collected during each day are documented properly.

The follow-up phase of the CCQC program will be conducted by the CCQC representative and will involve performing the various activities noted for the initial phase on a daily basis until completion of the particular definable feature of work.

9.0 DELIVERABLES

During the remedial activities performed at each AOC, daily QC reports are prepared, signed, and dated by the CCQC representative. These reports are submitted to the U.S. Army Project Manager on a weekly basis, at a minimum. The contents of each daily QC report includes: a summary of activities performed at the AOC, 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 SAP, 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 daily QC report submittal, as appropriate:

- A copy of any chain-of-custody forms sent to the laboratory.
- A summary of field-generated analytical results.
- Any other project-related forms utilized.
- A copy of the CCQC preparatory phase meeting minutes (unless bound in a logbook).

A sample daily QC report form is included herein in Attachment III.

10.0 FIELD VARIANCES AND CORRECTIVE ACTIONS

Per SOP-8 of this SAP (Attachment II), variances from the procedures outlined in this SAP will be documented on a field change request (FCR) forms included in Attachment III. Any proposed changes necessary to meet the objectives of the sampling outlined herein will constitute an FCR and will be accordingly communicated to USACE, ARNG, OHARNG, and the Ohio EPA for approval. Corrective measures relative to sample collection and laboratory analyses will follow the related procedures outlined SOP-8 of Attachment II.

11.0 PROJECT SCHEDULE

Schedules for implementation of remediation activities, including the sampling efforts referenced herein, will be governed by the schedule of remediation activities to be conducted concurrently at all 5 AOCs; the coordinated project schedule will accordingly be provided for all AOCs under separate cover.

12.0 REFERENCES

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Attachment I
Quality Assurance Project Plan

Final
Quality Assurance Project Plan Addendum
Remediation Completion of Multiple Areas of Concern Using the Vapor Energy Generator Thermal Desorption Technology

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

March 2021

Prepared for

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LIST OF ABBREVIATIONS AND ACRONYMS

ADR	Automated Data Review
AOC	Areas of Concern
CL	Control Limit
COC	Chemical of Concern
DoD	Department of Defense
EDD	Electronic Data Deliverable
FTL	Field Technical Lead
FWCUGs	Facility-Wide Cleanup Goals
FWQAPP	Facility-Wide Quality Assurance Project Plan
FWSAP	Facility-Wide Sampling and Analysis Plan
LCG	Louisville Chemistry Guidance
LDC	Laboratory Data Consultants
LQM	Laboratory Quality Manual
MDL	Method Detection Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NELAP	National Environmental Laboratory Accreditation Program
NTCRA	Non-Time-Critical Removal Action
OHIO EPA	Ohio Environnemental Protection Agency
PAH	Polycyclic Aromatic Hydrocarbon
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QSM	Quality Systems Manual
RD	Remedial Design
RL	Reporting Limit
RVAAP	Ravenna Army Ammunition Plant
SAP	Sampling Analysis Plan
SOP	Standard Operating Procedures
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VEG	Vapor Energy Generator
WP	Work Plan

1.0 INTRODUCTION

As an appendix to the Sampling Analysis Plan (SAP) for remediation completion of multiple Areas of Concern (AOCs) using the Vapor Energy Generator (VEG) Thermal Desorption Technology (VEG Technology), this Quality Assurance Project Plan (QAPP) addresses supplemental project-specific information in relation to the sampling to be performed as part of soil remediation at the former Ravenna Army Ammunition Plant (RVAAP), now known as Camp James A. Garfield Joint Military Training Center (CJAG), located in Portage and Trumbull Counties, Ohio. As with the SAP, this QAPP covers the following 5 AOCs:

- RVAAP-42 Load Line 9
- RVAAP-76 Depot Area
- RVAAP-34 Sand Creek Disposal Road Landfill
- RVAAP-38 NACA Test Area
- RVAAP-45 Wet Storage Area

Each QAPP section is presented herein, adhering to the FWQAPP and referencing sections within the SAP for project-specific addendum requirements.

2.0 PROJECT DESCRIPTION

The project description and facility history are documented in Sections 1.1 and 1.2 of the SAP, including the focus of the SAP and QAPP on the four categories of sampling as follows:

> Category 1: Confirmation soil sampling from excavation sidewalls and bottoms within the five AOCs, in order to confirm the required limits of soil excavation at each AOC;
>
> Category 2: Confirmation soil sampling from post-treatment soil stockpiles following onsite thermal treatment of impacted soils using the VEG Technology, confirming the treated soils may be used to backfill onsite excavations;
>
> Category 3: Waste profile sampling and analysis for soil slated for excavation and disposal, performed in-situ, prior to commencing excavation activities ensuring adequate handling, transportation and off-site disposal; and
>
> Category 4: Sampling of imported backfill soils to be used for remediation purposes, ensuring no impacted material is introduced to the site.

2.1 Past Data Collection Activity/Status

This information is contained in Section 1.2 and Section 1.3 of the SAP.

2.2 Project Objectives and Scope

This information is contained in Section 3.1 of the SAP.

2.3 Sample Design and Rationale

This information is contained in Section 3.6 of the SAP.

2.4 Parameters to be Tested and Frequency

Field sampling methods and procedures for each of the four categories of sampling under this QAPP are discussed in Section 4.2 of the SAP. Sample matrix types/categories, analytical parameters, and analytical methods applicable under this QAPP are discussed in Section 4.2 of the SAP. As indicated in the SAP, the details of sample frequency and locations for the Category 1 soil samples representing excavation pit sidewall and bottom confirmation samples will be provided in AOC-specific remedial design (RD) and Non-Time-Critical Removal Action (NTCRA) Workplans (WPs). Moreover, since the extent and volume of soil excavations at each AOC as described in Section 1.3 of the SAP are characterized by uncertainty, there is a corresponding uncertainty in the volume of soils to be thermally treated or disposed off-site; this uncertainty limits the ability to accurately estimate the final number of post treatment soil stockpile samples under sample Category 2. Hence, Table 2-1 of this QAPP provides the guidelines to be implemented for determining the number of samples that will be collected for each sample category following initiation of field sampling efforts (and subsequent determination of the volumes of soils to be excavated, treated/reused, and profiled for off-site disposal). Included in Table 2-1 are the guidelines to be used for anticipated sample numbers, quality assurance (QA) sample frequencies, field quality control (QC) sample frequencies, and the 10% United States Army Corps of Engineers (USACE) QA Split sample frequencies.

2.5 Project Schedule

The project schedule relative to sampling included herein and in the SAP will be governed by the schedule of remediation activities to be conducted concurrently at all 5 AOCs; the coordinated project schedule will accordingly be provided for all AOCs under separate cover.

Table 2-1. Guidelines for Sample Types and Frequencies
Former RVAAP Site, Portage and Trumbull Counties, OH

Sample Category/Type	USEPA Analytical Method	Field Samples			Field Duplicate Samples	MS/MSD Samples	Temperature Blank Samples	Equipment Rinsate Samples	Trip Blank Samples	QA Duplicate/ Split Samples	QA Trip Blank Samples
		Composite	ISM	Discrete							
Category 1: Excavation sidewall and bottom samples	8270D, 6010C, 7471B	0	TBD (see RD/NTCRA WP)	0	10% of Field Samples	5% of Field Samples	1 per cooler	NA	NA	10% of Field Samples	NA
Category 2: Post-treatment soil stockpile sample	8270D, 7471B	One 8-point composite sample for every 100-cubic yard stockpile	0	0	10% of Field Samples	5% of Field Samples	1 per cooler	NA	NA	10% of Field Samples	NA
Category 3: Waste profile samples for soil disposed off-site	6010C, 7471B, 1311*	One 8-point composite sample for every 250-cubic yards (in-situ)	0	0	0	5% of Field Samples	1 per cooler	NA	NA	10% of Field Samples	NA
Category 4: Soil Source Samples	RVAAP Full Suite Analysis	0	0	One discrete soil sample for each 4,000 cubic yards	0	0	1 per cooler	NA	NA	NA	NA

ISM: Incremental Sampling Methodology
NA: Not Applicable
TBD = Sample number and frequency specified in AOC-specific RDs/NTCRA WPs based on excavation dimensions.
* Analysis using USEPA Method 1311 for TCLP will be performed on all waste profile samples.
Water will be obtained from a previously approved source.
Decontamination (i.e, rinsate water) will be thermally oxidized and recycled as clean steam to treat impacted soils via the VEG Technology; hence, decon water will not be sampled.
Trip blanks are excluded due to the absence of volatile organic compounds as chemicals of concern.
Laboratory Control Samples and Method Blanks will be performed/analyzed by Test America at frequency of one sample per analytical batch.
Endpoint confirmed with the landfill receiving the waste that waste profile sample frequency meets the landfill's permit requirements.

3.0 PROJECT ORGANIZATION AND REPONSIBILITY

Section 2.0 of the SAP includes the functional project organization and responsibilities for implementation of the sampling activities covered by the SAP. The selected analytical laboratory:

Test America, Inc. (Test America)
5102 LaRoche Avenue
Savannah, GA 31404
Telephone: 912-354-7858

Test America in Savannah, GA is accredited in accordance with the Department of Defense (DoD) and the National Environmental Laboratory Accreditation Program (NELAP), and the laboratory project manager assigned to this project, Ms. Michelle Kersey, has worked extensively on past USACE projects, including those involving the use of the VEG Technology for thermal treatment of soil. Relevant QA manual, laboratory qualification statements, certifications, and license documentation will be provided to USACE, upon request of the Ohio Environmental Protection Agency (Ohio EPA) and Untied States Environmental Protection Agency (USEPA) organizations. In addition, the Savannah, GA location of Test America is one of the few available laboratories that has the necessary resources to perform 24- and 48-hour turnaround time (TAT) on samples, allowing for prompt decision-making relative to the need for additional thermal treatment, ability for reuse of soils, and/or profiling of soils for off-site disposal.

4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

4.1 Data Quality Objectives

Data quality objectives (DQOs) for the proposed sampling are discussed in detail in Section 3.0 of the SAP. Supplementing that information, Table 4-1 herein summarizes the analytical DQO for the lab analyses to be conducted for the 5 AOCs covered by the SAP, with analyses performed in accordance to the DoD Quality Systems Manual (QSM), version 5.1 (DoD, 2017) and the USACE, Louisville District's QSM Supplement (USACE, 2007).

4.2 Level of Quality Control Effort

To assess whether QA objectives have been achieved, analyses of specific field and laboratory QC samples are required. Applicable field QC measurements will include field duplicates to determine sample heterogeneity and sampling methodology reproducibility. Laboratory QC measurements will include method blanks, laboratory control samples (LCS), laboratory duplicates, and matrix spike/matrix spike duplicate (MS/MSD) samples, as dictated by the individual methods and will be analyzed to assess the quality of the data resulting from the sampling program.

Laboratory method blanks and LCSs are employed to determine the accuracy and precision of the analytical method implemented by the laboratory. LCS measurements consist of the standard mid-level analyte concentration plus a method reporting level (MRL) low-level concentration. The laboratory will routinely perform and monitor the QC/MRL; however, corrective action will not be required for individual analyte variances. The QC/MRL will be analyzed at the beginning of the analytical sequences as required by the QSM (DoD, 2017). Additionally, the laboratory will analyze the QC/MRL sample at the close of the analytical sequence.

Matrix spike samples provide information about the effect of the sample matrix on the measurement methodology. Laboratory sample duplicates and matrix spike duplicates assist in determining the analytical reproducibility and precision of the analysis for the samples of interest.

The general level of the QC effort will include collecting one duplicate samples for every 10 samples (i.e., representing 10% of the total number of samples). As previously discussed, the anticipated number of duplicate samples is dependent upon the total volume of soil to be excavated/treated from each AOC or excavation area, which has a level of uncertainty due to the possibility of remediating additional soil based on the results of confirmation sampling of the excavation pit sidewalls and bottoms.

Matrix spike/matrix spike duplicate samples must be investigative samples. Soil matrix spike/matrix spike duplicate samples require no extra volume for VOCs or extractable organics. One matrix spike/matrix spike duplicate sample will be designated in the field and collected for at least every 20 samples (i.e., representing 5% of the total number of samples).

The QC effort for in-field measurements, including conductivity, pH, organic vapors, dissolved oxygen, will include daily calibration of the instrument using traceable standards and documented instrument manufacturer procedures.

4.3 Accuracy, Precision, and Sensitivity of Analysis

The fundamental QA objectives for accuracy, precision, and sensitivity of laboratory analytical data are the QC acceptance criteria of the analytical protocols. The accuracy and precision required for the specified analytical parameters are incorporated in Tables 4-1 and 4-2 of this QAPP. As indicated in Table 4-2, the reporting limits for the chemicals of concern (COCs) are well below the facility-wide cleanup goals (FWCUGs) and applicable updated residential soil regional screening levels (RSLs) for polycyclic aromatic hydrocarbons (PAHs).

Analytical accuracy is expressed as the percent recovery of an analyte that has been added to a blank sample or environmental sample at a known concentration before analysis. Accuracy will be determined in the laboratory with matrix spike, LCS, and/or blank spike analyses. The percent recoveries for specific target analytes will be calculated and used as an indication of the accuracy of the analyses performed.

Precision will be determined with spike analyses conducted on duplicate pairs of environmental samples (matrix spike/matrix spike duplicate) or comparison of positive duplicate pair responses. The relative percent difference (RPD) between the two results will be calculated and used as an indication of the precision of the analyses performed.

Sample collection precision will be assessed through the analyses of field duplicates. Precision will be reported as the relative standard deviation (RSD) from the mean of measurements.

4.4 Completeness, Representativeness, and Comparability

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under ideal conditions. The contracted laboratories will provide data meeting QC acceptance criteria for all samples tested. Overall project completeness goals are identified in Tables 4-1 and 4-2 herein.

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that depends upon the proper design of the sampling program and proper laboratory protocol. Representativeness will be satisfied by ensuring that the SAP and this QAPP are followed, proper sampling techniques are used, proper analytical procedures are followed, and sample holding times are not exceeded. Representativeness will be determined by assessing the combined aspects of the QA program, QC measures, and data evaluations.

Comparability expresses the confidence with which one data set can be compared to another. The extent to which existing and planned analytical data will be comparable depends upon the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data are expected to provide comparable data. These new analytical data, however, may not be directly comparable to existing data because of differences in procedures and QA objectives.

4.5 Initial Data Review

For excavation confirmation samples collected using the Incremental Sampling Methodology (ISM), the first three ISM samples will be collected in triplicate. Following review of the triplicate data for the first three confirmation samples, additional ISM field triplicates will be collected such that 1 in 10 excavation confirmation samples are collected in triplicate overall. The results of the initial ISM field triplicate samples and the results of the associated laboratory subsample replicates will be submitted to Ohio EPA for a 48-hour review of the following DQOs:

- For ISM laboratory subsample replicate results greater than the Limits of Quantitation (LOQ) (duplicates for PAHs and Metals; one per laboratory batch of up to 20 samples for each analytical group), an RPD of less than or equal to 20% as a goal. If this DQO is not met, a J-flag will be applied to the associated data.

- For the field ISM triplicates, an RSD of less than or equal to 30 to 35% as a goal (RSD less than or equal to 35%) will be incorporated into sample data evaluations. If this DQO is not met for the ISM field triplicate samples, then Ohio EPA will work with the Army to determine whether there are concerns with the data quality, using Table 1 of the Ohio EPA Field Standard Operating Procedure (FSOP) as a guide (see Attachment 1). If there are concerns with the data quality, then the Army, Ohio EPA and Endpoint will work together to determine the path forward, following the guidance below excerpted from the Hawai'i Department of Health Technical Guidance Manual Section 4.2.7.3 "Evaluation of Data Representativeness, Table 4-2 Recommended Adjustment of Multi Increment Data for Decision Making Based on RSD of Replicate Samples", http://hawaiidoh.org/tgm-pdfs/TGM.pdf (HDOH, 2016):

  Good Precision (RSD <35%)

  - Compare unadjusted ISM sample data directly to cleanup goal for decision making (for RVAAP, the maximum field replicate value will be used to compare to the cleanup goal);

  - Data can be used for confirmation purposes without the need for additional sampling, if cleanup goals are met.

  Moderate Precision (RSD >35% but <50%)

  - Review and discuss field sampling methods and laboratory processing and analysis methods and discuss potential sources of error (e.g., improper increment collection methods, inadequate number or mass of increments, unrepresentative laboratory subsampling methods, etc.);

  - Compare unadjusted ISM sample data directly to cleanup goal for decision making (for RVAAP, the maximum field replicate value will be used to compare to the cleanup goal);

- Additional confirmation sampling recommended following remediation of decision units (DUs) that exceed cleanup goals, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples.

Poor Precision (RSD >50% but <100%)

- Review and discuss field sampling methods and laboratory processing and discuss potential sources of error in report;

- If the large majority of total error is attributable to laboratory subsampling and analysis error, request laboratory to subsample and analyze the batch of DU samples again using correct techniques, and include additional subsampling replicates;

- Compare the 95% UCL (Chebyshev method) for replicate data to 150% of the cleanup goal for decision making;

- Estimate a 95% UCL for DUs where replicates were not collected based on the 95% UCL and mean calculated for the replicate data; Compare results to 150% of the cleanup goal;

- Provide additional, multiple lines of evidence for acceptance (or rejection) of the data for decision making purposes including knowledge of the site history and the anticipated potential for contamination above cleanup goal, the adequacy of the methods used to collect, process and analyze samples, and the approximation of the data to cleanup goal;

- Additional confirmation sampling recommended following remediation of DUs that exceed cleanup goal, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples.

Very Poor Precision (RSD >100%)

- If the large majority of total error is attributable to laboratory subsampling and analysis error, request laboratory to subsample and analyze the batch of DU samples again using correct techniques, and include additional subsampling replicates;

- Review and discuss field sampling methods and laboratory processing and analysis methods and discuss potential sources of error in report;

- Consider re-sampling of DU(s) most suspect for contamination using a larger number of increments and/or smaller DUs;

- If one or more of the replicate samples exceeds the cleanup goal then remediation of the DU should be considered, even if the mean concentration is well below the cleanup goal. Remediation of associated DUs where replicate samples were not collected should also be considered;

- If all replicate samples are below the cleanup goal, then compare the 95% UCL (Chebyshev method) for replicate data to the unadjusted cleanup goal for decision making;

- If all replicate samples are below the cleanup goal, estimate a 95% UCL for DUs where replicates were not collected based on the 95% UCL and mean calculated for the replicate data and compare results to unadjusted cleanup goal;

- Provide additional, multiple lines of evidence for acceptance (or rejection) of the data for decision making purposes including knowledge of the site history and the anticipated potential for contamination above cleanup goal, the adequacy of the methods used to collect, process and analyze samples and the approximation of the data to cleanup goal;

- Additional confirmation sampling recommended following remediation of DUs that exceed cleanup goal, including use of smaller DUs and/or a larger number of increments and collection of additional replicate samples.

If field triplicate samples are being collected for a particular DU, the aliquots will be collected from completely independent systematic random locations in the grid (i.e., aliquots for the field triplicate samples will not be collected around a single grid point used for the parent sample since this may not adequately test small-scale variability within the DU) (HDOH, 2016).

Table 4-1. Data Quality Objectives Summary for Soil Sampling

Former RVAAP Site, Portage and Trumbull Counties, OH

USEPA Analytical Method	Sample Type	Field & Laboratory Precision (RSD)	Accuracy (Laboratory)	Completeness
8270D	ISM and Composite	<35% RSD	45-134%	90%
6010C	ISM and Composite	<35% RSD	81-112%	90%
7471B	ISM and Composite	<35% RSD	82-119%	90%
1311	ISM and Composite	<35% RSD	82-119%	80%

Table 4-2. Laboratory Reporting Limits
Former RVAAP Site, Portage and Trumbull Counties, OH

Chemical of Concern	Laboratory Limits						FWCUG or Updated Residential RSL (1E-05 TRL, HQ=1.0) (mg/kg)
	RL (mg/kg)	MDL (mg/kg)	LOD (mg/kg)	LCS-Low (%)	LCS-High (%)	LCS-RPD (%)	
Benz(*a*)anthracene	0.067	0.033	0.067	49	126	20	11
Benzo(*a*)pyrene	0.067	0.012	0.033	45	129	20	1.1
Benzo(*b*)fluoranthene	0.067	0.033	0.067	45	132	20	11
Dibenz(*a*,*h*)anthrancene	0.067	0.033	0.067	45	134	20	1.1
Indeno(1,2,3-*cd*)pyrene	0.067	0.028	0.067	45	133	20	11
Arsenic	0.3	0.1	0.3	82	118	20	4.25
Lead	0.2	0.05	0.15	84	118	20	400
Mercury	0.1	0.02	0.06	74	126	20	22.7
Chemical of Concern	**RL (mg/L)**	**MDL (mg/L)**	**LOD (mg/L)**	**LCS-Low (%)**	**LCS-High (%)**	**LCS-RPD (%)**	**TCLP Criteria (mg/L)**
TCLP (arsenic)	0.200	0.200	0.200	86	113	0.2	5
TCLP (lead)	0.200	0.200	0.200	87	113	0.2	5
TCLP (mercury)	0.02	0.02	0.02	82	119	0.2	0.2
Benz(*a*)anthracene	0.05	0.00280	0.0100	58	125	20	NA
Benzo(*a*)pyrene	0.05	0.00360	0.0100	54	128	20	NA
Benzo(*b*)fluoranthene	0.05	0.0130	0.0250	53	131	20	NA
Dibenz(*a*,*h*)anthrancene	0.05	0.005	0.01	51	134	20	NA
Indeno(1,2,3-cd)pyrene	0.05	0.005	0.01	52	134	20	NA

FWCUG = Facility Wide Cleanup Goal
RSL = USEPA Residential Soil Regional Screening Level (June 2017)
ppm = parts per million
NA = Not Applicable
TRL = Target Risk Level
HQ = Hazard Quotient
RSL = USEPA Residential Soil Regional Screening Level (June 2017)
RL = Reporting limit
MDL= Method detection limit
LOD= Limit of detection

5.0 SAMPLING PROCEDURES

Sampling procedures are discussed in Section 4.2.2 of the SAP, corresponding to procedures detailed within the Standard Operating Procedures (SOPs) included as an Attachment to the SAP. Table 5-1 herein summarizes sample container, preservation, and holding time requirements for the sampling covered by the SAP.

Table 5-1. Container Requirements for Soil Samples

Former RVAAP Site, Portage and Trumbull Counties, OH

Analytical Group	Container	Minimum Sample Size	Preservative	Holding Time
PAHs	One 8-oz glass jar with Teflon®-lined cap for composite samples. One Ziplock bag for ISM samples.	60 g for composite sample in 8-oz jar. 900 g to 2,500 g for ISM sample in Ziplock bag.	Cool, 4°C	14 days (extraction) 40 days (analysis)
Metals	One 8-oz glass jar with Teflon®-lined cap for composite samples. One Ziplock bag for ISM samples.	60 g for composite sample in 8-oz jar. 900 g to 2,500 g for ISM sample in Ziplock bag.	Cool, 4°C	180 days (mercury at 28 days)

6.0 SAMPLE CUSTODY

6.1 Field Chain of Custody Procedures

Sample handling, packaging, and shipment procedures will follow those identified in SOP-5 and SOP-6 of Attachment II of the SAP.

6.2 Laboratory Chain of Custody Procedures

Laboratory chain of custody will follow handling and custody procedures identified in SOP-5 of Attachment II of the SAP.

6.3 Final Evidence Files Custody Procedures

Custody of evidence files will follow those criteria defined in SOP-5 of Attachment II of the SAP.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

This section describes the procedures for maintaining the accuracy of all the instruments and measuring equipment that are used for conducting field tests and laboratory analyses. These instruments and equipment shall be calibrated before each use or on a scheduled, periodic basis according to manufacturer instructions.

7.1 Field Instruments/Equipment

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. All field instruments for this purpose will have unique identifiers, and each instrument will be logged in the Material and Testing Equipment (M&TE) Log Book before use in the field, if multiple identical instruments are to be used. The Site Safety and Health Officer (SSHO) or his/her designee will be responsible for performing and documenting daily calibration/checkout records for instruments used in the field.

Equipment to be used during field sampling will be examined to certify that it is in operating condition. This will include checking the manufacturer's operating manual and instructions for each instrument to ensure that all maintenance requirements are being observed. Field notes from previous sampling trips will be reviewed so that the notation on any prior equipment problems will not be overlooked and all necessary repairs to equipment will be carried out. Spare parts or duplication of equipment will be available to the sampling effort.

Calibration of field instruments will be performed at intervals specified by the manufacturer or more frequently as conditions dictate. Calibration procedures and frequency will be recorded in a field logbook or daily field sheets.

Field instruments specific to the sampling included in the SAP consists of a photoionization detector (PID) for organic vapor detection. If an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be returned to the manufacturer for service and a back-up instrument will be calibrated and used in its place.

Detailed instructions on the proper calibration and use of each field instrument follow the guidelines established by the manufacturer. The technical procedures for each instrument used on this project include the manufacturer's instructions detailing the proper use and calibration of each instrument. Project personnel responsible for calibrating and operating field instruments will receive training in the proper use of each instrument. Documentation of current training records for all project field personnel will be maintained in the training records database for the project.

7.2 Laboratory Instruments

Calibration of laboratory equipment will follow procedures identified in the laboratories' LQM, corporate, and facility-specific operating procedures and will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by laboratory personnel performing QC activities. These records will be filed at the location where the work is performed and will be subject to QA audit. Procedures and records of calibration will follow direction as stated in the DoD QSM (DoD, 2017) and USACE, Louisville District's QSM Supplement (USACE, 2007).

8.0 ANALYTICAL PROCEDURES

8.1 Laboratory Analysis

As indicated in Section 3.0, Test America in Savannah, GA will serve as the DoD and NELAP-certified laboratory for analysis of samples on this project. Analytical methods, parameters and quantitation or reporting limits to be used by Test America are listed in Tables 2-1, Table 4-1 and Table 4-2 of this QAPP.

The laboratory's LQM will be followed during the analysis of these samples. The following Test America laboratory SOPs, which may be provided upon request, will implement the defined USEPA methods:

- Semi-Volatile Organic Compounds by GCMS (Method 8270D), SA-SM-033 Rev 7, 07/05/17
- Elements by ICP (Method 6010C), SA-ME-070 Rev 19, 07/05/17
- Mercury Preparation and Analysis (Method 7471B), SA-ME-028 Rev 13, 07/05/17
- Toxicity Characteristic Leaching Procedure (Method 1311), SA-EX-015 Rev 12A, 02/27/18

The laboratory will at all times maintain a safe and contaminant free environment for the analysis of samples. The laboratory will further demonstrate, through instrument blanks, holding blanks, and analytical method blanks, that the laboratory environment and procedures will not and do not impact analytical results. The laboratory will also implement all reasonable procedures to maintain project-reporting levels for all sample analyses. Where contaminant and sample matrix analytical interferences impact the laboratory's ability to obtain project reporting levels, the laboratory will institute sample clean-up processes, minimize dilutions, adjust instrument operational parameters, or propose alternative analytical methods or procedures. Elevated reporting levels will be kept to a minimum throughout the execution of this work.

Although this project falls under the requirements of the USACE Louisville Chemistry Guidance (LCG), the quantitation levels (as presented in Table 4-2 herein) are the governing analytical detection limits for this project. Additionally, project specified reporting limits (RL) take precedence over those presented in the LCG. However, in cases where the laboratory-proposed RL is greater than three times the method detection limit (MDL), a USACE-approved variance may be required prior to USACE acceptance of the adjusted RL. Test America's reporting limit and control limit (CL) compliance values for all COCs and applicable analytical methods are included in Table 4-2 of this QAPP.

8.2 Field Screening Analytical Protocols

No analytical field screening will be performed during this project.

9.0 INTERNAL QUALITY CONTROL CHECKS

9.1 Field Sample Collection

Sample collection procedures, field quality assurance/quality control (QA/QC) sample types, guidelines for the number of samples, and frequencies are identified in Section 4.2 of the SAP and are further presented in Table 2-1 herein. In general, field duplicates (blind, QC) will be collected at a frequency of ten (10) percent for each matrix. MS/MSDs will be collected at a frequency of five (5) percent for each sample matrix. QA split samples will be collected on ten (10) percent of the total number of field samples collected for each matrix and sent to the designated QA laboratory.

As previously indicated in the SAP, disposable soil sampling equipment will be used, eliminating the collection of equipment rinsate samples (typically collected at a frequency of one per week of sampling). In addition, to the extent practicable, clean steam from the VEG Technology's vapor generator will be used to decontaminate excavation equipment, thereby minimizing the potential for generation of liquid IDW from decontamination procedures. Any liquid IDW generated from decontamination of excavation equipment will either be disposed of within truck beds transporting metals-impacted soil (i.e., liquids from decontamination of equipment used for excavating metals-impacted soil) or utilized (and thermally oxidized) by the VEG Technology as a sustainable practice of converting the limited water used to decontaminate equipment used to excavate PAH-impacted soil into a hot, clean (via thermal oxidation) steam used in turn to treat the soil COCs within the VEG treatment chamber. Lastly, in the absence of volatile organic compound (VOCs) as COCs and in the absence of use of drilling fluids, no trip blanks or source water sampling will be required as part of the sampling activities.

9.2 Sample Processing

Sampling processing protocols will follow those described in Section 4.2.2 of the SAP.

9.3 Laboratory Analysis

Analytical QA/QC procedures will follow those identified in the referenced EPA methodologies. These will include method blanks, LCS, MS, MSD, laboratory duplicate analysis, calibration standards, internal standards, surrogate standards, and calibration check standards as required by specific methods. The laboratory will conform to its LQM and implement its established SOPs to perform the various analytical methods required by the project.

Implementation of QC procedures during sample collection, analysis, and reporting ensures that the data obtained are consistent with its intended use. Both field and laboratory QC checks are performed throughout the work effort to generate data confidence. Analytical QC measures are used to determine if the analytical process is in control and to determine the sample matrix effects on the data being generated.

Laboratories will provide documentation in each data package that both initial and ongoing instrument and analytical QC functions have been met. Any non-conforming analysis will be re-analyzed by the laboratory if sufficient sample volume is available. Sufficient sample volumes will be collected to provide for re-analyses, if required.

10.0 DATA REDUCITION, VALIDATION, AND REPORTING

10.1 Data Reduction

Sample collection will follow the established protocols defined in the SAP and associated SOPs. Data to be used in project reports will be reduced and summarized. The methods of data reduction will be documented.

The Contractor QA Manager or his/her designee is responsible for reviewing all field-generated data. This includes verifying that all field descriptive data are recorded properly, that all field instrument calibration requirements have been met, that all field QC data have met frequency and criteria goals, and that field data are entered accurately in all worksheets.

10.1.1 Laboratory Services

All samples collected for investigations at the former RVAAP will be sent to DoD NELAP-accredited laboratories. Data reduction, evaluation, and reporting for samples analyzed by the laboratory will be performed according to specifications outlined in the laboratory's LQM guidance and this QAPP. Laboratory reports will include documentation verifying analytical holding time compliance.

Laboratories will perform in-house analytical data reduction under the direction of the Laboratory QA Officer or Laboratory Project Manager. The Laboratory QA Officer/Project Manager is responsible for assessing data quality and informing the Contractor QA Manager and the U.S. Army of any data considered "unacceptable" or requiring caution on the part of the data user in terms of its reliability. Data will be reduced, evaluated, and reported as described in the laboratory LQM guidance. Data reduction, review, and reporting by the laboratory will be conducted as follows:

- Raw data are produced by the analyst who has primary responsibility for the correctness and completeness of the data. All data will be generated and reduced following QAPP-defined methods and implementing laboratory SOPs.
- Level 1 technical review is completed by the area supervisor or data review specialist. This review evaluates the data for attainment of QC criteria, as outlined in the established methods, and for overall reasonableness. This review ensures all calibration and QC data are in compliance, checks at least 10% of the data calculations, and documents that the data package is complete and ready for reporting and archival.
- Upon acceptance of the raw data by the area supervisor, the report is generated and sent to the Laboratory Project Manager for Level 2 administrative data review. This review ensures consistency and compliance with all laboratory instructions, the laboratory's LQM guidance, the project laboratory statement of work, and the project QAPP.
- The Laboratory Project Manager completes a thorough review of all reports.
- Final reports are generated and signed by the Laboratory Project Manager and/or QA Officer.

- Data are delivered to the Contractor for data verification and validation.

The data review process identifies any out-of-control data points and data omissions and initiates interactions with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the Contractor Project Manager based on the extent of the deficiencies and their importance in the overall context of the project. The laboratory will provide flagged data to denote the following: (1) concentrations below project reporting levels, (2) estimated concentrations due to poor spike recovery, (3) concentrations of chemical are also found in the laboratory blank, (4) concentrations exceeding the calibration range, and (5) GC analyses with greater than 25% difference between the primary and confirmation columns.

Laboratories will prepare and retain full analytical and QC documentation for the project. Such retained documentation will be both hard (paper) copy and electronic storage media (e.g., compact disc) as dictated by the analytical methodologies employed. As needed, laboratories will supply hard copies of the retained information.

Laboratories will provide the following information to the Contractor in each analytical data package submitted:

- Cover sheets listing the samples included in the report and narrative comments describing problems encountered in analysis;

- Tabulated results of inorganic and organic compounds identified and quantified; and

- Analytical results for QC sample spikes, sample duplicates, initial and continuous calibration verifications of standards and blanks, standard procedural blanks, LCSs, MRLs and other deliverables as identified in Section 10.3 herein.

10.2 Data Validation

Laboratory Data Consultants (LDC) will perform an independent validation of the data collected during this project, including use of the Automated Data Review (ADR) software. Flags signifying the usability of data will be noted and entered into an analytical database. Data discrepancies noted during the verification and validation processes may be recorded as nonconformance reports (NCRs), which are sent to the laboratory for clarification and/or correction. Decisions to repeat sample collection and analyses may be made by the Contractor Project Manager or U.S. Army Project Manager based on the extent of the deficiencies and their importance in the overall context of the project. LDC has performed similar independent data validation on multiple other soil remediation projects involving the use of the VEG Technology under USACE contracts.

All data generated will be in the format specified by the Automated Data Review (ADR) User's Manual. The ADR software was developed by LDC and is available from USACE or directly from the developers. The ADR format is designed to facilitate data review and evaluation. The electronic dataset will include data flags in accordance with referenced protocols along with additional comments from the data review process. Laboratory data flags will include the following: (1) concentrations below LOQs, (2) estimated concentrations due to poor spike recovery, and (3) concentrations of chemical also found in the laboratory blank. Each dataset will be incorporated into reports as required.

10.2.1 Data Verification/Validation Approach

Samples will be analyzed through implementation of "definitive" analytical methods. "Definitive data" will be reported consistent with the deliverables identified in Section 10.3 herein and in Appendix E of the DoD QSM (DoD, 2017). This report content is consistent with what is understood as an USEPA Level III deliverable (data forms including laboratory QC and calibration information). DQOs identified in Section 4.0 and method-specified criteria may be verified and validated. Comprehensive analytical information will be retained by the subcontract laboratory.

A systematic process for data verification and/or validation will be performed to ensure the precision and accuracy of the analytical data are adequate for their intended use. The greatest uncertainty in a measurement is often a result of the sampling process and inherent variability in the environmental media rather than the analytical measurement. Therefore, analytical data validation will be performed only to the level necessary to minimize the potential of using false-positive or false-negative results in the decision-making process (i.e., to ensure accurate identification of detected versus non-detected compounds). This approach is consistent with the objectives for the program, with the analytical methods, and for determining contaminants of concern and calculating risk.

These definitive data then will be verified and validated in accordance with the investigation-specific DQO requirements. Data may be subjected to some or all of the review process steps presented in Figure 10-1. Primary, field duplicate and QA split samples may be collected for each project. All primary and field duplicate samples will be analyzed at the Contractor's primary laboratory and resultant data will receive primary review (STEP-1) by the analyzing facility. Primary laboratory data will be subjected to data verification (STEP-2) by the Contractor. Ten percent of the primary data may receive comprehensive validation (STEP-3a). This 10% should consist of the samples randomly selected for field duplicate determinations. Data packages (in hard copy or pdf format) selected for validation will be provided by the Contractor to the USACE-contracted third-party validator. QA split sample analyses will be performed by the QA laboratory designated by either Ohio EPA or USACE, Louisville District. These data will receive primary review by the analyzing facility with subsequent verification and comprehensive validation (STEPS-2 and -3b) by USACE, Louisville District. Validation reports from STEPS-3a and -3b will be combined with QA split sample comparison by USACE, Louisville District into sequentially generated Chemical Quality Assurance Reports (CQARs) (STEP-4). At the end of a project, this information will form the basis for the Chemical Data Quality Assessment Report (CDQAR) produced by USACE, Louisville District (STEP-5).

Verification support staff will conduct a systematic review of all primary data. 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);
- Matrix spike/matrix spike duplicate and duplicate results;
- Sample re-analysis;
- Secondary dilutions; and
- Laboratory case narrative.

Validation will be accomplished by comparing the contents of the data packages and QA/QC results to requirements contained in the requested analytical methods. USACE's subcontracted validation support staff will be responsible for these activities. All validation staff will be independent of both the analytical laboratory and the Contractor, and all validation staff must be contracted by USACE, Louisville District. The protocol for analyte data validation can be located in the following documents:

- DoD QSM (DoD, 2017);

- 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* (USEPA, 1994b); and

- *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA, 1994a).

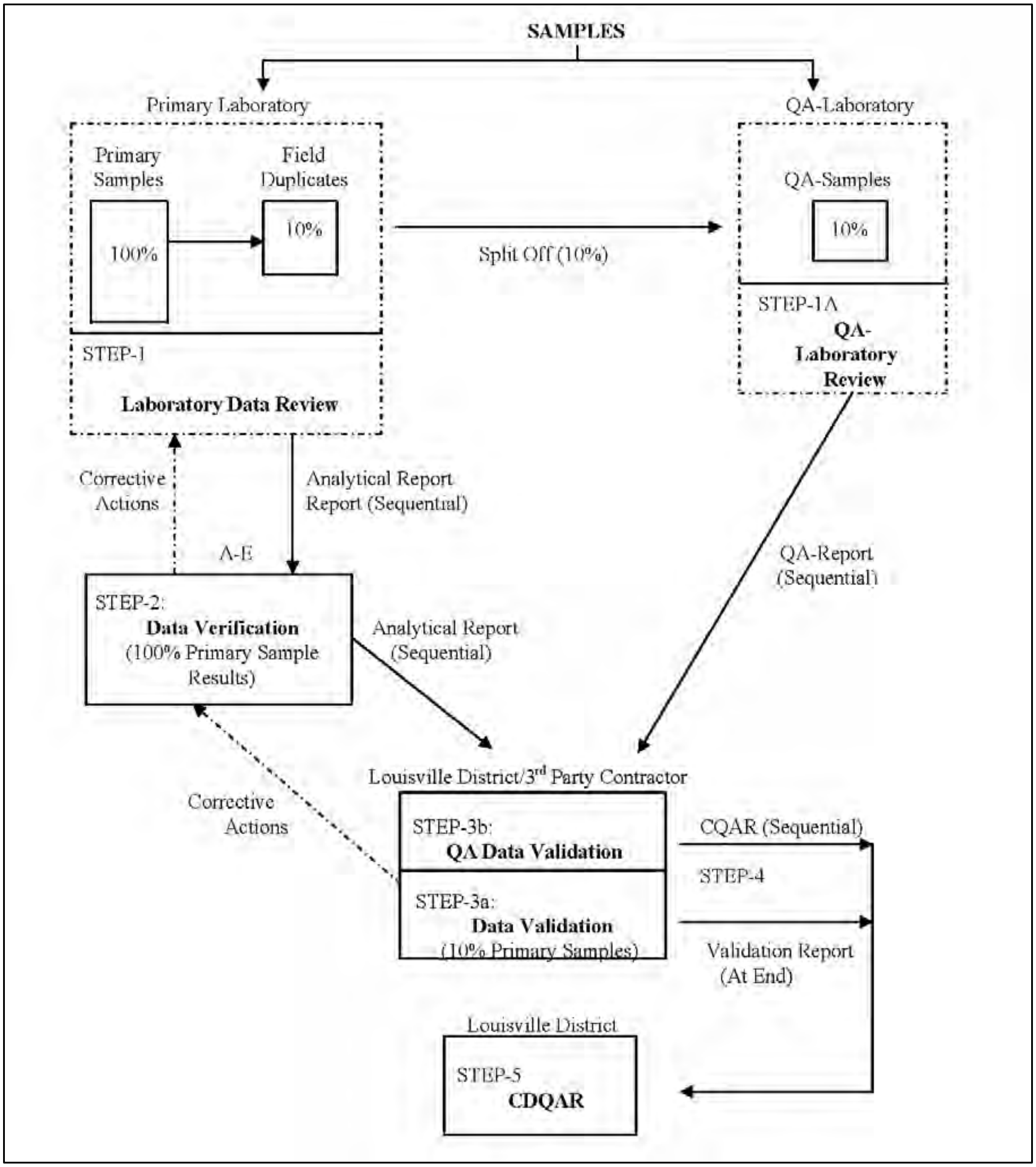

Figure 10-1. Definitive Data Review Process

10.2.2 Primary Analytical Data Verification/Validation Categories

10.2.2.1 Holding Times

Evaluation of holding times ascertains the validity of results based on the length of time from sample collection to sample preparation or sample analysis. Verification of sample preservation must be confirmed and accounted for in the evaluation of sample holding times. The evaluation of holding times is essential to establishing sample integrity and representativeness. Concerns regarding physical, chemical, or biochemical alteration of analyte concentrations can be eliminated or qualified through this evaluation.

10.2.2.2 Calibration

The purpose of initial and continuing calibration verification analyses is to verify the linear dynamic range and stability of instrument response. Relative instrument response is used to quantitate the analyte results. If the relative response factor is outside acceptable limits, then the data quantification is uncertain and requires appropriate qualification.

10.2.2.3 Blanks

The assessment of blank analyses is performed to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks applies to any blank associated with the samples, including field, trip, equipment, and method blanks. Contamination during sampling or analysis, if not discovered, results in false-positive data.

Blanks will be evaluated against project reporting levels as specified in Table 4-2. The concentration of any target analyte in the blank should not exceed one-half the reporting limit (or the reporting limit for common laboratory contaminants), one-tenth the amount measured in any sample, or one-tenth the regulatory limit (see the DoD QSM). Sample data will be qualified relative to any blank contamination observed.

10.2.2.4 Laboratory Control Samples

The LCS serves as a monitor of the overall performance of the analytical process, including sample preparation, for a given set of samples. Evaluation of this standard provides confidence in, or allows qualification of, results based on a measurement of process control during each sample analysis.

10.2.2.5 Method Reporting Limits Standard

The MRL is used to assess the performance of the measurement system at the lower limits of analysis. Evaluation of this standard provides confidence that low concentrations near the requested reporting limit will be detected and accurately quantified.

10.2.2.6 Surrogate Recovery

System monitoring compounds are added to every sample, blank, LCS, matrix spike, matrix spike duplicate, and standard. Such compounds are used to evaluate extraction, cleanup, and analytical efficiency by measuring recovery on a sample-specific basis. Poor system performance, as indicated by low surrogate recoveries, is one of the most common reasons for data qualification. Evaluation of surrogate recovery is critical to the provision of reliable sample-specific analytical results

10.2.2.7 Internal Standards

Internal standards are utilized to evaluate and compensate for sample-specific influences on the analyte quantification. These standards are evaluated to determine if data require qualification due to excessive variation in acceptable internal standard quantitative or qualitative performance measures. For example, a decrease or increase in internal standard area counts for organics may reflect a change in sensitivity that can be attributed to the sample matrix. Because quantitative determination of analytes is based on the use of internal standards, evaluation is critical to the provision of reliable analytical results.

10.2.2.8 Matrix Spike, Matrix Spike Duplicate, and Duplicate

Matrix spike, matrix spike duplicate, and duplicate results serve as an indicator of individual sample and matrix type influence over the analytical values. Evaluation of these measures provides confidence that the sample matrix has not impacted results or allows qualification of results based on the percent spike recovery or imprecision indicated by the duplicate comparison.

10.2.2.9 Post-Digestion Spikes

Metal post-digestion spikes are evaluated to establish precision and accuracy of individual analytical determinations. Because of the nature of some elemental analytical techniques and because of the detailed decision tree and analysis scheme required for quantitation of the elements, evaluation of this QC element is critical to ensuring reliable analytical results.

10.2.2.10 Sample Re-Analysis

When instrument performance monitoring standards indicate an analysis is out of control, the laboratory is required to re-analyze the sample. If the re-analysis does not solve the problem (i.e., surrogate compound recoveries are outside the limits for both analyses), then the laboratory is required to submit data from both analyses. An independent review is required to determine which is the appropriate sample result.

10.2.2.11 Secondary Dilutions

When the concentration of any analyte in any sample exceeds the initial calibration range, a new aliquot of that sample must be diluted and re-analyzed. The laboratory is required to report data from both analyses. When this occurs, an independent review of the data is required to determine the appropriate results to be used for that sample. An evaluation of each analyte exceeding the calibration range must be made, including a review of the dilution analysis performed. Results chosen in this situation may be a combination of both the original results (i.e., analytes within the initial calibration range) and the secondary dilution results.

10.2.2.12 Laboratory Case Narrative

Analytical laboratory case narratives are reviewed for specific information concerning the analytical process. This information is used to direct the data validator to potential problems with the data.

10.3 Data Reporting

Laboratories will prepare and submit analytical and QC data reports to the Contractor or the U.S. Army (QA split sample data) in compliance with the requirements of this QAPP, including data forms listed in Table 10-1, and will be considered a definitive data package. The definitive data package will include a cover sheet, table of contents, case narrative, the analytical results, sample management records, and internal laboratory QA/QC information. The laboratory data package should be organized so that the analytical results are reported on a per-batch basis. A general outline is presented below.

Cover Sheet
- Title of report;
- Name and location of laboratory;
- Name and location of all subcontract laboratories;
- Contract number;
- Client name and address;
- Project name and AOC location;
- Statement of data authenticity with official signatures; and
- Amendments, if applicable.

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Case Narrative

Analytical Results
- Laboratory name and location;
- Project name and ID number;
- Field sample ID number;
- Laboratory sample ID number;
- Matrix;
- Sample description;
- Sample preservation or condition at receipt;
- Date sample collected;
- Date sample received by the laboratory;

- Date sample extracted or prepared;
- Date sample analyzed;
- Analysis time when holding time is <48 hr;
- Analytical method numbers, including preparation numbers;
- Preparation and analytical batch numbers;
- Analyte or parameter;
- MRLs;
- LOQs;
- LODs;
- Analytical results;
- Confirmation data;
- Laboratory-assigned data qualifiers;
- Concentration units;
- Dilution factors;
- Percent moisture or percent solids;
- Chromatograms, as needed;
- Sample aliquot size analyzed; and
- Final extract volume.

Laboratory Reporting Limits

Sample Management Records

QA/QC Information

Table 10-1. Standard Data Deliverables (Hard Copy), Former RVAAP

Method Requirements	Deliverables
Requirements for all Methods:	
Holding time information and methods requested	Signed chain-of-custody forms
Discussion of laboratory analysis, including any laboratory problems	Case narratives
LCS (run with each batch of samples processed)	Results (control charts when available)
Organics: GC/MS Analysis	
Sample results, including TICs	USEPA Form 1 or equivalent
Surrogate recoveries	USEPA Form 2 or equivalent
Matrix spike/matrix spike duplicate data	USEPA Form 3 or equivalent
Method blank data	USEPA Form 4 or equivalent
GC/MS tune	USEPA Form 5 or equivalent

Table 10-1. Standard Data Deliverables (Hard Copy), Former RVAAP (continued)

Method Requirements	Deliverables
GC/MS initial calibration data	USEPA Form 6 or equivalent
GC/MS continuing calibration data	USEPA Form 7 or equivalent
GC/MS internal standard area data	USEPA Form 8 or equivalent
Organics: GC Analysis	
Sample results	USEPA Form 1 or equivalent
Surrogate recoveries	USEPA Form 2 or equivalent
Matrix spike/matrix spike duplicate data	USEPA Form 3 or equivalent
Method blank data	USEPA Form 4 or equivalent
Initial calibration data	USEPA Form 6 or equivalent
If calibration factors are used	A form listing each analyte, the concentration of each standard, the relative calibration factor, the mean calibration factor, and the %RSD
Calibration curve if used	Calibration curve and correlation coefficient
Continuing calibration data	USEPA Form 9 or equivalent
Positive identification (second column confirmation)	USEPA Form 10 or equivalent
Metals	
Sample results	USEPA Form 1 or equivalent
Initial and continuing calibration	USEPA Form 2 or equivalent, dates of analyses and calibration curve, and the correlation coefficient factor
Method blank	USEPA Form 3 or equivalent and dates of analyses
ICP interference check sample	USEPA Form 4 or equivalent and dates of analyses
Spike sample recovery	USEPA Form 5A or equivalent
Method Requirements	
Post-digestion spike sample recovery for ICP metals	USEPA Form 5B or equivalent
Post-digestion spike for GFAA	USEPA Form 5B or equivalent
Duplicates	USEPA Form 6 or equivalent
LCS	USEPA Form 7 or equivalent
Standard additions (when implemented)	USEPA Form 8 or equivalent
Holding times	USEPA Form 13 or equivalent
Run log	USEPA Form 14 or equivalent
Wet Chemistry	
Sample results	Report result
Matrix spike recovery	% Recovery
Matrix spike duplicate or duplicate	% Recovery and % RPD
Method blank	Report results
Initial calibration	Calibration curve and correlation coefficient
Continuing calibration check	Recovery and % difference
LCS	LCS result and control criteria

GC = Gas chromatograph
GFAA = Graphite furnace atomic absorption
ICP = Inductively coupled plasma
LCS = Laboratory control standard
MS = Mass spectrometer
RPD = Relative percent difference
RSD = Relative standard deviation
RVAAP = Ravenna Army Ammunition Plant
TIC = Tentatively identified compound
USEPA = United States Environmental Protection Agency

EDDs will contain the same information as described for the hard copy deliverables. The contract laboratory will deliver an EDD that is ADR compatible. The contract laboratory must identify variances to the established library prior to any analysis being performed. No variances to the DoD GSM (DoD, 2017) and the USACE, Louisville district's QSM supplement (USACE, 2007) are anticipated.

The laboratory will be required to confirm sample receipt and log-in information. The laboratory will return a copy of the completed COC and confirmation of the laboratory's analytical log-in to the contractor within 2 days of sample receipt.

The subcontract analytical laboratory will prepare and retain full analytical and QC documentation. Such retained documentation will include all hard copies and other storage media (e.g., disc storage). As needed, the subcontract analytical laboratory will make available all retained analytical data information.

11.0 PERFORMANCE AND SYSTEM AUDITS

11.1 Field Audits

Informal field audits will be conducted on an on-going basis to ensure the consistency of implementation. This includes field training, daily review of field forms and observing field procedures.

The Endpoint QA Manager and/or the Field Technical Lead (FTL) will perform a minimum of one formal field audit for the media being sampled at each AOC. This audit will encompass the sampling of excavation sidewall and bottom soils (Category 1 samples), treated soil stockpile sampling (Category 2) and waste characterization sampling (Category 3 samples). USACE, EPA Region V, or Ohio EPA audits may be conducted at the discretion of the respective agency.

11.2 Laboratory Audits

Internal performance and systems audits will be conducted by the laboratory's QA staff as defined in the laboratory's LQM.

12.0 PREVENTATIVE MAINTENANCE PROCEDURES

12.1 Field Instruments and Equipment

Specific preventative maintenance procedures to be followed for field analytical and sampling equipment are those recommended by the manufacturers. These procedures are included in the technical procedures governing the use of these instruments.

Field instruments will be checked and/or calibrated before they are shipped or carried to the field. Each field instrument will be checked daily against a traceable standard or reference with a known value to ensure that the instrument is in proper calibration. Instruments found to be out of calibration will be recalibrated before use in the field. If the instrument cannot be calibrated, it will be returned to the supplier or manufacturer for recalibration and a back-up instrument will be used in its place. Calibration checks and calibrations will be documented on the Field Meter/Calibration Log Sheets in the M&TE Log Book or field sheets/daily QC reports. Any maintenance conducted on field equipment must be documented in the M&TE Log Book or field sheets/daily QC reports.

Critical spare parts such as batteries will be kept on-site to minimize down time of malfunctioning instruments. Back-up instruments and equipment should be available on-site or within 1-day shipment to avoid delays in the field schedules.

12.2 Laboratory Instruments

Routine and preventive maintenance for all laboratory instruments and equipment will follow the direction of the laboratory's LQM.

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

13.1 Field Measurements Data

No field data measurements are planned as part of the sampling covered by the SAP.

13.2 Laboratory Data

Laboratory data will be assessed for compliance with the required precision, accuracy, completeness, and sensitivity as outlined in the following sections. Laboratory data, in the form of an EDD will be provided by Test America for use in the ADR program.

A contractor-generated project-specific library and the most current LCG master library, with all of the methods to be analyzed under this scope of work, will be used as reference for all complied EDDs. The project-specific library will accurately reflect all of the analytical requirements specified in the QAPP and will be provided to both the USACE and Test America and LDC for use in screening submittals and use in the respective ADR program. Data review will comply with the LCG criteria and provide compatibility with ADR software.

All electronic data submitted by Test America will be error-free, and in complete agreement with the hardcopy data. Data files are to be delivered electronically. All electronic data will be submitted with a transmittal letter certifying that electronic data is in agreement with all hardcopy data reports and has been found to be free of the errors using the latest version of ADR software. Test America will correct any errors identified.

13.2.1 Precision

Laboratory precision is measured by the variability associated with duplicate (two) or replicate (more than two) analyses. One type of sample that can be used to assess laboratory precision is the LCS. Multiple LCS analyses over the duration of the project can be used to evaluate the overall laboratory precision for the project. In this case, the comparison is not between a sample and a duplicate sample analyzed in the same batch, but between LCSs analyzed in multiple batches.

Precision is the measurement of the variability associated with the sampling and analytical process. Precision is determined by analysis of duplicate field samples, laboratory/matrix duplicates, LCSDs and/or MSDs. Field duplicate samples and MSD samples should be collected to assess field precision at a frequency as described in Worksheet #20. The required control limits for LCSD, MSD and laboratory/matrix duplicate precision for each method, matrix, and analyte are provided in Table 15-1. A control limit, relative percent difference (RPD) of ± 50 percent for soil will be used for original and field duplicate concentrations greater than five times the LOQ for treatment samples. For ISM laboratory subsample replicates a control limit RSD/RPD of 20 percent will be used. For ISM field triplicate results, the precision is measured using the RSD and the control limit for that will be less than or equal to 30 to 35 percent as a goal (RSD less than or equal to 35 percent). The formula for the calculation of RPD and RSD are provided below.

If calculated from duplicate measurements:

$$RPD = 100\% \times \frac{(C_1 - C_2)}{(C_1 + C_2) \times \frac{1}{2}} \quad (1)$$

Where:

RPD = relative percent difference
C1= larger of the two observed values
C2 = smaller of the two observed values

If calculated from three or more replicates, use RSD rather than RPD:

$$RSD = 100\% \times (s / \bar{y}) \qquad (2)$$

Where:

RSD = relative standard deviation
s = standard deviation
y= mean of replicate analyses

Standard deviation, σ, is defined as follows:

$$\sigma = \sum_{i=1}^{n} \sqrt{\frac{(y_i - \bar{y})^2}{n-1}} \qquad (3)$$

Where:

σ = standard deviation
yi = measured value of the ith replicate
y= mean of replicate analyses
n = number of replicates

13.2.2 Accuracy

The accuracy of the laboratory analytical measurement process will be determined by comparing the percent recovery for the LCS versus its documented true value.

Investigative sample accuracy will be assessed for compliance with the established QC criteria described in Section 4.0 of this QAPP using the analytical results of method blanks, reagent/preparation blanks, matrix spike/matrix spike duplicate samples, field QC samples, and bottle blanks. The percent recovery of matrix spike samples will be calculated using Equation 13-4. This accuracy will include variables associated with the analytical process, influences related to sample matrix interferences, and sample heterogeneity.

$$\%R = \frac{A - B}{C} \, x \, 100 \qquad \textbf{(Equation 13-4)}$$

where

A = The analyte concentration determined experimentally from the spiked sample,
B = The background level determined by a separate analysis of the unspiked sample, C = The amount of the spike added.

13.2.3 Completeness

Data completeness of laboratory analyses will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using Equation 13-5.

$$\text{Completeness} = \frac{\text{Number of Valid Laboratory Measurements Made}}{\text{Number of Laboratory Measurements Planned}} \times 100\% \qquad \textbf{(Equation 13-5)}$$

13.2.4 Sensitivity

Achieving MRLs depends on sample preparation techniques, instrumental sensitivity, and matrix effects. Therefore, it is important to establish actual detection limits for each major matrix under investigation (e.g., water and soil) using a scientifically valid and documented procedure (see the DoD QSM). The LOD is typically an established analysis of a standard spiked at two to three times the detection limit. The LOQ is the lowest concentration of an analyte that can be determined within the specified limits of precision and bias. LOQ values will be greater than or equal to the LOD and must be less than or equal to the project reporting limits.

LODs and LOQs should be verified at least quarterly. It is also important to monitor instrument sensitivity through calibration blanks and low concentration standards to ensure consistent instrument performance. It is also critical to monitor the analytical method sensitivity through analysis of method blanks, calibration check samples, and LCSs.

14.0 CORRECTIVE ACTIONS

Corrective actions may be required for two major types of problems: analytical/equipment problems and non-compliance with criteria. Analytical and equipment problems may occur during sampling, sample handling, sample preparation, laboratory instrumental analysis, and data review.

14.1 Sample collection/field measurements

Field activity corrective action protocols will follow directions provided in SOP-8 of Attachment II of the SAP.

14.2 Laboratory analyses

Corrective actions shall be implemented to resolve problems and restore malfunctioning analytical systems. Laboratory activity corrective action protocol will follow directions provided in this section and the laboratory's LQM. Laboratory personnel have received QA training and are aware that corrective actions are necessary when:

- QC data do not meet DoD QSM (DoD, 2017) criteria for precision and accuracy;
- Blanks contain target analytes above acceptable levels and must be investigated;
- Undesirable trends are detected in spike recoveries or RPDs between duplicates;
- Unusual changes in detection limits are identified;
- Deficiencies are detected by internal audits, external audits, or from performance evaluation samples results; or
- Inquiries concerning data quality are received.

Corrective action procedures are often handled at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors and checks the instrument calibration, spike and calibration mixes, instrument sensitivity, and so on. If the problem persists or cannot be identified, the matter is referred to the Laboratory Supervisor, Manager, and/or QA Department for further investigation. Once resolved, full documentation of the corrective action procedure is filed with project records and the QA Department, and the information is summarized within case narratives.

Corrective actions may include:

- Re-analyzing the samples if holding time criteria permit;
- Evaluating, eliminating, and re-analyzing blank contaminant sources;

- Modifying the analytical method (i.e., standard additions) with appropriate notification and documentation;

- Re-sampling and analyzing;

- Evaluating and amending sampling procedures; or

- Accepting data and acknowledging the level of uncertainty.

If re-sampling is deemed necessary due to laboratory problems, the Contractor Project Manager will identify the necessary cost recovery approach to implement the additional sampling effort.

The following corrective action procedures will be required:

- Problems noted during sample receipt will be documented in the appropriate laboratory's Letter of Receipt (LOR). The Contractor and U.S. Army will be contacted immediately to determine the problem resolution. All corrective actions will be thoroughly documented.

- When sample extraction/digestion or analytical holding times are not within the method required specifications, the Contractor and U.S. Army will be notified immediately to determine the problem resolution. All corrective actions will be thoroughly documented.

- All initial and continuing calibration sequences that do not meet method requirements will result in a review of the calibration. When appropriate, re-analysis of the standards or re-analysis of the affected samples back to the previous acceptable calibration check is warranted.

- All appropriate measures will be taken to prepare and clean up samples in an attempt to achieve the project reporting limits as stated. When difficulties arise in achieving these limits, the laboratory will notify the Contractor and the U.S. Army to determine the problem resolution. All corrective actions will be thoroughly documented.

- Any dilutions impacting the project reporting limits will be documented in case narratives along with revised reporting limits for those analytes affected. Analytes detected above the detection limit, but below the LOQ, will be reported as estimated values.

- Failure of method-required QC to meet the requirements specified in this QAPP shall result in review of all affected data. Resulting corrective actions may encompass those identified earlier. The Contractor and U.S. Army will be notified as soon as possible to discuss possible corrective actions, particularly when unusual or difficult sample matrices are encountered.

- When calculation and reporting errors are noted within any given data package, reports will be re-issued with applicable corrections. Case narratives will clearly state the reasons for reissuance of such reports.

15.0 QA REPORTS TO MANAGEMENT

All performance and system audits of laboratory and field operations will be reported directly to project management, program management, and USACE in accordance with Section 11.0 of this QAPP. In addition to these audit reports, laboratory LORs and analytical case narratives will be required from the laboratory.

The laboratory will provide status reports, as requested, to the Contractor point of contact for analytical activities. These status reports will contain the status of each sample received for the project and may be presented from established laboratory information system electronic databases or spreadsheets. Information to be provided may include the following:

- Project name and contract number;
- Laboratory sample number, project sample identification number, matrix type, and location of samples received during the monthly reporting period;
- Description of, and justification for, alternative methods used or modifications of existing methods (any proposed changes to analytical methods in approved SAPs require written approval from the Contractor and U.S. Army);
- Control charts for all LCS or matrix spike analyses applicable to the project;
- A summary of all out-of-control events during the monthly reporting period, including references to documentation and corrective action reports;
- Changes in laboratory QA personnel and other key technical staff, including resumes of new personnel;
- Changes in business affiliation or status; and
- Changes in the laboratory QA plan, SOPs, or applicable operating licenses.

All COC forms will be compared with samples received by the laboratory, and a LOR will be prepared and sent to the Contractor describing any differences in the COC forms and the sample labels or tags. All deviations, such as broken or otherwise damaged containers, will be identified on the receiving report. This report will be forwarded to the Contractor within 2 days of sample receipt and will include a signed copy of the COC form, itemized project sample numbers, laboratory sample numbers, cooler temperature upon receipt, and itemization of analyses to be performed.

Case narrative statements will accompany analytical results from the laboratory. These reports, in conjunction with evaluation of field QC and any significant problems/corrective actions, will form the basis for the project data quality assessment. Final project reports will contain QA sections summarizing the data quality information collected during the project.

16.0 REFERENCES

DoD, 2017. DoD Quality Systems Manual for Environmental Laboratories. Version 5.1, January.

Hawai'i Department of Health (HDOH). 2016. *Technical Guidance Manual for the Implementation of the Hawai'i State Contingency Plan,* Section 4, Decision Unit Characterization. August.

USACE, 2007. Quality Systems Manual Supplement. March.

USEPA, 1994a. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. EPA-540/R-94/013. February.

USEPA, 1994b. *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*. EPA-540/R-94/012. February.

USEPA, 2008. *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*. June.

USEPA, 2017. National Functional Guidelines for Organic Superfund Data Review, EPA-540-R-2017-002, January.

Attachment II
Standard Operating Procedures (SOPs) for Sample Collection

SOP-1 Incremental Sampling Method (ISM)

The purpose of this standard operating procedure (SOP) is to summarize requirements for the effective field implementation of increment sampling method (ISM) for soil undertaken as part of site characterization at contaminated sites. The ISM soil sampling process provides a view of mean contaminant concentrations over the area of a DU.

This SOP applies to all Endpoint personnel and subcontractors who perform ISM activities, and is limited to describing methods for obtaining surface soil samples (considered less than 1-foot below ground surface) for non-volatile, semi-volatile and inorganic analyses using ISM techniques. ISM techniques have been developed for volatile organic compounds and subsurface soil, however, they are not included in this SOP. This SOP was developed according to the following reference documents:

- *American Society for Testing and Materials (ASTM) D-6323-98. 2003 (re-approved). Standard Guide for Laboratory Subsampling of Media Related to Waste Management Activities.*
- *Hawaii State Department of Health (HDOH). 2020. Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan. Office of Hazard Evaluation and Emergency Response. Sections 3.4 and 4.2.*
- *ITRC. February 2012. Technical and Regulatory Guidance, Incremental Sampling Methodology. The Interstate Technology & Regulatory Council Incremental Sampling Methodology Team.*
- *Alaska Department of Environmental Conservation (ADEC). March 2009. Draft Guidance on Multi-Increment Soil Sampling. State of Alaska Department of Environmental Conservation Division of Spill Prevention and Response Contaminated Sites Program. Ramsey, C. and A. Hewitt (Ramsey, et. al.). 2005. A Methodology for Assessing Sample Representativeness, Environmental Forensics. 6:71-75.*
- *Pitard, Francis F. Pierre Gy's. Sampling Theory and Sampling Practice. 1993. 2nd edition. CRC Press.*
- *U.S. Environmental Protection Agency (USEPA). November 2003. Guidance for Obtaining Representative Laboratory Analytical Subsamples from Particulate Laboratory Samples. R.W. Gerlach and J.M. Nocerino, EPA/600/R-03/027. http://www.cluin.org/download/char/epa_subsampling_guidance.pdf.*

This SOP focuses on the most commonly used ISM soil sampling tasks and applications anticipated at a field site and should be used in conjunction with other applicable project SOPs.

General

The objective of ISM is to reduce the variability created by taking discrete samples, and improve the reliability and representativeness of environmental data by obtaining multiple sub-samples (sample increments) over a decision unit (DU) (defined as the area or volume in question). These "increments" are combined into one bulk ISM sample, which is submitted to the laboratory, resulting in a better representation of actual mean concentrations in a DU.

The DU encompasses the area or volume about which a decision is necessary (e.g., deciding whether risks are acceptable or not). Appropriate decision units must be identified for ISM to be valid. Therefore, the identification of decision units is one of the most important factors when using ISM. Identification and delineation of the decision units should be conducted during project planning and identified in a client and regulatory approved Workplan prior to obtaining ISM samples. Since ISM sampling provides an "average" concentration of a DU, agreement on the DU boundaries is extremely important prior to collecting the "bulk increment sample".

The number of increments incorporated into the bulk ISM, and the overall size of the ISM collected are not dependent on the size of the decision unit. The sampling theory is based on an assumption (and empirical observations) that 30 to 100 increments from a given decision unit of any size will result in a sample that is adequately representative of the average contaminant level in the decision unit as a whole. If the decision unit is the size of a small backyard garden, then 30 to 100 increments are collected. If the decision unit is a 10-acre, neighborhood-size area in a former agricultural field, then 30 to 100 increments of a similar mass are likewise collected.

If the contaminant distribution is expected to be very heterogeneous, it may be preferable to increase the number of increments collected to the recommended maximum of 100 for larger DUs. This may help to reduce field sampling error and minimize the variation between replicate samples used to evaluate the precision of the data collected. It has been reported that increasing the number of increments from 30 up to 100 may improve the reproducibility of data collected, and since the ISM sample is submitted as one sample, the number of increments collected does not typically increase analytical costs except that a small fee may be added for the excess sample mass management in the laboratory.

This SOP describes procedures for selecting sampling locations, marking field sampling locations, collecting incremental soil samples, and submitting these samples for laboratory analyses. This SOP assumes that the DU, and method for selecting increment locations within the DU has already been determined in the project work plan or project Quality Assurance Project Plan (QAPP), and that analyses and the laboratory conducting the analyses have been identified in the QAPP.

Sample Collection

ISM samples are prepared by typically collecting 30 to 50 small increments (samples) (up to 100 may be needed if a soil at the DU is determined to be very heterogeneous) of soil from systematic random locations within a specified decision unit and combining these increments into a single sample, referred to as the "bulk ISM sample." Individual soil increments typically weigh between 30 and 50 grams, with bulk ISM typically weighing between 900 and 2,500 grams. The mass of the final bulk ISM depends on the number of increments collected and the size of the sample collection tool utilized. However, a minimum final sample size should not be less than 1 kilogram as a general guideline.

The corners (or boundaries) of each of the designated ISM areas will be located using digital global positioning system and marked using wooden stakes or pin flags. Approximately equal sample volume aliquots will be collected using a step probe sampler, per the procedure outlined below. A sufficient number of aliquots will be collected to provide statistical confidence that the average concentration of a particular constituent within a designated area is represented by the ISM sample. No less than 30 aliquots for each sample will be collected to provide the requisite statistical confidence (95%).

Once the DU has been delineated with flags in the field collection of sample increments may begin.

Use flags or survey twine to define the edges of each grid cell and complete construction of the ISM sample grid similar to those depicted in the figures below.

Figures Illustrating Systematic Random Sampling Method

(Source: HDOH Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan, 2020)

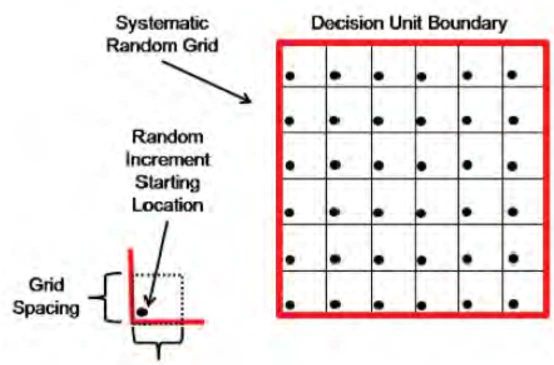

Figure 4-9. Example Increment Collection Locations Based on a Systematic Random Grid Scheme
Grid spacing determined based on DU area and number of desired increments. Initial increment location selected from random location, subsequent increments collected at uniform spacing within DU.

Figure 4-11. Systematic Increment Locations for Odd Shaped DUs (compare to Figure 4-9)
The number of increments collected within grid rows can vary in different areas of the DU.

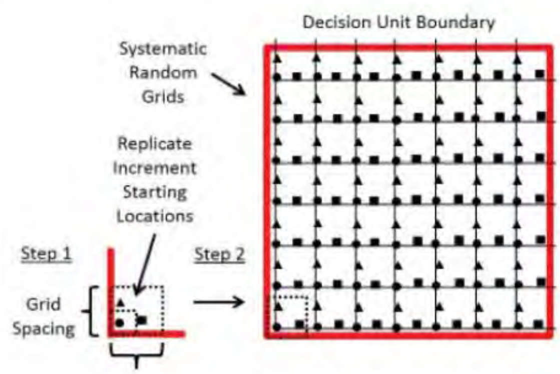

Figure 4-12. Example Collection of Increment Location Points for Triplicate Multi Increment Samples
Increments collected in a systematic random method. Circles, triangles and squares depict increment collection locations for three, respective Multi Increment samples (increments collected halfway between initial increment grid point locations).

Sketch the ISM sample grid design, orientation (compass bearing), overall dimensions, cell dimensions, nearby features, and any other valuable information in the field notebook. Photograph the completed sample grid for future reference. Survey the center and corner stake locations of the DU or record them with a GPS unit.

If using stratified random sampling mode, a grid is set up over the DU making each part of the grid equal size, and one increment is collected at random from each subunit of the grid. If using systematic random sampling mode, select a random starting point in one subunit, then collect an increment sample at this location, and the same location at each subsequent subunit of the DU.

In either mode the following procedures should be followed:

- Sampling tools shall be new or decontaminated prior to use according to the project planning documents.
- Sampling tools need not be decontaminated between each sample increment, but shall be decontaminated or discarded prior to sampling a new DU.
- Test the proposed sampling tool(s), and determine what tool(s) will provide the best sample increments.
- Samples should be collected from the same depth at all incremental sampling locations.
- Larger sized particles (rocks, cobbles, and coral) and roots should be avoided or discarded prior to transferring the sample into the bulk ISM container.
- The laboratory is going to sieve out anything >2 millimeters (mm), so collect enough sample at each increment such that there will still be sample for analysis after the portion > 2mm has been sieved out. This may require collection of multiple aliquots per increment if ISM samples are collected using a small diameter coring device.
- The sample collector will describe and classify soils collected according to Universal Soil Classification System (USCS) nomenclature. At a minimum, this will be done for the final bulk ISM sample after all the increments have been collected. Additionally, during collection of increments, the soil will be described at each significant change in lithology type encountered across the DU. Soil descriptions and classifications will be recorded in the field logbook.
- Individual increments collected are placed into a single sample container to produce the bulk ISM.
- If replicates and triplicates are being collected (strongly recommended), replicate increments may be collected from near the normal sample location by pacing off a few feet from the normal sample collection and obtaining a replicate increment. The triplicate increment may be collected by pacing another few feet from the duplicate increment sampling location.
- Store bulk ISM samples as required by the project planning documents.
- Pack and ship samples to the laboratory in accordance with the project planning documents.

Field instruments (e.g., PID, flame ionization detector, and XRF) will not be used to measure chemical concentrations or bias sample collection, unless it is determined that chemical concentration measurements are needed for the protection of workers' health and safety.

Collection of Field Replicate ISM Samples

To statistically evaluate sampling precision for each DU, replicate ISM samples are collected from selected decision units. Typically two replicate increments are collected from the same depth as the normal sample in different locations. A different random starting location is determined for each replicate collected in the selected DU(s). Replicate sample increments are generally collected along the same approximate directional lines established through the DU for the initial ISM samples, though at different systematic random locations than initially used. This is accomplished by pacing off the replicate increments from a different random starting location on the first line/row of the DU, and continuing to sample at this different random interval throughout the DU.

Replicate samples may be collected by establishing rows for increment collection that run perpendicular to or at a 45 degree angle to the direction used to collect the initial ISM. Another option is to use the same rows but collect increments in between the locations used for the initial sample. Replicate samples should be sent to the laboratory as “blind” samples, meaning the laboratory does not know they represent replicate samples of the initial ISM.

The replicate samples are prepared and analyzed in the same manner as carried out for the initial sample. Triplicate samples (i.e., initial ISM plus two replicates) are preferred and more useful than just duplicates for statistical analysis. If only one DU is being investigated, triplicate samples are recommended. If multiple DUs are being investigated, it may not be necessary to collect triplicates at all DUs.

Laboratory Processing of ISM Samples

The bulk ISM is submitted to the laboratory for analysis. Careful planning with the laboratory for processing of ISM samples by the Project Chemist prior to sample collection is essential to obtain meaningful results. Details of project requirements will be described in the project planning documents.

It is important to note that, while the laboratory is receiving a bulk sample of up to 2,500g, it will only analyze a subset of this sample. One issue discussed in both the Environmental Protection Agency (EPA) and American Society of Testing Materials (ASTM) guidance documents is the choice of a minimum subsample mass for extraction/analysis of soil samples in order to reduce “Fundamental Error” of the lab analyses to approximately 15% or less. The minimum appropriate mass is based on the maximum particle size in the soil samples. For samples with a maximum particle size of <2mm, the minimum analysis mass is 10 grams. If the analytical method to be used typically calls for sample extraction/analysis mass of less than 10 grams, the method should be modified to increase extraction/analysis mass to at least 10 grams for samples with maximum particle sizes of <2mm (larger mass could be beneficial for some analyses). For analyses of fine particulates (e.g., <250 μm), a one-gram sub-sample may be adequate to reduce Fundamental Error below 15%; however, a larger mass may be reliably run by the method (e.g., 2-10 grams).

SOP-2 Bucket Hand Auger Methods

The bucket hand auger method is a method to be used during collection of subsurface soil samples. The bucket hand auger collection method will be accomplished using a 3-inch-diameter stainless steel bucket auger head attached to an extension rod and T-shaped bar. The auger will be advanced continuously over 4.0- to 6.0-inch intervals into the soil to the required depth designated for the sampling location. Material collected in the bucket cylinder in each interval will be removed to the greatest extent possible using a disposable plastic spoon. Each sample interval will be sampled using a new bucket hand auger, even if at the same sampling location.

Soil will be homogenized in a disposable foil pan. Discrete samples for VOC analyses will be taken from the middle of the sample interval without being homogenized.

The bucket auger will be decontaminated after sample collection is completed; however, the auger will not be decontaminated after material is removed from each interval augered at a location unless multiple discrete samples are collected from a single location at different depth intervals.

The diameter of the bucket hand auger used for the investigations will depend upon the quantity of soil or sediment sample required to be collected from each sampling location to fulfill chemical analyses requirements. In general, a 3-inch diameter stainless-steel bucket auger head should be used.

SOP-3 Trowel/Spoon Method

The trowel/spoon method may be used to collect surface soil and sediment samples during remedial activities. The depth interval over which material will be collected using this method will be limited to the interval located from the land surface (after removal of surface debris) to a depth of 15.2 cm (6.0 inches) below ground level or from designated soil stockpiles.

The trowel collection method will be accomplished using a stainless-steel trowel or spoon. This instrument will be used to manually dig into the subsurface material to the required depth designated for the sampling location. The trowel will be decontaminated after digging is completed at each sampling location.

For soil sampling from stockpiles, a 7-point composite soil sample will be collected using a stainless trowel or disposable plastic spoon to collect equal sized aliquots (approximately 1 ounce each) from the stockpile and placed into a disposal foil pan. The total quantity of the discrete aliquot samples selected for compositing will be sufficient to perform all required laboratory analyses. The soil placed into the pan will initially be split into quarters, and each quarter will be mixed thoroughly in the center of the bowl using a disposable foil pan. All four quarters will be mixed together until the single composite sample has a consistent physical appearance. Upon completion of the compositing process, the sample will be divided in half and containers filled by scooping sample material alternately from each half.

SOP-4 Field Quality Control Sampling Procedures

Duplicate QC samples and matrix spike/matrix spike duplicate (MS/MSD) samples will be collected in association with surface soil and/or sediment samples during remedial activities. Equipment rinsate blanks and trip blanks will not be collected due to soil being the only sampling media and the use of disposable sampling equipment; therefore, no decontamination/rinsing of soil sampling equipment will be performed. Temperature blanks will be placed in each cooler.

Duplicate soil samples and MS/MSD samples (if extra volume is required for MS/MSD analysis) will be collected using the same composited material as the primary sample, using procedures defined in SOP-1 through SOP-3, herein. The duplicate is submitted as “blind” to the laboratory and is used to determine whether the field sampling technique is reproducible and to check the accuracy of reported laboratory results. Information regarding the total number, collection frequency, and analytical parameters for duplicate and MS/MSD samples is provided in Table 1 of Attachment I (QAPP) of the SAP. However, the number of duplicate samples will typically represent 10% of the total number of field samples collected for each AOC-specific removal effort or each excavation within each AOC.

An MS is an aliquot of a sample spiked with known quantities of specified target analytes and subjected to the entire analytical procedure. It is used to measure method accuracy and to indicate matrix effects. An MSD is a second aliquot of the sample spiked with known quantities of the same compounds. The purpose of the MSD, when compared with the MS, is to determine the precision for the method, field procedures, and matrix. If required, extra volume of sample is collected along with the field sample at the sampling location. In instances where the primary sample contains enough volume to perform MS/MSD analysis, no extra volume is required. The number of MS/MSDs will typically represent 5% of the total number of field samples.

A temperature blank (or temperature indicator) is a VOA vial or other small sample bottle filled with water and placed in each cooler. The temperature of this vial is measured upon arrival at the laboratory. The temperature blank is not analyzed and does not provide any measure of induced contamination. It is only provided to evaluate whether samples were adequately cooled during shipment.

SOP-5 Sample Documentation

Documentation Procedures:

The tracking procedure used to document all samples collected during the AOC-specific remedial activities is listed below.

1. Collect and place the samples into laboratory sample containers, as defined in SOP-1 through 4.

2. Complete the sample container label information as defined below.

3. Place the sample containers into an ice-filled cooler as specified by the sample method.

4. Complete sample documentation information on field forms.

5. Complete the project and sampling information sections of the COC form(s) for all samples to be transported in a single cooler, as defined below.

6. Complete the airbill for the cooler to be shipped (if necessary).

7. Perform a completeness and accuracy check of the COC form(s).

8. Complete the sample relinquishment section of the COC form(s) and place the form(s) into the cooler.

9. Place the COC seals on the exterior of the cooler.

10. Pack and ship the cooler to the laboratory as defined in SOP-6.

11. Laboratory receives the cooler, inspects the contents, and records the sample receipt information of the contained COC form(s) and cooler receipt form(s) as defined below SOP-6. Each cooler must have a separate cooler receipt form.

12. Transmit the original COC form(s) with the final analytical results from the laboratory.

Sample Labels:

All sample containers provided by the contracted analytical laboratory for use during the AOC-specific removal effort will be shipped with sample labels pre-affixed to the containers, or the labels will be affixed to the bottles upon delivery to the AOC. Information will be recorded on each sample container label at the time of sample collection. Sample labels will be completed with black indelible ink. However, if pre-printed labels are used, only field-specific information not already on the labels will be recorded at the time of sample collection. After labeling, if waterproof labels are not used, the label should be covered with wide clear tape to preserve the label during shipment. The information to be recorded on the labels will be as follows:

- Contractor name;
- Project name/sampling activity name;
- Sample identification number;
- Sample type (discrete or composite);
- Sample media;
- AOC name and/or sampling station number;
- Analysis to be performed;
- Associated sample methods;
- Volume of containers;
- Type of containers;
- Type of chemical preservative present in container;
- Destination laboratory name;
- Date and time of sample collection;
- Comments and special precautions; and
- Sampler(s) name and initials.

Chain-of Custody (COC) Records:

COC procedures implemented for the removal effort will be in three parts: documenting the handling of each sample from the time of collection, through completion of laboratory analysis, and delivery of final evidence files. The COC form serves as a legal record of sample possession. A unique number printed or entered on the form will identify each COC. A sample or evidence file is considered to be under custody if when it is:

- In the sampler's physical possession;
- In the sampler's view after being in possession;
- In the sampler's possession and then was secured so any tampering can be detected; or
- In a designated secure area.

Custody will be documented throughout the AOC-specific remediation field sampling activities by the COC form initiated for each day during which samples are collected. This COC will accompany the samples from the AOC to the laboratory and will be returned with the final analytical report. The field sampler is responsible for the care and custody of the samples until they are transferred or properly dispatched. All personnel with sample custody responsibilities will be required to sign, date, and note the time on the COC form in indelible ink when relinquishing samples from their immediate custody (except in the cases where samples are placed into designated secure areas for temporary storage before shipment). As few people as possible should handle the samples. All shipments will be accompanied by the COC record identifying the contents. The original record will accompany the shipment and copies will be retained by the sampler for return to project management and the project file. Bills of lading or airbills will be used as custody documentation during times when the samples are being shipped from the AOC to the laboratory and they will be retained as part of the permanent sample custody documentation. Whenever co-located or split samples are collected for comparison analysis by the U.S. Army QA Laboratory or a government agency, a separate COC will be prepared for those samples and marked to indicate with whom the samples are being split.

COC forms will be used to document the integrity of all samples collected. To maintain a record of sample collection and transfer between personnel, shipment, and receipt by the laboratory, COC forms will be filled out for sample sets as determined appropriate during the course of fieldwork.

The following information will be recorded on all COC forms:

- Project name (and USACE delivery order number);
- Name of Contractor;
- Name of Contractor Project Manager and contact information;
- Sample number (for each sample in shipment);
- Sample station (for each sample in shipment);
- Collection date and time (for each sample in shipment);
- Number of containers for each sample;
- Sample description (i.e., environmental medium);
- Sample type (discrete or composite);
- Analyses required for each sample;
- Sample methods;
- Sample preservation technique(s);
- COC or shipment number;
- USACE LIMS number (only on COC records for U.S. Army QA sample shipments);
- Shipping address of the laboratory;
- Name of subcontractor QA manager and contact information;
- Date, time, method of shipment, courier, and airbill number; and
- A space to be signed as custody is transferred between individuals.

The individual shipping the samples from the field to the laboratory is responsible for completing the COC form and noting the date and time of shipment. A field sampling team member or project QA manager will also inspect the form for completeness and accuracy. In addition, this individual determines the shipping classification for samples under United States Department of Transportation (DOT) HM126F, 49 *Code of Federal Regulations (CFR)*, Subtitle B, Chapter 1, Subchapter C, Hazardous Materials Regulations, and International Air Transport Association (IATA) dangerous goods regulations. After the form has been inspected and determined to be satisfactorily complete, the responsible individual signs, dates, and notes the time of transfer to the approved shipping company on the form. If samples are shipped to a laboratory in the local area, samples just collected and stored on ice may not have sufficient time to cool to the required temperature of 4°C (±2°C). The responsible individual will make note of this on the COC form. The COC form then is placed in a sealable plastic bag and placed inside the cooler used for sample transport. If a local courier service is used, the documentation can be given to the courier directly.

In addition to the COC form, custody seals will be placed on each cooler used for sample transport. These seals consist of a tamper-proof adhesive material placed across the lid and body of the coolers in such a manner that if the cooler is opened, the seals will be broken. The custody seals ensure no sample tampering occurs between the time the samples are placed into the coolers and the time the coolers are opened for analysis at the laboratory. Cooler custody seals are signed and dated by the individual responsible for completing the COC form contained within the cooler. The signature and date are written on both the cooler lid and cooler body portions of the seals.

Receipt of Sample Forms:

The contracted laboratory documents the receipt of environmental samples by accepting custody of the samples from the approved shipping company. This receipt is documented under the received by block on the COC. In addition, the contracted laboratory documents the condition of the environmental samples upon receipt. Sample receipt(s), including received COC, sample cooler receipt form, and sample login information, is transmitted to the project manager.

Final Evidence Files Custody Procedures:

The Contractor is the custodian of the evidence file and will maintain the contents of evidence files for each investigation, including all relevant records, reports, logs, field notebooks, pictures, subcontractor reports, correspondence, laboratory logbooks, and COC forms. Each project evidence file will be stored in a secure limited-access area and under custody of the Contractor Project Manager.

Analytical laboratories will retain all original raw data information (both hard copy and electronic) in a secure, limited-access area and under custody of the Laboratory Project Manager.

Corrections to Documentation:

All original information and data in field logbooks/data sheets, on sample labels, on COC forms, and on any other project-related documentation are recorded in black waterproof ink and in a completely legible manner. Errors in any document are corrected by crossing out the error and entering the correct information or data. Any error discovered in a document is corrected in the field by the individual responsible for the entry. Erroneous information or data are corrected in a manner that will not obliterate the original entry, and all corrections are initialed and dated by the individual responsible for the entry.

Monthly Reports:

Monthly reports may be submitted during implementation of remedial activities at AOCs as contracts require. The Monthly Reports focus on the progress to date of the AOC-specific remediation and are submitted directly to the U.S. Army Project Manager by the 10th day of the month following the reporting period. Copies of the Monthly Report are subsequently submitted to the Ohio EPA Northeast District Office Site Coordinator. The Monthly Reports will document AOC identification and activities, status, percent complete, data collected to date (excluding analytical results), difficulties encountered, corrective actions, and planned activities.

SOP-6 Sample Packaging and Shipping Requirements

Sample containers must be packaged according to requirements for preservation in transit to laboratories. Samples requiring cooling are packaged in thermally insulated rigid-body coolers. Samples not requiring cooling (i.e., geotechnical soil samples) are packaged in heavy cardboard shipping boxes. Environmental, QA, and QC samples collected during the project are shipped within their hold time to the laboratory. During the time period between collection and shipment, all samples are stored in ice-filled coolers or refrigerators and maintained in a secure area. Sample packaging, labeling, and shipping are conducted in accordance with applicable DOT (49 *CFR*)/IATA dangerous goods specifications and completed in accordance with instructions defined in Appendix F of the *Requirements for the Preparation of Sampling and Analysis Plans* (USACE 2001c)[1]. Packaging and shipping procedures for environmental samples collected during the AOC-specific remedial activities are as follows:

- Identify all sample containers with sample labels placed onto each container. Clearly label all samples with waterproof ink.

- Verify that sample containers are the appropriate type and volume and are properly preserved.

- Match sample containers with the information on the COC.

- Clean the exterior of all sample containers, if necessary.

- Ensure all bottles are properly sealed with lids tightened. If unsure about lid integrity, tape bottles, except those containing samples designated for volatile organic analyses, with electrical tape.

- Place all glass sample bottles in bubble wrap sleeves or Styrofoam forms.

- Place each sample bottle into a separate plastic bag that will then be sealed. For groundwater samples, place each vial for an individual sample into the same plastic bag. Wrap trip blank containers and place them in the cooler with the volatile organic analyte vials. Squeeze as much air as possible from the sample container bags before sealing.

- Tape the cooler drain plug shut from both the inside and outside before placing the samples into a rigid-body cooler. Line the cooler with a large plastic bag; cushioning packing material is preferred.

- Place all of the sample containers upright in the shipping coolers inside a large plastic bag along with sufficient ice to maintain a temperature of 4°C ±2°C, which will be placed around, among, below, and on top of the sample containers. Include a temperature blank in each cooler.

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[1] USACE 2001c. *Requirements for the Preparation of Sampling and Analysis Plans*. EM 200-1-3. February 2001.

- Ensure a trip blank is included in each cooler containing environmental samples for organic analysis, beginning when the environmental samples are placed in the cooler for storage and/or shipment.

- Place additional inert packing material into the cooler, if required, to prevent shifting of the sample containers during transport.

- Place all required laboratory paperwork, including the COC form(s), inside a plastic bag and tape it to the inside of the cooler lid.

- To complete the packing process, seal the cooler liner, close the cooler lid, and place two signed/dated custody seals on the cooler – one across the front and one across the side.

- Place arrows on each cooler indicating which end is up.

- Seal rigid-body coolers with strapping tape applied directly to the cooler body. Duct tape may be used around the seam of the cooler if shipping via a commercial carrier.

- Complete the airbill, if required for the shipment, and attach it to the top of the shipping box/cooler, which then will be transferred to the courier or commercial carrier for delivery to the laboratory. Verify the airbill contains accurate information prior to shipment.

- All coolers containing investigation samples will be shipped overnight to the laboratory by Federal Express or a similar courier.

Failure to properly handle, document, or ship the project samples as detailed could jeopardize the usability of the sample results and ultimately the project objectives.

Environmental samples should not be shipped as a hazardous material or a dangerous good unless they are known or expected to present a hazard as specified in one of the nine DOT hazard classes. In addition to standard shipping requirements and packaging and shipping procedures, hazardous samples collected during the AOC-specific remedial activities require the following:

- Each bagged sample bottle is placed upright into a separate paint-type can, the can filled with vermiculite or a similar packing material, and the lid secured to the can. The lid is sealed with metal clips or with strapping tape.

- Arrows are placed on each can indicating which end is up.

- The outside of each can is labeled with the proper DOT shipping name and identification number for the sample. This information is recorded on a sticker affixed to the can or printed legibly directly on the can.

- The cans containing samples are placed upright in a rigid-body cooler that has had its drain plug taped shut inside and out and has been lined with a large plastic bag. Vermiculite or a similar packing material is placed into the bottom of the cooler.

- All hazardous samples are shipped to the laboratory on ice, which will be contained in double plastic bags placed around, among, and on top of the sample container cans.

- Additional inert packing material is placed around and on top of cans in the cooler to prevent shifting during transport. After this material is added, the plastic liner inside the cooler is taped shut.

- Emergency response information must accompany hazardous materials shipments. This requirement is met by providing the carrier with Material Safety Data Sheets or by entering the Emergency Response Guidebook guide numbers on the shipping paper.

- The following markings are placed on the top of the cooler:
  - Proper shipping name;
  - DOT identification number;
  - Shipper’s or consignee’s name and address; and
  - “This End Up” legibly written if the shipment contains hazardous liquid materials.

- The following labels are placed on the top of the cooler:
  - Appropriate hazard class label (placed next to the proper shipping name); and
  - “Cargo Aircraft Only,” if applicable.

- The airbill, if necessary, for the shipment, is completed and attached to the top of the cooler, which then is transferred to the courier for delivery to the laboratory. Restricted-article airbills are used for the shipment, and the “Shipper Declaration for Dangerous Goods” section of the airbill is properly completed.

The contracted laboratory and/or USACE QA laboratory will document the condition of the environmental samples upon receipt at the laboratory. This is commonly completed on a “Condition Upon Receipt” form. The Condition Upon Receipt form or cooler receipt checklist will be provided to the Contractor Laboratory QA Manager within 24 hrs of sample receipt and should be included as part of the final laboratory deliverable. Both the contractor and USACE QA laboratories are responsible for the final disposition of environmental samples, including proper handling and disposal.

SOP-7 Investigation Derived Waste

IDW Collection and Containerization:

All wastes generated during environmental remediation activities at the former RVAAP must be managed in accordance with federal and state of Ohio requirements, this SOP, and the Camp James A. Garfield Waste Management Guidelines. All waste including trees/vegetation that are mulched onsite, will be tracked using the Waste Tracking Form and submitted to the OHARNG at the completion of the remedial action. All indigenous solid IDW (i.e., metals-impacted soils or PAH-impacted soils from RVAAP-76) will be excavated and loaded directly into plastic-lined hauling trucks and will be transported and disposed at the appropriate off-site disposal facility based on the results of in-situ profile samples collected prior to excavation.

In the event that indigenous solid IDW cannot be loaded directly into a haul truck, it will be contained in either labeled, DOT-approved, open-top 55-gal drums and sealed with bung-top lids or a staged roll-off bin. The temporary staging of solid IDW will be in a manner protective of human health and the environment. All potentially hazardous solid IDW will be segregated from potentially non-hazardous IDW and will be contained immediately in labeled, DOT-approved, open-top 55-gal drums equipped with plastic drum liners and sealed with bung-top lids.

All solid non-indigenous (e.g., expendable sampling equipment, PPE, and trash) IDW will be segregated as non-contaminated and potentially contaminated material. Potentially contaminated and non-contaminated solid non-indigenous IDW will be identified in the field based on visual inspection (e.g., soiled versus non-soiled), usage of the waste material (e.g., outer sampling gloves versus glove liners), and field screening of the material using available field instrumentation (e.g., organic vapor analyzer). All non-contaminated, non-indigenous, solid IDW will be contained in plastic lined trash cans with lids. Potentially contaminated non-indigenous solid IDW will be contained in labeled, DOT- approved, open-top 55-gal drums equipped with plastic drum liners and sealed with bung-top lids.

Minor volumes of liquid non-indigenous IDW (i.e., decontamination water) is anticipated; however, in the event that sufficient volume is generated, all liquid non-indigenous IDW will be segregated by metals-contaminated or PAH-contaminated. Metals-contaminated liquid will be disposed of within the truck loads containing metals-impacted soils slated for off-site disposal or contained in labeled, DOT-approved, 55-gal closed-top drums if the volume of metals-contaminated liquid IDW is too large a volume to add to the truck load. PAH-contaminated liquid will be temporarily stored in approved polyethylene storage containers and recycled within the VEG Technology's vapor generator.

IDW Container Labeling:

All containers, including empty ones, must be properly labeled. All waste storage containers (drums and storage tanks) will be labeled immediately before and continuously during their use to ensure proper management of the contained wastes. All labels will be weather-resistant, commercially available labels. Two labels will be affixed and located on opposite sides on the upper one-third of each storage container. Labels will be legibly completed using indelible ink. The drum number will be legibly recorded directly on a clean dry drum surface on the top and upper one-third of each storage container using an indelible paint marker. Additional label information may be recorded directly on a clean dry drum surface.

An example of the waste storage container label is shown in Figure 7-1. The following procedure will be used for waste container labeling:

- Place each label on a smooth part of the container and do not affix it across drum bungs, seams, ridges, or dents.
- Upon use of a container, replace the empty label with a drum label filled out with the information listed below.
- When classifying the IDW based on analytical results of the in-situ waste profile samples collected for each AOC, affix the appropriate hazardous or non-hazardous label to the drum.
- Record the following information on each label:
    - Contractor-assigned container number;
    - Contents;
    - Source of waste;
    - Source location (if applicable);
    - Project name and AOC identification;
    - Physical characteristic of the waste;
    - Generation date(s);
    - Address of waste generation; and
    - Contact information for a contractor contact and the CJAG JMTC Environmental Office.
- Record all information on container labels with indelible ink (permanent marker, UV resistant permanent marker or paint pen) and record necessary information on an appropriate field form.
- Protect all container labels so that damage or degradation of the recorded information is prevented.

DRUM NUMBER: 2021-LL9ss-001

CONTENTS Unsaturated Soil, 75% Full

SOURCE OF WASTE: LL9 Remedial Action

SOURCE LOCATION: Area 1 LL9ss-001

GENERATION DATE(S) 06/07/21-6/08/21

ADDRESS: 8451 State Route 5, Ravenna OH 44266

CONTACT: First Last (Company) (555)-555-5555
First Last (RVAAP) (330)-555-5555

COMMENTS_______________________________________

Figure 7-1. Example of Waste Storage Container Label

IDW Field Staging:

Subject to the review and approval of OHARNG staff before the start of a project, a field staging area (FSA) for IDW generated during remedial activities will be designated at each AOC. These FSAs are temporary storage areas only; no 90-day hazardous waste will be stored in an AOC-specific FSA. All IDW will be stored in the AOC-specific FSA until all excavation activities have been completed at the AOC or up to 30-days after generation, after which the IDW will be transported to and temporarily stored at Buildings 1036 (non-hazardous) and 1047 (hazardous) pending coordination of off-site disposal based on the waste profile sampling results collected in-situ prior to excavation activities. While a large volume of hazardous waste is not anticipated (due to direct loading of metals-impacted soils to hauling trucks and the anticipated small volume of contact waste generated from remediation of metals-impacted soils), in the event that sufficient hazardous waste is generated and requires onsite temporary storage, it will be stored at a centralized 90-day storage area located at Building 1047 with the final location approved by OHARNG Representatives.

Each FSA will be visibly marked and all waste containers (drums and polyethylene tanks) will be placed on top of plastic sheeting or pallets with raised edges to prevent any potential spilled liquid from escaping. In addition, the FSA will have an orange construction fence surrounding it. All IDW will be segregated by location (e.g., specific excavation areas within an AOC) and type (e.g., soil or water) so that it can be identified with a given location or operation. All waste containers will be stored in a manner to accommodate inspection and additional sampling, if necessary, and to facilitate safe handling of the containers. All labels will be oriented so they are facing out in a consistent direction to facilitate easy inspection. All RCRA hazardous wastes will be managed in accordance with the appropriate technical requirements establish in Ohio Administrative Code, Chapter 3745-55, Management of Hazardous Waste (40 *CFR* 264, Subparts I [containers] and J [tanks]).

Hazardous and non-hazardous IDW staged and stored at the former RVAAP is subject to the requirements of RVAAP's Installation Hazardous Waste Management Plan. Although storage of hazardous waste is not anticipated, in the event hazardous waste requires temporary storage, all contractors conducting environmental activities at the former RVAAP must comply with the following minimum requirements of aforementioned plan, including:

- No 90-day hazardous waste storage areas will be permitted within an AOC. Hazardous waste will be stored at a centralized 90-day storage area located at Building 1047.
- Waste characterized as hazardous based upon the result of analytical data will be designated and labeled as hazardous waste upon review of validated laboratory analytical and final classification of the waste. Waste characterized as hazardous must be moved to the designated 90-day storage area within 72 hours of the declaration that the waste is hazardous. Hazardous waste must be disposed within 90 days of the classification.
- All contractor waste, including environmental waste pending sampling, pending analysis waste, hazardous waste, and non-hazardous waste will be inspected and inventoried weekly. Documentation of the inspection will be recorded on the RVAAP weekly non-hazardous and hazardous waste inventory sheet. This inventory sheet will be submitted weekly to the CJAG JMTC Environmental Office as long as the waste is stored on-site. Hazardous waste must be inventoried every 7 days, at a

minimum, and maintain compliance with federal regulations (40 *CFR* 260-265). Inventory and inspection must include, at a minimum:

- Inventory of number of containers;
- Inspection of container(s) conditions (no bulging, or rusting);
- Inspection of labels (all present, correctly labeled, not faded);
- Date and time of inspection; and
- Inspectors name and signature.

- Both hazardous and non-hazardous waste (except for municipal waste) must be manifested.
- Hazardous waste containers must be closed and tightened according to manufacturer's specifications using a calibrated torque wrench (49 *CFR* 173.22).
- All contractors must obtain an RVAAP tracking number when shipping waste; this number must be written on the top of the front page of the manifest.
- The source of the waste (project name, activity, area within the AOC) and the weight must be written on the manifest.
- The contractor must give the state's copy of the manifest to the appropriate Camp James A. Garfield personnel, who will submit it on behalf of the facility.
- All non-hazardous containerized waste not transported off-site within 30 days following project completion must be consolidated at an RVAAP-approved storage area near Post 1. Any non-hazardous liquid waste will require secondary containment.
- All liquid hazardous waste must have secondary containment.
- All contractors must confirm that the disposal facility has received the hazardous and non-hazardous waste shipments within the required time frames. This will be accomplished by contacting the ARNG/OHARNG/USACE LRL Representative to verify that the disposal facility signed and returned a copy of the manifest to Camp James A. Garfield. If the copy has not been returned within 35 days of the pickup date, the contractor must immediately notify the CJAG JMTC Environmental Office and begin corrective actions.

<u>IDW Disposal:</u>

All indigenous and non-indigenous wastes generated are subject to disposal protocols outlined in the Camp James A. Garfield Waste Management Guidelines. The OHARNG Representative (or alternatively the ARNG Representative if waste is deemed non-hazardous), will sign all waste manifests and other shipping documents and oversee the disposition of all IDW at Camp James A. Garfield. Transportation of all IDW for storage and/or disposal will be in accordance with applicable state of Ohio and federal regulations.

When IDW will be disposed of off-site, using public roads as a means of transportation, the shipment or transportation of IDW may be subject to DOT requirements for containerizing, labeling, and shipping documentation (49 *CFR* 172).

There is no means for disposal of contaminated IDW at the former RVAAP. All IDW determined to be a hazardous waste will be disposed according to applicable state of Ohio and federal regulations at an approved off-site hazardous waste facility.

Any contaminated or potentially contaminated liquid IDW or saturated-soil IDW that is stored onsite during winter months will require special management to prevent accidental releases due to freezing. The contractor's foremost responsibility is to manage IDW so that, if possible, disposal can be completed before freezing conditions arise. If disposal cannot be executed before the onset of such conditions, or if long-term storage of liquids is anticipated, secondary containment is required and the waste may be stored inside Building 1047 upon OHARNG approval.

Secondary containment is the responsibility of the contractor and is subject to the requirements of RCRA.

All non-indigenous solid (expendable sampling equipment and trash) IDW will be disposed of as either sanitary trash or, if determined to be potentially contaminated, stored in an FSA located within the AOC and upon completion of excavation activities, transported and temporarily stored at Building 1036 until such time that it can be disposed at an approved facility.

All disposal facilities (must be in good standing with environmental regulatory agencies. The CJAG JMTC Environmental Office must be notified in advance of waste disposal as to which disposal facility is to be used. The CJAG JMTC Environmental Office has the authority to refuse the use of a particular disposal facility based on his/her review of their ability to protect the interests of the U.S. Army.

SOP-8 Field Variances and Corrective Actions

Field Variance System:

Variances from the operating procedures detailed in these SOPs or the approved SAP will be documented on a field change request (FCR) form (Figure 8-1) or an NCR form (Figure 8-2) where appropriate. If, during the remediation effort, changes necessary to meet the objectives of the SAP are identified, the Contractor QA Manager will contact the U.S. Army Project Manager and Ohio EPA to initiate the FCR and obtain proper approval for recommended changes.

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. These personnel are responsible for following QA procedures; the CCQC representative is responsible for verifying these procedures are being followed. 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 daily field sheets and in the daily QC report. If the problem is determined to be significant or subject to reoccurrence, the CCQC representative will initiate an NCR that will be submitted to the Contractor QA Officer, if this individual differs from the CCQC. An example of the NCR is illustrated in Figure 8-2. The Contractor QA Officer will then propose and implement an appropriate corrective action as documented on the NCR.

The Contractor QA Officer is responsible for ensuring that corrective actions for nonconformances are initiated by:

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

If appropriate, the CCQC representative or QA Officer will ensure that no additional work that depends on the nonconforming activity is performed until corrective actions are implemented and the nonconforming 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).

FIELD CHANGE REQUEST

FCR NO. ______________________________ DATE INITIATED __________
PROJECT ______________________________
CONTRACT NO. ______________________________

REQUESTOR IDENTIFICATION
NAME____________________ ORGANIZATION __________ PHONE __________

TITLE ____________________ SIGNATURE

BASELINE IDENTIFICATION
BASELINE(S) AFFECTED ☐ Cost ☐ Scope ☐ Milestone ☐ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION)

DESCRIPTION OF CHANGE:

JUSTIFICATION:

IMPACT OF NOT IMPLEMENTING REQUEST:

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

COST ESTIMATE ($) _0_ ESTIMATOR SIGNATURE ______________________
PHONE______________ DATE ________________

PREVIOUS FCR AFFECTED ☐ YES ☐ NO; IF YES, FCR NO. ___

USACE COR: ______________________________ DATE: ______________

OHIO EPA PROJECT MANAGER: ____________________ DATE: ______________

ENDPOINT H&S MANGER: ______________________________ DATE: ______________

Figure 8-1. Example of FCR to be Used for RVAAP AOC-Specific Investigations

NONCONFORMANCE REPORT	DATE OF NCR	NCR NUMBER
	LOCATION OF NONCONFORMANCE	PAGE ____ OF ____

INITIATOR (NAME/ORGANIZATION/PHONE)	FOUND BY	DATE FOUND
RESPONSIBLE ORGANIZATION/INDIVIDUAL		PROGRAM
		PROJECT

DESCRIPTION OF NONCONFORMANCE

CATEGORY: ____ ____ ____ ____ ____

A INITIATOR DATE QA/QC OFFICER DATE CAR REQ'D YES ☐ NO ☐

DISPOSITION:

PROBABLE CAUSE:

ACTIONS TAKEN TO PREVENT RECURRENCE:

B PROPOSED BY: ______ NAME ______ DATE

JUSTIFICATION FOR ACCEPTANCE

C INITIATOR: ______ NAME ______ DATE

VERIFICATION OF DISPOSITION AND CLOSURE APPROVAL

REINSPECTION/RETEST REQUIRED YES ☐ NO ☐ IF YES; ______ DATE ______ RESULT

D QUALITY ASSURANCE: ______ NAME ______ DATE

Figure 8-2. Example of NCR to be Used for RVAAP AOC-Specific Investigations

Laboratory Analysis:

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 Contractor QA Manager. If the problem is determined to be minor, the Contractor QA Manager will initiate an appropriate corrective action, which will be recorded in a memorandum submitted to the Contractor Project Manager and the ARNG/OHARNG/USACE LRL Representative. If the problem is determined to be significant, the Contractor QA Manager will initiate an NCR. Analytical NCRs will be copied to the U.S. Army Project Manager.

Laboratory personnel will be alerted that corrective actions may be necessary if 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.

Attachment III
Field Forms

Endpoint
Strategy. Science. Sustainability.

CONTRACTOR'S QUALITY CONTROL DAILY REPORT

REPORT NO. 7 SHEET 1 OF 1

PROJECT	CONTRACT NO.	DATE

CONTRACTOR'S REPRESENTATIVE ON THE JOB

WEATHER (Rain, Snow, Cloudy, Windy, etc.)	GROUND CONDITIONS (Dry, Damp, Wet, Frozen, etc.)

1. PRIME CONTRACTOR:

NO. EMPLOYEES BY JOB CATEGORIES (Arrival and Departure)	Hours	HEAVY EQUIPMENT ON JOB (Arrival and Departure)	NO. UNITS	HRS. WORKING		
				YES	NO	Comments

WORK PERFORMED BY PRIME CONTRACTOR:

MATERIALS DELIVERED (Arrival/MSDS)	OFFICIAL VISITORS TO SITE (Arrival and Departure)

2A. SUBCONTRACTOR,

NO. EMPLOYEES BY JOB CATEGORIES (Arrival and Departure)	Hours	HEAVY EQUIPMENT ON JOB (Arrival and Departure)	NO. UNITS	HRS. WORKING		
				YES	NO	Comments

WORK PERFORMED BY SUBCONTRACTOR:

3. SPECIFIC INSPECTIONS: (Inspections performed, results, and corrective actions)

4. TESTING: ☐1 Check if any testing was performed today. (Complete and attach Test Report Information Sheets.)

Type and Location of Testing:

5. CONSTRUCTION DEFICIENCIES OR RE-TESTING REQUIRED. AS A RESULT OF GOVERNMENT ONSITE QA:

6. HEALTH AND SAFETY OBSERVATIONS OR ACTIONS TAKEN:

7. CONTRACTOR DELAYS/PROBLEMS/DEFICIENCIES/CORRECTIVE ACTIONS:

8. REMARKS:

9. CERTIFICATION:

I certify that the above report is complete and correct and that I, or my authorized representative, have inspected all work performed this day by the prime contractor and each subcontractor and determined that all materials, equipment, and workmanship are in strict compliance with the RD, SAP/QAPP, and USACE requirements.

Contractor's Quality Control Representative

____

Field Sampling Report
Location ID:

Date:

Sampling Information

Source	**Soils / Sediments / Sludge**				
Method	Scoop		Trowel		
	Bowl		Hand Auger		
	Push Probe				
Miscellaneous					

Sample Collection: _______ hrs **Sample Type:** Composite - MI - Grab
Location: Plotted on Map - Staked in Field
If MI, # of increments taken: ___________ Estimated - Measured - Surveyed
Sample Depth: __________ FT (below surface) **Decon:** Dedicated - Each Day - Each Location

Analytical Parameters		**QA Samples**	
PAHs		MS/MSD	
Arsenic		Duplicate ID	
Lead		QA Split Sample	
Mercury		Temperature Blank	

Sample Description

Soil sample description should include:
Color Odor Staining Texture Moisture

Logged By: ______________________________________ Reviewed by:
(Please Print)

Signature: ________________________ Date: ________ Signature: __________________________ Date:

FIELD CHANGE REQUEST

FCR NO. ________________________________ DATE INITIATED __________
PROJECT ________________________________
CONTRACT NO. ___________________________

REQUESTOR IDENTIFICATION
NAME________________________ ORGANIZATION ___________ PHONE __________

TITLE ________________________ SIGNATURE

BASELINE IDENTIFICATION
BASELINE(S) AFFECTED ☐ Cost ☐ Scope ☐ Milestone ☐ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION)

DESCRIPTION OF CHANGE:

JUSTIFICATION:

IMPACT OF NOT IMPLEMENTING REQUEST:

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

COST ESTIMATE ($) __0__ ESTIMATOR SIGNATURE ____________________________
PHONE________________ DATE ____________________

PREVIOUS FCR AFFECTED ☐ YES ☐ NO; IF YES, FCR NO. ___

USACE COR: ____ DATE: ________________

OHIO EPA PROJECT MANAGER: ________________________ DATE: ________________

ENDPOINT H&S MANGER: ______________________________ DATE: ________________

TestAmerica Savannah
5102 LaRoche Avenue

Savannah, GA 31404-6019
phone 912.354.7858 fax 912.352.0165

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc.

Client Contact	**Project Manager:**	**Site Contact:**	**Date:**	COC No:
Company Name	**Tel/Fax:**	**Lab Contact:**	**Carrier:**	_______ of ______ COCs
Address	**Analysis Turnaround Time**			Sampler:
City/State/Zip	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx Phone	TAT if different from Below _________			Walk-in Client:
(xxx) xxx-xxxx FAX	☐ 2 weeks			Lab Sampling:
Project Name:	☐ 1 week			
Site:	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)																	Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____________

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for__________ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (^{o}C): Obs'd:_________ Corr'd:__________ Therm ID No.:____________

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time: