

Final

**Record of Decision
for Soil, Sediment, and Surface Water
at RVAAP-48 Anchor Test Area**

**Ravenna Army Ammunition Plant
Ravenna, Ohio**

**Contract No. W912QR-04-D-0028
Delivery Order No. 0001**

Prepared for:



**US Army Corps
of Engineers®**

**United States Army Corps of Engineers
Louisville District**

Prepared by:



**Leidos Engineering of Ohio, Inc.
8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087**

March 18, 2014

REPORT DOCUMENTATION PAGE

*Form Approved
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| 1. REPORT DATE (DD-MM-YYYY) 18-March-2014 | | 2. REPORT TYPE Technical | | 3. DATES COVERED (From - To) 1996 to 2014 | |
| 4. TITLE AND SUBTITLE Final Record of Decision for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area Ravenna Army Ammunition Plant Ravenna, Ohio | | | | 5a. CONTRACT NUMBER W912QR-04-D-0028 | |
| | | | | 5b. GRANT NUMBER NA | |
| | | | | 5c. PROGRAM ELEMENT NUMBER NA | |
| 6. AUTHOR(S) Jed Thomas, PE | | | | 5d. PROJECT NUMBER Delivery Order No. 0001 | |
| | | | | 5e. TASK NUMBER NA | |
| | | | | 5f. WORK UNIT NUMBER NA | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Leidos Engineering of Ohio, Inc. 8866 Commons Boulevard Twinsburg, Ohio 44087 | | | | 8. PERFORMING ORGANIZATION REPORT NUMBER 13-054(E)/3142014 | |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) USACE - Louisville District U.S. Army Corps of Engineers 600 Martin Luther King Jr., Place PO Box 59 Louisville, Kentucky 40202-0059 | | | | 10. SPONSOR/MONITOR'S ACRONYM(S) USACE | |
| | | | | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) NA | |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT Reference distribution page. | | | | | |
| 13. SUPPLEMENTARY NOTES None. | | | | | |
| 14. ABSTRACT This Record of Decision presents remedial alternatives and the selected remedy for soil, sediment, and surface water within the Anchor Test Area Area of Concern. The selected remedy (Alternative 2: Attain Unrestricted [Residential] Land Use) involves the removal of surface soil with chemical contamination above the cleanup goal for Unrestricted Land Use and disposal off-site at a licensed disposal facility. Removal will be conducted at location ATAss-005M under this remedy. There are no chemicals of concern in subsurface soil, surface water, and sediment; therefore, no further action is required for these media. | | | | | |
| 15. SUBJECT TERMS record of decision, remedial alternatives, selected remedy, no further action | | | | | |
| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
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John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Interim Director

May 16, 2014

Mr. Kevin Sedlak
Restoration Project Manager
Camp Ravenna
1438 State Route 534 SW
Newton Falls, OH 44444

Re: Approval and for the "Final Record of Decisions for Soil, Sediment, and Surface Water at the RVAAP-48 Anchor Test Area (Work Activity No. 267-000859-109) and RVAAP-13 Building 1200 (Work Activity No. 267-000859-188), Ravenna Army Ammunition Plant, Ravenna, Ohio," Dated March 18, 2014.

Dear Mr. Sedlak:

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received, reviewed, and signed the documents entitled, "Final Record of Decision for Soil, Sediment, and Surface Water at the RVAAP-13 Building 1200, Ravenna Army Ammunition Plant, Ravenna, Ohio," dated March 18, 2014, and "Final Record of Decision for Soil, Sediment, and Surface Water at the RVAAP-48 Anchor Test Area, Ravenna Army Ammunition Plant, Ravenna, Ohio," dated March 18, 2014. These documents, received by Ohio EPA's NEDO on March 19, 2014, was prepared for the U.S. Army Corps of Engineers (USACE) Louisville District, by Leidos Engineering of Ohio, Inc.

Ohio EPA has provided two signed copies of each final report. Please provide the appropriate signature to the enclosed documents and return one copy of each to the Ohio EPA.

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MR. KEVIN SEDLAK
CAMP RAVENNA
MAY 16, 2014
PAGE 2

If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1249.

Sincerely,



Andrew C. Kocher
Site Coordinator
Division of Environmental Response and Revitalization

ACK/nvr

enclosures

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Gregory F. Moore, USACE, Louisville District

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Nancy Zikmanis, Ohio EPA, NEDO, DERR

Final

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Ravenna Army Ammunition Plant
Ravenna, Ohio

Contract No. W912QR-04-D-0028
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Prepared for:

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

Prepared by:

Leidos Engineering of Ohio, Inc.
8866 Commons Boulevard
Twinsburg, Ohio 44087

March 18, 2014

CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Leidos has completed the Record of Decision for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area at the Ravenna Army Ammunition Plant, Ravenna, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing United States Army Corps of Engineers (USACE) policy.



Jed Thomas, PE
Study/Design Team Leader

3/18/14

Date



W. Kevin Jago, PG
Independent Technical Review Team Leader

3/18/14

Date

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

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

As noted above, all concerns resulting from independent technical review of the project have been considered.



Lisa Jones-Bateman
Senior Program Manager

3/18/14

Date

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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

REIMS = Ravenna Environmental Information Management System

USACE = United States Army Corps of Engineers

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ACRONYMS AND ABBREVIATIONS

| | |
|-----------------|--|
| amsl | above mean sea level |
| AOC | Area of Concern |
| ARAR | Applicable or Relevant and Appropriate Requirements |
| ARNG | Army National Guard |
| bgs | below ground surface |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CERCLIS | Comprehensive Environmental Response, Compensation, and Liability Act Information System |
| COC | Chemical of Concern |
| COPEC | Chemical of Potential Ecological Concern |
| CSM | Conceptual Site Model |
| CUG | Cleanup Goal |
| ERA | Ecological Risk Assessment |
| FS | Feasibility Study |
| ft | feet |
| FWCUG | Facility-wide Cleanup Goal |
| HHRA | Human Health Risk Assessment |
| IRP | Installation Restoration Program |
| ISM | Incremental Sampling Method |
| LUC | Land Use Control |
| mg/kg | milligrams per kilogram |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| OHARNG | Ohio Army National Guard |
| Ohio EPA | Ohio Environmental Protection Agency |
| O&M | Operation and Maintenance |
| PCB | Polychlorinated Biphenyl |
| PP | Proposed Plan |
| RAO | Remedial Action Objective |
| RD | Remedial Design |
| RI | Remedial Investigation |
| ROD | Record of Decision |
| RVAAP | Ravenna Army Ammunition Plant |
| SRC | Site-related Contaminant |
| SVOC | Semi-volatile Organic Compound |
| TCLP | Toxicity Characteristic Leaching Procedure |
| USACE | United States Army Corps of Engineers |
| U.S. Army | United States Department of the Army |
| USEPA | United States Environmental Protection Agency |
| USP&FO | United States Property and Fiscal Officer |
| VOC | Volatile Organic Compound |
| yd ³ | cubic yard |

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PART I: THE DECLARATION

A. SITE NAME AND LOCATION

This Record of Decision (ROD) addresses soil, sediment, and surface water contaminants at Anchor Test Area. Anchor Test Area is designated as area of concern (AOC) RVAAP-48 within the former Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio (Figures 1 and 2).

The 21,683-acre facility, consisting of 21,683 acres, is located in northeastern Ohio within Portage and Trumbull counties, approximately 4.8 kilometers (3 miles) east/northeast of the City of Ravenna and approximately 1.6 kilometers (1 mile) northwest of the City of Newton Falls. The facility, previously known as RVAAP, was formerly used as a load, assemble, and pack facility for munitions production. As of September 2013, administrative accountability for the entire acreage of the facility has been transferred to the United States Property and Fiscal Officer (USP&FO) for Ohio and subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a military training site (Camp Ravenna). References in this document to RVAAP relate to previous activities at the facility as related to former munitions production activities or to activities being conducted under the restoration/cleanup program.

Anchor Test Area is located in the south-central portion of Camp Ravenna. The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) Identifier for former RVAAP is OH5210020736.

B. STATEMENT OF BASIS AND PURPOSE

The U.S. Department of the Army (U.S. Army) is the lead agency and has chosen the selected remedy for Anchor Test Area in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record file for the AOC.

The Ohio Environmental Protection Agency (Ohio EPA), the supporting state regulatory agency, approved the *Remedial Investigation/Feasibility Study Report for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area* (USACE 2012) and *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area* (USACE 2013). The remedial investigation/feasibility study (RI/FS) report evaluated contaminated soil, sediment, and surface water at Anchor Test Area. The RI/FS report and proposed plan (PP) recommended removing an estimated 12.5 yd³ of surface soil [0-1 ft below ground surface (bgs)] with off-site disposal to attain Unrestricted (Residential) Land Use. Ohio EPA concurs with the selected remedy and that the remedy satisfies the requirements of the Ohio EPA *Director's Final Findings and Orders*, dated June 10, 2004 (Ohio EPA 2004).

C. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect public health, welfare, and the environment from actual or potential releases of hazardous substances into the environment.

D. DESCRIPTION OF THE SELECTED REMEDY

The future use for Anchor Test Area is Military Training Land Use. Arsenic was identified as the chemical of concern (COC) in soil for the Representative Receptor for Military Training Land Use (National Guard Trainee) and Resident Receptor for Unrestricted (Residential) Land Use in soil. No action is required to attain remedies for sediment or surface water at this AOC, as neither of these media are present.

The selected remedy for Anchor Test Area is Alternative 2: Attain Unrestricted (Residential) Land Use, which involves removing surface soil (0-1 ft bgs) at location ATA-005M with off-site disposal (Figure 3). The selected remedy was chosen because it is protective of all receptors (including the National Guard Trainee and Resident Receptor), is cost effective, and can be performed in a timely manner. The following is a brief list of activities associated with Alternative 2.

- Excavate contaminated soil from location ATA-005M at 0-1 ft bgs.
- Dispose an estimated 12.5 yd³ of excavated soil at an off-site facility licensed and permitted to accept the waste.
- Conduct confirmation sampling to determine whether cleanup goals (CUGs) have been attained.
- Grade and backfill successfully remediated areas with clean soil and seed.

The selected remedy will achieve the requisite level of protectiveness for the AOC. The cost for the selected remedy is estimated to be \$93,967. The U.S. Army will not be required to develop and implement land use controls (LUCs) and five-year reviews, as this remedy attains Unrestricted (Residential) Land Use.

E. STATUTORY DETERMINATIONS

The selected remedy protects human health and the environment, complies with federal and state laws and regulations that are applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions to the maximum extent practicable.

The selected remedy does not satisfy the statutory preference for treatment. The treatment technologies evaluated for soil contaminated with arsenic were not found to be feasible or were cost prohibitive for implementation at Anchor Test Area, as noted in the approved RI/FS report.

Because the selected remedy will not result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for Unrestricted (Residential) Land Use, five-year reviews will not be required for this remedial action.

F. RECORD OF DECISION DATA CERTIFICATION CHECKLIST

Table 1 provides the location of key remedy selection information contained in Part II, Decision Summary. Additional information can be found in the Administrative Record file for Anchor Test Area.

Table 1. ROD Data Certification Checklist

| ROD Data Checklist Item | ROD Section | Page |
|--|------------------|----------|
| COCs and their respective concentrations | II.G | 12 |
| Baseline risk represented by the COCs | II.G | 12 |
| CUGs established for COCs and the basis for these goals | II.G | 12 |
| How source materials constituting principal threats are addressed | II.K | 18 |
| Current and future use assumptions used in the baseline risk assessment and ROD | II.F | 12 |
| Suitable potential land uses, following the selected remedy | II.L.4 | 20, 21 |
| Estimated capital and total present worth costs, discount rate, and number of years over which the remedy cost estimates are projected | II.J.7 II.L.3 | 17 20 |
| Key factor(s) that led to selecting the remedy | II.L.1 | 18, 19 |


COC = Chemical of concern.
ROD = Record of Decision.

G. AUTHORIZING SIGNATURES AND SUPPORTING STATE REGULATORY AGENCY ACCEPTANCE OF REMEDY



John P. Dernberger
COL, NGB
USPFO for Ohio

1 June 2014
Date



Peter Whitehouse, Chief DERR
Ohio Environmental Protection Agency

7/14/2014
Date

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PART II: DECISION SUMMARY

A. SITE NAME, LOCATION, AND DESCRIPTION

The facility, consisting of 21,683 acres, is located in northeastern Ohio within Portage and Trumbull counties, approximately 4.8 kilometers (3 miles) east/northeast of the City of Ravenna and approximately 1.6 kilometers (1 mile) northwest of the City of Newton Falls. The facility, previously known as RVAAP, was formerly used as a load, assemble, and pack facility for munitions production. As of September 2013, administrative accountability for the entire acreage of the facility has been transferred to the USP&FO for Ohio and subsequently licensed to OHARNG for use as a military training site (Camp Ravenna). References in this document to RVAAP relate to previous activities at the facility as related to former munitions production activities or to activities being conducted under the restoration/cleanup program.

Anchor Test Area is approximately 0.5 acres and is located approximately 50 to 75 ft west of Wilcox-Wayland Road and 2,500 ft south of Newton Falls Road (Figure 3). The distinct surface features of the AOC are the former blast wall dirt mounds and a nearby sandpit. The anchor tests were likely performed within the 12 by 36 ft sandpit. The adjacent dirt mounds functioned as blast walls. One mound is approximately 8 to 10 ft high while the others are only 1-2 ft high. The dirt mounds are still observable, although they are overgrown with vegetation and small trees. The sandpit is no longer visually distinct due to vegetative growth. Metal debris is visible in the area, and a section of cement culvert can be seen in one of the dirt mounds.

The U.S. Army is the lead agency and is responsible for any applicable remediation, decisions, and cleanup at Anchor Test Area. These activities are being funded and conducted under the Installation Restoration Program (IRP). The Ohio EPA is the supporting state regulatory agency.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The former RVAAP was constructed in 1940 and 1941 for depot storage and ammunition assembly/loading and placed on standby status in 1950. Production activities resumed from 1954 to 1957 and 1968 to 1972. Demilitarization activities, including disassembly of munitions and explosives melt-out and recovery, continued until 1992.

Operational information about Anchor Test Area is limited. The AOC was a former research and development area used by The Firestone Tire and Rubber Company Defense Research Division. Available information indicates the AOC was used for testing explosives-driven soil anchoring devices. These devices were typically metal rods driven into the ground and attached via a cable to stabilize structures or anchor them to the ground. The dates of use for this AOC are unknown; however, a 1961 drawing shows the final design for the industrial operations that occurred at the AOC; therefore, it is likely it was not active until after the early 1960s.

Since 1998, Anchor Test Area has been included in various historical assessments and investigations conducted at the former RVAAP. The following historical environmental investigations have been completed for Anchor Test Area:

- Relative Risk Site Evaluation for Newly Added Sites (USACHPPM 1998); and
- Characterization of 14 AOCs (MKM 2007).

In 2010, the PBA08 Remedial Investigation (PBA08 RI) was implemented to supplement historical data available for the AOC and support the development of the RI/FS report. The results of the PBA08 RI sampling were combined with applicable results of previous sampling events to evaluate the nature and extent of contamination, examine contaminate fate and transport, conduct risk assessments, and evaluate potential remedial alternatives. The nature and extent of contamination and conceptual site model (CSM) are presented in Section E of this ROD.

There have been no CERCLA enforcement actions related to Anchor Test Area.

C. HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the RVAAP community relations program, the U.S. Army and Ohio EPA have interacted with the public through news releases, public meetings, reading materials, direct mailings, an internet website, and receiving and responding to public comments. Specific items in the community relations program include:

Restoration Advisory Board: The U.S. Army established a Restoration Advisory Board in 1996 to promote community involvement in U.S. Department of Defense environmental cleanup activities and allow the public to review and discuss progress with decision makers. Board meetings are generally held every two or three months and are open to the public.

Community Relations Plan: The *Ravenna Army Ammunition Plant Community Relations Plan* (USACE 2003) was prepared to establish processes to keep the public informed of activities at the former RVAAP. The plan is available in the Administrative Record at Camp Ravenna.

Internet Website: The U.S. Army established an internet website in 2004 for the former RVAAP. It is accessible to the public at www.rvaap.org.

In accordance with CERCLA Section 117(a) and NCP Section 300.430(f)(2), the U.S. Army released the *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area* (USACE 2013) to the public on July 25, 2013. The PP and other project-related documents were made available to the public in the Administrative Record maintained at Camp Ravenna and in the Information Repositories at Reed Memorial Library in Ravenna, Ohio, and Newton Falls Public Library in Newton Falls, Ohio. A notice of availability for the PP was sent to the media outlets: radio stations, television stations, and newspapers (e.g., *Youngstown Vindicator*, *Warren Tribune-Chronicle*, *Akron Beacon Journal*, and *Ravenna Record Courier*), as specified in the RVAAP

Community Relations Plan. The notice of availability initiated the 30-day public comment period beginning July 25, 2013, and ending August 23, 2013.

The U.S. Army held a public meeting on August 7, 2013, at the Paris Township Hall, Ravenna, Ohio to present the PP to the public. At this meeting, representatives of the U.S. Army provided information and answered questions. A transcript of the public meeting is available to the public and has been included in the Administrative Record. Responses to verbal comments received at this meeting are included in the Responsiveness Summary, which is Part III of this ROD. No additional written comments were received during the public comment period.

The U.S. Army considered public input from the public meeting on the PP when selecting the remedial alternative.

D. SCOPE AND ROLE OF RESPONSE ACTIONS

The overall program goal of the IRP at the former RVAAP is to clean up previously contaminated lands to reduce contamination to concentrations that will not cause risks to human health or the environment. No removal actions have been performed at Anchor Test Area to date.

This ROD addresses soil, sediment, and surface water. The intended future land use for Anchor Test Area is Military Training Land Use, which is consistent with the intended future land use for Camp Ravenna. The contamination present at Anchor Test Area poses a potential risk to human health because COC (arsenic) concentrations exceeded CUGs for the Representative Receptor for Military Training Land Use (National Guard Trainee), as well as the Resident Receptor for Unrestricted (Residential) Land Use. Implementing the remedy described in this ROD will address potential risk through removal and off-site disposal of contaminated soil. The selected remedy described in the ROD is consistent with, and protective for, the intended future use (Military Training Land Use) at the AOC. Other media (e.g., groundwater) and other AOCs at Camp Ravenna will be managed as separate actions or decisions by the U.S. Army and will be considered under separate RODs.

E. SUMMARY OF SITE CHARACTERISTICS

Site characteristics, nature and extent of contamination, and the CSM for Anchor Test Area are based on investigations conducted from 1998 through 2010 and are summarized in the *Remedial Investigation/Feasibility Study Report for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area* (USACE 2012).

E.1 Site Characteristics

E.1.1 Topography/Physiography

Anchor Test Area is located on the southern edge of a small topographic high isolated from other former operational areas at an elevation of approximately 1004 ft above mean sea level (amsl)

(Figure 3). From this topographic high, the elevation gently slopes downward towards the south and west. The key surface features at the AOC are remnants of the former sandpit and the nearby dirt mounds that functioned as blast walls. Metal debris is present at the AOC, and a portion of a cement culvert is visible in a dirt mound.

The AOC is heavily overgrown with trees and shrubs, and the immediate vicinity is heavily forested, with the exception of the large wetland approximately 500 ft to the south. No perennial surface water or drainage conveyance features are present at the AOC. Surface water occurs only intermittently as overland storm water runoff associated with heavy rainfall events and generally flows towards the wetland. The wetland is drained to the south by an unnamed stream which enters the west branch of the Mahoning River.

E.1.2 Geology

Bedrock has not been encountered at Anchor Test Area during characterization activities. The inferred bedrock formation at Anchor Test Area is the Pennsylvanian age Pottsville Formation, Sharon Sandstone member, informally referred to as the Sharon Conglomerate. The Sharon Sandstone Member, the lowest unit of the Pottsville Formation, is a highly porous, loosely cemented, permeable, cross-bedded, frequently fractured and weathered, orthoquartzite sandstone, which is locally conglomeratic. Thin shale lenses occur in the upper portion of the unit.

The soil type found at this AOC is the Ellsworth silt loam (2-6% slopes). The Ellsworth is formed in silty clay loam and silty clay glacial till where bedrock is greater than 6 ft bgs. The Ellsworth silt loam is moderately well drained with slow to very slow permeability and potential for moderate erosion (USDA 2010).

The composition of unconsolidated deposits at Anchor Test Area generally consists of yellowish-brown silty sands overlain by yellowish-brown, medium stiff, silt-rich clay. Poorly sorted sands were observed in the vicinity of the former sand pit. A geotechnical sample collected from 4.0 to 4.9 ft bgs was characterized as silty clay with little sand, and a geotechnical sample collected from 10.0 to 12.0 ft bgs was characterized as sand-rich silt.

E.1.3 Hydrogeology

No monitoring wells are present at Anchor Test Area. However, groundwater was observed at 8.7 to 13 ft bgs in unconsolidated borings. The nearest facility-wide monitoring well is BKGmw-013, located approximately 2,200 ft to the north. Well gauging data collected at this well during the January 2010 facility-wide sampling event indicated a top of casing water level of 976.45 ft amsl (EQM 2010). Monitoring well BKGmw-013 is completed in the unconsolidated zone to a depth of 25.5 ft bgs (948.45 ft amsl). The generalized regional groundwater flow direction in the vicinity of the AOC is towards the east, as presented in Figure 3.

During the Relative Risk Site Evaluation (USACHPPM 1998), a soil boring was advanced to a depth of 16 ft bgs in the middle of the sand pit, and groundwater was not encountered. The soil borings advanced during the PBA08 RI (USACE 2012) indicated a soil overburden thickness greater than 13 ft bgs with groundwater encountered at depths of approximately 8.7 to 13.0 ft bgs.

E.1.4 Ecology

The ecological risk assessment (ERA) in the RI/FS report concluded that there are no important and significant ecological resources at the AOC. The forest type at Anchor Test Area is green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), and hackberry (*Celtis occidentalis* and *laevigata*). This same type of habitat is found adjacent to the AOC and elsewhere at Camp Ravenna. The habitat is also found in the larger surrounding local ecoregion (USFS 2011 and Kloss 2011). Thus, there are no known unique resources at Anchor Test Area. Per the 2010 Camp Ravenna Joint Military Training Center Rare Species List, there are no federal endangered species or critical habitats on Camp Ravenna property. State-endangered, state-threatened, state potentially threatened, state species-of-concern and state special-interest species have been identified at Camp Ravenna. Anchor Test Area has not been previously surveyed for rare species. There have been no documented sightings of rare, threatened, or endangered species at the AOC. The vegetation and habitat resources are documented in the *Integrated Natural Resources Management Plan and Environmental Assessment for the Ravenna Training and Logistics Site, Portage and Trumbull Counties, Ohio* (OHARNG 2008).

E.2 Site Investigations

Since 1998, Anchor Test Area has been included in various historical assessments and investigations conducted at the former RVAAP. The following environmental reports have been completed for Anchor Test Area:

- *Relative Risk Site Evaluation for Newly Added Sites* (USACHPPM 1998); and
- *Characterization of 14 AOCs* (MKM 2007).

In 2010, the PBA08 RI was implemented to supplement historical data available for the AOC and support the development of the RI/FS report. The results of the PBA08 RI sampling were combined with applicable results of previous sampling events to evaluate the nature and extent of contamination, examine contaminate fate and transport, conduct risk assessments, and evaluate potential remedial alternatives.

E.3 Nature and Extent of Contamination

No primary contaminant sources remain at Anchor Test Area. The dates and duration of operational usage are unknown, although available data indicate it was not active until the early 1960s. Remaining infrastructure consists of only a sandpit and remnant earthen mounds that functioned as blast walls. Some metal debris remains on the AOC, presumably sourced from former testing

activities. Analysis of data collected during previous investigations and the PBA08 RI identified surface soil as the principal secondary source of contamination. No sediment or surface water samples were collected because perennial surface water or defined drainage conveyances are not present at the AOC. Surface water may occur only as intermittent storm water runoff associated with heavy rainfall events.

The prevalent site-related contaminants (SRCs) detected in surface soil were semi-volatile organic compounds (SVOCs) and metals. The highest concentrations of inorganic SRCs were generally observed in sample location ATA-005M and in the vicinity of the former blast wall mounds. Arsenic was detected in all incremental sampling method (ISM) samples collected at Anchor Test Area with a concentration of 54 mg/kg at sample location ATA-005M, exceeding the background concentration of 15.4 mg/kg. No explosives, propellants, volatile organic compounds (VOCs), pesticides, or polychlorinated biphenyls (PCBs) were detected or identified as SRCs in surface soil at this AOC.

Subsurface soil (soil deeper than 1 ft bgs) contained fewer detected SRCs than surface soil. All identified subsurface soil SRCs either had a background concentration of 0 mg/kg (as was the case for the metals) or had no background concentration for comparison (as was the case for the SVOCs and VOCs). No spatial or vertical trends were evident, and the metal SRCs (cadmium and silver) occurred within a narrow range of concentrations. Three organic SRCs [bis(2-ethylhexyl)phthalate, methylene chloride, and toluene] were detected in the 4.0 to 7.0 ft bgs interval; toluene was also detected in the 1.0 to 4.0 ft bgs interval. Explosives, propellants, pesticides, and PCBs were not detected in any subsurface soil sample.

E.4 Conceptual Site Model

The CSM is updated in this section to incorporate results of RIs conducted at Anchor Test Area. Elements of the CSM include:

- Primary and secondary contaminant sources and release mechanisms,
- Contaminant migration pathways and discharge or exit points,
- Potential receptors with unacceptable risk, and
- Data gaps and uncertainties.

E.4.1 Primary and Secondary Contaminant Sources and Release Mechanisms

No primary contaminant sources (e.g., operational facilities or retention basins) exist at Anchor Test Area. The remnant sandpit, earthen blast barriers, and soil are considered as secondary sources of contamination.

The potential mechanisms for releases of contaminants from secondary sources at Anchor Test Area include:

- Erosion of soil matrices with sorbed contaminants and mobilization in turbulent surface water flow under storm conditions,
- Dissolution of soluble contaminants and transport in surface water, and
- Contaminant leaching to groundwater.

No perennial drainage conveyance exists on or in the immediate vicinity of the AOC; therefore, surface water and sediment are not present. There are no well-defined natural surface water conveyances or engineered storm water drainage systems exiting the AOC; therefore, the migration pathway is limited to diffuse overland flow through heavily vegetated terrain.

E.4.2 Contaminant Migration Pathways and Exit Points

Contaminant migration from soil sources via surface water occurs primarily by: (1) movement of the particle-bound contaminants in surface water runoff, and (2) transport of dissolved constituents in surface water. Upon reaching portions of surface water conveyances where flow velocities decrease, particle-bound contaminants will settle out as sediment accumulation. Sediment-bound contaminants may become re-suspended and migrate during storm events or may partition to a dissolved phase in surface water. There are no well-defined natural surface water conveyances or engineered storm water drainage systems exiting the AOC; therefore, the migration pathway is limited to diffuse overland flow through heavily vegetated terrain. Surface soil data indicate minimal dispersal of contaminants from the sample area ATA-005M to the surrounding vicinity via this pathway given that arsenic concentrations were below background concentrations surrounding ATA-005M.

The estimated direction of groundwater flow at Anchor Test Area is to the east, based on facility-wide potentiometric data. The groundwater table occurs within unconsolidated glacial overburden at depths of 8.7 to 13 ft bgs, based on 2010 soil boring data. Contaminant leaching pathways from soil to the water table are through interbedded clayey to sandy glacial till. Fate and transport modeling results indicated that only arsenic may leach from surface soil in sample area ATA-005M and migrate to groundwater below the source at concentrations above maximum contaminant levels/regional screening levels and facility-wide cleanup goals (FWCUGs). However, the maximum predicted concentration in the groundwater table at the downgradient receptor (wetland area southeast of the AOC) is predicted to be less than the facility-wide background concentration. Additionally, migration of arsenic is likely to be attenuated within the unconsolidated zone because of moderate to high retardation factors within the unconsolidated zone. Based on the modeling results, migration of contaminants via the groundwater pathway is not expected.

E.4.3 Potential Receptors

The National Guard Trainee is a Representative Receptor under the future use (Military Training Land Use). This receptor is assumed to be exposed to soil from 0 to 4 ft bgs and 4 to 7 ft bgs, surface

water, and sediment. As noted previously, no perennial drainage conveyance exists in immediate vicinity of the AOC; therefore, surface water and sediment are not present.

Ecological receptors at Anchor Test Area are potentially exposed to contaminants in soil. Groundwater is not considered an exposure medium for ecological receptors on the AOC given its depth and occurrence with bedrock, and there are no discharge points (e.g., springs, seeps) that would represent a potential exposure point.

F. CURRENT AND POTENTIAL FUTURE LAND USES

Anchor Test Area is currently managed by the Army National Guard/OHARNG. The AOC is not currently being utilized for training purposes. The future use of Anchor Test Area is Military Training Land Use. Accordingly, the National Guard Trainee is the Representative Receptor for Military Training Land Use. In accordance with CERCLA, the Resident Receptor was evaluated in the human health risk assessment (HHRA) to assess an Unrestricted (Residential) Land Use scenario. This ROD discusses future land use, as it pertains to soil and how it impacts human health, the environment, and groundwater. Surface water and sediment are not present on the AOC; therefore, there is no exposure media under current or potential future land uses. Currently, groundwater at the AOC is not used for domestic or industrial supplies. Groundwater will be evaluated as part of the Facility-wide Groundwater AOC.

G. SUMMARY OF SITE RISKS

The HHRA and ERA estimated risks to human and ecological receptors. The HHRA and ERA identified exposure pathways; COCs and chemicals of potential ecological concern (COPECs), if any; and provided a basis for remedial decisions. This section of the ROD summarizes the results of the HHRA and ERA, which are presented in detail in the *Remedial Investigation/Feasibility Study Report for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area* (USACE 2012) and *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area* (USACE 2013) located in the Administrative Record and Information Repositories.

G.1 Human Health Risk Assessment

Anchor Test Area is currently inactive (not used for military training). Currently, military training and operations are conducted at the facility and in the adjacent areas surrounding the AOC. The OHARNG future use for the AOC is Military Training Land Use. The most representative receptor for this land use is the National Guard Trainee. The HHRA evaluates exposure to contaminants and estimates risks for the National Guard Trainee. In addition, risk is estimated for the Resident Receptor to evaluate a potential Unrestricted (Residential) Land Use as a comparative baseline, in accordance with CERCLA.

The HHRA evaluated potential risk for the SRCs present in soil, discussed in Section E.3. One SRC, arsenic in surface soil (0-1 ft bgs), was identified as a COC for the National Guard Trainee and

Resident Receptor. The concentration of arsenic at location ATA-005M (54 mg/kg) was greater than the National Guard Trainee FWCUG (27.8 mg/kg), Resident Receptor FWCUG (4.25 mg/kg), and background concentration (15.4 mg/kg). Consequently, surface soil (0-1 ft bgs) at location ATA-005M requires remediation to attain the future use (Military Training Land Use) and Unrestricted (Residential) Land Use.

No COCs were identified in subsurface soil (greater than 1 ft bgs). Sediment and surface water do not exist at the AOC. The COCs, CUGs, and locations requiring remediation are presented in Table 2.

Table 2. Summary of COCs, CUGs, and Locations Requiring Remedy

| Media | Chemicals of Concern | Cleanup Goals | Location and Depth Requiring Remediation |
|---------------------------|-----------------------------|-------------------------|---|
| Surface Soil ¹ | Arsenic | 15.4 mg/kg ² | ATA-005M at 0-1 ft bgs |
| Subsurface Soil | None | Not applicable | Not applicable |

¹ Inclusive of surface soil (0-1 ft bgs) for the Resident Receptor and deep surface soil (0-4 ft bgs) for the National Guard Trainee. Because 0-1 ft bgs samples were collected using Incremental Sampling Methods (ISM) and the 1-4 ft bgs samples were collected using discrete sampling, these intervals were evaluated separately.

² The cleanup goal for arsenic is the Ravenna Army Ammunition Plant facility-wide background value for surface soil (0-1 ft bgs).

ft bgs = feet below ground surface

mg/kg = Milligram per kilogram.

G.2 Ecological Risk Assessment

The ERA for Anchor Test Area (USACE 2012) evaluated chemical contamination to determine if it posed a risk to the environment. The ERA incorporated historical and PBA08 RI data. Four integrated soil COPECs (arsenic, chromium, manganese, and mercury) were identified in the Level I ERA. The ERA compared Anchor Test Area to the U.S. Army's list of important Camp Ravenna ecological places and resources. None of the 39 important places identified on the list were present, and no ecologically significant resources were identified at Anchor Test Area. Consequently, the ERA for Anchor Test Area concludes with a Level I Scoping Level Risk Assessment, with a recommendation of no further action from the ecological risk perspective.

G.3 Basis for Action Statement

Results of the HHRA for Anchor Test Area indicate that exposure to soil under current and anticipated future use scenarios may result in unacceptable risks to human receptors, unless remediation is undertaken. The response action selected in this ROD is necessary to protect public health and welfare or the environment from actual or threatened releases of hazardous substances.

H. REMEDIAL ACTION OBJECTIVES

The remedial action objective (RAO) references CUGs and target risk levels that are considered protective of human health under current and future use scenarios. The RAO for Anchor Test Area is to prevent: (1) National Guard Trainee exposure to COCs above CUGs in soil; (2) adverse ecological

effects from previous AOC activities; and (3) negative groundwater impacts from contaminant migration from source media (e.g., soil).

Conclusions of the ERA, presented in Sections E.1.4 and G.2, indicate remedial actions are not warranted to specifically protect ecological receptors. Evaluation of contaminant fate and transport, presented in Section E.4, indicates soil remediation to prevent negative groundwater impacts is not warranted. Remedial decisions specific to groundwater media at Anchor Test Area will be evaluated in a separate report. Table 2 presents media-specific COCs, CUGs, and areas requiring remediation.

I. DESCRIPTION OF ALTERNATIVES

The RI/FS report developed and evaluated remedial alternatives for surface soil at Anchor Test Area. The remedial alternatives are listed below:

- Alternative 1: No Action; and
- Alternative 2: Attain Unrestricted (Residential) Land Use¹.

This section includes a description of various components of the remedial alternatives identified in the RI/FS report, including soil removal, disposal, and handling.

¹Alternative 2 was named “Attain National Guard Training and Residential Land Uses” in the RI/FS report and was re-named “Attain Unrestricted Land Use” in the Proposed Plan.

I.1 Alternative 1 – No Action

Alternative 1 provides no remedial action and is required under NCP as a baseline for comparison with other remedial alternatives. Alternative 1 provides no additional protection to human health and the environment. Any current legal and administrative LUC mechanisms at the AOC will be discontinued. No future legal, administrative, or physical LUC mechanisms will be employed at the AOC.

Environmental monitoring would not be performed, and five-year reviews would not be conducted in accordance with CERCLA 121(c). In addition, no restrictions on land use will be pursued.

I.2 Alternative 2 – Attain Unrestricted (Residential) Land Use

Unrestricted (Residential) Land Use was evaluated using FWCUGs for the Resident Receptor, as well as any FWCUGs that may be more stringent for the National Guard Trainee. Alternative 2 involves removing and transporting chemical contaminants in soil that pose a risk to the Representative Receptor for Military Training Land Use (National Guard Trainee) and the Resident Receptor for Unrestricted (Residential) Land Use. Approximately 12.5 yd³ (ex situ) of contaminated surface soil (0-1 ft bgs) from location ATA-005M will be excavated and transported to an off-site disposal facility licensed and permitted to accept these wastes. Confirmation sampling will be conducted to ensure CUGs are attained. Areas undergoing soil removal will be re-graded and backfilled with clean soil.

Alternative 2 does not include LUCs, CERCLA five-year reviews, or operation and maintenance (O&M) sampling as Unrestricted (Residential) Land Use will be attained through remedial actions conducted under this remedial alternative.

J. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

These alternatives were evaluated with respect to the nine comparative analysis criteria, as outlined in CERCLA (Table 3). The nine criteria are categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria as follows:

Threshold Criteria – Must be met for the alternative to be eligible for selection as a remedial option.

1. Overall protection of human health and the environment.
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).

Primary Balancing Criteria – Used to weigh major trade-offs among alternatives.

3. Long-term effectiveness and permanence.
4. Reduction of toxicity, mobility, or volume through treatment.
5. Short-term effectiveness.
6. Implementability.
7. Cost.

Modifying Criteria – FS consideration to the extent that information was available. Evaluated fully after public comment period on the PP.

8. State acceptance.
9. Community acceptance.

J.1 Overall Protection of Human Health and the Environment

Alternative 1 does not provide overall protection of human health, as COCs for the National Guard Trainee and Resident Receptor remain on site. This criterion must be met for an alternative to be considered for final selection. Alternative 1 (No Action) will not reduce the short- or long-term risks from potential exposure to COCs, and is thus not protective. Alternative 2 provides protection of human health by removing contamination and will not require additional protectiveness after contaminant removal, as the alternative will achieve Unrestricted (Residential) Land Use.

No risks were identified for ecological receptors. Therefore, neither alternative includes remedial actions to address ecological risks.

Table 3. CERCLA Evaluation Criteria

| |
|--|
| Overall Protection of Human Health and the Environment – considers whether or not an alternative provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls. |
| Compliance with Applicable or Relevant and Appropriate Requirements – considers how a remedy will meet all the applicable or relevant and appropriate requirements of other federal and state environmental statutes and/or provide grounds for invoking a waiver. |
| Long-term Effectiveness and Permanence – considers the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met. |
| Reduction of Toxicity, Mobility, or Volume Through Treatment – considers the anticipated performance of the treatment technologies that may be employed in a remedy. |
| Short-Term Effectiveness – considers the speed with which the remedy achieves protection, as well as the potential to create adverse impacts on human health and the environment that may result during the construction and implementation period. |
| Implementability – considers the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution. |
| Cost – considers capital costs and operation and maintenance costs associated with the implementation of the alternative. |
| State Acceptance – indicates whether the state concurs with, opposes, or has no comment on the preferred alternative. |
| Community Acceptance – considers public input following a review of the public comments received on the Remedial Investigation/Feasibility Study Report and Proposed Plan. |

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

J.2 Compliance with Applicable or Relevant and Appropriate Requirements

CERCLA Section 121 specifies that remedial actions must comply with requirements or standards under federal or more stringent state environmental laws that are “applicable or relevant and appropriate to the hazardous substances or particular circumstances at the site.” These enforceable standards protect future users of the AOC. There are no identified chemical-specific or location-specific ARARs for Alternatives 1 or 2. Action-specific ARARs were identified for Alternative 2, as presented in Attachment A. With appropriate design and planning, Alternative 2 would comply with these ARARs.

J.3 Long-Term Effectiveness and Permanence

Alternative 1 (No Action) is neither effective nor permanent long term. Alternative 1 will not involve any remedial action or LUCs for potential future exposure. Alternative 2 is considered permanent and effective long term since this alternative removes soil that presents a risk to the Resident Receptor. Alternative 2 attains Unrestricted (Residential) Land Use; therefore, no LUCs or five-year reviews are required.

J.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 1 (No Action) and Alternative 2 [Attain Unrestricted (Residential) Land Use] do not include treatment principal elements and; therefore, offer no reduction in toxicity, mobility, or volume because no treatment process is proposed.

J.5 Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and environment during construction and operation of the remedy until CUGs are achieved. No short-term human health risks are associated with Alternative 1 (No Action) beyond baseline conditions because no actions will be implemented that have impacts on soil, air quality, water resources, or biotic resources. Alternative 2 presents short-term risk to workers, the community, and the environment during soil excavation and transportation. Excavation will result in a temporary loss of vegetated habitat. Short-term environmental impacts are minimized through construction mitigation techniques. Mitigation measures (e.g., dust control, storm water controls, site housekeeping activities, covering and cleaning haul trucks) during excavation activities will minimize and/or eliminate all potential risks.

J.6 Implementability

No actions are proposed for Alternative 1. Alternative 2 can be readily implemented after the remedial design (RD) is developed and all appropriate coordination with local, state, and federal agencies is completed. Excavating surface soil, constructing temporary roads, and waste handling are conventional, straightforward construction techniques and methods. Multiple off-site disposal facilities are available to accept generated waste. Resources (e.g., equipment, material, trained personnel) to implement this alternative are readily available.

J.7 Cost

The present value cost to complete Alternative 1 is \$0. No capital costs are associated with this alternative.

The present value cost to complete Alternative 2 is approximately \$93,967 (in base year 2010 dollars with a 4.125% discount factor). No O&M is required; therefore, no O&M costs are associated with these alternatives.

J.8 State Acceptance

State acceptance was evaluated formally after the public comment period on the PP. Ohio EPA concurs that Alternative 1: No Action does not provide adequate protection of human health and the environment. Therefore, Ohio EPA has expressed its support for Alternative 2: Attain Unrestricted (Residential) Land Use.

J.9 Community Acceptance

Community acceptance was evaluated formally after the PP public comment period. During the public meeting, the community voiced no objections to Alternative 2: Attain Unrestricted (Residential) Land Use, as indicated in Part III of this ROD, the Responsiveness Summary.

K. PRINCIPAL THREAT WASTES

Principal threat wastes, as defined by the U.S. Environmental Protection Agency (USEPA) in *A Guide to Principal Threat and Low Level Threat Wastes* (USEPA 1991), are source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. Wastes that generally are considered to constitute principal threats include, but are not limited to:

- Liquids - wastes contained in drums, lagoons or tanks, free product floating on or under groundwater.
- Mobile source material – surface soil or subsurface soil containing high concentrations of chemicals that are mobile due to wind entrainment, volatilization, surface runoff, or subsurface transport.
- Highly toxic source material – buried drummed non-liquid wastes, buried tanks containing non-liquid wastes, or soils containing significant concentrations of highly toxic materials.

USEPA guidance indicates where mobility and toxicity of source material combine to pose a potential risk of 10^{-3} or greater, generally treatment alternatives should be considered. Anchor Test Area does not contain source materials that are considered principal threat wastes, as described above, and no chemicals pose a risk of 10^{-3} or greater. As such, no remedies are required to address principal threat wastes at this AOC.

L. THE SELECTED REMEDY

Alternative 2: Attain Unrestricted (Residential) Land Use is selected for implementation at Anchor Test Area. This alternative also attains the requisite level of cleanup for Military Training Land Use.

L.1 Rationale for the Selected Remedy

The selected remedy meets the threshold criteria and provides the best overall balance of trade-offs in terms of the five balancing criteria:

- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, and volume;
- Short-term effectiveness;
- Implementability; and
- Cost.

The selected remedy is protective for the future use, is cost effective, and can be performed in a timely manner. Based on the available risk assessment information, the selected remedy will achieve the RAO, which prevents: (1) National Guard Trainee exposure to COCs above CUGs in soil, (2) adverse ecological effects from previous AOC activities, and (3) negative groundwater impacts from contaminant migration from source media (e.g., soil and sediment).

Using engineering controls, personal protective equipment, erosion and sediment controls, proper waste handling practices, and monitoring will mitigate short-term effects during construction. The selected remedy addresses state and community concerns by removing contaminated soil from Anchor Test Area.

L.2 Description of the Selected Remedy

Alternative 2 consists of excavating contaminated surface soil to attain Unrestricted (Residential) Land Use at Anchor Test Area. This alternative requires soil removal at location ATA-005M. The estimated total disposal volume (i.e., ex situ) is approximately 12.5 yd³. Excavated soil will be transported by truck to an off-site disposal facility. This remedial alternative requires coordinating remediation activities with Ohio EPA, OHARNG, and the U.S. Army. Coordinating with stakeholders during implementation of the excavation minimizes health and safety risks to on-site personnel and potential disruptions of Camp Ravenna activities. The time period to complete this remedial action is relatively short and does not include an O&M period to assess impacts from soil. Components of this remedial alternative include:

- RD;
- Waste characterization sampling;
- Site setup, soil excavation, and waste disposal;
- Confirmatory sampling; and
- Restoration.

Remedial Design. An RD plan will be developed prior to initiating remedial actions. This plan will outline construction permitting requirements; site preparation activities (e.g., staging and equipment storage areas, truck routes, storm water controls); the extent of the excavation; sequence of construction activities; decontamination; and segregation, transportation, and disposal of various waste streams. Engineering and administrative controls (e.g., erosion controls, health and safety controls) will be developed during the active construction period to ensure remediation workers and the environment are protected.

Waste Characterization Sampling. Waste characterization samples will be collected from the area requiring removal. The waste characterization samples are collected as ISM samples from the area(s) undergoing this remedy to provide the disposal facility data to properly profile the waste and determine if it is characteristically non-hazardous or hazardous. Each ISM sample analysis can include (but is not limited to) toxicity characteristic leaching procedure (TCLP) metals, TCLP SVOCs, TCLP Pesticides, TCLP Herbicides, Reactive Cyanide, Reactive Sulfide, and PCBs.

Site Setup, Soil Excavation, and Waste Disposal. Erosion control material such as silt fences and straw bales will be installed to minimize sediment runoff prior to any ground disturbance. Dust generation will be minimized during excavation activities by keeping equipment movement areas and excavation areas misted with water. The health and safety of remediation workers, on-site Camp Ravenna employees, and the general public will be covered in a site-specific health and safety plan.

To achieve a scenario in which Unrestricted (Residential) Land Use is attained for the AOC, soil will be removed from location ATA-005M from 0 to 1 ft bgs. Soil removal will be accomplished using conventional construction equipment such as backhoes, bulldozers, front-end loaders, and scrapers. Oversize debris will be crushed or otherwise processed to meet disposal facility requirements. Excavated soil will be hauled by truck to a licensed disposal facility permitted to accept the characterized waste stream.

Confirmatory Sampling. At the end of the soil excavation, confirmatory samples will be collected. The confirmatory samples will be sent to an off-site laboratory to be analyzed for COC concentrations. If the analyses indicate the COC concentration in soil exceeds the CUGs, further excavation will be conducted. If confirmation sample results are less than CUGs, further soil removal will not be required, and the area can be restored.

Restoration. Once it is determined additional excavation will not be required, all disturbed and excavated areas will be backfilled with clean soil, as needed, and graded to meet neighboring contours. The backfill will come from a source that was previously sampled and approved for use by Ohio EPA. After the area is backfilled and graded, workers will apply a seed mixture (as approved by the OHARNG) and mulch. Restored areas will be inspected and monitored as required in the Storm Water Pollution Prevention Plan.

L.3 Summary of the Estimated Remedy Costs

The present value cost to complete Alternative 2 is approximately \$93,967 (in base year 2010 dollars with a 4.125% discount factor). No O&M is required; therefore, no O&M costs are associated with these alternatives.

This cost estimate is based on the best available information regarding the anticipated scope of the selected remedy. This is an order of magnitude engineering cost estimate that is expected to be within -30 to +50% of the actual project cost in accordance with USEPA guidance (USEPA 1988).

L.4 Expected Outcomes of the Selected Remedy

Table 2 provides a summary of the CUGs to be achieved for soil at Anchor Test Area after the construction phase. Residual risks after implementing the selected remedy will be within the acceptable risk range for the future use. Removing contaminated soil will reduce the likelihood of contaminant migration to other environmental media, such as surface water or groundwater. Removing soil to attain human health CUGs will also reduce risks to ecological receptors.

No negative socioeconomic and community revitalization impacts are expected from this remedial action. Positive socioeconomic impacts are expected from excavating and removing soil exceeding the CUGs because additional resources will be available for use by the OHARNG training mission.

M. STATUTORY DETERMINATIONS

The selected remedy satisfies the statutory requirements of CERCLA Section 121 and the NCP, as described below.

M.1 Protection of Human Health and the Environment

Human exposure to COCs will be eliminated to levels that are protective through excavation and off-site disposal of soil at Anchor Test Area. The selected remedy also protects environmental receptors from potential exposure to COC-contaminated media. The selected remedy will attain the CUGs listed in Table 2.

M.2 Compliance with ARARs

The selected remedy will comply with the action-specific ARARs listed in Attachment A.

M.3 Cost-Effectiveness

The selected remedy meets the statutory requirement for a cost-effective remedy. Cost effectiveness is concerned with the reasonableness of the relationship between the effectiveness afforded by each alternative and its costs compared to other available options.

M.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The selected remedy represents the maximum extent to which permanent solutions are practicable for soil at the AOC. The selected remedy represents the best balance of trade-offs between the alternatives because it provides a permanent solution for contaminated media, is cost-effective, and eliminates the need for long-term LUCs respective to chemical contaminants in soil.

M.5 Preference for Treatment as a Principal Element

The selected remedy uses permanent solutions to the maximum extent practicable. The remedy does not satisfy the statutory preference for treatment. The treatment technologies evaluated in the RI/FS report were found to be technically infeasible or cost prohibitive for implementation at Anchor Test Area. For example, biodegradation or thermal technologies are not effective for reducing arsenic concentrations in soil.

M.6 Five-Year Review Requirements

Five-year reviews in compliance with CERCLA Section 121(c) and NCP Section 300.430(f) (4) (ii) will not be required.

N. DOCUMENTATION OF NO SIGNIFICANT CHANGE

The *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area* (USACE 2013) was released for public comment in July 2013. The PP identified Alternative 2: Attain Unrestricted (Residential) Land Use at Anchor Test Area as a recommended alternative. After the public comment period, no significant changes regarding the recommended alternative, as originally identified in the PP, were necessary or appropriate.

PART III: RESPONSIVENESS SUMMARY FOR PUBLIC COMMENTS ON THE U.S. ARMY PROPOSED PLAN FOR ANCHOR TEST AREA AT RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OH

A. OVERVIEW

In July 2013, the U.S. Army released the *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area* (USACE 2013) for public comment. A 30-day public comment period was held from July 25, 2013 to August 23, 2013. The U.S. Army hosted a public meeting on August 7, 2013 to present the PP and take questions and comments from the public for the record.

For soil, surface water, and sediment at Anchor Test Area, the U.S. Army recommended Alternative 2: Attain Unrestricted (Residential) Land Use. During the public meeting, Ohio EPA concurred with the recommendation of this alternative. Oral comments were not received at the public meeting and are addressed under Section B.

The community voiced no objections to Alternative 2, and this alternative is selected as the final remedy for soil, surface water, and sediment at Anchor Test Area in this ROD.

B. SUMMARY OF PUBLIC COMMENTS AND LEAD AGENCY RESPONSES

No comments were received verbally during the public meeting, and no written comments were received during the 30-day public comment period.

C. TECHNICAL AND LEGAL ISSUES

There were no technical or legal issues raised during the public comment period.

REFERENCES

- Environmental Quality Management (EQM) 2010. *Facility-Wide Groundwater Monitoring Program Report on the January 2010 Sampling Event, Ravenna Army Ammunition Plant, Ravenna, Ohio*. July 2010.
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- MKM (MKM Engineers, Inc.) 2007. *Characterization of 14 AOCs at Ravenna Army Ammunition Plant*. March 2007.
- OHARNG (Ohio Army National Guard) 2008. *Integrated Natural Resources Management Plan and Environmental Assessment for the Ravenna Training and Logistics Site, Portage and Trumbull Counties, Ohio*. March 2008.
- Ohio EPA (Ohio Environmental Protection Agency) 2004. *Director's Final Findings and Orders in the matter of U.S. Department of the Army, Ravenna Army Ammunitions Plant*. June 2004.
- USACE (U.S. Army Corps of Engineers) 2003. *Ravenna Army Ammunition Plant, Ravenna, Ohio, Community Relations Plan*. September 2003.
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- USACE 2013. *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-48 Anchor Test Area*. May 2013.
- USACHPPM (United States Army Center for Health Promotion and Preventative Medicine) 1998. *Relative Risk Site Evaluation for Newly Added Sites at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. Hazardous and Medical Waste Study No. 37-EF-5360-99. October 1998.
- USDA (United States Department of Agriculture) 2010. *Soil Map of Portage County, Version 4*. Website: www.websoilsurvey.nrcs.usda.gov. January 2010.
- USEPA (U.S. Environmental Protection Agency) 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final*, Document No. EPA/540/G. October 1988.
- USEPA 1991. *A Guide to Principal Threat and Low Level Threat Wastes*. Quick Reference Fact Sheet. November 1991.
- USFS (United States Forest Service) 2011. *Forest Inventory Data Online (FIDO). Forest Inventory and Analysis National Program*. <http://www.fia.fs.fed.us/tools-data/default.asp>. February 2011.

FIGURES

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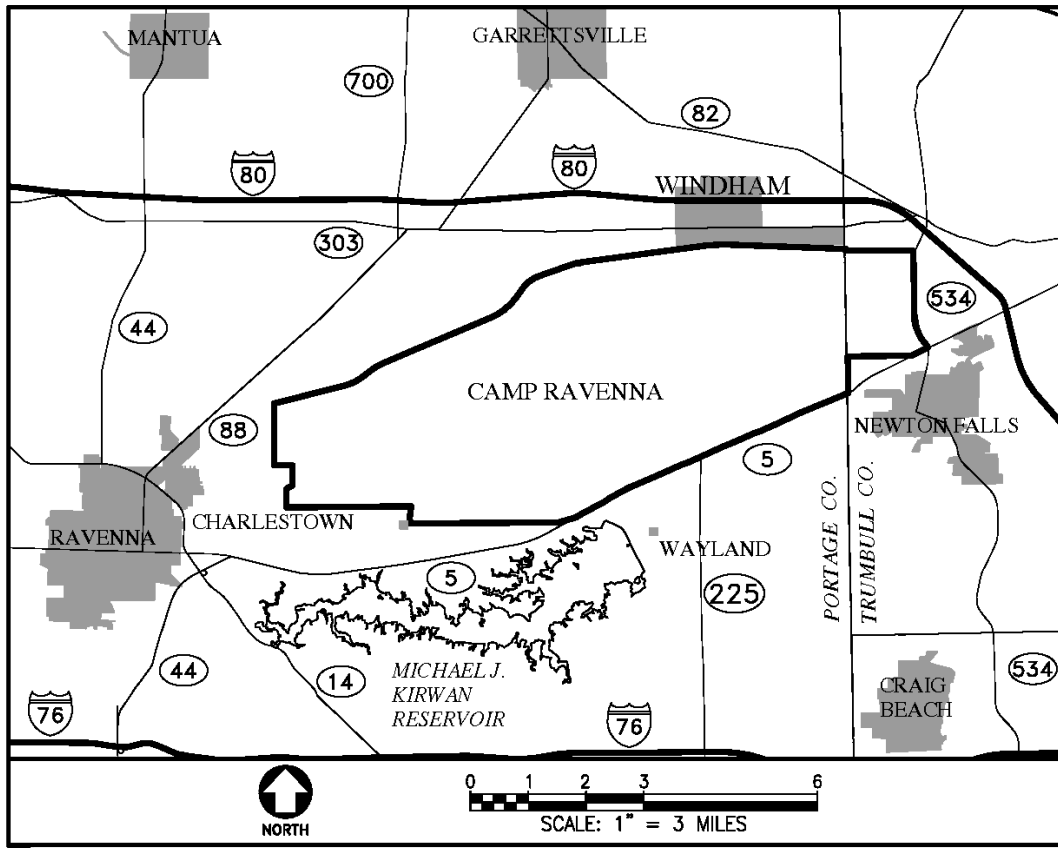


Figure 1. General Location and Orientation of Camp Ravenna

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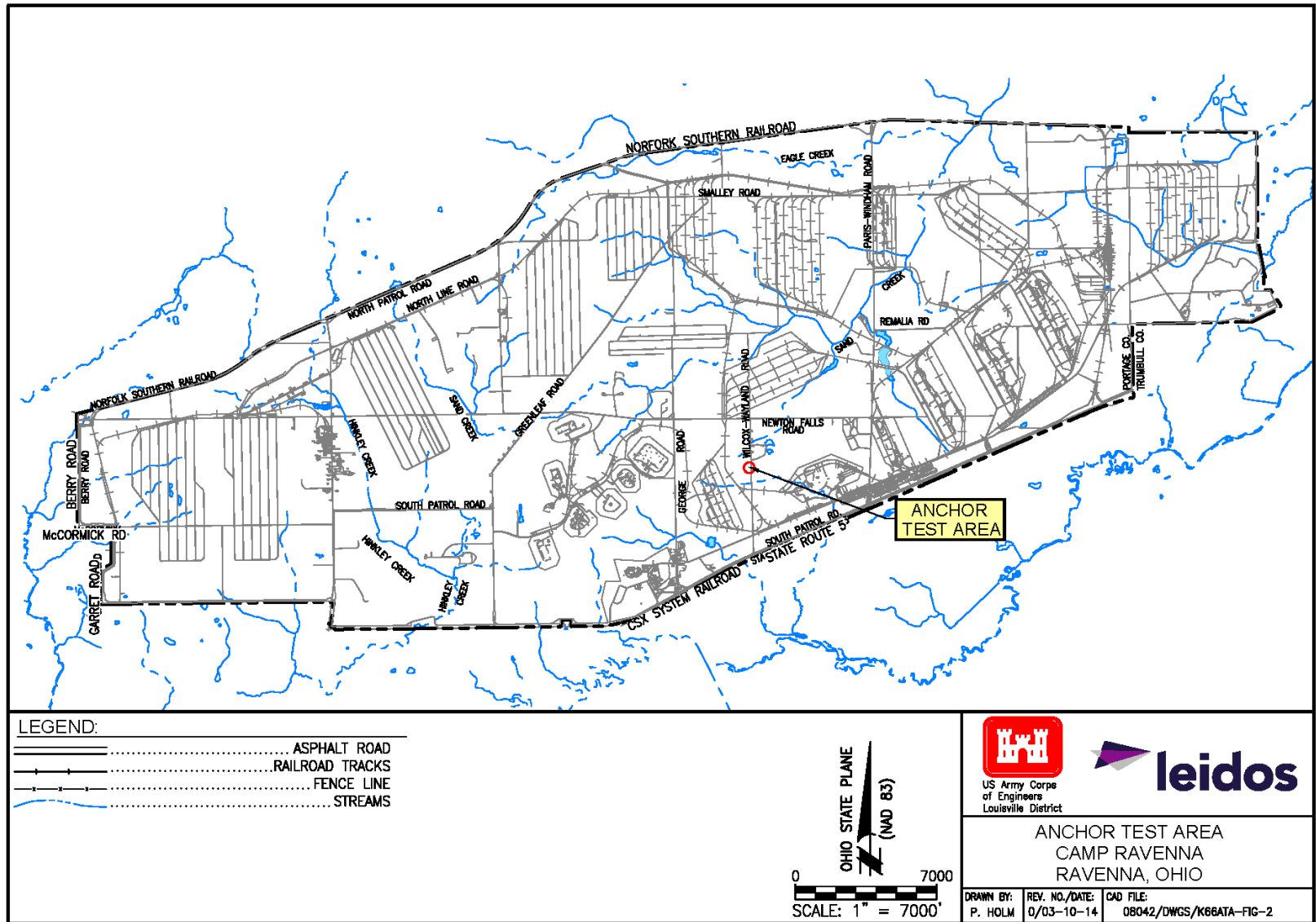


Figure 2. Camp Ravenna Installation Map

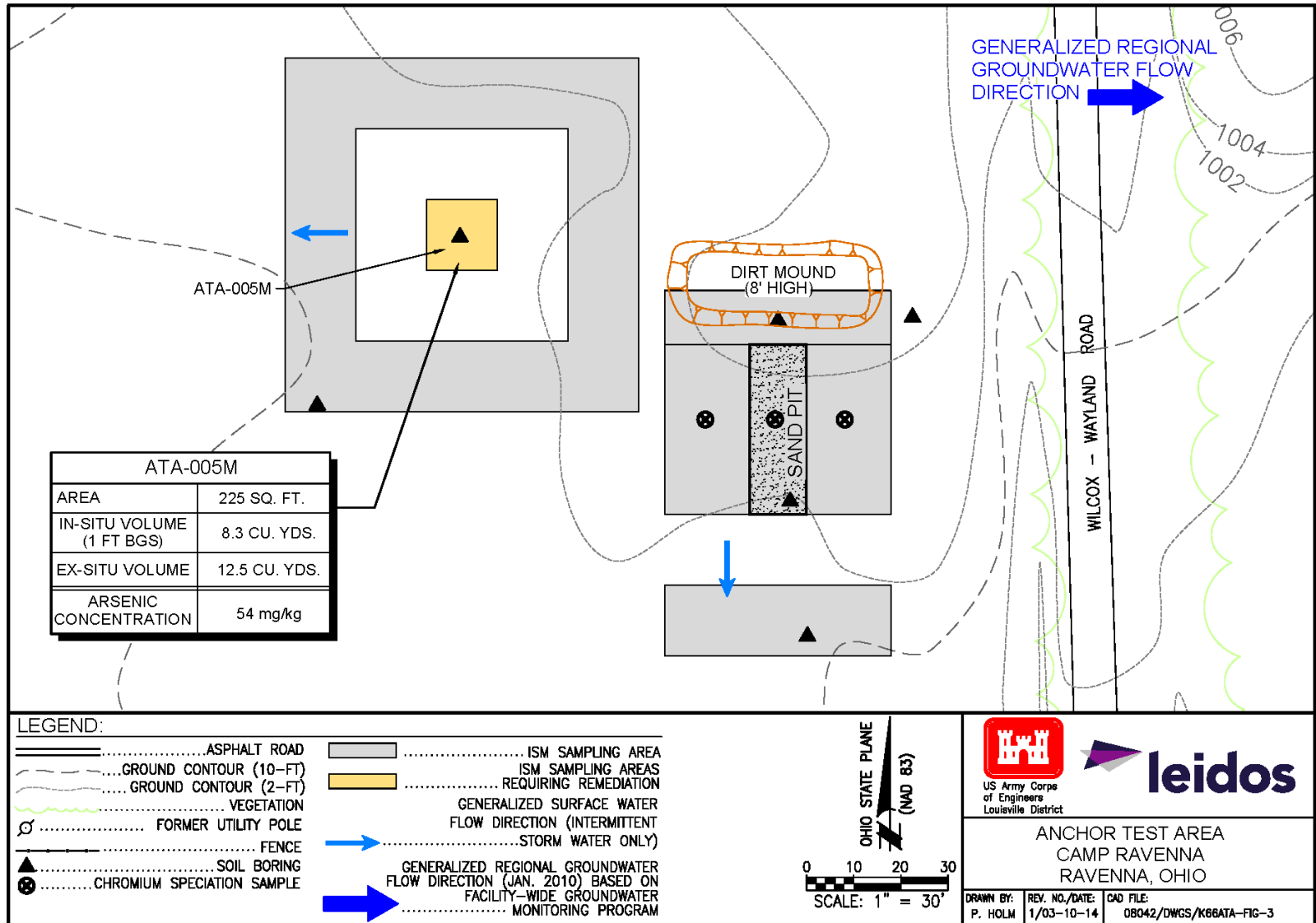


Figure 3. Anchor Test Area Site Features

ATTACHMENT A
DESCRIPTION OF ARARS

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Table A-1. Potential Action-Specific ARARs

| Media and Citation | Description of Requirement | Potential ARAR Status | Standard |
|--|--|---|---|
| Prohibition of air pollution nuisances (e.g., fugitive dust) OAC Section 3745-15-07 | These rules prohibit a release of nuisance air pollution that endangers health, safety, or welfare of the public or causes personal injury or property damage. | Applies to any activity that could result in the release of a nuisance air pollutant. This would include dust from excavation or soil management processes. | Any person undertaking an activity is prohibited from emitting nuisance air pollution. |
| Storm water requirements at construction sites 40 CFR Part 450 | These rules require that storm water controls be employed at construction sites that exceed 1 acre in size. | Applies to any construction activity that exceeds 1 acre in total size. | Persons undertaking construction activities (including grubbing and land clearing) at an AOC where the construction footprint is over 1 acre in size must design and implement erosion and run-off controls. |
| Generation of contaminated soil or debris OAC Section 3745-52-11 | These rules require that a generator determines whether a material generated is a hazardous waste. | Applies to any material that is or contains a solid waste. Must be characterized to determine whether the material is or contains a hazardous waste. | Any person that generates a waste as defined must use prescribed methods to determine if waste is considered characteristically hazardous. |
| Management of contaminated soil or debris that is or contains a hazardous waste OAC Sections 3745-52-30 through -34 | These rules require that hazardous waste be properly packaged, labeled, marked, and accumulated onsite pending on-site or off-site disposal. | Applies to any hazardous waste or media containing a hazardous waste that is generated from on-site activities. | All hazardous waste must be accumulated in a compliant manner that includes proper marking, labeling, and packaging of such waste in accordance with the specified regulations. This includes inspection of containers or container areas where hazardous waste is accumulated on-site. |
| Acquisition and use of manifests for hazardous waste shipments to off-site treatment, storage, or disposal facilities OAC Sections 3745-52-20 through -23 | These rules require that a Uniform Hazardous Waste Manifest be used for any off-site shipment of hazardous waste. | Applies to any shipment of hazardous waste to an off-site facility for treatment, storage, or disposal. | Requires a generator who transports or offers for transportation hazardous waste for off-site treatment, storage, or disposal to prepare a uniform hazardous waste manifest. |

Table A-1. Potential Action-Specific ARARs (continued)

| Media and Citation | Description of Requirement | Potential ARAR Status | Standard |
|---|--|--|--|
| <p>Soil contaminated with RCRA hazardous waste</p> <p>OAC Section 3745-400-49 OAC Section 3745-400-48 UTS</p> | <p>These rules prohibit land disposal of RCRA hazardous waste subject to them unless the waste is treated to meet certain standards that are protective of human health and the environment. Standards for treatment of hazardous waste-contaminated soil prior to disposal are set forth in the two cited rules. Use of the greater of either technology-based standards or Universal Treatment Standard (UTS) is prescribed.</p> | <p>Land disposal restrictions (LDRs) apply only to RCRA hazardous waste. This rule is considered for ARAR status only upon generation of a RCRA hazardous waste. If any soil is determined to be RCRA hazardous, and if they will be disposed of on-site, this rule is potentially applicable to disposal of the soil.</p> | <p>All soil subject to treatment must be treated as follows:</p> <ol style="list-style-type: none"> 1) For non-metals, treatment must achieve 90% reduction in total constituent concentration [primary constituent for which the waste is characteristically hazardous as well as for any organic or inorganic Underlying Hazardous Constituent (UHC)], subject to 3 below. 2) For metals and carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90% reduction in constituent concentrations as measured in leachate from the treated media (tested according to the TCLP) or 90% reduction in total constituent concentrations (when a metal removal treatment technology is used), subject to 3 below. 3) When treatment of any constituent subject to treatment to a 90% reduction standard would result in a concentration less than 10 times the UTS for that constituent, treatment to achieve constituent concentrations less than 10 times the UTS is not required. This is commonly referred to as "90% capped by 10xUTS." |
| <p>Soil contaminated with RCRA hazardous waste</p> <p>OAC Section 3745-400-49 OAC Section 3745-400-48 UTS</p> | <p>These rules prohibit land disposal of RCRA hazardous waste subject to them unless the waste is treated to meet certain standards that are protective of human health and the environment. Standards for treatment of hazardous contaminated soil prior to disposal are set forth in the two cited rules. Use of the greater of either technology-based standards or UTS is prescribed.</p> | <p>LDRs apply only to RCRA hazardous waste. This rule is considered for ARAR status only upon generation of a RCRA hazardous waste. If any soil is determined to be RCRA hazardous, and if they will be disposed of on-site, this rule is potentially applicable to disposal of the soil.</p> | <p>All soil subject to treatment must be treated as follows:</p> <ol style="list-style-type: none"> 1) For non-metals, treatment must achieve 90% reduction in total constituent concentration (primary constituent for which the waste is characteristically hazardous as well as for any organic or inorganic UHC), subject to 3 below. 2) For metals and carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90% reduction in constituent concentrations as measured in leachate from the treated media (tested according to the TCLP), or 90% reduction in total constituent concentrations (when a metal removal treatment technology is used), subject to 3 below. 3) When treatment of any constituent subject to treatment to a 90% reduction standard would result in a concentration less than 10 times the UTS for that constituent, treatment to achieve constituent concentrations less than 10 times the UTS is not required. This is commonly referred to as "90% capped by 10xUTS." |

Table A-1. Potential Action-Specific ARARs (continued)

| Media and Citation | Description of Requirement | Potential ARAR Status | Standard |
|---|---|--|--|
| Debris Contaminated with RCRA Hazardous Waste OAC Section 3745-400-49 OAC Section 3745-400-47 | These rules prescribe conditions and standards for land disposal of debris contaminated with RCRA hazardous waste. Debris subject to this requirement for characteristic RCRA contamination that no longer exhibits the hazardous characteristic after treatment does not need to be disposed of as a hazardous waste. Debris contaminated with listed RCRA contamination remains subject to hazardous waste disposal requirements. | If RCRA hazardous debris is disposed of on-site, these rules are potentially applicable to disposal of the debris. | Standards are extraction or destruction methods prescribed in OAC Section 3745-400-47. Treatment residues continue to be subject to RCRA hazardous waste requirements. |
| Soil/Debris Contaminated with RCRA Hazardous Waste – Variance OAC Section 3745-400-44 | The Director will recognize a variance approved by the USEPA from the alternative treatment standards for hazardous contaminated soil or for hazardous debris. | Potentially applicable to RCRA hazardous soil or debris that is generated and placed back into a unit and that will be land disposed of on-site. | A site-specific variance from the soil treatment standards can be used when treatment to concentrations of hazardous constituents greater (i.e., higher) than those specified in the soil treatment standards minimizes short- and long-term threats to human health and the environment. In this way, on a case-by-case basis, risk-based LDR treatment standards approved through a variance process could supersede the soil treatment standards. |

AOC = Area of Concern

ARAR = Applicable or Relevant and Appropriate Requirements

CAMU = Corrective Action Management Unit

CFR = Code of Federal Regulations

LDR = Land Disposal Restrictions

MTR = Minimum Technical Requirements

OAC = Ohio Administrative Code

RCRA = Resource Conservation and Recovery Act

TCLP = Toxicity characteristic leaching procedure

UHC = Underlying Hazardous Constituent

USEPA = U.S. Environmental Protection Agency

UTS = Universal Treatment Standard

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ATTACHMENT B
COMMENT RESPONSE CORRESPONDENCE

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**Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266**

February 25, 2014

Ohio Environmental Protection Agency
DERR-NEDO
Attn: Mr. Andrew Kocher, Project Manager
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program
Portage/Trumbull Counties, RVAAP-48 Anchor Test Area
Responses to Ohio EPA Comments on the Draft Record of Decision for Soil, Sediment,
and Surface Water at the RVAAP-48 Anchor Test Area
(Work Activity No. 267-000859-109)

Dear Mr. Kocher,

On February 20, 2014, the U.S. Army received Ohio Environmental Protection Agency comments on the *Draft Record of Decision for Soil, Sediment, and Surface Water for RVAAP-48 Anchor Test Area*. This letter presents responses to those comments.

This Record of Decision documents the mutually agreed remedy between Ohio EPA and the U.S. Army for the Anchor Test Area area of concern. Please contact the undersigned at (703) 601-7785 or brett.a.merkel.civ@mail.mil, if there are issues or concerns associated with the responses to comments. I look forward to your response prior to our submission of the Final Record of Decision.

Sincerely,

A handwritten signature in black ink that reads "Brett Merkel".

Brett A. Merkel
RVAAP Restoration Program Manager
Army National Guard Directorate

cc: Nancy Zikmanis, Ohio EPA, DERR-NEDO
Rod Beals, Ohio EPA, DERR-NEDO
Justin Burke, Ohio EPA, CO
Kevin Sedlak, ARNG, Camp Ravenna
Katie Tait, OHARNG Camp Ravenna
Glen Beckham, USACE Louisville
Nat Peters, USACE Louisville
Kevin Jago, Leidos
Jed Thomas, Leidos
Gail Harris, Vista Sciences

Subject: Responses to Ohio EPA comments of the Draft Record of Decision for Soil, Sediment, and Surface Water at Anchor Test Area, Ravenna Army Ammunition Plant Restoration Program, Portage/Trumbull Counties, RVAAP-48 Anchor Test Area

Ohio EPA Comments and Army Responses

- 1) Page 3, Line 19 - Please remove "Scott J. Nally, Director" and add "Craig W. Butler, Interim Director".

Army Response: Agree. The signatory for Ohio EPA has been revised as recommended.

- 2) Page 16, Lines 22 - Please add a reference here to Appendix A.

Army Response: Agree. The referenced text has been revised as follows:

"Action-specific ARARs were identified for Alternative 2, as presented in Appendix A. With appropriate design and planning, Alternative 2 would comply with these ARARs."

- 3) Pages 18-19, Lines 42-43 and Lines 1-2 - Please update the cost estimate/base year (2010) due to the time, now 4 years later.

Army Response: Clarification. The main intent of the cost estimate throughout the CERCLA process is to provide a comparative analysis among the different alternatives. As the escalated costs do not have an impact on the comparative analysis, it is recommended that the cost estimate remain the same as was previously presented to the public in the proposed plan. No change is recommended.

- 4) Page 20, Lines 41-43 – See comment 3. Please revise.

Army Response: Clarification. Please see response to comment 3. No change is recommended.