Final

Record of Decision
for Soil, Sediment, and Surface Water
at RVAAP-44 Load Line 11

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-15-C-0046

Prepared for:

US Army Corps of Engineers®

U.S. Army Corps of Engineers
Louisville District

Prepared by:

leidos

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8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087

February 15, 2018

REPORT DOCUMENTATION PAGE

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None.

14. ABSTRACT

This Record of Decision documents the selection of No Further Action (NFA) with respect to soil, sediment, and surface water to attain Unrestricted (Residential) Land Use at Load Line 11. In addition, this document presents the physical characteristics, geology, and hydrogeology of Load Line 11. This document also summarizes a previous Interim Removal Action, current nature and extent of contamination in soil, sediment, and surface water; contaminant fate and transport; and human health and ecological risk assessments. These evaluations indicate there are no chemicals of concern (COCs) that pose unacceptable risk.

15. SUBJECT TERMS

record of decision, no further action, land use, chemicals of concern, interim removal action

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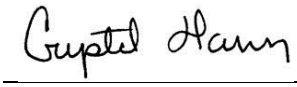
CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Leidos has completed the Record of Decision for Soil, Sediment, and Surface Water at RVAAP-44 Load Line 11 at the Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, 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 U.S. Army Corps of Engineers policy. In addition, an independent verification was performed to ensure all applicable changes were made per regulatory and Army comments.

Jed Thomas, P.E.
Study/Design Team Leader

2/15/18
Date



Crystal Hann
Independent Technical Review Team Leader

2/15/18
Date

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

Internal Leidos Independent Technical Review comments are recorded on a Document Review Record per Leidos standard operating procedure ESE A3.1 Document Review. 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

2/15/18
Date

Ohio Environmental Protection Agency

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

March 29, 2018

Mr. Mark Leeper
Team Lead
Cleanup and Restoration Branch
ARNG Directorate
111 South George Mason
Arlington, VA 22204

Re: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project records
Remedial Response
Portage County
267000859115

Subject: Concurrence of Final Record of Decision for Soil, Sediment, and Surface Water at Load Line 11 for the Former Ravenna Army Ammunition Plant (RVAAP) Document (Work Activity No. 267-000859-115)

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the Final Record of Decision (ROD) for Soil, Sediment, and Surface Water at RVAAP-44 Load Line 11. The document is dated February 15, 2018, and was received at Ohio EPA, Northeast District Office (NEDO) on February 15, 2018. This letter serves to document Ohio EPA's concurrence regarding the proposal of no further action (NFA) for the RVAAP Load Line 11 site as contained in the final ROD.

We have no comments on the Final Record of Decision for Load Line 11 Soil, Sediment, and Surface Water. Based on the information contained in the Final ROD document, other investigation documents/reports, and Ohio EPA's oversight participation during the investigation, Ohio EPA concurs with the Final ROD document for the RVAAP Load Line 11 for NFA.

If you have any questions concerning the above, please feel free to contact Megan Oravec at (330) 963-1168.

Sincerely,

Michael Proffitt, Chief
Division of Environmental Response and Revitalization

MP/MO/nvp

cc: Craig Coombs, USACE, Louisville District
Katie Tait, OHANG, Camp Ravenna
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Contract No. W912QR-15-C-0046

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

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February 15, 2018

DOCUMENT DISTRIBUTION
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Portage and Trumbull Counties, Ohio

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ARNG = Army National Guard.
DERR = Division of Environmental Response and Revitalization.
IED = Installation and Environnent Division.
NEDO = Northeast District Office.
OHARNG = Ohio Army National Guard.
Ohio EPA = Ohio Environmental Protection Agency.
REIMS = Ravenna Environmental Information Management System.
SWDO = Southwest District Office.
USACE = U.S. Army Corps of Engineers.

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ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
AOC	Area of Concern
Army	U.S. Department of the Army
bgs	below ground surface
Camp Ravenna	Camp Ravenna Joint Military Training Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
CMCOPC	Contaminant Migration Chemical of Potential Concern
COC	Chemical of Concern
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
FPA	Former Production Area
FWCUG	Facility-wide Cleanup Goal
FWGWMP	Facility-wide Groundwater Monitoring Program
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
IRA	Interim Removal Action
IRP	Installation Restoration Program
MDL	Method Detection Limit
NPA	Non-production Area
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PAH	Polycyclic Aromatic Hydrocarbon
PBA08 RI	2008 Performance-based Acquisition Remedial Investigation
PCB	Polychlorinated Biphenyl
PP	Proposed Plan
RI	Remedial Investigation
ROD	Record of Decision
RVAAP	Ravenna Army Ammunition Plant
SL	Screening Level
SRC	Site-related Contaminant
SVOC	Semi-volatile Organic Compound
TR	Target Risk
USEPA	U.S. Environmental Protection Agency
USP&FO	U.S. Property and Fiscal Officer
VOC	Volatile Organic Compound

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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 Load Line 11. Load Line 11 is designated as area of concern (AOC) RVAAP-44 within the former Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio (Figures 1 and 2).

The former RVAAP is now known as Camp Ravenna Joint Military Training Center (Camp Ravenna). Camp Ravenna, consisting of 21,683 acres, is federally owned and 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. As of September 2013, administrative accountability for the entire acreage of the facility has been transferred to the U.S. 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).

Load Line 11 is located in the south-central portion of Camp Ravenna. The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) Identifier for RVAAP is OH5210020736.

B STATEMENT OF BASIS AND PURPOSE

The U.S. Department of the Army (Army) is the lead agency and has chosen the selected remedy for Load Line 11 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. 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, concurred with the *Phase II Remedial Investigation Report for Soil, Sediment, and Surface Water at RVAAP-44 Load Line 11* (USACE 2016) (herein referred to as the Phase II Load Line 11 RI Report) and *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-44 Load Line 11* (USACE 2017) (herein referred to as the Load Line 11 PP). The Phase II Remedial Investigation (RI) Report evaluated contaminated soil, sediment, and surface water at Load Line 11 and recommended no further action for these media. The decision that no further action is required for soil, sediment, and surface water at Load Line 11 satisfies the requirements of the Ohio EPA *Director's Final Findings and Orders*, dated June 10, 2004 (Ohio EPA 2004).

C DESCRIPTION OF THE SELECTED REMEDY

No further action is necessary for soil, sediment, and surface water at Load Line 11 for Unrestricted (Residential) Land Use. Consequently, no further action is necessary for the future use of the site (Military Training). Groundwater at Load Line 11 will be addressed under future CERCLA decisions.

Land use controls will not be implemented as part of this decision, as no CERCLA-related chemicals of concern (COCs) were identified in soil, sediment, or surface water for the Resident Receptor.

D STATUTORY DETERMINATIONS

The recommendation of no further action for soil, sediment, and surface water is protective of human health and the environment and meets the statutory requirements for cleanup standards established in Section 121 of CERCLA. Because the CERCLA-related contamination present in soil, sediment, and surface water at Load Line 11 does not pose a potential risk to human health or the environment, five-year reviews will not be required.

E AUTHORIZING SIGNATURE

12 May 2018

Erik T. Gordon
COL, GS
I&E, Army National Guard

Date

PART II: DECISION SUMMARY

A SITE NAME, LOCATION, AND DESCRIPTION

When the RVAAP Installation Restoration Program (IRP) began in 1989, RVAAP (CERCLIS Identification Number OH5210020736) was identified as a 21,419-acre installation. In 2002 and 2003, OHARNG surveyed the property and the total acreage of the property was found to be 21,683 acres. The RVAAP IRP encompasses investigation and cleanup of past activities over the entire 21,683-acre former RVAAP.

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). The Army is the lead agency for any remediation, decisions, and applicable cleanup at Load Line 11. These activities are being funded and conducted under the IRP. Ohio EPA is the supporting state regulatory agency.

Camp Ravenna is 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. 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.

Camp Ravenna is a parcel of property approximately 17.7 km (11 miles) long and 5.6 km (3.5 miles) wide, bounded by State Route 5 and the CSX System Railroad on the south; Garret, McCormick, and Berry roads on the west; the Norfolk Southern Railroad on the north; and State Route 534 on the east (see Figures 1 and 2). Camp Ravenna is surrounded by several communities: Windham to the north, Garrettsville 9.6 km (6 miles) to the north, Newton Falls 1.6 km (1 mile) to the southeast, Charlestown to the southwest, and Wayland 4.8 km (3 miles) to the south.

Load Line 11, formerly known as Booster Line #1, is an approximately 48-acre fenced AOC located near the southwest corner of the intersection of Fuze and Booster Spur Road and Newton Falls Road, north of Load Line 7, in the south-central portion of Camp Ravenna (Figure 1 and Figure 2). Load Line 11 was formerly used for producing artillery primers and fuzes.

The distinct surface features of Load Line 11 are shown on Figure 3. All buildings, including slabs and foundations, were removed from 2004–2006. Remaining features at Load Line 11 include a one-lane asphalt road that enters the AOC from the south and an asphalt parking area remains by former Building AP-11. The Load Line 11 AOC fence is still in place, but it is not currently maintained. Small construction drainage ditches border the access road (USACE 2016).

The AOC boundary encompasses the former production area (FPA) and non-production area (NPA) soil exposure units (EU). The FPA consists of 11.4 acres and is in the central portion of the AOC. The FPA encompasses the locations of the former production and storage buildings. The NPA is 36.8 acres and includes the areas between the FPA and AOC fence. Load Line 11 also has three sediment

and surface water EUs: East Ditch, West Ditch, and Sewer Outfall. These EUs are presented on Figure 4.

B SITE HISTORY AND ENFORCEMENT ACTIVITIES

RVAAP was constructed in 1940 and 1941 for depot storage and ammunition assembly/loading and placed on standby status in 1950. The primary purpose of the former RVAAP was to load medium and major caliber artillery ammunition (i.e., bombs, mines, fuze and boosters, primers, and percussion elements) and store finished components. Load Lines 5 through 11 produced fuzes, boosters, primers, detonators, and percussion elements.

Load Line 11, formerly known as Booster Line #1, is a 48-acre, fenced AOC located near the southwest corner of the intersection of Fuze and Booster Spur Road and Newton Falls Road, north of Load Line 7, in the south-central portion of Camp Ravenna (Figure 1 and Figure 2). Below is a summary of historical operations at Load Line 11 (USATHAMA 1978):

- 1941–1945 – The site operated at full capacity to produce artillery primers. Black powder was used to charge the primers. No bulk handling of other explosives occurred at Load Line 11. At the end of World War II, Load Line 11 was deactivated, and the process equipment remained on standby status.
- 1951–1957 – The site was reactivated to produce primers. During reactivation, Load Line 11 produced 9,927,118 MK2A4 percussion primers, 24,482,465 MK2A4 primers, and 1,504,935 MK2A4 repack primers.
- 1969–1971 – The site was reactivated to produce approximately 7,000,000 MR ZA4 fuzes.
- 1971 – The site was deactivated and process equipment was removed.

No fuel storage tanks were present at Load Line 11 during operations. No historical information exists to indicate Load Line 11 was used for any other processes (including fuel storage and use, burning, etc.) other than what is presented above (USACE 2016).

An interim removal action (IRA) was conducted in 2001 to remove building sumps, contaminated media within six ditch lines, and a hot spot with petroleum contamination. These activities were conducted by the Army in unison with the Phase I RI, as further described in Section E.2.

C COMMUNITY PARTICIPATION

Using the RVAAP community relations program, the 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 the following:

- **Restoration Advisory Board –** The 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 the progress with decision makers. Board meetings are generally held two to three times per year and are open to the public.
- **Community Relations Plan –** The *Community Relations Plan* (Vista 2017) is maintained to establish processes to keep the public informed of activities at RVAAP. The plan is available in the Administrative Record at Camp Ravenna.
- **Internet Website –** The Army established an internet website in 2004 for RVAAP. It is accessible to the public at www.rvaap.org.

In accordance with CERCLA Section 117(a) and National Oil and Hazardous Substances Pollution Contingency Plan Section 300.430(f)(2), the Army released the Load Line 11 PP (USACE 2017) to the public on June 12, 2017. The proposed plan (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 radio stations, television stations, and newspapers (e.g., *Youngstown Vindicator, Warren Tribune-Chronicle, Akron Beacon Journal,* and *Ravenna Record Courier*), as specified in the Community Relations Plan. The notice of availability initiated the 30-day public comment period beginning June 12, 2017 and ending July 12, 2017.

The Army held a public meeting on June 27, 2017, at the Shearer Community Center, 9355 Newton Falls Road, Ravenna, Ohio 44266 to present the PP. At this meeting, representatives of the Army provided information and were available to answer any questions. A transcript of the public meeting is available to the public and has been included in the Administrative Record. Responses to any verbal comments received at this meeting and written comments received during the public notification period are included in the Responsiveness Summary, which is Part III of this ROD.

The Army considered public input from the public meeting on the PP when selecting the remedy.

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 are not anticipated to cause risks to human health or the environment. An IRA took place from January to June 2001 to remove contamination in primary migration pathways at Load Line 11, as described in Section E.2.

This ROD addresses soil, sediment, and surface water. The CERCLA-related contamination at Load Line 11 is at concentrations considered protective of human health and does not represent a risk to the environment. Therefore, these media are already protective for Unrestricted (Residential) Land Use, and the program goal of the IRP at RVAAP has been met for Load Line 11.

Potential impacts to groundwater from soil (e.g., contaminant leaching) were evaluated in the RI Report, as protectiveness to groundwater was included in the fate and transport analysis. However, groundwater will be evaluated as an individual AOC for the entire facility (designated as RVAAP-66) under the Facility-wide Groundwater Monitoring Program (FWGWMP).

E SITE CHARACTERISTICS

This section presents site characteristics, nature and extent of contamination, and the conceptual site model for Load Line 11. These characteristics and findings are based on investigations conducted from 1978–2010 and are further summarized in the Phase II Load Line 11 RI Report (USACE 2016).

E.1 Physical Characteristics

This section describes the topography/physiology, geology, hydrogeology, and ecological characteristics of Camp Ravenna and Load Line 11 that were key factors in identifying the potential contaminant transport pathways, receptor populations, and exposure scenarios to evaluate human health and ecological risks.

E.1.1 Topography/Physiography

The topography of Camp Ravenna is gently undulating with an overall decrease in ground elevation from a topographic high of approximately 1,220 ft above mean sea level (amsl) in the far western portion of the facility to low areas at approximately 930 ft amsl in the far eastern portion. Topographic relief at the AOC is moderate, with a topographic high in the central portion of the AOC. Ground elevations within Load Line 11 range from 1,070–1,100 ft amsl (Figure 3). Surface water follows topographic relief and drains into ditches that exit the AOC. Sand Creek is immediately to the north of the AOC boundary.

Load Line 11 is an approximately 48-acre AOC located near the southwest corner of the intersection of Fuze and Booster Spur Road and Newton Falls Road, north of Load Line 7, in the south-central portion of Camp Ravenna (Figure 2). A fence exists as the perimeter boundary of the AOC, although it is not currently maintained.

All buildings and structures within the Load Line 11 fence line have been demolished, and building slabs and footers have been removed. Soil near the former production buildings was extensively disturbed during building demolition activities. The work areas were re-graded, cavities were filled with approved fill dirt as needed, and the area was vegetated following the building decontamination and demolition. Remaining features at Load Line 11 include a one-lane asphalt access road that enters the AOC from the south and encircles 75% of the FPA (Figure 3). An asphalt parking area remains by former Building AP-11. Small drainage ditches border some portions of the access road, and drainage conveyances are located throughout the AOC boundary. Vacant, wooded land is located directly to the south and southwest.

E.1.2 Geology

As shown on Figure 5, Load Line 11 is located within Hiram Till glacial deposits. Although the unconsolidated deposit's characteristics may vary due to site disturbances (e.g., building construction, demolition, and re-grading), the primary soil type found at Load Line 11 is the Mahoning silt loam which covers over 85% of the AOC. The northern boundary of the AOC is comprised of Rittman silt loam and the very eastern portion of the AOC is Wadsworth silt loam (USDA 2010). Mahoning silt loam is a gently sloping, poorly drained soil formed in silty clay loam or clay loam glacial till, generally where bedrock is greater than 6 ft below ground surface (bgs). The Mahoning silt loam has low permeability, with rapid runoff and seasonal wetness. The Rittman silt loam is a deep, moderately eroded, moderately well drained soil formed in silty clay or clay loam glacial till plains or moraines, generally where bedrock is greater than 6 ft bgs. The Wadsworth silt loam is a somewhat poorly drained, low permeability soil formed in silty clay loam glacial till.

The composition of unconsolidated deposits at Load Line 11 varies laterally and vertically across the AOC but generally consists of clay to sand-rich silt tills with interbedded sands and gravel lenses throughout. Deposits are generally stiff, moderately plastic, and tend to hold water. Cross-sections of the Load Line 11 subsurface were created from monitoring well lithology records to illustrate lateral distribution and variation of the discontinuous glacial sediment (MKM 2005). Geotechnical analyses conducted during the Phase I RI indicated a grain size distribution of 0–20.9% gravel, 13.2–27.6% sand fractions, 17.1–60.3% silt fractions, and 27.2–69.5% clay fractions. Geotechnical classifications indicate the sample collected from 1–3 ft bgs was lean clay with little sand, and the 4–6 and 8–10 ft bgs samples were silts with increasing sand content with depth (MKM 2005).

The bedrock formation underlying the unconsolidated deposits at Load Line 11, as inferred from existing geologic data, is the Pennsylvanian-age Pottsville Formation, Sharon Member (Figure 6). The Sharon Member is the basal unit of the early Pennsylvania Pottsville Formation. The Pottsville group of northeastern Ohio is typically sheet like and is thinner than that of eastern Pennsylvania. Most of this member consists of conglomerate and sandstone to include: vein quarts, quartzite, sandstone, slate, shale, silicified Devonian limestone, and metamorphic clasts (Ninke and Evans 2002). Historical investigations have not encountered bedrock at Load Line 11 with an average borehole depth of 17 ft bgs and a maximum depth of 23 ft bgs. Bedrock was not encountered during 2008 Performance-based Acquisition Remedial Investigation (PBA08 RI) drilling activities where the maximum depth of boreholes was 13 ft bgs (USACE 2016). Bedrock was encountered in 2012 during the installation of LL11mw-012, which was screened in bedrock consisting of Sharon Shale to a depth of 115 ft bgs.

E.1.3 Hydrogeology

Ten groundwater monitoring wells were installed at Load Line 11 during the Phase I RI. Initial depths to groundwater varied from 5–17 ft bgs. Monitoring wells at the AOC ranged in completion from 15.55–22.35 ft bgs. Two additional monitoring wells, LL11mw-011 (unconsolidated) and LL11mw-012 (bedrock), were installed under the Facility-wide Groundwater Monitoring Plan in 2012.

Water level elevations at the AOC range from 1,068.4–1,091.73 ft amsl (less than 0.08–13.6 ft below top of casing) with the highest elevation at monitoring well LL11mw-001. Potentiometric data indicate the groundwater table occurs within the unconsolidated zone throughout the AOC. Monitoring well groundwater elevations are collected under the FWGWMP. The estimated groundwater flow directions developed from the January 2010 facility-wide potentiometric data were presented in the *Facility-wide Groundwater Monitoring Program Report on the January 2010 Sampling Event* (EQM 2010). The potentiometric surface in the unconsolidated zone shows the groundwater flow pattern to the north toward Sand Creek (Figure 3). The hydraulic gradient at the AOC is 0.017 ft/ft.

Results of slug tests performed at 10 monitoring wells (wells LL11mw-001 to LL11mw-010) during the Phase I RI indicate an average hydraulic conductivity of 3.49E-05 cm/s for the uppermost unconsolidated aquifer (MKM 2005).

E.1.4 Ecology

There is only intermittent water within the East Ditch and West Ditch. Load Line 11 has two small wetlands (Wetland 1 and Wetland 2) within the AOC boundary. The ecological risk assessment (ERA) in the Phase II Load Line 11 RI Report (USACE 2016) concluded that wetlands are important and significant ecological resources at the AOC (Figure 7).

A field survey conducted by SAIC field biologists at Load Line 11 indicated the AOC consists of five vegetation types (Figure 7). The habitat area is dominated by dry, mid-successional cold-deciduous shrubland. Small areas of three forest types are represented along the western, northern, and eastern boundaries. The western boundary runs through a small amount of mixed, cold-deciduous successional forest and American beech (*Fagus grandifolia*), oak (*Quercus spp.*), and maple (*Acer spp.*) forest alliance. The northern boundary runs through a small strip of green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), and hackberry (*Celtis occidentalis*) temporarily-flooded forest alliance. The eastern boundary runs through a small amount of mixed, cold-deciduous successional forest. The southern boundary runs through a small amount of a fourth forest type: American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and American tulip tree (*Liriodendron tulipifera*) forest alliance.

The northern long-eared bat (*Myotis septentrionalis*; endangered species) exists at Camp Ravenna. There are no other federally listed species and no critical habitat occurs on Camp Ravenna. Load Line 11 has not been previously surveyed for federal- or state-listed species; however, there have been no documented sightings of state-listed, federally listed, threatened, or endangered species at the AOC (OHARNG 2014).

The habitats at Load Line 11 were assessed to be healthy and functioning. Functional habitat was determined by noting the absence of large bare spots and dead vegetation or other obvious visual signs of an unhealthy ecosystem (USACE 2016).

E.2 Site Investigations and Interim Removal Action

E.2.1 Site Investigations

In 1978, the U.S. Army Toxic and Hazardous Materials Agency conducted an Installation Assessment of RVAAP to review the potential for contaminant releases at multiple former operations areas, as documented in *Installation Assessment of Ravenna Army Ammunition Plant* (USATHAMA 1978). This assessment indicated historical operations may have utilized lead azide or lead styphnate, which are primary explosives. The *Relative Risk Site Evaluation for Newly Added Sites* (USACHPPM 1998) indicated that several inorganic chemicals and explosives were detected in surface soil, sediment, and groundwater (inferred from subsurface soil). The Relative Risk Site Evaluation scored Load Line 11 as a "high-priority" AOC due to potentially contaminated sediment potentially migrating to Sand Creek and affecting human and ecological receptors, including state endangered species (USACHPPM 1998).

Since 1978, Load Line 11 has been included in various historical assessments and investigations conducted at the former RVAAP. The following environmental investigations have been completed for Load Line 11:

- Installation Assessment of Ravenna Army Ammunition Plant (USATHAMA 1978);
- Resource Conservation and Recovery Act Facility Assessment (Jacobs 1989);
- Preliminary Assessment for the Characterization of Areas of Contamination (USACE 1996);
- Relative Risk Site Evaluation for Newly Added Sites (USACHPPM 1998);
- 2000/2001 Phase I RI (MKM 2005); and
- 2010/2012 PBA08 RI (USACE 2016).

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 contaminant fate and transport, and conduct risk assessments, as summarized in the Phase II Load Line 11 RI Report (USACE 2016).

E.2.2 Interim Removal Action

An IRA took place from January through June 2001 to remove contamination in primary migration pathways at Load Line 11, as summarized in the *Load Line 11 Interim Removal Action Report* (MKM 2004). The IRA was performed concurrently with the Phase I RI activities and is summarized below. Figure 8 presents the removal areas and locations sampled under the IRA.

Sump Excavation – Five sedimentation sumps were excavated, removed, and disposed. These sumps contained fibrous material and were located adjacent to Buildings AP-3, AP-5, AP-6, and AP-8. The sumps were excavated and removed in accordance with federal (40 Code of Federal Regulations Part 61, Subpart M) and state (Ohio Administrative Code 3745-20) asbestos emission control regulations. As part of the removal activities, approximately 15,000 gal of water were removed from sumps. During the water removal at Building AP-3, it was determined that the infiltration rate of groundwater into the sewer system was significant enough to impede removal operations. Consequently, the sewer

manholes downgradient of each sump were filled with bentonite cement to prevent water from infiltrating back into the sumps during the excavation and removal operations. Upon removing the sumps, one confirmation sample was collected from the bottom of each excavation.

Ditch Excavation – Six ditches exhibited elevated concentrations of metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and/or polychlorinated biphenyls (PCBs). These ditches were excavated and disposed to a depth of 2 ft bgs, totaling 230 yd^3 of contaminated soil. Confirmation samples were collected after the soil removal and confirmed the removal of contamination.

Hot Spot Excavation – One 30 by 30 by 8 ft hot spot area, located in an open field north of Building AP-17, was excavated due to petroleum contamination encountered during RI soil boring activities conducted to install monitoring well LL11mw-005. (The monitoring well was relocated approximately 50 ft northeast of the original location.) Following excavation operations, six confirmation samples were collected at the bottom of the excavation (approximately 8 ft bgs) to verify that the petroleum-contaminated soil was removed.

Test Trench Excavations – Unexploded ordnance technicians encountered an area of high magnetometer readings north-northwest of the hot spot area while clearing the excavation area for the hot spot. Excavation of test trenches and confirmation samples indicated that no unexploded ordnance was present. Upon this determination, the test trenches were backfilled and leveled to the original ground surface elevation.

E.3 Nature and Extent of Contamination

Data from the Phase I RI, IRA, and 2010/2012 PBA08 RI that represent the current status of Load Line 11 effectively characterized the nature and extent of the contamination. To support the evaluation of nature and extent of contamination, site-related contaminant (SRC) concentrations were compared to screening levels (SLs) corresponding to the lowest facility-wide cleanup goal (FWCUG) for the Resident Receptor (Adult and Child) and National Guard Trainee at a target hazard quotient (HQ) of 0.1, target risk (TR) of 1E-06, as presented in the *Facility-wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (USACE 2010) (herein referred to as the FWCUG Report). It can be concluded that:

- The previous IRA removed contamination associated with Load Line 11,
- The vertical and horizontal extent of existing contamination is defined, and
- No further sampling is needed to evaluate Load Line 11.

Figure 9 depicts all the sampling locations from the Phase I RI and PBA08 RI and the locations of IRA excavation activities. The following sections detail the nature and extent of contamination for surface soil, subsurface soil, sediment, and surface water in the FPA and NPA.

E.3.1 Soil

Locations where explosives were identified as potential contaminants from previous use were thoroughly evaluated, including around former process buildings and across the AOC as a whole. The maximum concentrations of the explosives and propellants were all below their respective SLs and were not considered chemicals of potential concern (COPCs) in surface and subsurface soil at the FPA and NPA.

Arsenic, chromium, lead, and mercury were identified as potential SRCs and as potentially related to the previous site use. When evaluating these chemicals against their SLs [using the trivalent chromium FWCUG for chromium and the regional SL of 400 mg/kg for lead], chromium, lead, and mercury concentrations were all below their SLs; therefore, these chemicals were not considered COPCs for the FPA or NPA in surface and subsurface soil. Arsenic was the only inorganic chemical potentially related to previous AOC operations that is considered a COPC in surface and subsurface soil at the FPA and NPA. However, the arsenic exposure point concentration (EPC) at the FPA and NPA were below the Resident Receptor FWCUG.

With the exception of benzo(a)pyrene at four surface soil sample locations, none of the detected concentrations of SVOCs, VOCs, pesticides, or PCBs in surface or subsurface soil were above the Resident Receptor (Adult and Child) FWCUGs at a TR of 1E-05, HQ of 1. Benzo(a)pyrene is considered a COPC in the surface soil at the FPA and NPA; however, the EPC at the FPA (0.219 mg/kg) is below the Resident Receptor FWCUG (0.221 mg/kg) and the EPC at the NPA (0.28 mg/kg) is only slightly above that FWCUG.

E.3.2 Sediment and Surface Water

The East Ditch represents a ditch line that drained portions of the eastern part of the FPA. The East Ditch EU was evaluated with two sediment samples and one surface water sample. No explosives or propellants were detected in the East Ditch sediment and surface water samples. Arsenic was the only inorganic chemical from previous site use that exceeded its SL in sediment and is considered a COPC. No inorganic chemical concentrations detected in the surface water sample exceeded their respective SLs. One polycyclic aromatic hydrocarbon (PAH) [benzo(a)pyrene] concentration detected in sediment exceeded its SL and was identified as a COPC; however, the benzo(a)pyrene concentration was detected at a concentration below the Resident Receptor (Adult and Child) FWCUG at a TR of 1E-05, HQ of 1. SVOCs were not detected in the surface water sample. In addition, no VOCs, pesticides, or PCBs were detected in sediment at the East Ditch. Two pesticides [beta-hexachlorocyclohexane (BHC) and gamma-chlordane] were identified as SRCs at low, estimated concentrations. No VOCs or PCBs were detected in the East Ditch surface water.

The West Ditch represents a ditch line west of former Building AP-4 that drains the western half of Load Line 11. No explosives were detected in West Ditch sediment. The propellant nitrocellulose was detected in sediment sample LL11sd-096 at a concentration below its SL. No explosives or propellants were detected in the surface water sample. No inorganic chemicals related to previous site use exceeded their SLs except for arsenic in the surface water sample. One PAH [benzo(a)pyrene] exceeded its SL in the West Ditch sediment sample and was identified as a COPC. Four PAHs

[benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene] exceeded their SLs in the surface water sample and were identified as COPCs. The PAH concentrations detected in sediment and surface water were all above the Resident Receptor (Adult and Child) FWCUGs at a TR of 1E-05, HQ of 1. No PCBs, pesticides, or VOCs were detected in sediment at the West Ditch. One pesticide (beta-BHC) was identified as an SRC and was detected at a low, estimated concentration below laboratory detection limits. No VOCs or PCBs were detected in the West Ditch surface water.

The Sewer Outfall EU is represented by a sediment sample collected at the sanitary system overflow outfall north of the FPA. The only SRCs identified were the inorganic chemicals sulfate and sulfide, neither of which has established background concentrations for comparison.

One sediment sample and one surface water sample were collected at the off-AOC location LL11sd/sw-082, located on Sand Creek downstream of Load Line 11. Inorganic chemicals were not detected above background concentrations in the sediment; however, six inorganic chemicals were detected above their respective background concentrations for surface water. All the detections were at concentrations below their respective SLs. No explosives, propellants, SVOCs, pesticides, or PCBs were detected in the off-AOC sediment. Two VOCs (carbon disulfide and toluene) were present at low, estimated concentrations below laboratory detection limits.

No explosives, propellants, SVOCs, VOCS, pesticides, or PCBs were observed at this Sand Creek location.

E.4 Conceptual Site Model

Conceptual site model elements are discussed in this section, including primary and secondary contaminant sources and release mechanisms, contaminant migration pathways and discharge or exit points, and potential human receptors and ecological resources.

E.4.1 Primary and Secondary Contaminant Sources and Release Mechanisms

No primary contaminant sources (e.g., operational facilities) are currently located at Load Line 11. The IRA conducted in 2001 removed contamination from the primary pathways for off-AOC migration, and all buildings within the Load Line 11 fence line were demolished as of 2006. Remnant contamination in soil and sediment within the AOC is considered a secondary source of contamination.

The primary mechanisms for release of chemicals from secondary sources at the AOC are:

- Eroding soil matrices with sorbed chemicals and mobilization in overland surface water storm runoff during heavy rainfall conditions,
- Dissolving soluble chemicals and transport in perennial surface water conveyances and intermittent surface water runoff,

- Re-suspending contaminated sediment during periods of high flow with downstream transport within the surface water system, and
- Leaching contaminants to groundwater.

E.4.2 Contaminant Migration Pathways and Exit Points

The potential for soil and sediment contaminants to impact groundwater was evaluated in the fate and transport evaluation presented in the Phase II Load Line 11 RI Report (USACE 2016). Contaminants in surface soil may migrate to surface water via drainage ditches in the dissolved phase following a storm event, or as particulates in storm water runoff.

Maximum SRC concentrations identified in surface and subsurface soil were evaluated using a series of generic screening steps to identify initial contaminant migration chemicals of potential concern (CMCOPCs). These soil CMCOPCs were further evaluated using the Seasonal Soil Compartment model to predict leaching concentrations and identify final CMCOPCs based on RVAAP facility-wide background criteria and the lowest risk-based screening criteria among U.S. Environmental Protection Agency (USEPA) maximum contaminant levels, USEPA tap water regional SLs, or RVAAP groundwater FWCUGs for the Resident Receptor Adult. Final CMCOPCs were evaluated using the Analytical Transient 1-, 2-, and 3-Dimensional (AT123D) model to predict groundwater mixing concentrations beneath source areas and concentrations at the nearest downgradient groundwater receptor to the AOC (e.g., stream). Maximum SRC concentrations in sediment were evaluated using an analytical solution to identify final CMCOPCs for evaluation using AT123D. The AT123D modeling results were evaluated with respect to AOC groundwater monitoring data, as well as model limitations and assumptions, to identify chemicals to be retained as CMCOCs.

Conclusions of the soil and sediment screening, leachate modeling, and groundwater modeling are as follows:

- Arsenic, barium, cobalt, zinc, pentaerythritol tetranitrate, benzo(b)fluoranthene, and naphthalene at the FPA and arsenic, cobalt, manganese, and naphthalene at the NPA were among the soil CMCOPCs predicted to exceed the screening criteria in groundwater beneath the source area; however, none of these CMCOPCs were predicted to be above their respective groundwater criteria at the downgradient receptor location.
- Among the sediment CMCOPCs, benz(a)anthracene and naphthalene at the East Ditch aggregate and antimony, benz(a)anthracene, benzo(b)fluoranthene, and dibenz(a,h)anthracene at the West Ditch aggregate were predicted to exceed the screening criteria in groundwater beneath the source area; however, none of these CMCOPCs were predicted to be above criteria at the downgradient receptor location.

Evaluation of modeling results with respect to current AOC groundwater data and model limitations indicated that identified CMCOPCs are not currently impacting groundwater beneath the source areas and that modeling assumptions are conservative.

All SRCs identified in surface soil, subsurface soil, and sediment at Load Line 11 were evaluated through the stepwise fate and transport evaluation. All SRCs were eliminated as posing future impacts to groundwater, and no further action is necessary for surface soil, subsurface soil, and sediment to protect groundwater (USACE 2016). Groundwater will be further evaluated under the FWGWMP.

E.4.3 Potential Human Receptors and Ecological Resources

In February 2014, the Army and Ohio EPA amended the risk assessment process to address changes in the RVAAP restoration program. The *Final Technical Memorandum: Land Uses and Revised Risk Assessment Process for the RVAAP Installation Restoration Program* (ARNG 2014, herein referred to as the Technical Memorandum) identified the following three Categorical Land Uses and Representative Receptors to be considered during the RI phase of the CERCLA process.

1. Unrestricted (Residential) Land Use – Resident Receptor (Adult and Child) (formerly called Resident Farmer).
2. Military Training Land Use – National Guard Trainee.
3. Commercial/Industrial Land Use – Industrial Receptor (USEPA Composite Worker).

An evaluation using Resident Receptor (Adult and Child) FWCUGs was used to provide an Unrestricted (Residential) Land Use evaluation. Unrestricted (Residential) Land Use is considered protective for all categories of Land Use at Camp Ravenna. Additional human health receptors associated with Camp Ravenna are the National Guard Trainee and Industrial Receptor. No COCs were identified as requiring remediation to be protective for the Resident Receptor or Unrestricted (Residential) Land Use. The receptor is assumed to be exposed to surface soil from 0–1 ft bgs and subsurface soil from 1–13 ft bgs.

Load Line 11 has important and significant ecological resources such as wetlands. This finding from the Level I ERA invoked the Level II ERA. Groundwater is not considered an exposure medium for ecological receptors on the AOC given its depth and occurrence within bedrock, and there are no discharge points (e.g., springs, seeps) that would represent potential exposure points.

F CURRENT AND POTENTIAL FUTURE LAND USES

Load Line 11 is currently managed by the Army National Guard/OHARNG. The AOC is not currently being utilized for training purposes. The future use of Load Line 11 is Military Training. 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, sediment, and surface water and how it impacts human health, the environment, and groundwater.

G SUMMARY OF SITE RISKS

The HHRA and ERA estimated risks to human receptors and ecological resources; 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 Phase II Load Line 11 RI Report (USACE 2016) and Load Line 11 PP (USACE 2017) located in the Administrative Record and Information Repositories.

G.1 Human Health Risk Assessment

The HHRA identified COCs and conducted risk management analysis to determine if COCs pose unacceptable risk to the Resident Receptor (Adult and Child). Since the risk management analysis determined there were no unacceptable risks to the Resident Receptor (Adult and Child), it can be concluded that there is no unacceptable risk to the National Guard Trainee and Industrial Receptor.

Media of concern at Load Line 11 are surface soil (0–1 ft bgs), subsurface soil (1–13 ft bgs), sediment, and surface water. Soil data associated with Load Line 11 were aggregated into surface and subsurface soil at the FPA and NPA. Sediment and surface water aggregates evaluated in the HHRA included the East Ditch that flows north and the West Ditch that flows west/northwest and eventually to Sand Creek.

No COCs were identified for the Resident Receptor (Adult and Child) in subsurface soil or sediment. Five PAHs [benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene] were identified as COCs for the Resident Receptor (Adult and Child) in surface soil. The EPC for benzo(a)pyrene in surface soil at the NPA (0.28 mg/kg) is only slightly above the Resident Receptor FWCUG of 0.221 mg/kg, and the EPC for benzo(a)pyrene in the FPA (0.219 mg/kg) was slightly less than the Resident Receptor. Other PAHs were identified as COCs because they contribute to a sum-of-ratios of two at the FPA and NPA. Accordingly, no COCs were identified for potential additional remediation.

Four PAHs [benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene] were identified as COCs for the Resident Receptor (Adult and Child) in surface water collected from the West Ditch. All of the reported concentrations were at low, estimated concentrations. Surface runoff is the potential source of contamination to surface water in the West Ditch and PAH concentrations are not significantly elevated in soil or sediment. This indicates there is no identifiable source beyond normal levels of these chemicals to surface water due to runoff from roads and other traffic areas. In addition, incidental exposures of the Resident Receptor (Adult and Child) to surface water at the West Ditch that only intermittently holds water are much less than the incidental exposure that would occur due to ingesting drinking water (i.e., 2 L/day for an adult) and dermal contact while swimming and wading. These exposures were incorporated into the development of the FWCUGs. Thus, these low, estimated concentrations of PAHs were not identified as COCs for remediation in surface water.

Based on the risk management analysis, no COCs were identified to be carried forth in a feasibility study for the Resident Receptor (Adult and Child) in any of the media of concern; therefore, no other receptors were evaluated and no further action is recommended from a human health risk perspective.

G.2 Ecological Risk Assessment

The ecological habitat at Load Line 11 consists of 48 acres of shrubland, herbaceous field (grasses), and forests. Aquatic resources, including two wetlands (0.15 acres), are present at Load Line 11. Intermittent surface water flows in small drainage ditches bordering the roads and within the AOC. During most of the year there is no water in the drainage ditches; however, there is sufficient precipitation at Camp Ravenna to maintain aquatic habitat. The terrestrial vegetation provides a habitat for birds, mammals, insects, and other organisms. The northern long-eared bat (*Myotis septentrionalis*; federally threatened) exists at Camp Ravenna. There are no other federally listed species or critical habitats on Camp Ravenna. Load Line 11 has not been previously surveyed for federal- or state-listed species; however, there have been no documented sightings of state-listed, federally listed, threatened, or endangered species at the AOC (OHARNG 2014).

The Level I ERA presents important ecological resources on or near the AOC and evaluates the potential for current contamination to impact ecological resources. There is chemical contamination present in soil, sediment, and surface water at Load Line 11. This contamination was identified using historical and PBA08 RI data. Ecological resources at Load Line 11 were compared to the list of important ecological places and resources (USACE 2016). Based on the 39 criteria defining important places and resources as identified by the Army and Ohio EPA, the wetlands at the AOC were determined to be important and significant ecological resources. Because contamination is at or near the important ecological resources, these findings invoked a requirement of a Level II ERA. The Level II ERA incorporated available data to identify integrated COPECs. A total of 20 integrated soil COPECs, 5 integrated sediment COPECs, and 5 integrated surface water COPECs were identified in the Level II ERA at Load Line 11.

The integrated soil, sediment, and surface water COPECs were further evaluated with technical and refinement factors agreed upon by the Army and Ohio EPA. The Level II ERA concluded that there are no chemicals requiring remediation or further evaluation to be protective of the environment. Per the *Guidance for Conducting Ecological Risk Assessments* (Ohio EPA 2008), once the Level II assessment eliminates COPECs from further ecological evaluation, the ERA can be completed. No further action is recommended to be protective from an ecological perspective at Load Line 11.

H DOCUMENTATION OF NO SIGNIFICANT CHANGE

The Load Line 11 PP (USACE 2017) was released for public comment on June 12, 2017. Feedback received from the public during the public comment period and public meeting are presented in Part III of this ROD. The PP recommended no further action for soil, sediment, and surface water at Load Line 11. No significant changes were necessary or appropriate following the conclusion of the public comment period.

PART III: RESPONSIVENESS SUMMARY FOR PUBLIC COMMENTS ON THE ARMY PROPOSED PLAN FOR RVAAP-44 LOAD LINE 11

A OVERVIEW

On June 12, 2017, the Army released the Load Line 11 PP (USACE 2017) for public comment. A 30-day public comment period was held from June 12, 2017 to July 12, 2017. The Army hosted a public meeting on June 27, 2017 to present the PP and take questions and comments from the public for the record. This public comment period and public meeting also included PPs for Load Lines 5, 6, and 8.

For soil, surface water, and sediment at Load Line 11, the Army recommended no further action. During the public meeting, Ohio EPA concurred with the recommendation of no further action. Comments provided during the public comment period and public meeting are summarized in the following section.

The community voiced no objections to the no further action recommendation. All public input was considered during the selection of the final remedy for soil, surface water, and sediment at Load Line 11 in this ROD.

B SUMMARY OF PUBLIC COMMENTS AND LEAD AGENCY RESPONSES

The following subsections summarize the oral and written comments provided during the public comment period and public meeting. The Army's responses provided below are considered final upon approval of the Final ROD.

B.1 Oral Comments from Public Meeting

Comment 1: If the report indicates that a chemical group (e.g., VOCs, explosives, PCBs) is not detected at the site, does that mean there was zero detection of all of the chemicals within that specific chemical group?
Response: If the report indicates that a chemical group is not detected at the site, it means that all chemicals analyzed as part of the chemical group had concentrations below the laboratory method detection limits (MDL). These laboratory MDLs were at low enough concentrations to ensure nature and extent of contamination and risk can be thoroughly evaluated at a site.

Comment 2: Was there a functional commonality among the various load lines that used chromium? If chromium was used, was it in the hexavalent chromium form?
Response: Chromium is a potential contaminant from operational history. Chromium was extensively analyzed for at Load Line 11, as 77 surface soil samples and 75 subsurface soil samples were analyzed for chromium. The chromium concentrations were predominantly at or near the concentrations in which chromium naturally occurs in the respective media. As part of the chromium analysis, Load Line 11 was sampled to specifically assess the predominant form of chromium

(trivalent or hexavalent) that occurs at the site. It was determined that hexavalent chromium (maximum concentration of 0.71J mg/kg) is not of concern at Load Line 11, and trivalent chromium is the predominant form of chromium. All concentrations were below the applicable risk levels for trivalent chromium.

Comment 3: It would be helpful for the public for full-sheet maps to be provided in the slideshow package handouts.
Response: Agree. Future presentations will have full-sheet maps provided as part of the handouts provided to the public.

Comment 4: What are the interim land use controls that are used at these sites (Load Lines 5, 6, 8, and 11)?
Response: The Army is currently controlling/restricting the sites during the completion of the CERCLA process. Based on the RIs and subsequent analysis, the current recommendation is to allow for Unrestricted (Residential) Land Use at each site.

Comment 5: Are the land use controls considering the possibility of tampering with, or vandalism of the monitoring wells?
Response: The groundwater wells will continue to be used as part of the Facility-wide Groundwater Monitoring Program conducted at the former RVAAP. While the Army controls Camp Ravenna and implements the Facility-wide Groundwater Monitoring Program, the potential for tampering or vandalism of the wells is low, as the wells are locked and the facility currently has a perimeter fence. When the program discontinues use of the wells, the wells will be abandoned per all appropriate rules and regulations.

B.2 Written Comments

No written comments were received during the public comment period.

C TECHNICAL AND LEGAL ISSUES

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

PART IV: REFERENCES

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Vista (Vista Sciences Corporation) 2017. *Community Relations Plan for the Ravenna Army Ammunition Plant Restoration Program*. March 2017.

FIGURES

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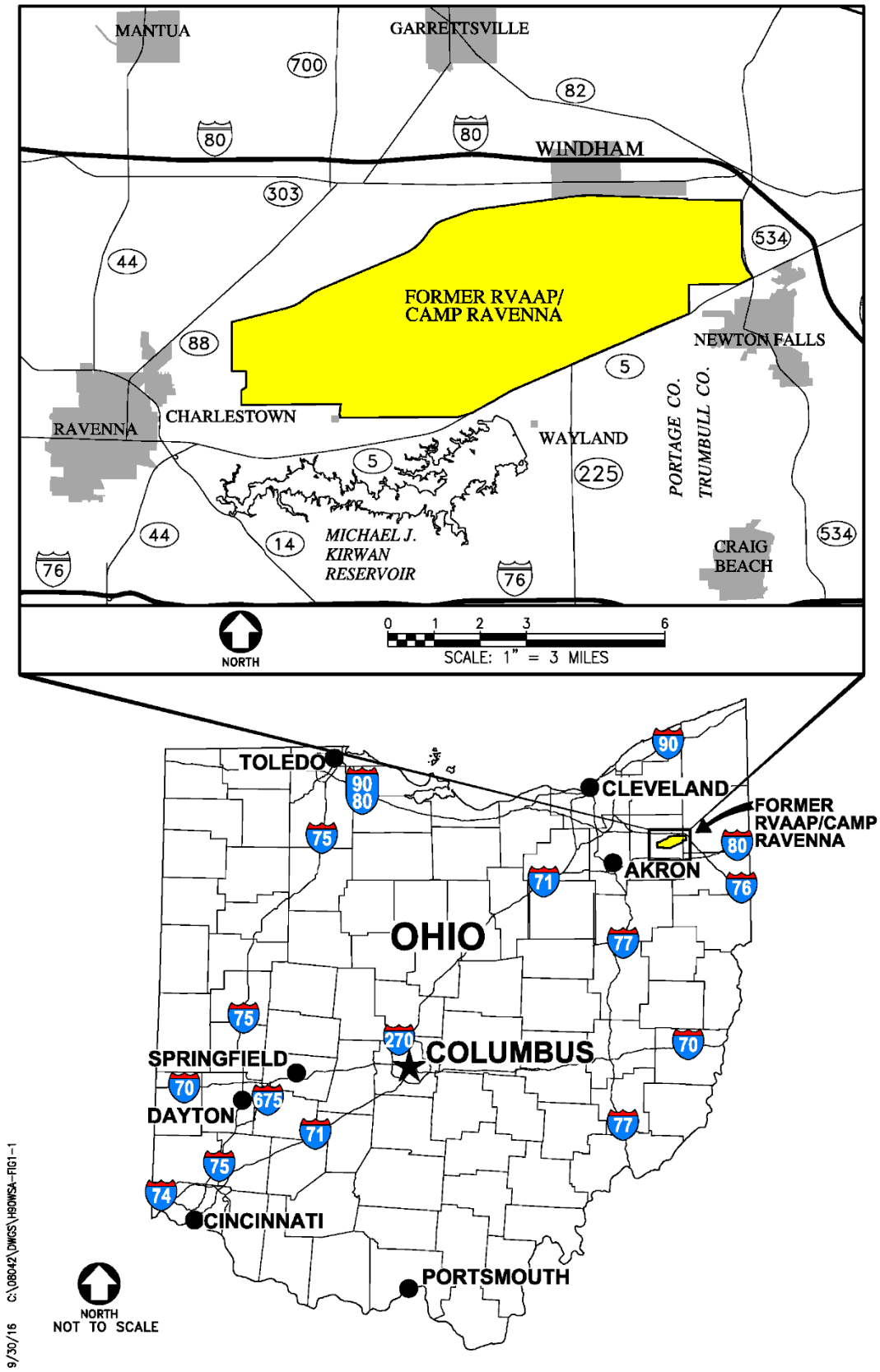


Figure 1. General Location and Orientation of Camp Ravenna

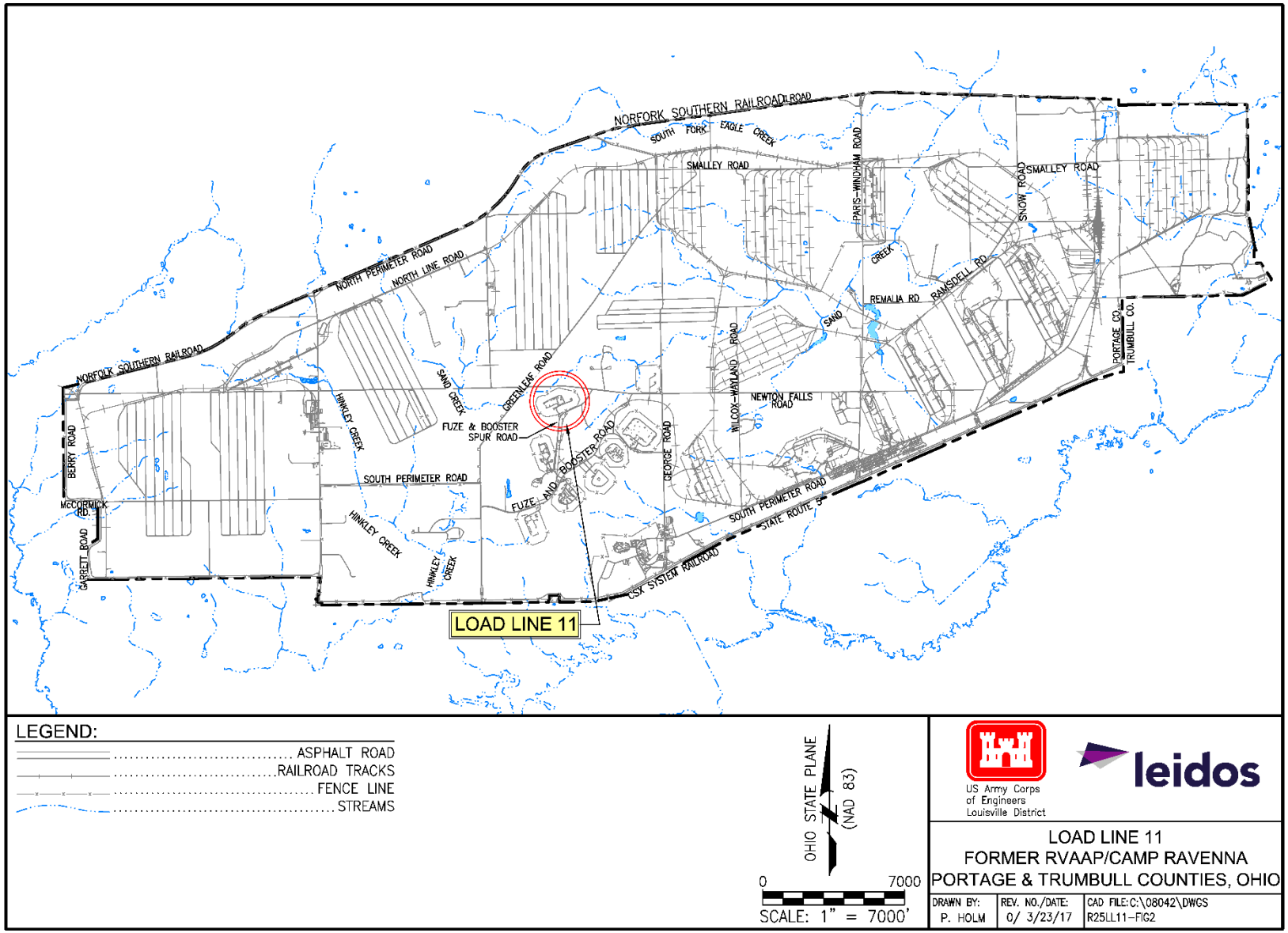
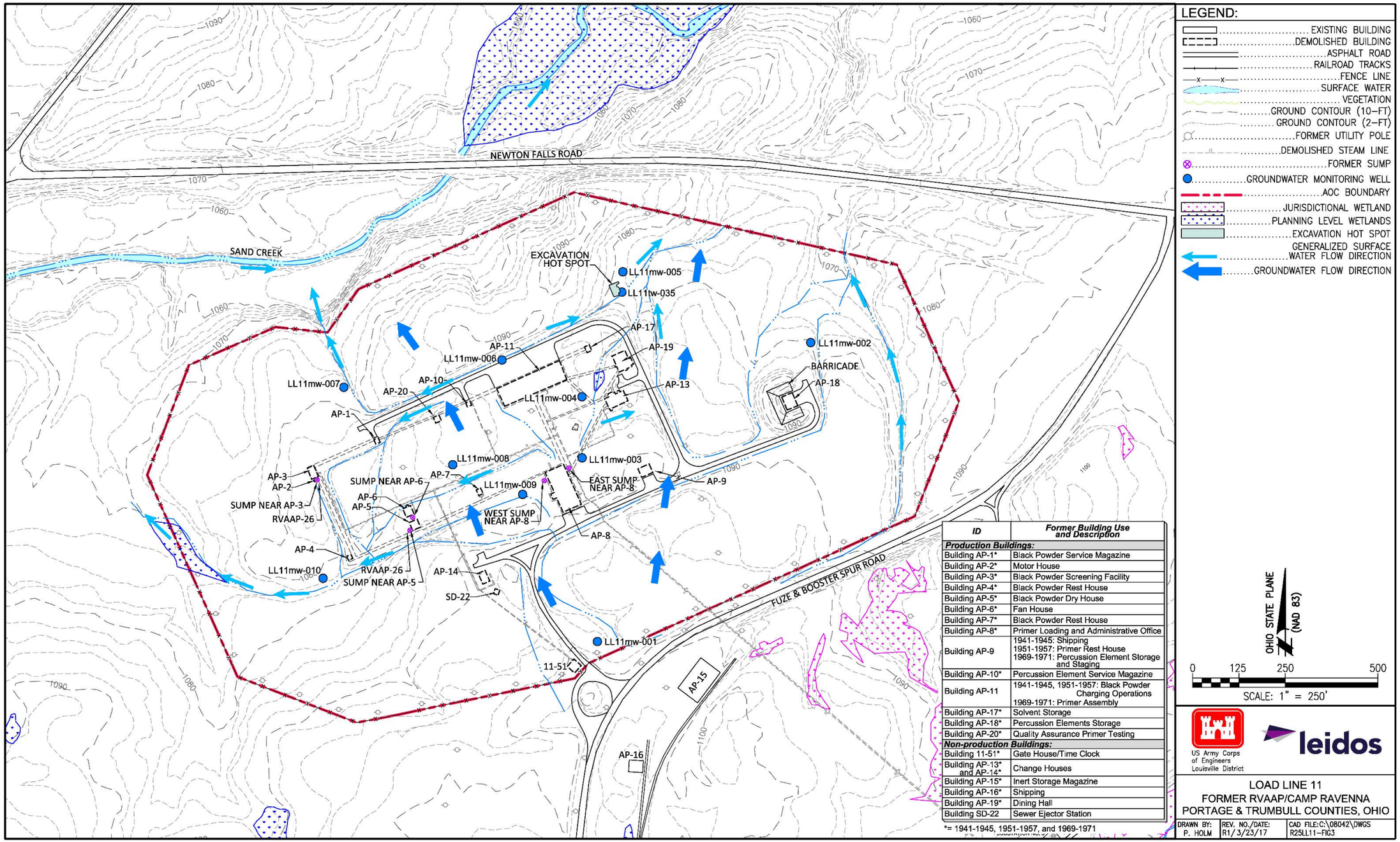


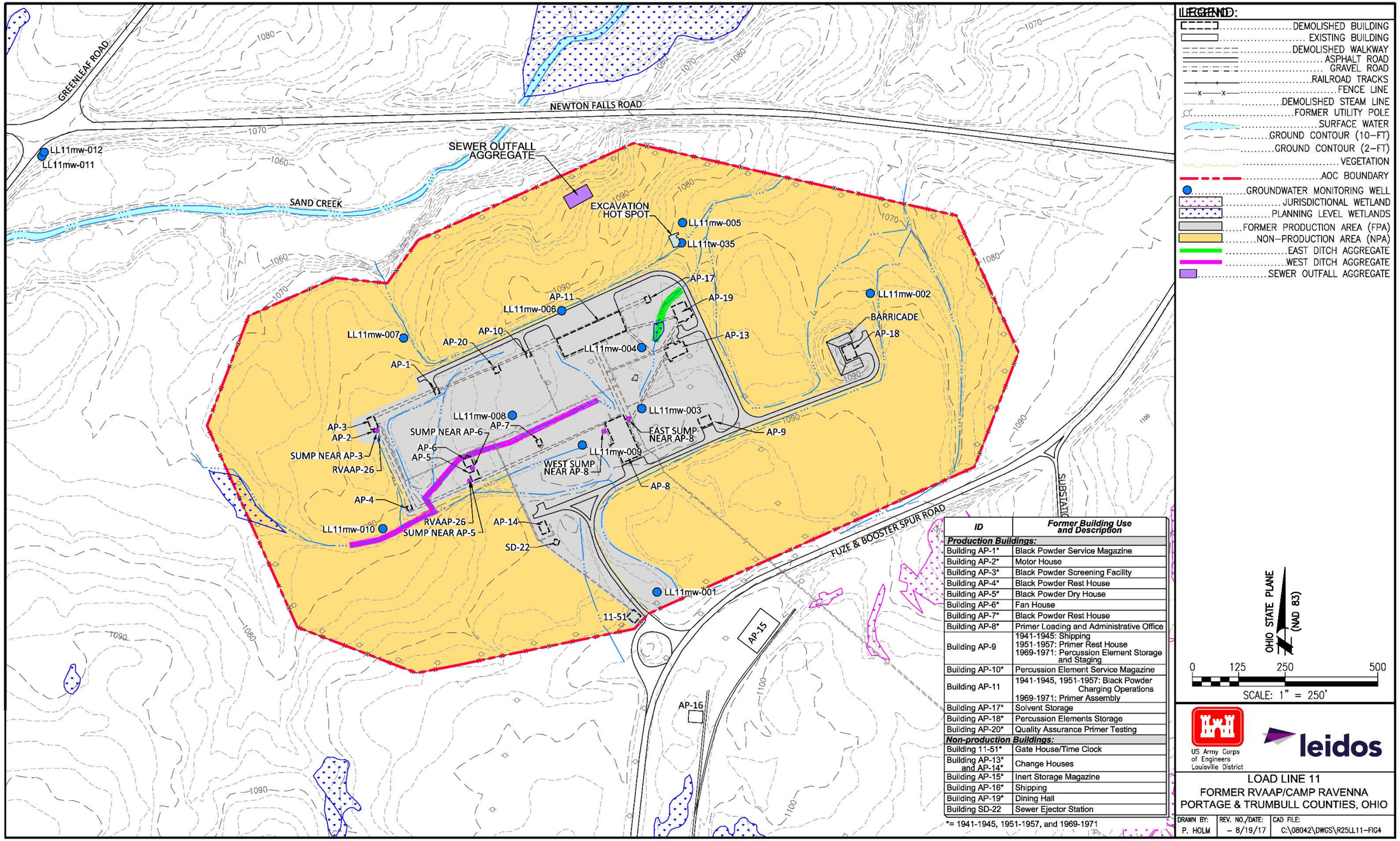
Figure 2. Camp Ravenna Installation Map



ID	Former Building Use and Description
Production Buildings:	
Building AP-1*	Black Powder Service Magazine
Building AP-2*	Motor House
Building AP-3*	Black Powder Screening Facility
Building AP-4*	Black Powder Rest House
Building AP-5*	Black Powder Dry House
Building AP-6*	Fan House
Building AP-7*	Black Powder Rest House
Building AP-8*	Primer Loading and Administrative Office
Building AP-9	1941-1945: Shipping 1951-1957: Primer Rest House 1969-1971: Percussion Element Storage and Staging
Building AP-10*	Percussion Element Service Magazine
Building AP-11	1941-1945, 1951-1957: Black Powder Charging Operations 1969-1971: Primer Assembly
Building AP-17*	Solvent Storage
Building AP-18*	Percussion Elements Storage
Building AP-20*	Quality Assurance Primer Testing
Non-production Buildings:	
Building 11-51*	Gate House/Time Clock
Building AP-13* and AP-14*	Change Houses
Building AP-15*	Inert Storage Magazine
Building AP-16*	Shipping
Building AP-19*	Dining Hall
Building SD-22	Sewer Ejector Station

*= 1941-1945, 1951-1957, and 1969-1971

Figure 3. Load Line 11 Site Features



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Building AP-2*	Motor House
Building AP-3*	Black Powder Screening Facility
Building AP-4*	Black Powder Rest House
Building AP-5*	Black Powder Dry House
Building AP-6*	Fan House
Building AP-7*	Black Powder Rest House
Building AP-8*	Primer Loading and Administrative Office
Building AP-9	1941-1945: Shipping 1951-1957: Primer Rest House 1969-1971: Percussion Element Storage and Staging
Building AP-10*	Percussion Element Service Magazine
Building AP-11	1941-1945, 1951-1957: Black Powder Charging Operations 1969-1971: Primer Assembly
Building AP-17*	Solvent Storage
Building AP-18*	Percussion Elements Storage
Building AP-20*	Quality Assurance Primer Testing
Non-production Buildings:	
Building 11-51*	Gate House/Time Clock
Building AP-13* and AP-14*	Change Houses
Building AP-15*	Inert Storage Magazine
Building AP-16*	Shipping
Building AP-19*	Dining Hall
Building SD-22	Sewer Ejector Station

*= 1941-1945, 1951-1957, and 1969-1971

Figure 4. Load Line 11 Exposure Units

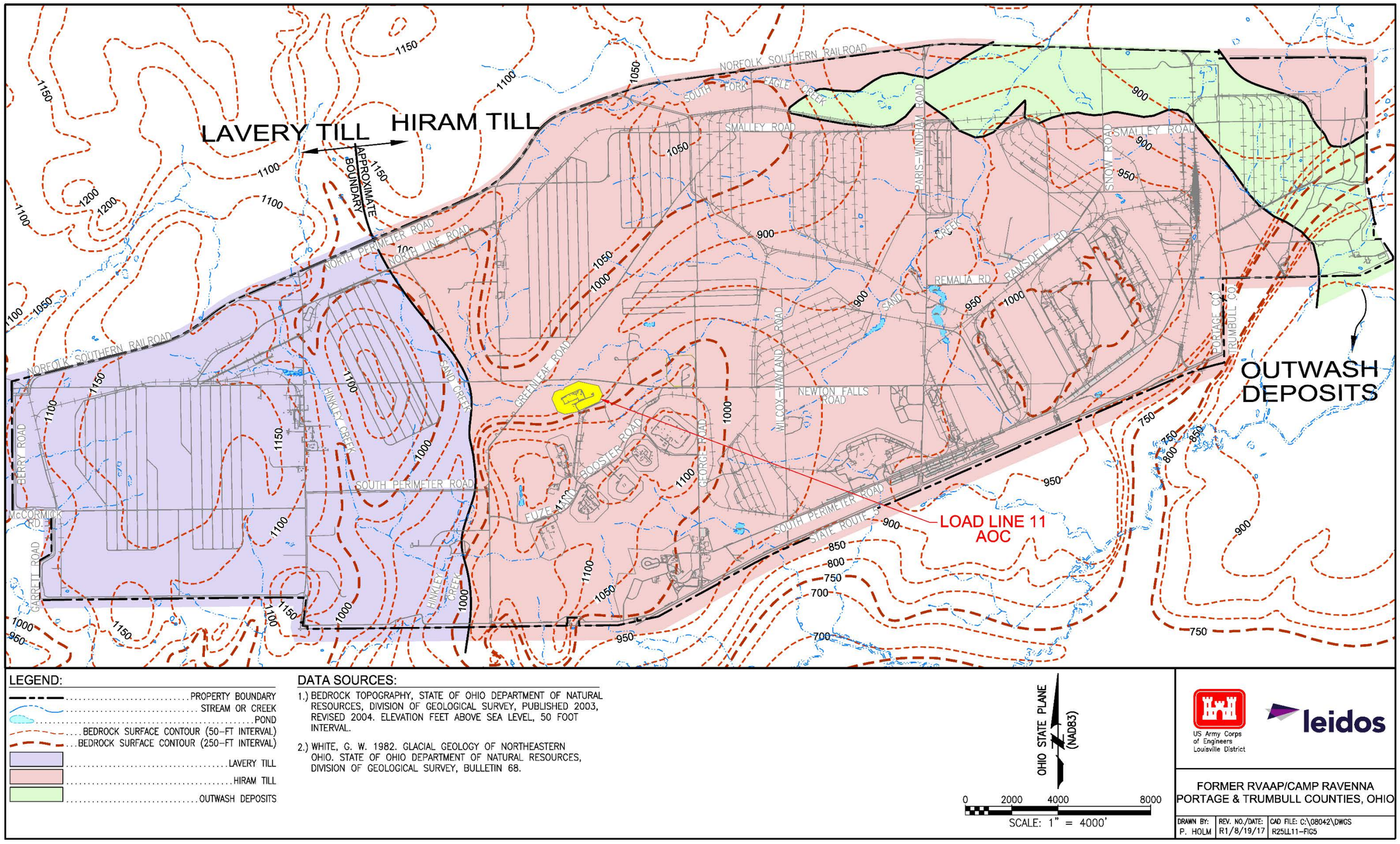

Figure 5. Geologic Map of Unconsolidated Deposits on Camp Ravenna

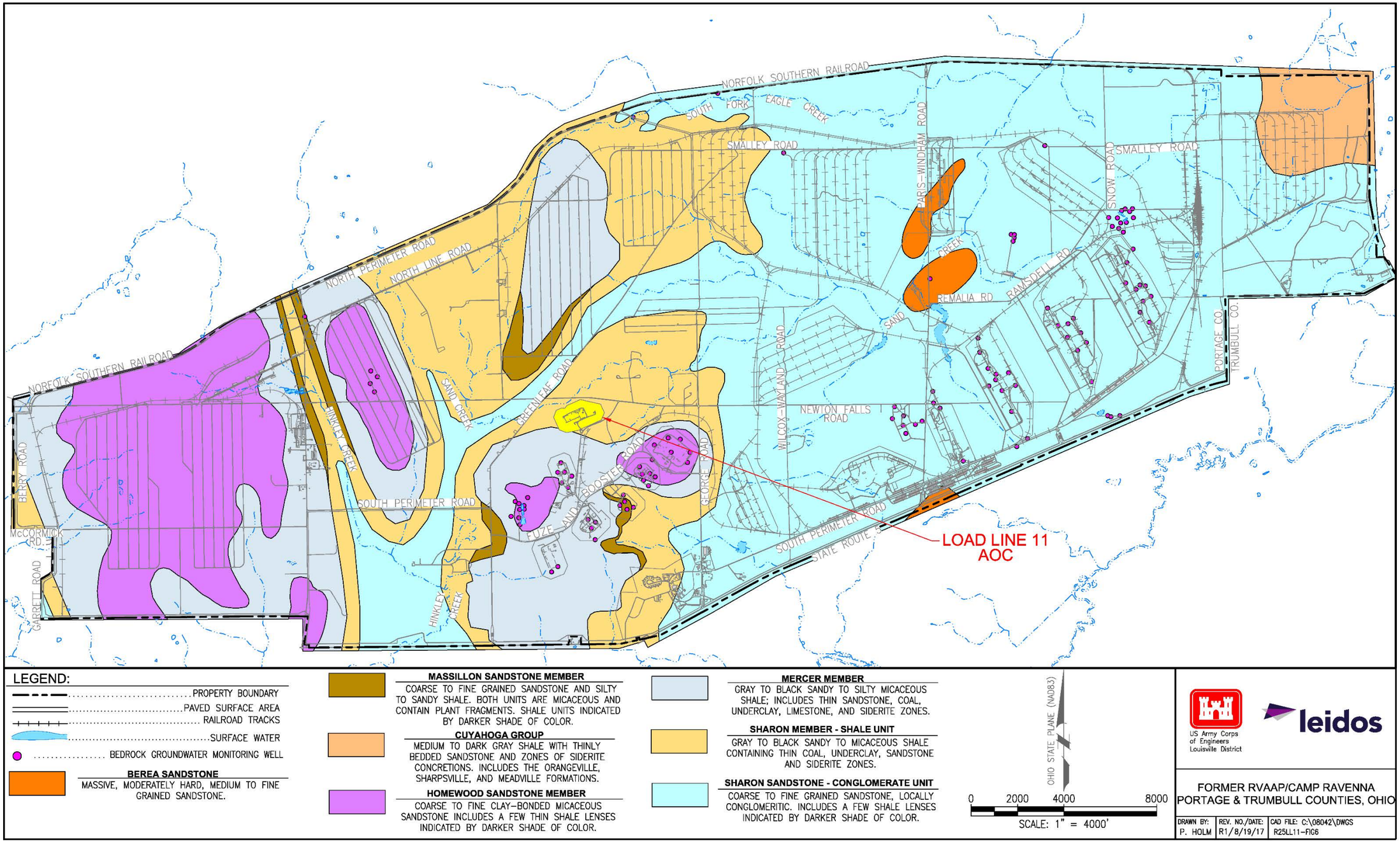

Figure 6. Geologic Bedrock Map and Stratigraphic Description of Units on Camp Ravenna

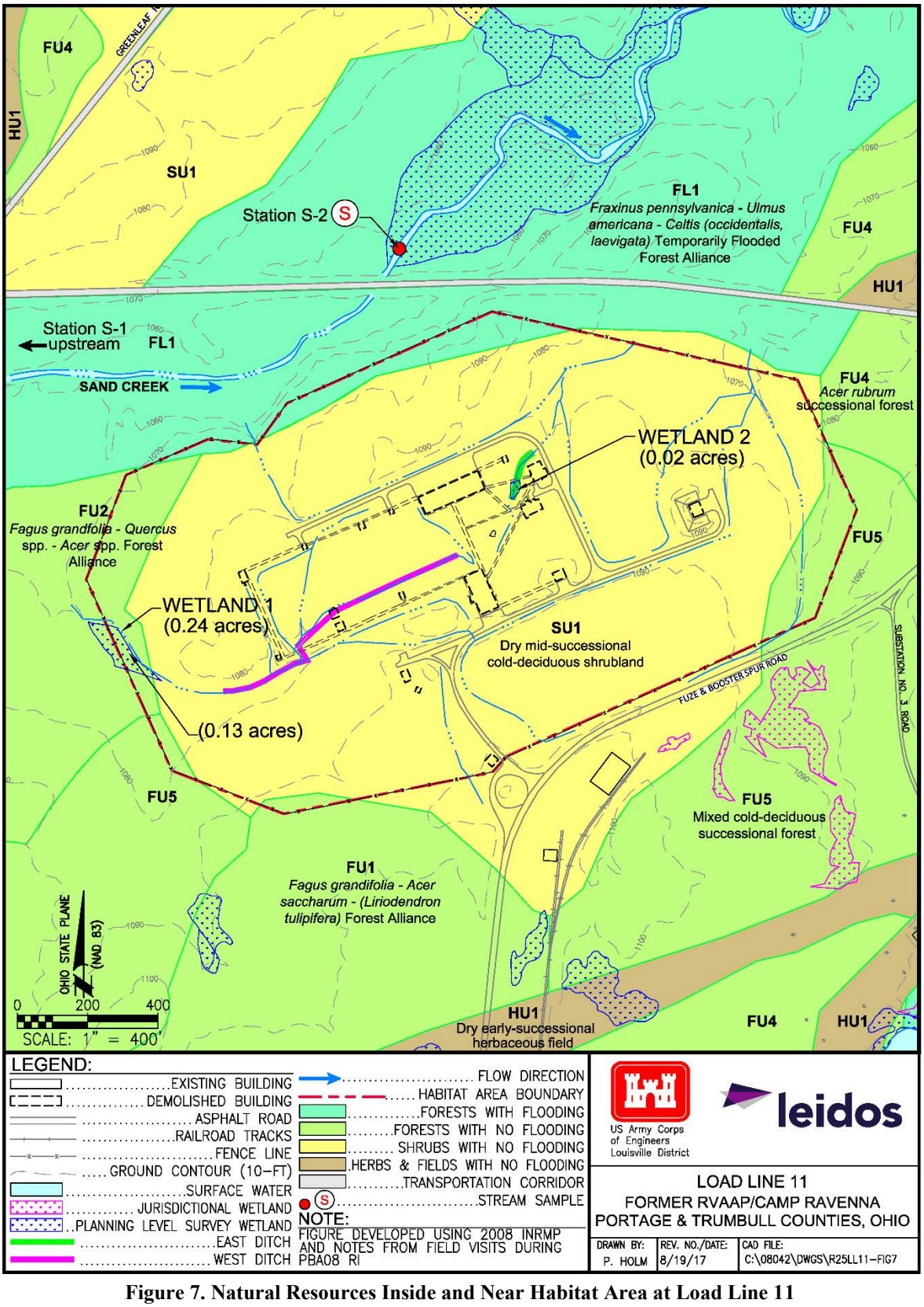

Figure 7. Natural Resources Inside and Near Habitat Area at Load Line 11

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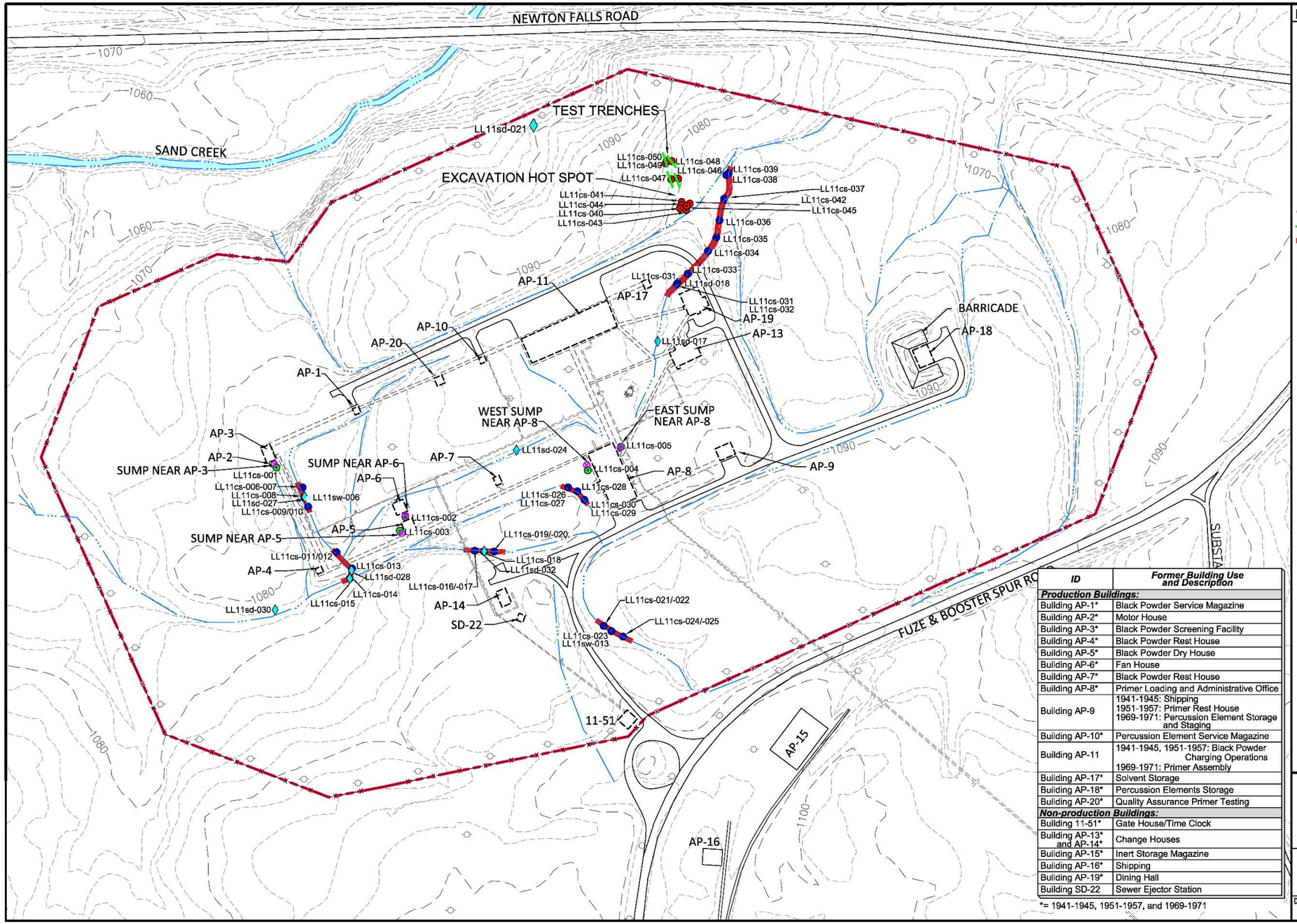


ID	Former Building Use and Description
Production Buildings:	
Building AP-1*	Black Powder Service Magazine
Building AP-2*	Motor House
Building AP-3*	Black Powder Screening Facility
Building AP-4*	Black Powder Rest House
Building AP-5*	Black Powder Dry House
Building AP-6*	Fan House
Building AP-7*	Black Powder Rest House
Building AP-8*	Primer Loading and Administrative Office
Building AP-9	1941-1945: Shipping 1951-1957: Primer Rest House 1969-1971: Percussion Element Storage and Staging
Building AP-10*	Percussion Element Service Magazine
Building AP-11	1941-1945, 1951-1957: Black Powder Charging Operations 1969-1971: Primer Assembly
Building AP-17*	Solvent Storage
Building AP-18*	Percussion Elements Storage
Building AP-20*	Quality Assurance Primer Testing
Non-production Buildings:	
Building 11-51*	Gate House/Time Clock
Building AP-13* and AP-14*	Change Houses
Building AP-15*	Inert Storage Magazine
Building AP-16*	Shipping
Building AP-19*	Dining Hall
Building SD-22	Sewer Ejector Station

*= 1941-1945, 1951-1957, and 1969-1971

LEGEND:

- DEMOLISHED BUILDING
- EXISTING BUILDING
- DEMOLISHED WALKWAY
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- DEMOLISHED STEAM LINE
- FORMER UTILITY POLE
- SURFACE WATER
- DRAINAGE DITCH
- GROUND CONTOUR (10-FT)
- GROUND CONTOUR (2-FT)
- VEGETATION
- AOC BOUNDARY
- TEST TRENCH LOCATION
- DITCH EXCAVATION AREA
- FORMER SUMP LOCATION
- SUMP CONFIRMATION SAMPLE
- DITCH CONFIRMATION SAMPLE
- HOT SPOT CONFIRMATION SAMPLE
- SEDIMENT SAMPLE LOCATION

NOTE:

1. SUMPS NEAR BUILDINGS AP-3, AP-5 AND AP-8 WERE REMOVED DURING THE 2001 INTERIM REMOVAL ACTION.
2. THE SEWER LINE & NEAREST MANHOLE ASSOCIATED WITH THE SUMPS WERE PLUGGED.

OHIO STATE PLANE (NAD 83)

0 100 200 400

SCALE: 1" = 200'

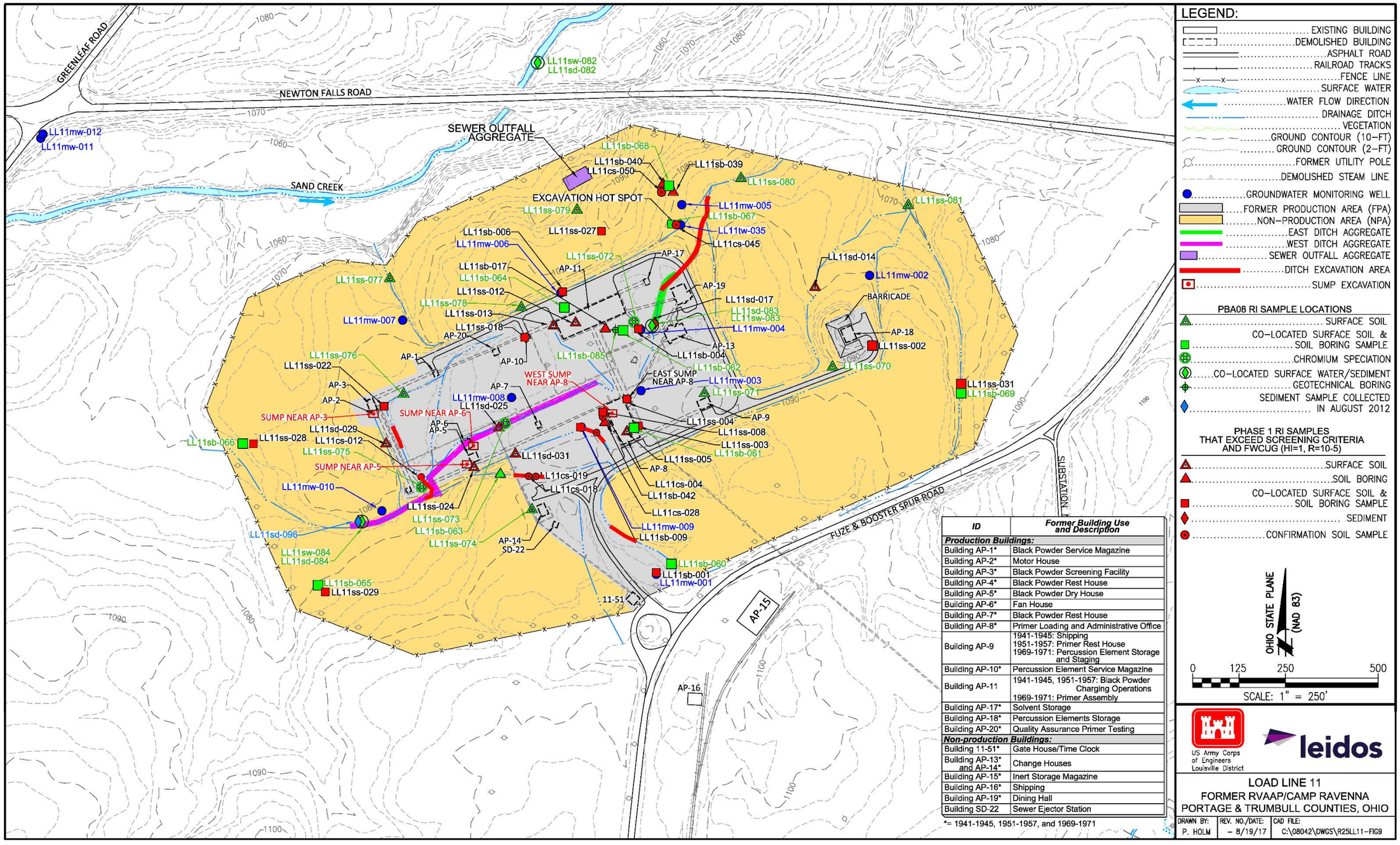
US Army Corps of Engineers Louisville District

leidos

LOAD LINE 11
FORMER RVAAP/CAMP RAVENNA
PORTAGE & TRUMBULL COUNTIES, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
P. HOLM	– 8/19/17	C:\08042\DWGS\R25LL11-FIG8

Figure 8. IRA Removal Areas and Sample Locations



ID	Former Building Use and Description
Production Buildings:	
Building AP-1*	Black Powder Service Magazine
Building AP-2*	Motor House
Building AP-3*	Black Powder Screening Facility
Building AP-4*	Black Powder Rest House
Building AP-5*	Black Powder Dry House
Building AP-6*	Fan House
Building AP-7*	Black Powder Rest House
Building AP-8*	Primer Loading and Administrative Office
Building AP-9	1941-1945: Shipping 1951-1957: Primer Rest House 1969-1971: Percussion Element Storage and Staging
Building AP-10*	Percussion Element Service Magazine
Building AP-11	1941-1945, 1951-1957: Black Powder Charging Operations 1969-1971: Primer Assembly
Building AP-17*	Solvent Storage
Building AP-18*	Percussion Elements Storage
Building AP-20*	Quality Assurance Primer Testing
Non-production Buildings:	
Building 11-51*	Gate House/Time Clock
Building AP-13* and AP-14*	Change Houses
Building AP-15*	Inert Storage Magazine
Building AP-16*	Shipping
Building AP-19*	Dining Hall
Building SD-22	Sewer Ejector Station

*= 1941-1945, 1951-1957, and 1969-1971

LEGEND:

- EXISTING BUILDING
- DEMOLISHED BUILDING
- ASPHALT ROAD
- RAILROAD TRACKS
- FENCE LINE
- SURFACE WATER
- WATER FLOW DIRECTION
- DRAINAGE DITCH
- VEGETATION
- GROUND CONTOUR (10-FT)
- GROUND CONTOUR (2-FT)
- FORMER UTILITY POLE
- DEMOLISHED STEAM LINE
- GROUNDWATER MONITORING WELL
- FORMER PRODUCTION AREA (FPA)
- NON-PRODUCTION AREA (NPA)
- EAST DITCH AGGREGATE
- WEST DITCH AGGREGATE
- SEWER OUTFALL AGGREGATE
- DITCH EXCAVATION AREA
- SUMP EXCAVATION

PBA08 RI SAMPLE LOCATIONS

- SURFACE SOIL
- CO-LOCATED SURFACE SOIL & SOIL BORING SAMPLE
- CHROMIUM SPECIATION
- CO-LOCATED SURFACE WATER/SEDIMENT
- GEOTECHNICAL BORING
- SEDIMENT SAMPLE COLLECTED IN AUGUST 2012

PHASE 1 RI SAMPLES THAT EXCEED SCREENING CRITERIA AND FWCUG (HI=1, R=10-5)

- SURFACE SOIL
- SOIL BORING
- CO-LOCATED SURFACE SOIL & SOIL BORING SAMPLE
- SEDIMENT
- CONFIRMATION SOIL SAMPLE

OHIO STATE PLANE (NAD 83)

0 125 250 500

SCALE: 1" = 250'

US Army Corps of Engineers Louisville District

leidos

LOAD LINE 11
FORMER RVAAP/CAMP RAVENNA
PORTAGE & TRUMBULL COUNTIES, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
P. HOLM	– 8/19/17	C:\08042\DWGS\R25LL11-FIG9

Figure 9. Load Line 11 Sample Locations

ATTACHMENT A

OHIO EPA COMMENTS

Ohio Environmental Protection Agency

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

January 31, 2018

Mr. Mark Leeper
Team Lead
Cleanup/Restoration Branch
Army National Guard Directorate
111 South George Mason Drive
Arlington, VA 22204

Re: US Army Ammunition PLT RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
267000859115

Subject: Ravenna Army Ammunition Plant, Portage/Trumbull Counties. "Response to Comments, Draft, Record of Decision for Soil, Sediment, and Surface Water at RVAAP-44, Load Line 11," Dated December 26, 2017

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the "Response to Comments, Draft, Record of Decision for Soil, Sediment, and Surface Water at RVAAP-44 Load Line 11" for the Ravenna Army Ammunition Plant (RVAAP), Portage/Trumbull Counties. This document is dated and was received at Ohio EPA, Northeast District Office (NEDO) on December 26, 2017.

The comments have been adequately addressed. As stated in the response letter, once the comments have been resolved, the final version of the Record of Decision (ROD) will be forwarded to Ohio EPA. If Ohio EPA has comments on the final version that requires revision to the ROD, the Army will address the comments and submit a revised final version.

Please forward the final version of the ROD to Ohio EPA for review. I will be out of the office for an extended period of time. If you have any questions in my absence, please contact Megan Oravec at megan.oravec@epa.ohio.gov or at (330) 963-1168.

Sincerely,

Vicki Deppisch
Hydrogeologist/Project Coordinator
Division of Environmental Response and Revitalization

VD/nvp

cc: Katie Tait, OHARNG RTLS
Rebecca Shreffler, VISTA Sciences Corp.
Craig Coombs, USACE
Kevin Sedlak, OHARNG RTLS
Gail Harris, VISTA Sciences Corp.

ec: Mark Leeper, ARNG
Rodney Beals, Ohio EPA, DERR
Nat Peters, USACE
Bob Princic, Ohio EPA, NEDO, DERR
Tom Schneider, Ohio EPA, SWDO, DERR
Megan Oravec, Ohio EPA, NEDO, DERR

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

December 26, 2017

Ohio Environmental Protection Agency
DERR-NEDO
Attn: Ms. Vicki Deppisch
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, RVAAP-44 Load Line 11, Responses to Comments on the Draft Record of Decision (Work Activity No. 267-000-859-115)

Dear Ms. Deppisch:

The Army appreciates your time and comments (dated October 2, 2017, received October 11, 2017) on the *Draft Record of Decision for Soil, Sediment, and Surface Water at RVAAP-44 Load Line 11*. Enclosed for your review are responses to your comments. Although the Ohio EPA requested a Revised Draft submittal, the Army will distribute the Final version of this document upon resolution of these comments. If Ohio EPA has comments on the Final version that requires additional revisions to the ROD, the Army will address the comments and submit a Revised Final version.

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

Sincerely,

Mark Leeper
RVAAP Restoration Program Manager
Army National Guard Directorate

cc: Bob Princic, Ohio EPA, NEDO
Rod Beals, Ohio EPA, NEDO
Tom Schneider, Ohio EPA, SWDO
Kevin Sedlak, ARNG, Camp Ravenna
Katie Tait, OHARNG, Camp Ravenna
Craig Coombs, USACE Louisville
Nathaniel Peters, II, USACE Louisville
Jed Thomas, Leidos
Gail Harris, Vista Sciences Corporation

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, RVAAP-44 Load Line 11 (Work Activity No. 267-000-859-115)

Ohio EPA General Comment:
The Draft Record of Decision (ROD) is inconsistent with the language, issues, statements, etc. in the approved Final Proposed Plan (PP). Please compare the Final PP to the Draft ROD and change the document to more accurately reflect the Final PP in appropriate places, and resubmit a revised draft ROD to Ohio EPA. We recommend that you refer to Ohio EPA's comment letter for the Draft ROD for LL-5, including the public meeting comments.

Army Response: Agree. The Army will compare the Final Proposed Plan with the Record of Decision and assess consistency and incorporate necessary changes in forthcoming Records of Decision. In addition, the Load Line 5 ROD comments (dated 11/13/17, approved 12/12/17) have been reviewed for applicability to the Load Line 11 ROD. Changes to the Load Line 11 ROD per these comments are specified below.

Load Line 5 ROD Comment 1:
Page 8, lines 30 & 31 state: "The predominant site-related contaminants (SRCs) in surface and subsurface soil at Load Line 5 were PAHs, which were observed in all surface soil samples analyzed across the entire AOC." This sentence, without referring to the detected levels, is misleading and open to interpretation. Please rephrase, delete or qualify this statement in the same sentence.

Load Line 11 ROD Applicability, Army Response: Not applicable. A similar statement is not provided in the Load Line 11 ROD.

Load Line 5 ROD Comment 2:
Page 11, line 21 and/or other appropriate text: Please add "The ground water will be further evaluated under the Facility Wide Groundwater Monitoring Program (FWGWMP)" and other appropriate text areas.

Load Line 11 ROD Applicability, Army Response: Agree.

The following paragraph has been added to the end of Part II, Section D Scope and Role of Response Actions:

> "Potential impacts to groundwater from soil (e.g., contaminant leaching) were evaluated in the RI report, as protectiveness to groundwater was included in the fate and transport analysis. However, groundwater will be evaluated as an individual AOC for the entire facility (designated as RVAAP-66) under the Facility-wide Groundwater Monitoring Program (FWGWMP)."

Text on page 12, line 14 has been revised as follows:

> "All SRCs identified in surface soil, subsurface soil, and sediment at Load Line 11 were evaluated through the stepwise fate and transport evaluation. All SRCs were eliminated as posing future impacts to groundwater, and no further action is necessary for surface soil, subsurface soil, and sediment to protect groundwater (USACE 2016). Groundwater will be further evaluated under the FWGWMP."

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, RVAAP-44 Load Line 11 (Work Activity No. 267-000-859-115)

Load Line 5 ROD Comment 3:
Page 12, lines 32-41, HHRA: This paragraph discusses PAHs. Please refer to language in Final PP. Please remove the reference that PAHs may represent background. The use of background for PAHs was discussed, resolved and eliminated in previous RI comment letters. A strong weight-of-evidence approach is acceptable, provided it includes information such as the sampling location is located adjacent to an asphalt road or parking lot, the sample location cannot be attributable to previous historical information, etc. Please revise this paragraph and refer to the final PP.

Load Line 11 ROD Applicability, Army Response: Not applicable. The Load Line 11 ROD does not discuss background in the discussion of PAHs.

Load Line 5 ROD Comment 4:
Page 13, Section G.2, Ecological Risk: Please add the name of the Ohio EPA reference document that was used to conduct the Ecological Risk evaluation in the appropriate text area.

Load Line 11 ROD Applicability, Army Response: Clarification. The Ohio EPA reference document (Guidance for Conducting Ecological Risk Assessments [Ohio EPA 2008]) was named in the Draft version of this ROD. No changes are necessary.

Load Line 5 ROD Comment 5:
Page 13. Section H, Documentation of No Significant Change: Please add to this paragraph how many public comments were submitted, if the content of the comments affected any significant change, and if not, then "no significant change" was necessary or appropriate after the public comment period.

Load Line 11 ROD Applicability, Army Response: Section H has been revised as follows:

> "The Load Line 11 PP (USACE 2017) was released for public comment on June 12, 2017. Feedback received from the public during the public comment period and public meeting are presented in Part III of this ROD. The PP recommended no further action for soil, sediment, and surface water at Load Line 11. No significant changes were necessary or appropriate following the conclusion of the public comment period."

Load Line 5 ROD Comment 6:
Public Comment #1: It would have been helpful to the commenter to have added that no chemical was detected above the Method Detection Limit (MDL) and explain that the MDL is a very low level below any action level.

Load Line 11 ROD Applicability, Army Response: Agree. The response to Public Comment #1 has been revised as follows:

> "If the report indicates that a chemical group is not detected at the site, it means that all chemicals analyzed as part of the chemical group had concentrations below the laboratory method detection limits (MDL). These laboratory MDLs were at low enough concentrations to ensure nature and extent of contamination and risk can be thoroughly evaluated at a site."

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, RVAAP-44 Load Line 11 (Work Activity No. 267-000-859-115)

Load Line 5 ROD Comment 7:
Public Comment #5: It would have been helpful to the commenter to have stated that each monitoring well is locked and the entire site is fenced which would deter the potential for tampering or vandalism of the wells.

Load Line 11 ROD Applicability, Army Response: Agree. The response to Public Comment #5 has been enhanced as follows:

> "Response: The groundwater wells will continue to be used as part of the Facility-wide Groundwater Monitoring Program conducted at the former RVAAP. While the Army controls Camp Ravenna and implements the Facility-wide Groundwater Monitoring Program, the potential for tampering or vandalism of the wells is low, as the wells are locked and the facility currently has a perimeter fence. When the program discontinues use of the wells, the wells will be abandoned per all appropriate rules and regulations."

Load Line 5 ROD Comment 8 (new comment provided in Ohio EPA letter dated 12/12/17):
Please note for the Final LL-5 ROD and all future RODs, it would be helpful to clarify under the "Summary of Public Comments and Lead Agency Responses" section to add that responses to all oral and written comments are finalized in the Final ROD approval.

Load Line 11 ROD Applicability, Army Response: Agree. Part III, Section B Summary of Public Comments and Lead Agency Responses has been revised as follows:

> "The following subsections summarize the oral and written comments provided during the public comment period and public meeting. The Army's responses provided below are considered final upon approval of the Final ROD."

Ohio Environmental Protection Agency

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

October 2, 2017

Mr. Mark Leeper
Team Lead
Cleanup/Restoration Branch
Army National Guard Directorate
111 South George Mason Drive
Arlington, VA 22204

Re: US Army Ammunition PLT RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
267000859115

Subject: Ravenna Army Ammunition Plant, Portage/Trumbull Counties. "Draft, Record of Decision for Soil, Sediment, and Surface Water at RVAAP-44, Load Line 11," Dated August 24, 2017

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the "Draft, Record of Decision for Soil, Sediment, and Surface Water at RVAAP-44 Load Line 11" for the Ravenna Army Ammunition Plant (RVAAP), Portage/Trumbull Counties. This document is dated and was received at Ohio EPA, Northeast District Office (NEDO) on August 24, 2017.

The Draft Record of Decision (ROD) is inconsistent with the language, issues, statements, etc. in the approved Final Proposed Plan (PP). Please compare the Final PP to the Draft ROD and change the document to more reflect the Final PP in appropriate places, and resubmit a revised draft ROD to Ohio EPA. We recommend that you refer to the examples in Ohio EPA's comment letter for the Draft ROD for LL-5, including the public meeting comments.

If you have any questions, please call me at (330) 963-1207.

Sincerely,

Vicki Deppisch
Hydrogeologist/Project Coordinator
Division of Environmental Response and Revitalization

VD/nvr

cc: Katie Tait/Kevin Sedlak OHARNG RTLS
Craig Coombs, USACE
Rebecca Shreffler/Gail Harris, VISTA Sciences Corp.

ec: Mark Leeper, ARNG
Bob Princic, Ohio EPA, NEDO, DERR
Rodney Beals, Ohio EPA, NEDO, DERR
Tom Schneider, Ohio EPA, SWDO, DERR
Nat Peters, USACE