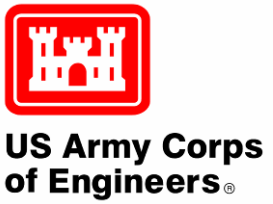
Final

Record of Decision for Soil, Sediment, and Surface Water at RVAAP-33 Load Line 6

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-15-C-0046

Prepared for:



U.S. Army Corps of Engineers
Louisville District

Prepared by:

Leidos
8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087

January 25, 2018

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
25-01-2018	Technical	Nov 1978 - Jan 2018

4. TITLE AND SUBTITLE

Final
Record of Decision for Soil, Sediment, and Surface Water
at RVAAP-33 Load Line 6
Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

5a. CONTRACT NUMBER
W912QR-15-C-0046

5b. GRANT NUMBER
NA

5c. PROGRAM ELEMENT NUMBER
NA

6. AUTHOR(S)
Thomas, Jed, H.

5d. PROJECT NUMBER
NA

5e. TASK NUMBER
NA

5f. WORK UNIT NUMBER
NA

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

Leidos
8866 Commons Boulevard
Suite 201
Twinsburg, Ohio 44087

8. PERFORMING ORGANIZATION REPORT NUMBER
17-009(E)/012318

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 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 6. In addition, this document presents the physical characteristics, geology, and hydrogeology of Load Line 6. This document also summarizes 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.

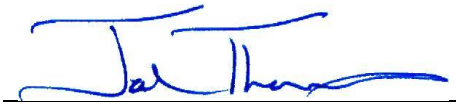
15. SUBJECT TERMS

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

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Nathaniel Peters, II
U	U	U	U	58	19b. TELEPHONE NUMBER *(Include area code)* 502.315.2624

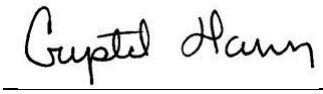
CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Leidos has completed the Record of Decision for Soil, Sediment, and Surface Water at RVAAP-33 Load Line 6 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

1/25/18
Date



Crystal Hann
Independent Technical Review Team Leader

1/25/18
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

1/25/18
Date

Ohio Environmental Protection Agency

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

March 29, 2018

Re: US Army Ravenna Ammunition PLT RVAAP
Remediation Response
Project Records
Remedial Response
Trumbull County
267000859117

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

SUBJECT: RAVENNA ARMY AMMUNITION PLANT PORTAGE/TRUMBULL COUNTIES, "FINAL RECORD OF DECISION FOR SOIL, SEDIMENT, AND SURFACE WATER AT RVAAP-33 LOAD LINE 6," DATED JANUARY 25, 2018

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the "Final Record of Decision for Soil, Sediment, and Surface Water at RVAAP-33 Load Line 6," document for the Ravenna Army Ammunition Plant (RVAAP), Portage/Trumbull Counties. The document is dated and was received at Ohio EPA, Northeast District Office (NEDO) on January 25, 2018. This letter serves to document Ohio EPA's concurrence regarding the proposal of no further action (NFA) for the RVAAP-33 Load Line 6 site contained in the Final Record of Decision (ROD).

The Army submitted a Final Proposed Plan (PP) dated March 17, 2017, recommending NFA for unrestricted (residential) land use based on the Final Remedial Investigation (RI) report findings, including the human health risk assessment and ecological risk assessment, and other investigation documents and reports. Ohio EPA concurred with the recommendation in a letter dated May 11, 2017.

The Army released the Load Line 6 PP to the public on June 12, 2017. A notice of availability was sent to radio stations, television stations, and newspapers as specified in the Community Relations Plan that initiated the 30-day public comment period beginning June 12, 2107 and ending July 12, 2017. The Army held a public meeting on June 27, 2017, to present the Final PP document. Five oral comments were received at the public meeting, and Part III of the ROD contains the Responsiveness Summary that addresses these public comments. The Final ROD contains minor changes to address the comments received on the Final PP.

Based on the information contained in the Final PP document, other investigation documents and reports, and Ohio EPA's oversight participation during the investigation, Ohio EPA concurs with the Final ROD document for the RVAAP-33 Load Line 6 for NFA. If you have any questions concerning the above, please feel free to contact Vanessa Steigerwald Dick, NEDO, at (330) 963-1219.

Sincerely,

Michael Proffitt
Chief
Division of Environmental Response and Revitalization

MP:VSD:nvp

cc: Gail Harris/Rebecca Shreffler, Vista Sciences

ec: Mark Leeper, ARNGD, Arlington
Katie Tait/Kevin Sedlak, ARNG, Camp Ravenna
Craig Coombs, USACE Louisville
Tom Schneider, Ohio EPA, SWDO, DERR
Rod Beals, Ohio EPA, NEDO, DERR
Bob Princic, Ohio EPA, NEDO, DERR
Vanessa Steigerwald Dick, Ohio EPA, NEDO, DERR
Vicki Deppisch, Ohio EPA, NEDO, DERR
Bill Damschroder, Ohio EPA, Legal

Final

Record of Decision for Soil, Sediment, and Surface Water at RVAAP-33 Load Line 6

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-15-C-0046

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

Prepared by:
Leidos
8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087

January 25, 2018

DOCUMENT DISTRIBUTION
for the
Final Record of Decision
for Soil, Sediment, and Surface Water at RVAAP-33 Load Line 6
Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Name/Organization	Number of Printed Copies	Number of Electronic Copies
Bob Princic, Ohio EPA DERR	1	3
Tom Schneider, Ohio EPA, SWDO	Transmittal letter only	
Vanessa Steigerwald-Dick, Ohio EPA, NEDO-DERR	Transmittal letter only	
Rodney Beals, Ohio EPA, NEDO-DERR	Transmittal letter only	
Mark Leeper, ARNG-IED Cleanup	0	1
Katie Tait, OHARNG Kevin Sedlak, ARNG	Transmittal letter only	
Craig Coombs, USACE – Louisville District	Transmittal letter only	
Nathaniel Peters II, USACE – Louisville District	1	1
Admin Records Manager – Camp Ravenna	2	2
Pat Ryan, Leidos-REIMS	0	1
Jed Thomas, Leidos	1	1
Leidos Contract Document Management System	0	1

ARNG = Army National Guard.
CO = Central Office.
DERR = Division of Environmental Response and Revitalization.
IED = Installation and Environment 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.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
AOC	Area of Concern
Army	U.S. Department of the Army
AT123D	Analytical Transient 1-, 2-, and 3-Dimensional Model
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
ERA	Ecological Risk Assessment
FPA	Former Production Area
FWCUG	Facility-wide Cleanup Goal
FWGWMP	Facility-wide Groundwater Monitoring Program
HHRA	Human Health Risk Assessment
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HQ	Hazard Quotient
IRP	Installation Restoration Program
MDL	Method Detection Limit
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
NPA	Non-production Area
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PBA08 RI	2008 Performance-based Acquisition Remedial Investigation
PCB	Polychlorinated Biphenyl
PP	Proposed Plan
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
RVAAP	Ravenna Army Ammunition Plant
SRC	Site-related Contaminant
SVOC	Semi-volatile Organic Compound
TNT	2,4,6-Trinitrotoluene
TOW	Tube-Launched, Optically-Tracked, Wire-Guided
TR	Target Risk
USEPA	U.S. Environmental Protection Agency

USP&FO	U.S. Property and Fiscal Officer
VOC	Volatile Organic Compound

PART I: THE DECLARATION

A SITE NAME AND LOCATION

This Record of Decision (ROD) addresses soil, sediment, and surface water contaminants at Load Line 6. Load Line 6 is designated as area of concern (AOC) RVAAP-33 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 6 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 6 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-33 Load Line 6* (USACE 2016) (herein referred to as the Phase II Load Line 6 RI Report) and *Proposed Plan for Soil, Sediment, and Surface Water at RVAAP-33 Load Line 6* (USACE 2017) (herein referred to as the Load Line 6 PP). The Remedial Investigation (RI) Report evaluated contaminated soil, sediment, and surface water at Load Line 6 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 6 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 6 for Unrestricted (Residential) Land Use. Consequently, no further action is necessary for the future use of the site (Military Training). Groundwater at Load Line 6 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 6 does not pose a potential risk to human health or the environment, five-year reviews will not be required.

E AUTHORIZING SIGNATURE

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

12 May 2018
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 6. 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 11.2 km (7 miles) to the north, Garrettsville 9.6 km (6 miles) to the north, Newton Falls 1.6 km (1 mile) to the southeast, Charlestown 3.6 km (6 miles) to the southwest, and Wayland 4.8 km (3 miles) to the south.

Load Line 6 is approximately 43 acres and is located south of Fuze and Booster Road, at the intersection of Fuze and Booster Spur Road and in the south-central portion of Camp Ravenna (Figure 2). The distinct surface features of the AOC, shown on Figure 3, include an AOC fence that is not currently maintained and a one-lane asphalt road that enters the AOC from the north and surrounds the former production buildings. The AOC boundary encompasses the former production area (FPA) and non-production area (NPA) exposure units. The FPA consists of 18.1 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 25.3 acres and includes the areas between the FPA and AOC fence. The FPA and NPA are depicted on Figure 4.

All buildings, with the exception of four production buildings, were thermally decontaminated/demolished in 2002. Between 2005 and 2007, the remaining four production buildings were demolished by conventional methods, and all footers and floor slabs were removed to a minimum of 4 ft below ground surface (bgs). Remnants of the Firestone Test Facility [munitions response site (MRS) RVAAP-033-R-01] are located within the AOC fence and include the Shaped

Charge Test Chamber foundation, Former Test Pond, concrete blocks around the pond, and access road to the pond.

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, fuzes 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 6, also known as Fuze Line #2, is a 43-acre fenced AOC located south of Fuze and Booster Road at the intersection of Fuze and Booster Spur Road (Figure 2). The AOC is located in the south-central portion of Camp Ravenna, west of Load Line 5 and east of Load Line 8. Below is a summary of historical operations at Load Line 6:

- From 1941–1945, the site predominantly operated at full capacity as a fuze assembly line. At the end of World War II, Load Line 6 was deactivated, and the process equipment was removed.
- From 1950s through the late 1970s, the Firestone Tire and Rubber Company's Defense Research Division used Load Line 6 intermittently for developing shaped charges for armor penetration on the south portion of the AOC. Two buildings were used as test chambers for tube-launched, optically-tracked, wire-guided (TOW) missiles and Dragon missiles. These buildings are referred to as TOW and Dragon Missile Test Chamber #1 and TOW and Dragon Missile Test Chamber #2. Shaped charges were tested under water at the small pond (i.e., Shaped Charge Test Pond, herein referred to as the "Former Test Pond"). An additional building was located adjacent to the pond that was used for testing shaped charges (Shaped Charge Test Chamber). Less than 900 kg of the explosives 2,4,6-trinitrotoluene (TNT); composition B [a combination of TNT and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)]; and Octol [a mixture of TNT and octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)] were used by Firestone per year. The Shaped Charge Test Chamber and Former Test Pond from the former Firestone Test Facility make up MRS RVAAP-033-R-01 (CB&I 2014).
- From 1981–1989, Physics International was a tenant at Load Line 6 and operated a pink water evaporation unit (historically designated as AOC RVAAP-14). This unit was closed under Resource Conservation and Recovery Act regulations.
- From 1987–1989, the Load Line 6 Treatment Plant (historically designated as AOC RVAAP-15) was operable. The pink water treatment plant was discharged under a National Pollutant Discharge Elimination System permit to the George Road Sewage Treatment Plant (RVAAP-22).

No historical information exists to indicate Load Line 6 was used for any other processes other than what is presented above. There have been no CERCLA enforcement actions related to Load Line 6.

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 6 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.

This ROD addresses soil, sediment, and surface water. The concentrations of CERCLA-related contamination at Load Line 6 are considered protective of human health and do 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 6.

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 6. These characteristics and findings are based on investigations conducted from 1978–2012 and are further summarized in the Phase II Load Line 6 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 6 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. The topography at Load Line 6 is generally flat to gently sloping in the FPA and slopes downwards towards the perennial drainage channel at the south-central side of the AOC. The elevation at the AOC averages 1,120 ft amsl.

Load Line 6 is located south of Fuze and Booster Road at the intersection of Fuze and Booster Spur Road, west of Load Line 5, and east of Load Line 8, in the south-central portion of Camp Ravenna (Figure 2). All buildings and structures have been demolished and building slabs and footers have been removed. Soil near former production buildings was extensively disturbed during building demolition activities. The work areas were re-graded and the area was vegetated (MKM 2005 and LES 2007). Remnant infrastructure at Load Line 6 consists of the asphalt road within the FPA, the AOC fence, and the shaped charge test chamber foundation and concrete blocks around the Former Test Pond.

Perennial surface water at Load Line 6 is limited to the Former Test Pond located at the south-central portion of the AOC. The Former Test Pond is approximately 35 ft in diameter with a maximum depth

of 14 ft. The underwater tactile investigation in August 2011 revealed that the pond is conical shaped with approximate 50–60 degree side slopes (CB&I 2014).

Surface water also occurs intermittently throughout the AOC as storm water runoff within constructed drainage ditches or natural conveyances. The surface water drainage generally follows the topography of the AOC, from the north towards the south. At the south end of the AOC, surface runoff that follows the constructed drainage ditches feeds into a natural drainage channel in the south-central portion of the AOC, immediately east of and adjacent to the Former Test Pond. This natural drainage channel becomes the downstream perennial headwater streams to the Michael J. Kirwan Reservoir.

E.1.2 Geology

The soil type covering more than 95% of Load Line 6 is the Mahoning silt loam (2–6% slopes). Mahoning silt loam (2–6% slopes) comprises the remaining 5% in southeastern portion of the AOC. The 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 bgs. Mahoning silt loam has low permeability with rapid runoff and seasonal wetness (USDA 2010).

As shown on Figure 5, Load Line 6 is located within Hiram Till glacial deposits. At Load Line 6, unconsolidated zone characteristics may vary due to site disturbances, including building construction, demolition, and re-grading.

As show on Figure 6, the bedrock formation at Load Line 6, as inferred from existing geologic data, is the Pennsylvanian age Pottsville Formation, Mercer Member. Bedrock was encountered at Load Line 6 at 12.9–20 ft bgs during monitoring well installation activities as part of the Characterization of 14 AOCs (MKM 2007). During the 2008 Performance-based Acquisition Remedial Investigation (PBA08 RI), top of bedrock was encountered in one soil boring (LL6sb-072) at 7–12 ft bgs (USACE 2016).

E.1.3 Hydrogeology

Seven monitoring wells are present at Load Line 6, which were installed in 2004 during the Characterization of 14 AOCs (MKM 2007). During monitoring well installation, bedrock, if encountered, was observed at a depth of 13–20 ft bgs. Bedrock was encountered in one soil boring at 21.25 ft bgs during the PBA08 RI, but shallow bedrock was encountered from 7–12 ft bgs. Initial depths to groundwater encountered during well installation varied from 8.2–18.2 ft bgs. Monitoring well groundwater elevations are collected under the FWGWMP. The groundwater flow pattern at Load Line 6 is to the east/southeast.

E.1.4 Ecology

Load Line 6 has perennial surface water in the Former Test Pond and intermittent surface water in small drainage ditches bordering the roads and within the FPA. 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.

A field survey conducted by Leidos field biologists at Load Line 6 in May 2010 identified three main habitat types, as presented in Figure 7. The vegetation community throughout most of the habitat area is a dry, early-successional, herbaceous field (Figure 7). The southwest portion of the habitat area consists of a temporarily flooded forest alliance of green ash (*Fraxinus pennsylvanica)*, American elm (*Ulmus americana)*, and hackberry *(Celtis occidentalis* and *laevigata)*. One other community was represented in the northeastern portion of the habitat area consisting of the mixed-deciduous successional forest community (Figure 7). There has been an increase of a dry, mid-successional, cold-deciduous shrubland; a decrease in the dry, early-successional herbaceous field; and an increase in the temporarily flooded forest alliance as documented in the May 2010 field survey. These changes are attributed to plant succession.

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 6 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).

E.2 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 soil, sediment, and surface water samples collected during the *Relative Risk Site Evaluation for Newly Added Sites* (USACHPPM 1996) had no detections of explosives, but there were several detections of inorganic chemicals.

Since 1978, Load Line 6 has been included in various historical assessments and investigations conducted at the former RVAAP. The following environmental investigations have been completed for Load Line 6:

- Installation Assessment of Ravenna Army Ammunition Plant (USATHAMA 1978),
- Resource Conservation and Recovery Act Facility Assessment (Jacobs 1989),
- Preliminary Assessment Screening of Boundary Load Line Areas (USAEHA 1994),
- Preliminary Assessment for the Characterization of Areas of Contamination (USACE 1996),
- Relative Risk Site Evaluation for Newly Added Sites (USACHPPM 1996),
- 2002 Lead Azide Screening (MKM 2003),
- 2003 Phase I RI (MKM 2007),
- Military Munitions Response Program (MMRP) RI at RVAAP-033-R-01 Firestone Test Facility MRS (CB&I 2014), and
- 2010 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, conduct risk assessments, as summarized in the Phase II Load Line 6 RI Report (USACE 2016). This included applicable information and sample results from the *Remedial Investigation Report for RVAAP-033-R-01 Firestone Test Facility MRS* (CB&I 2014).

E.3 Nature and Extent of Contamination

Analytical results from the RIs effectively characterized the nature and extent of contamination at the AOC (USACE 2016). Figure 8 presents the RI sample locations. Based on previous information and the summary below, it can be concluded that the vertical and horizontal extent of contamination is defined, and no further sampling is needed to evaluate Load Line 6.

E.3.1 Soil

Seven inorganic chemicals (antimony, arsenic, barium, cadmium, chromium, lead, and mercury) were identified as potential inorganic site-related contaminants (SRCs) and potentially related to previous AOC operations. Of these chemicals, only arsenic and cadmium are considered chemicals of potential concern (COPCs) in surface soil at the FPA and NPA (USACE 2016).

Only 2 of 59 surface soil samples collected at Load Line 6 exceeded the subsurface soil background concentration of 19.8 mg/kg. The two locations with exceedances were sample location LL6sb-007 with a concentration of 41 mg/kg and LL6sd-081 with a concentration of 31.3 mg/kg. Along with other factors considered in the human health risk assessment (HHRA), the arsenic exposure point concentration was below the facility-wide background concentration; therefore, the Phase II Load Line 6 RIR concluded that arsenic was not considered a COC requiring remediation (USACE 2016).

Cadmium was not identified as a COPC in the NPA. Cadmium had one detection above the facility-wide cleanup goal (FWCUG) at a target risk (TR) of 1E-06, hazard quotient (HQ) of 0.1 (6.41 mg/kg) in 1 of 44 samples collected in the FPA, with a maximum detected concentration of 6.8 mg/kg at sample location LL6sb-002. However, subsurface soil concentrations were below the screening level at this location and throughout the FPA and NPA (USACE 2016). In addition, the cadmium exposure point concentration was below the Resident Receptor (Adult and Child) FWCUG; therefore, the Phase II Load Line 6 RIR concluded that cadmium is not a COC requiring remediation (USACE 2016).

None of the detected concentrations of semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), pesticides, or polychlorinated biphenyls (PCBs) in surface or subsurface soil were above the Resident Receptor (Adult and Child) FWCUG at a TR of 1E-05, HQ of 1. Building 2F-35 was the only building at Load Line 6 whose purpose was solvent storage. The sample associated with former Building 2F-35 (LL6sb-014) had no detectable concentrations of VOCs in soil.

A Suspect VOC Disposal Pit to the east of Building 2F-35 was assessed during the Phase I RI. Of the 10 borings installed to assess this area, none of the borings had VOCs detected during the field screening. Also, of the four samples sent to the analytical laboratory, none had detections of total petroleum hydrocarbons (diesel range organics and gasoline range organics and GRO) or VOCs. Di-n-octylphthalate, the only SVOC detected, was at LL6sb-049 with an estimated concentration of 0.02J mg/kg. Thus, no evidence of VOC contamination is present from the Suspect VOC Disposal Pit (USACE 2016).

E.3.2 Sediment and Surface Water

The Drainage Ditches were evaluated with two sediment and three surface water samples. No SVOCs, VOCs, PCBs, explosives, or propellants had concentrations above the Resident Receptor (Adult and Child) FWCUG and regional screening level (RSL) at a TR of 1E-06, HQ of 0.1. No sediment or surface water concentrations for metals in the Drainage Ditches samples exceeded the RSL at a TR of 1E-05, HQ of 1 except for the surface water concentration for cobalt at LL6sw-082 that had a concentration of 0.0072 mg/L.

The Former Test Pond was assessed with one co-located sediment and surface water sample (LL6sd/sw-084) collected during the 2010 PBA08 RI, two sediment samples (FTFsd-002-SD and FTFsd-003-SD) and one surface water sample (FTFsw-001-0001-SW) collected in August 2011 during the MMRP RI, and one sediment sample (LL6sd-096-5870-SD) and surface water sample (LL6sw-096-5871-SW) collected in August 2012. One explosive (tetryl) was detected in sediment at sample location LLsd-084 at an estimated concentration of 0.031J mg/kg. This detection was below the RSL at a TR of 1E-06, HQ of 0.1, and is, therefore, not considered a COPC. One explosive (HMX) was detected in surface water at sample location LLsw-084 at an estimated concentration of 0.000062J mg/L collected from the Former Test Pond. This detection was below the Resident Receptor (Adult and Child) FWCUG at a TR of 1E-06, HQ of 0.1, and is, therefore, not considered a COPC. None of the samples collected in 2011 or 2012 had detections of explosives or propellants. No sediment or surface water concentration for metals at the Former Test Pond exceeded the RSL at a TR of 1E-05, HQ of 1 (USACE 2016).

Surface water and wet sediment samples were collected at potential exit points from the Fuze and Booster Hill area (which includes Load Lines 5 through 11) and near the southern boundary of Camp Ravenna to determine nature and extent. Four surface water and co-located composite wet sediment samples were collected from these areas in order to characterize current conditions and assess potential exit pathways from the area. This report evaluates two of these samples (FWSsd/sw-101 and FWSsd/sw-103) that are south and southeast of Load Line 6. No explosives or propellants were detected in these sediment samples. HMX was detected in both surface water samples and RDX was detected at FWSsw-103 at concentrations well below the Resident Receptor (Adult and Child) FWCUG at a TR of 1E-06, HQ of 0.1. No sediment or surface water concentration for metals at FWSsd/sw-101 and FWSsd/sw-103 exceeded the RSL at a TR of 1E-05, HQ of 1. No PCBs were detected in sediment or surface water samples, and only low, estimated concentrations of toluene at 0.00041J mg/kg in sediment at FWS-103 and gamma-chlordane at 0.000048J mg/L at FWS-101 were detected. All other SVOCs, VOCs, and pesticides had non-detectable concentrations (USACE 2016).

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 6. All buildings, with the exception of four production buildings, were thermally decontaminated/demolished in 2002. Between 2005 and 2007, the remaining four production buildings were demolished by conventional methods, and all footers and floor slabs were removed to a minimum of 4 ft bgs. Remnants of the Firestone Test Facility (MRS RVAAP-033-R-01) include the Shaped Charge Test Chamber foundation, Former Test Pond, concrete blocks around the pond, and access road to the pond. Remnant contamination in soil and sediment is considered a secondary source of contamination.

The potential mechanisms for contaminant releases from secondary sources at Load Line 6 include:

- Eroding soil with sorbed contaminants and mobilization in turbulent surface water flow under storm conditions,
- Dissolving soluble contaminants and transport in surface water,
- Re-suspending contaminated sediment during periods of high flow with downstream transport within the surface water system, and
- Contaminant leaching to groundwater.

E.4.2 Contaminant Migration Pathways and Exit Points

The potential for soil and sediment contaminants to impact groundwater was evaluated in a fate and transport evaluation presented in the Phase II Load Line 6 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 soil, subsurface soil, and sediment were evaluated using a series of generic screening steps to identify initial contaminant migration chemicals of potential concern (CMCOPCs). These CMCOPCs for soil 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 RSLs, 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. Inorganic and organic SRCs exist in surface soil, subsurface soil, and sediment at Load Line 6. These SRCs include chemicals that were identified as potential contaminants from previous site usage and chemicals that were identified from the SRC screening process using available data. All SRCs were further evaluated to determine if residual concentrations in soil and sediment may potentially impact groundwater quality and warrant evaluation in an FS.

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

- Selenium in NPA soil was predicted to exceed the screening criteria in groundwater beneath the source area; however, it was not predicted to exceed the screening criteria in groundwater at the downgradient receptor location.
- Selenium and naphthalene in FPA soil were predicted to exceed the screening criteria in groundwater beneath the source area; however, neither of these constituents were predicted to exceed the screening criteria in groundwater at the downgradient receptor location.

All SRCs identified in surface soil, subsurface soil, and sediment at Load Line 6 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. 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) 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 bgs.

The Level I Scoping Level environmental risk assessment (ERA) presents important ecological resources on or near the AOC and evaluates the potential for current contamination to impact ecological resources at Load Line 6. Because contamination is at or near the important resources, these findings invoked a requirement for a Level II ERA. The Level II ERA incorporated available data to identify integrated chemicals of potential ecological concern (COPECs). There are 19 integrated soil COPECs, 5 integrated sediment COPECs, and 5 integrated surface water COPECs that were identified in the Level II ERA at Load Line 6. The 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 conducted to protect 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 6 (USACE 2017).

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 6 is currently managed by Army National Guard/OHARNG. The AOC is not currently being utilized for training purposes. The future use of Load Line 6 is Military Training. The Resident Receptor (Adult and Child) was evaluated in the 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 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 6 RI Report (USACE 2016) and Load Line 6 PP (USACE 2017) located in the Administrative Record and Information Repositories.

G.1 Human Health Risk Assessment

The HHRA did not identify any COCs that pose unacceptable risk to the Resident Receptor (Adult and Child). Because there is no unacceptable risk to the Resident Receptor, it can be concluded that there is no unacceptable risk to the National Guard Trainee and Industrial Receptor.

The media evaluated in the HHRA for the Resident Receptor (Adult and Child) were surface soil (0–1 ft bgs), subsurface soil (1–13 ft bgs), sediment, and surface water. Soil data associated with Load Line 6 were aggregated into surface and subsurface soil at the FPA and NPA. Sediment and surface

water data were aggregated and evaluated separately at the Drainage Ditches and the Former Test Pond.

No COCs were identified for the Resident Receptor (Adult and Child) in any of the media of concern; therefore, no remediation is required for the Resident Receptor, no other receptors were evaluated, and no further action is recommended from a human health risk perspective. Therefore, the site is protective for Unrestricted (Residential) Land Use. Because the site is protective for Unrestricted (Residential) Land Use, it is also protective for Commercial/Industrial Land Use and Military Training Land Use (USACE 2016).

G.2 Ecological Risk Assessment

The ecological habitat at Load Line 6 consists of 43 acres of mostly field (grasses) and shrubs with some forest. Load Line 6 also features surface water (e.g., Former Test Pond) near areas of contamination. This intermittent surface water flows in small drainage ditches bordering the roads and within the FPA. 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 vegetation provides a habitat for birds, mammals, insects, and other organisms that typically require approximately 1 acre of habitat. 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 6 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 Scoping Level 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 6. This contamination was identified using RI data. Ecological resources at and near Load Line 6 were compared to the list of important ecological places and resources (USACE 2016). Based on the 39 criteria defining important places as identified by the Army and Ohio EPA, the Former Test Pond and nearby wetlands are important and significant ecological resources (USACE 2016). Because contamination is at or near important resources, these findings invoked a requirement for a Level II ERA. The Level II ERA incorporated available data to identify integrated COPECs. There are 19 integrated soil COPECs, 5 integrated sediment COPECs, and 5 integrated surface water COPECs that were identified in the Level II ERA at Load Line 6.

The 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 conducted to protect 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 6.

H DOCUMENTATION OF NO SIGNIFICANT CHANGE

The Load Line 6 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 6. No significant changes were necessary or appropriate following the conclusion of the public comment period.

THIS PAGE INTENTIONALLY LEFT BLANK.

PART III: RESPONSIVENESS SUMMARY FOR PUBLIC COMMENTS ON THE ARMY PROPOSED PLAN FOR RVAAP-33 LOAD LINE 6

A OVERVIEW

On June 12, 2017, the Army released the Load Line 6 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, 8, and 11.

For soil, surface water, and sediment at Load Line 6, 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 6 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 at Load Line 6; 59 surface soil samples and 52 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 6

had sampling performed to specifically assess the predominant form of chromium (trivalent or hexavalent) in which chromium is at the site. No hexavalent chromium was detected in this analysis. Therefore, it was determined that hexavalent chromium is not of concern at Load Line 6, 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

ARNG (Army National Guard) 2014. *Final Technical Memorandum: Land Uses and Revised Risk Assessment Process for the Ravenna Army Ammunition Plant (RVAAP) Installation Restoration Program, Portage /Trumbull Counties, Ohio*. Memorandum between ARNG-ILE Cleanup and the Ohio Environmental Protection Agency. February 2014.

CB&I 2014. *Remedial Investigation Report for RVAAP-033-R-01 Firestone Test Facility MRS, Version 1.0*. August 2014.

Jacobs (Jacobs Engineering Group, Inc.) 1989. *Resource Conservation and Recovery Act Facility Assessment, Preliminary Review/Visual Site Inspection Ravenna Army Ammunition Plant Ravenna, Ohio*. October 1989.

LES (Lakeshore Engineering Services Inc.) 2007. *Project Completion Report: Munitions Response for the Demolition of Load Lines 5, 7, Building 1039, Transite Removal at Building T-1604, Removal of Remaining Concrete and Miscellaneous Debris at Load Lines 6, 9, and 11 at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. December 2007.

MKM (MKM Engineers, Inc.) 2003. *Final Sampling and Analysis Plan Addendum for the Remedial Investigation of Load Line 9, Ravenna Army Ammunition Plant, Ravenna, Ohio*. September 2003.

MKM 2005. *Thermal Decomposition and 5X Certification of Load Lines 6, 9 and Wet Storage Area Igloos 1, 1A, 2, & 2A*. December 2005.

MKM 2007. *Characterization of 14 AOCs at Ravenna Army Ammunition Plant.* March 2007.

OHARNG (Ohio Army National Guard) 2014. *Integrated Natural Resources Management Plan at the Camp Ravenna Joint Military Training Center, Portage and Trumbull Counties, Ohio.* December 2014.

Ohio EPA (Ohio Environmental Protection Agency) 2004. *Director's Final Findings and Orders for the Ravenna Army Ammunition Plant*. June 2004.

Ohio EPA 2008. *Guidance for Conducting Ecological Risk Assessments (Ohio EPA)*. Division of Emergency and Remedial Response. April 2008.

USACE (U.S. Army Corps of Engineers) 1996. *Preliminary Assessment for the Characterization of Areas of Contamination at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. February 1996.

USACE 2016. *Phase II Remedial Investigation Report for Soil, Sediment, Surface Water at RVAAP-33 Load Line 6, Former Ravenna Army Ammunition Plant Portage and Trumbull Counties, Ohio.* June 2016.

USACE 2017. *Proposed Plan for Soil, Sediment, Surface Water at RVAAP-33 Load Line 6, Former Ravenna Army Ammunition Plant Portage and Trumbull Counties, Ohio.* April 2017.

USACHPPM (U.S. Army Center for Health Promotion and Preventative Medicine) 1996. *Hazardous and Medical Waste Study No. 37-EF-5360-97 Relative Risk Site Evaluation, Ravenna Army Ammunition Plant*. November 1996.

USAEHA (U.S. Army Environmental Hygiene Agency) 1994. *Preliminary Assessment Screening No. 38-26-1329-94, Boundary Load Line Areas, Ravenna Army Ammunition Plant, Ravenna, Ohio*. June 1994.

USATHAMA (U.S. Army Toxic and Hazardous Materials Agency) 1978. *Installation Assessment of Ravenna Army Ammunition Plant*, Records Evaluation Report No. 132. 1978.

USDA (U.S. Department of Agriculture) 2010. Soil Map of Portage County, Version 4. Website: www.websoilsurvey.nrcs.usda.gov. January 2010.

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

FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK.

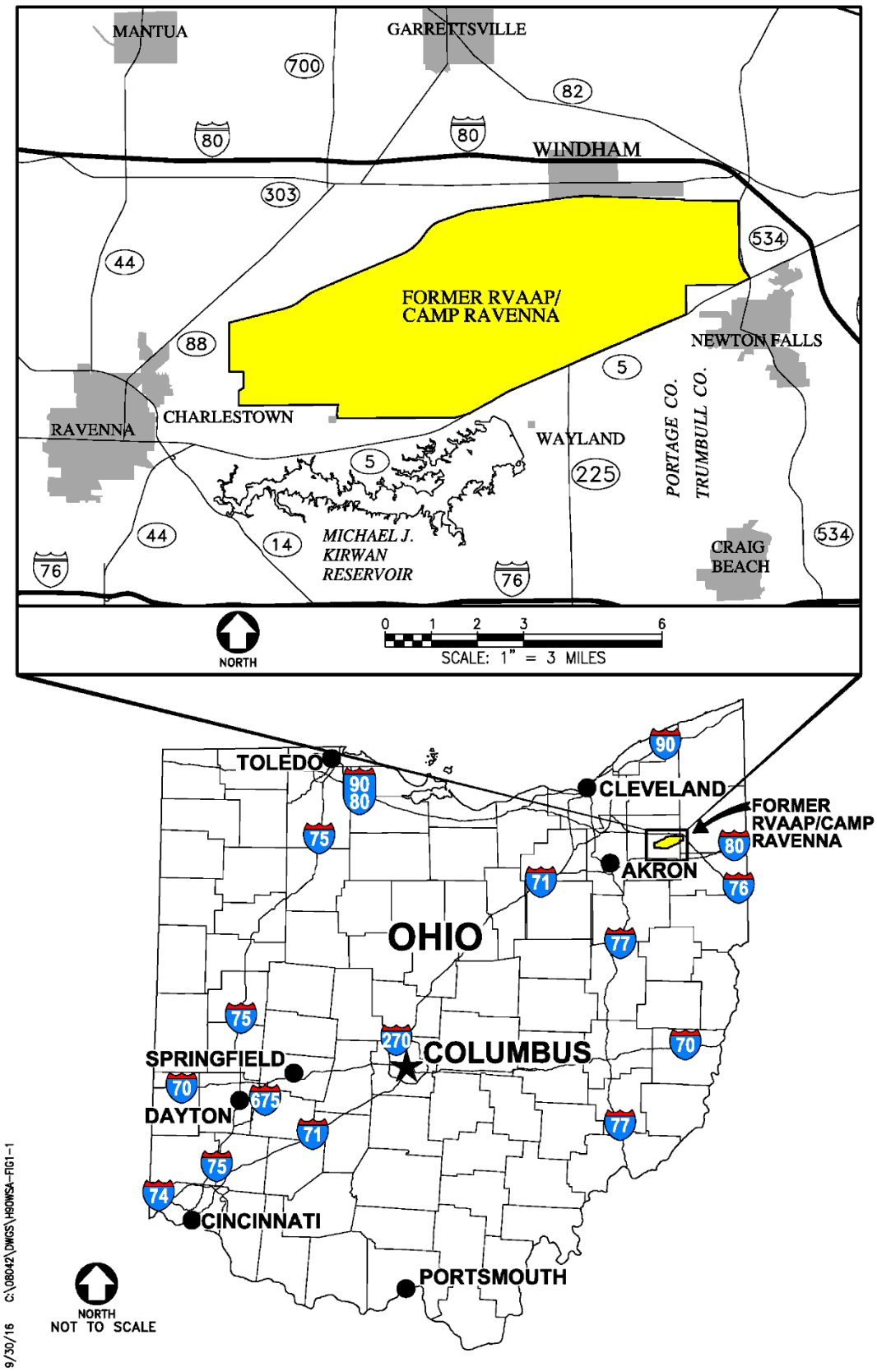


Figure 1. General Location and Orientation of Camp Ravenna

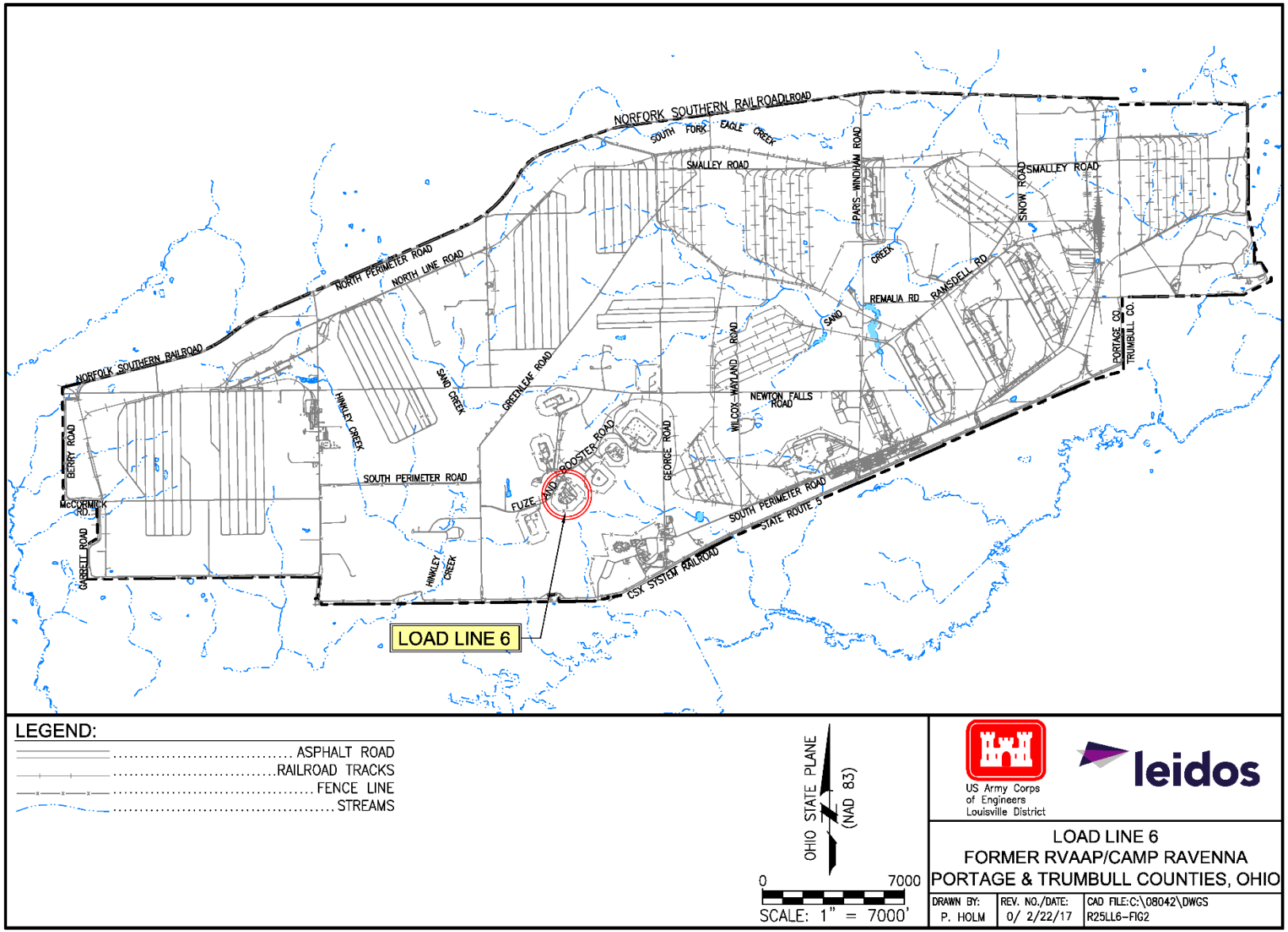
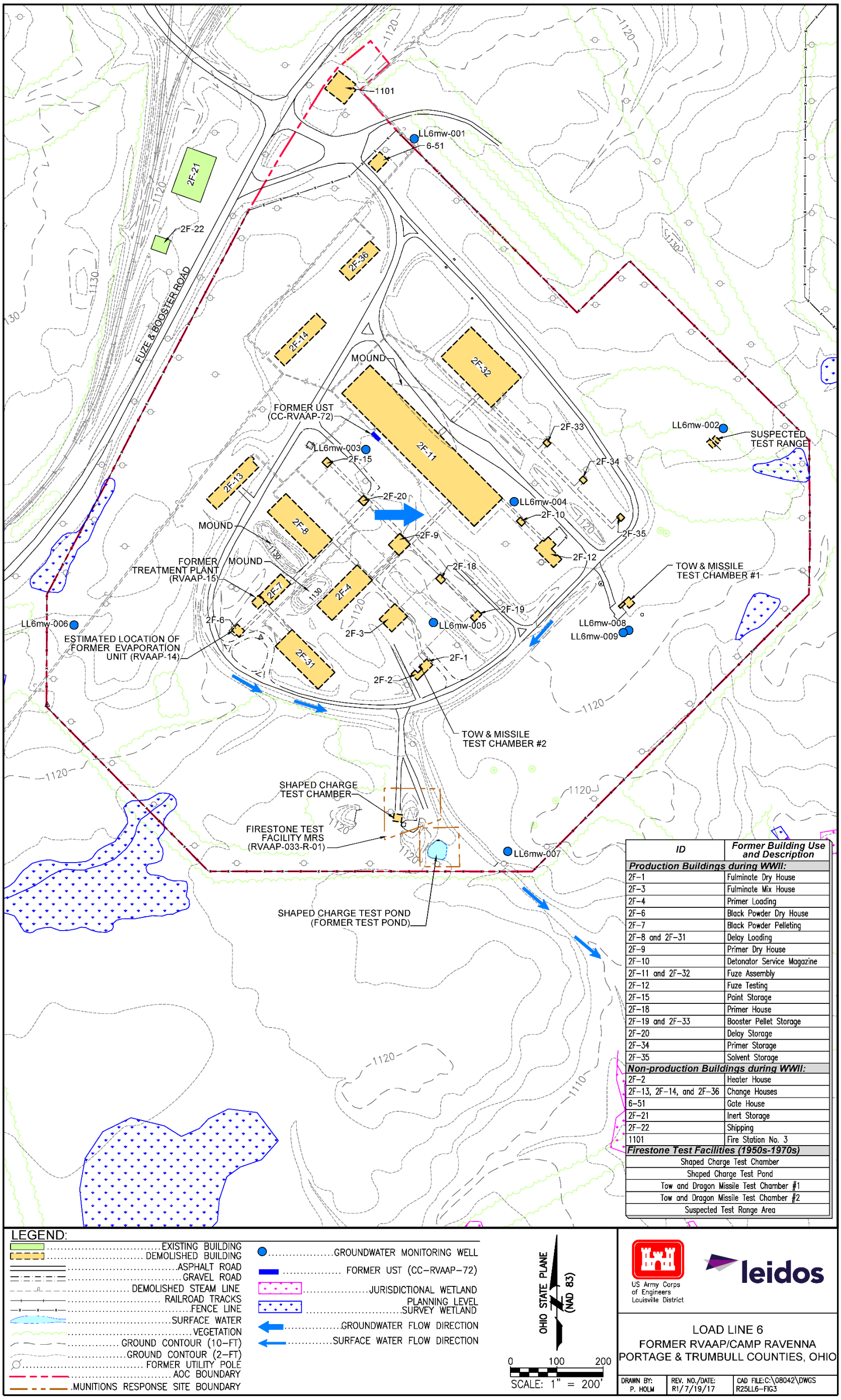


Figure 2. Camp Ravenna Installation Map



ID	Former Building Use and Description
Production Buildings during WWII:	
2F-1	Fulminate Dry House
2F-3	Fulminate Mix House
2F-4	Primer Loading
2F-6	Black Powder Dry House
2F-7	Black Powder Pelleting
2F-8 and 2F-31	Delay Loading
2F-9	Primer Dry House
2F-10	Detonator Service Magazine
2F-11 and 2F-32	Fuze Assembly
2F-12	Fuze Testing
2F-15	Paint Storage
2F-18	Primer House
2F-19 and 2F-33	Booster Pellet Storage
2F-20	Delay Storage
2F-34	Primer Storage
2F-35	Solvent Storage
Non-production Buildings during WWII:	
2F-2	Heater House
2F-13, 2F-14, and 2F-36	Change Houses
6-51	Gate House
2F-21	Inert Storage
2F-22	Shipping
1101	Fire Station No. 3
Firestone Test Facilities (1950s-1970s)	
Shaped Charge Test Chamber	
Shaped Charge Test Pond	
Tow and Dragon Missile Test Chamber #1	
Tow and Dragon Missile Test Chamber #2	
Suspected Test Range Area	

Figure 3. Load Line 6 Site Features

ID	Former Building Use and Description
Production Buildings during WWII:	
2F-1	Fulminate Dry House
2F-3	Fulminate Mix House
2F-4	Primer Loading
2F-6	Black Powder Dry House
2F-7	Black Powder Pelleting
2F-8 and 2F-31	Delay Loading
2F-9	Primer Dry House
2F-10	Detonator Service Magazine
2F-11 and 2F-32	Fuze Assembly
2F-12	Fuze Testing
2F-15	Paint Storage
2F-18	Primer House
2F-19 and 2F-33	Booster Pellet Storage
2F-20	Delay Storage
2F-34	Primer Storage
2F-35	Solvent Storage
Non-production Buildings during WWII:	
2F-2	Heater House
2F-13, 2F-14, and 2F-36	Change Houses
6-51	Gate House
2F-21	Inert Storage
2F-22	Shipping
1101	Fire Station No. 3
Firestone Test Facilities (1950s-1970s)	
Shaped Charge Test Chamber	
Shaped Charge Test Pond	
Tow and Dragon Missile Test Chamber #1	
Tow and Dragon Missile Test Chamber #2	
Suspected Test Range Area	

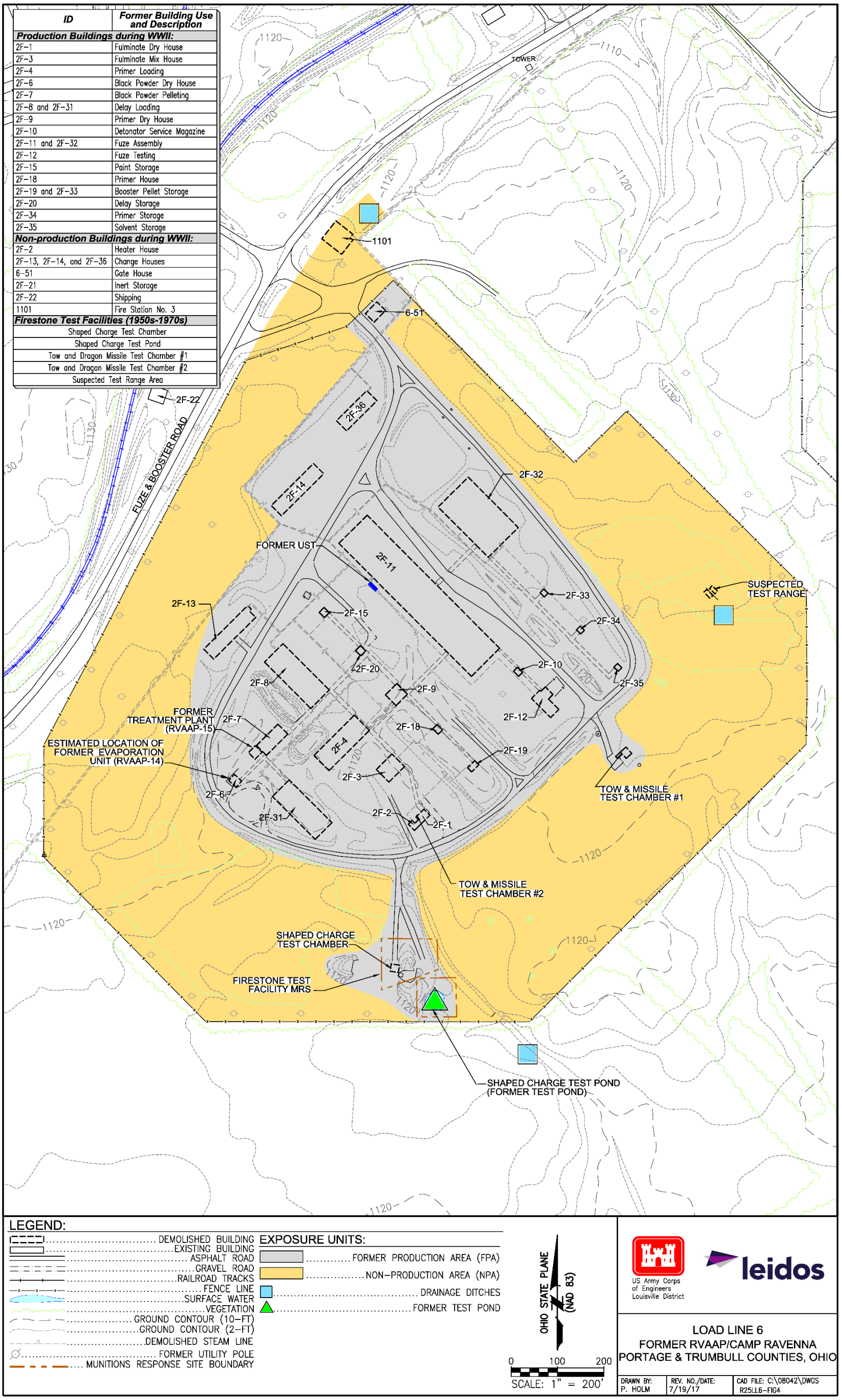


Figure 4. Load Line 6 Exposure Units

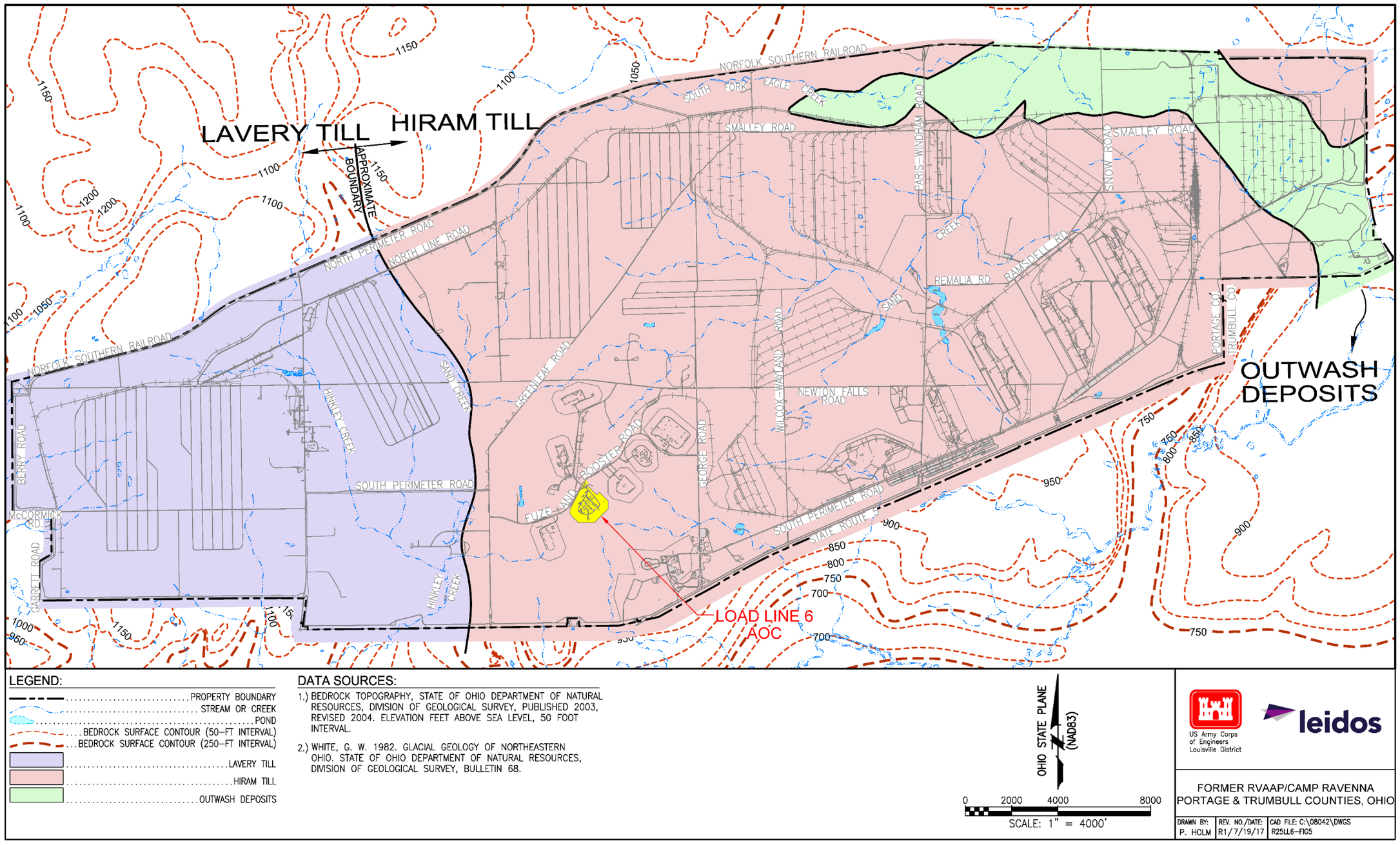


Figure 5. Geologic Map of Unconsolidated Deposits on Camp Ravenna

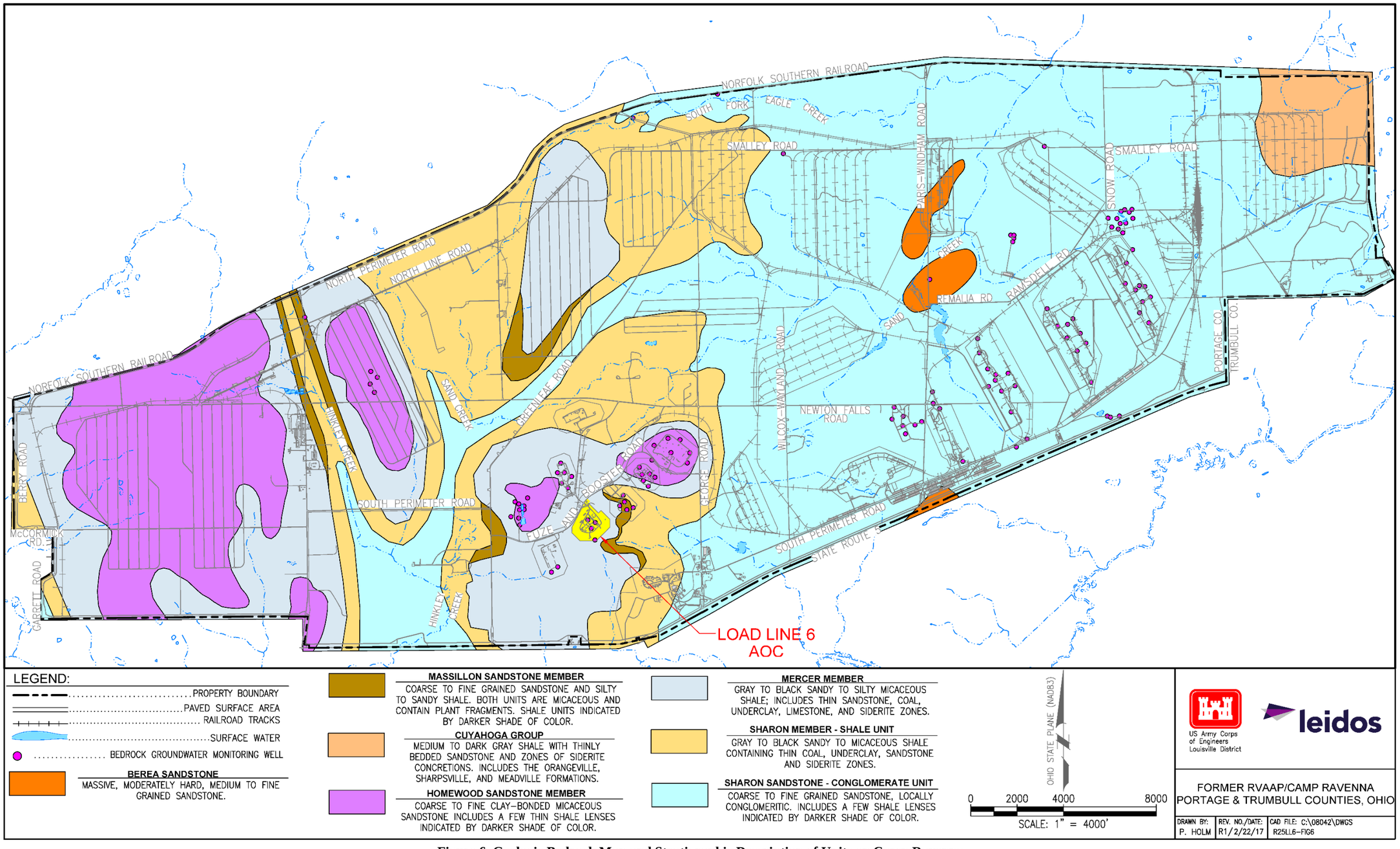


Figure 6. Geologic Bedrock Map and Stratigraphic Description of Units on Camp Ravenna

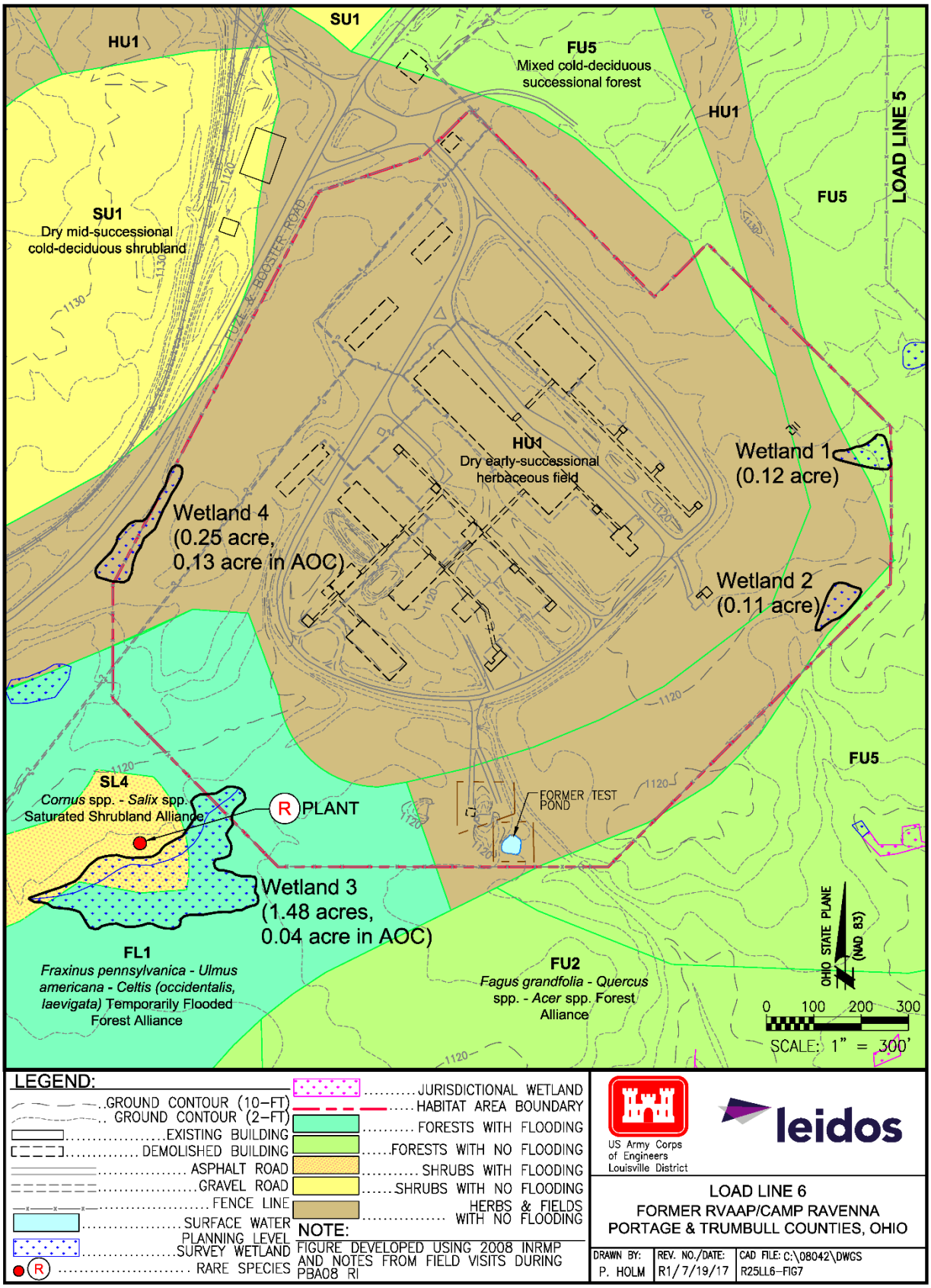


Figure 7. Natural Resources Inside and Near Habitat Area at Load Line 6

THIS PAGE INTENTIONALLY LEFT BLANK.

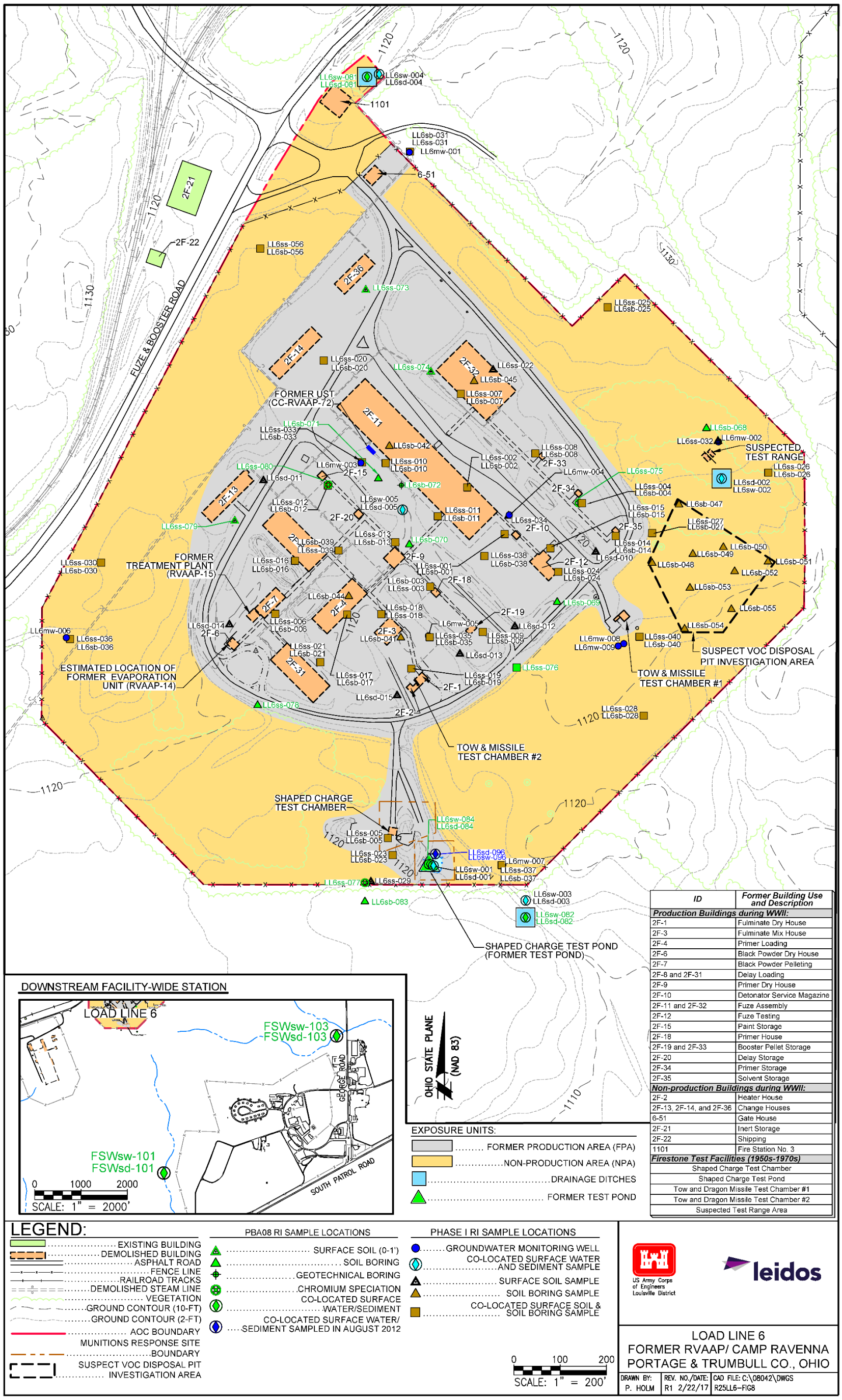


Figure 8. Load Line 6 Sample Locations

THIS PAGE INTENTIONALLY LEFT BLANK.

ATTACHMENT A

OHIO EPA COMMENTS AND RESPONSES

Ohio Environmental Protection Agency

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

January 17, 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
267000859117

Subject: Ravenna Army Ammunition Plant, Portage/Trumbull Counties. "Response to Comments, Draft, Record of Decision for Soil, Sediment, and Surface Water at RVAAP-33, Load Line 6" 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-33 Load Line 6" 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 Vanessa Steigerwald Dick at Vanessa.Steigerwald-Dick@epa.ohio.gov or at (330) 963-1219.

Sincerely,

for

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

VD/nvr

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

ec: Mark Leeper, ARNG
Rodney Beals, NEDO, DERR
Nat Peters, USACE
Bob Princic, NEDO, DERR
Tom Schneider, SWDO, DERR
Vanessa Steigerwald Dick, NEDO, DERR

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-33 Load Line 6, Responses to Comments on the Draft Record of Decision (Work Activity No. 267-000-859-117)

Dear Ms. Deppisch:

The Army appreciates your time and comments (dated September 13, 2017, received September 21, 2017) on the *Draft Record of Decision for Soil, Sediment, and Surface Water at RVAAP-33 Load Line 6*. Enclosed for your review are responses to your comments. Upon the final resolution of these responses to comments, the Army will distribute the final version of this document.

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

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

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, RVAAP-33 Load Line 6 (Work Activity No. 267-000-859-117)

Ohio EPA General Comment:
Although detailed, 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 DD and change the DD to be consistent with the Final PP. Please refer to the examples in 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 6 ROD. Changes to the Load Line 6 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 6 ROD Applicability, Army Response: Not applicable. A similar statement is not provided in the Load Line 6 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 6 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 6 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. Groundwater will be further evaluated under the FWGWMP."

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, RVAAP-33 Load Line 6 (Work Activity No. 267-000-859-117)

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 6 ROD Applicability, Army Response: Not applicable. The Load Line 6 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 6 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 6 ROD Applicability, Army Response: Section H has been revised as follows:

> "The Load Line 6 PP (USACE 2016) 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 6. 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 6 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-33 Load Line 6 (Work Activity No. 267-000-859-117)

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 6 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 6 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

September 13, 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
267000859117

Subject: Ravenna Army Ammunition Plant, Portage/Trumbull Counties. "Draft, Record of Decision for Soil, Sediment, and Surface Water at RVAAP-33, Load Line 6," Dated August 10, 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-33 Load Line 6" for the Ravenna Army Ammunition Plant (RVAAP), Portage/Trumbull Counties. This document is dated August 10, 2017 and was received at Ohio EPA, Northeast District Office (NEDO) on August 16, 2017.

Although detailed, 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 DD and change the DD to be consistent with the Final PP. Please 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, OHARNG RTLS
Kevin Sedlak, OHARNG RTLS
Craig Coombs, USACE
Gail Harris, VISTA Sciences Corp.
Rebecca Shreffler, VISTA Sciences Corp.

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