Final

Action Memorandum
for RVAAP-67 Facility-wide Sewers: Load Line 2 Functional Area and CC-RVAAP-75 George Road Sewage Treatment Plant Mercury Spill

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-15-C-0046

Prepared for:

US Army Corps of Engineers®

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Louisville District

Prepared by:

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14. ABSTRACT

This Action Memorandum presents the preferred removal action alternatives for addressing 1) lead contamination is sewer sediment (and associated sewer and culvert piping) and downgradient sediment at the Load Line 2 functional area (FA) of the Facility-wide Sewers area of concern (AOC) and 2) mercury contamination within subsurface piping at the George Road Sewage Treatment Plant Mercury Spill AOC at the former Ravenna Army Ammunition Plant (RVAAP).

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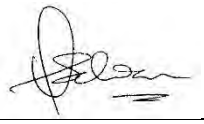
CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Leidos has completed the Action Memorandum for RVAAP-67 Facility-wide Sewers: Load Line 2 Functional Area and CC-RVAAP-75 George Road Sewage Treatment Plant Mercury Spill 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.

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

9/21/2017
Date



Selvam Arunachalam, P.E.
Independent Technical Review Team Leader

9/21/2017
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

9/21/2017
Date

Final

Action Memorandum for RVAAP-67 Facility-wide Sewers: Load Line 2 Functional Area and CC-RVAAP-75 George Road Sewage Treatment Plant Mercury Spill

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-15-C-0046

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600 Martin Luther King, Jr. Place
Louisville, Kentucky 40202

Prepared by:
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Twinsburg, Ohio 44087

September 21, 2017

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ARNG = Army National Guard.
IED = Installation and Environment Division.
OHARNG = Ohio Army National Guard.
REIMS = Ravenna Environmental Information Management System.
USACE = U.S. Army Corps of Engineers.

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ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
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 Information System
CFR	Code of Federal Regulations
CUG	Cleanup Goal
DFFO	Director's Final Findings and Orders
EE/CA	Engineering Evaluation/Cost Analysis
FA	Functional Area
FS	Feasibility Study
FWCUG	Facility-wide Cleanup Goal
HQ	Hazard Quotient
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NCP	National Contingency Plan
NPL	National Priorities List
NTCRA	Non-time-critical Removal Action
O&M	Operations and Maintenance
OAC	Ohio Administrative Code
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
RAO	Removal Action Objective
RAWP	Removal Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RSL	Regional Screening Level
RVAAP	Ravenna Army Ammunition Plant
SI	Site Inspection
SRC	Site-related Contaminant
TCLP	Toxicity Characteristic Leaching Procedure
TR	Target Risk
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USP&FO	U.S. Property and Fiscal Officer

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ACTION MEMORANDUM

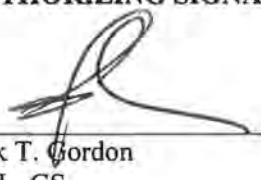
RVAAP-67 FACILITY-WIDE SEWERS: LOAD LINE 2 FUNCTIONAL AREA AND CC-RVAAP-75 GEORGE ROAD SEWAGE TREATMENT PLAN MERCURY SPILL FORMER RAVENNA ARMY AMMUNITION PLANT PORTAGE AND TRUMBULL COUNTIES, OHIO

APPROVAL

This Action Memorandum presents the preferred removal action alternatives for addressing (1) lead contamination in sewer sediment (and associated sewer and culvert piping) and downgradient sediment at the Load Line 2 functional area (FA) of the Facility-wide Sewers area of concern (AOC) and (2) mercury contamination within subsurface piping at the George Road Sewage Treatment Plant Mercury Spill AOC at the former Ravenna Army Ammunition Plant (RVAAP) [now known as Camp Ravenna Joint Military Training Center (Camp Ravenna)], in Portage and Trumbull counties, Ohio. The U.S. Department of the Army is the lead agency under the Installation Restoration Program at the former RVAAP. Accordingly, the U.S. Department of the Army developed this Action Memorandum consistent with the Comprehensive Environmental Response, Compensation, and Liability Act as amended, and consistent with, the National Oil and Hazardous Substances Contingency Plan.

This decision document will be incorporated into the larger Administrative Record file for RVAAP, which is available for public view at the Camp Ravenna Environmental Office, 1438 State Route 534 SW, Newton Falls, OH 44444. This document, which presents a non-time-critical removal action (NTCRA) for the Load Line 2 FA with a present worth cost estimate of approximately $164,482 and NTCRA for the George Road Sewage Treatment Plant Mercury Spill AOC of approximately $63,581, is approved by the undersigned.

AUTHORIZING SIGNATURE:



2 Feb 2018

Erik T. Gordon
COL, GS
Chief, Installation and Environment (I&E)

Date

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OVERVIEW

A PURPOSE

The U.S. Department of the Army (Army), in consultation with the Ohio Environmental Protection Agency (Ohio EPA), has agreed to proceed with a non-time-critical removal action (NTCRA) for the following:

- Lead contamination of sewer sediment (and associated sewer and culvert piping) and downgradient sediment within the Facility-wide Sewers area of concern (AOC) at the Load Line 2 functional area (FA), and
- Mercury contamination within subsurface piping at the George Road Sewage Treatment Plant Mercury Spill AOC.

This Action Memorandum was prepared by Leidos under the U.S. Army Corps of Engineers (USACE) Louisville District Contract Number W912QR-15-C-0046. This Action Memorandum is the primary decision document in establishing the administrative record for selecting the NTCRA responses per Section 113(k) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and provides the following in accordance with the *Superfund Removal Guidance for Preparing Action Memoranda* (USEPA 2009):

- Determines the need for a CERCLA removal action,
- Authorizes the removal action,
- Identifies the action and cleanup levels (if applicable), and
- Explains the rationale for the removal response.

B NON-TIME-CRITICAL REMOVAL ACTION

An NTCRA can provide substantial risk reduction at a site by addressing specific problems without requiring time-consuming investigation and decision-making. The NTCRA generally attempts to control the source of contamination and can be used to remediate a site completely (DOE 1998). The purpose of the NTCRAs at the Load Line 2 FA and George Road Sewage Treatment Plant Mercury Spill AOC is to remove the source of contamination to achieve site closure at both sites.

This NTCRA process follows the administrative record requirements presented in Exhibit 2 of the *Superfund Removal Guidance for Preparing Action Memoranda* (USEPA 2009) and shown in Figure 1. The Army is the lead agency responsible for implementing these NTCRAs and developed the *Engineering Evaluation/Cost Analysis for RVAAP-67 Facility-wide Sewers: Load Line 2 Functional Area and CC-RVAAP-75 George Road Sewage Treatment Plant Mercury Spill* (Leidos 2017a) (herein referred to as the EE/CA).

Planning and performance of all elements of this work will be in accordance with the requirements of the *Director's Final Findings and Orders for RVAAP* (DFFO) dated June 10, 2004 (Ohio EPA 2004). Ohio EPA is the lead regulatory agency and reviewed, provided comments, and concurred with the

investigations and recommendations associated with these sites. The Ohio EPA reviewed the EE/CA and provided concurrence in a letter dated April 14, 2017.

C PUBLIC NOTIFICATION AND COMMENT PERIOD

The Army maintains a *Community Relations Plan for the Ravenna Army Ammunition Plant Restoration Program* (Vista 2017) (herein referred to as the Community Relations Plan) for Camp Ravenna to ensure the public has convenient access to information regarding project progress. The community relations program interacts with the public through news releases, public meetings, public workshops, and Restoration Advisory Board meetings with local officials, interest groups, and the general public. Additionally, Camp Ravenna has an online resource for restoration news and information. This website can be viewed at www.rvaap.org.

Section 113(k)(2) of CERCLA provides for involving communities affected by response decisions at Superfund sites. To ensure public involvement of this NTCRA, the Army issued a notice of availability for the EE/CA on May 15, 2017 seeking public input of the final remedy selection. The notice of availability was issued 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 (Vista 2017). The EE/CA 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 until June 13, 2017.

No written comments were received during the public comment period.

D ACTION MEMORANDUM ORGANIZATION

This document is separated into two sections so each site individually meets the action memorandum purpose and follows the basic action memorandum outline, as presented in the *Superfund Removal Guidance for Preparing Action Memoranda* (USEPA 2009). Section 1 discusses the RVAAP-67 Facility-wide Sewers: Load Line 2 Functional Area, and Section 2 discusses the CC-RVAAP-75 George Road Sewage Treatment Plant Mercury Spill.

SECTION 1:

RVAAP-67 FACILITY-WIDE SEWERS: LOAD LINE 2 FUNCTIONAL AREA

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PART I: PURPOSE

The purpose of this Action Memorandum is to request and document approval of the selected removal action of lead-contaminated sewer sediment (and associated sewer and culvert piping) and downgradient sediment within the Load Line 2 FA at the former Ravenna Army Ammunition Plant. The former Ravenna Army Ammunition Plant (RVAAP) is located within Portage and Trumbull counties, Ohio.

PART II: SITE CONDITIONS AND BACKGROUND

Camp Ravenna is located in northeastern Ohio within Portage and Trumbull counties and is currently used as a military training site. Camp Ravenna is 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 (Figure 2). References in this document to the former 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.

The Army is implementing an NTCRA process to address potential ecological risk identified in the sewer outfall discharge point at drop inlet DB22 within the Load Line 2 FA at the former RVAAP. The sewer sediment sample collected from this location [LL2sd-308(st)] had a lead concentration of 872 mg/kg in August 2010. The selected action will remove lead-contaminated sewer sediment (and associated sewer and culvert piping) and downgradient sediment associated with this outfall discharge point.

Load Line 2 is located in the southeast portion of the former RVAAP. The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) Identifier for RVAAP is OH5210020736. The following subsections present the site conditions and background of the proposed removal area.

A SITE DESCRIPTION

The Facility-wide Sewers AOC is comprised of approximately 26 miles of storm and sanitary sewers located throughout the former RVAAP (Figure 3). The Facility-wide Sewers AOC includes sewer lines containing residual sediment and water, pipe bedding below the sewer lines, and the sewer line discharge points. The storm sewer systems at the former RVAAP collected runoff from drainage areas along roads, railbeds, and buildings and diverted it to ditches and drainage conveyances through outfalls. Historically, the storm and sanitary sewer systems may have received inadvertent discharges of contaminated wastewater related to manufacturing munitions or other industrial processes.

Due to the size and structure of the Facility-wide Sewers AOC, it was divided into 19 FAs based on the spatial distribution of the systems and their operational characteristics. Figure 4 presents the Facility-wide Sewers drainage networks and associated FAs. The Load Line 2 FA is the portion of sewers within the Facility-wide Sewers AOC that resides within Load Line 2, as shown in Figure 4. The Load Line 2 FA, shown in detail in Figure 5, includes any storm and sanitary sewers that exist in Load Line 2 and the corresponding sewer sediment, sewer water, outfall sediment, outfall water, and pipe bedding material.

Load Line 2 is a former melt-pour load line located in the southeastern portion of Camp Ravenna. It was in operation from 1941–1971. During 1941–1945, 1951–1957, and 1969–1971, Load Line 2 was used to melt and load 2,4,6-trinitrotoluene and composition B (a combination of 2,4,6-trinitrotoluene and hexahydro-1,3,5-trinitro-1,3,5-triazine) explosives into large-caliber shells. The primary buildings used for assembling and disassembling munitions were DB-4 and DB-4A. All buildings and some

associated structures have since been demolished. Remnant structures from operational activities include asphalt and gravel access roads, man-made ditches, sewer lines, manholes, and ballast from former railroad tracks. The former buildings have been demolished. The former main process area is heavily vegetated with grass and scrub vegetation between the major structures of Load Line 2. The non-production areas around the main process area are characterized by scrub vegetation and immature hardwoods. The topography of Load Line 2 is characterized as moderately subdued on a reworked sandstone bedrock surface. Elevations are approximately 990–1,010 ft above mean sea level.

The Load Line 2 FA contains separate storm and sanitary sewer systems. The sanitary sewer system is part of the Sand Creek Treatment Plant Network. Sanitary effluent from the FA was pumped through a former ejector station located at the south end of the load line prior to exiting the central western portion of the Load Line 2 FA headed to the Load Line 3 FA. The storm sewer network is unique to the Load Line 2 FA and discharged to a series of surface drainage conveyances throughout the load line. Available historical documents do not indicate any incidents or occurrences of intentional dumping or discharging contaminated wastewaters to the Load Line 2 FA storm sewer (SAIC 2012).

A.1 Removal Site Evaluation

Multiple investigations were performed at Load Line 2 FA storm and sanitary sewers. The investigations that are relevant to the lead-contaminated area addressed in this Action Memorandum (immediately east of former Buildings DB-3 and DB-802) are presented below, and results are presented in Figure 6:

- 2001 Load Line 2 Phase II RI, as summarized in the *Phase II Remedial Investigation Report for Load Line 2* (Shaw 2004).
- 2009/2010 Facility-wide Sewers RI, as summarized in the *Draft Remedial Investigation/Feasibility Study Report for RVAAP-67 Facility-wide Sewers* (SAIC 2012) [herein referred to as the Draft Facility-wide Sewers Remedial Investigation (RI)/Feasibility Study (FS) Report].
- 2016 Source Area Pre-Delineation Sampling, as summarized in the EE/CA.

A.1.1 Initial Investigations

Lead concentrations within the storm sewer from samples collected during the 2001 Load Line 2 Phase II RI and the 2009/2010 Facility-wide Sewers RI are summarized below.

- Drop Inlet DB22, sample LL2sd-308 (collected on 08/09/10), had a lead concentration of 872 mg/kg. This location is also considered an outfall discharge point and was evaluated for ecological risk.
- Drop Inlet DB20, sample LL2-250 (collected on 07/28/01), had a lead concentration of 14,600 mg/kg, and sample LL2sd-615(st) (collected on 08/31/10) had a lead concentration of 29,200 mg/kg. Drop inlet DB20 is not visible from the ground surface; samples were

collected from the storm sewer system at its approximate former location using a direct-push rig.

- Drop Inlet DB21, sample LL2-251 (collected on 07/28/01), had a lead concentration of 5,280 mg/kg. Drop inlet DB21 is located in close proximity to the concrete dump area (former Building DB-802), which has been removed.
- Drop Inlet C4, sample LL2-235 (collected on 07/29/01) had a lead concentration of 1,670 mg/kg, and sample LL2sd-296(st) (collected on 08/09/10) had a lead concentration of 277 mg/kg. The destruction of locations C2 and C3, both downstream of C4, has resulted in an incomplete exposure pathway for observed lead contamination at C4.
- The sample at the main outfall discharge (LL2sd-311(st), collected on 10/03/09) had a lead concentration of 31.4 mg/kg at the terminus of the storm sewer line.

Lead also was observed in the sample at location LL2-252 at a concentration of 656 mg/kg; however, an interim sample LL2-212 had a concentration of 50.4 mg/kg for lead. Location LL2-252 is approximately 1,000 ft downstream of DB22.

The Draft RI/FS Report concluded that elevated lead concentrations may pose a potential ecological risk within a section of the storm sewer system surrounding sample location LL2sd-308 (Drop Inlet DB22) and may warrant a remedial action.

A.1.2 Source Area Pre-Delineation Sampling

The EE/CA established the removal action objective (RAO) for lead contamination at the Load Line 2 FA to prevent adverse ecological effects from prior AOC activities and negative surface water impacts from contaminant migration from source media. In addition, the EE/CA specified that the U.S. Environmental Protection Agency (USEPA) regional screening level (RSL) for lead at 400 mg/kg will serve as the cleanup goal (CUG) for the selected removal action at the Load Line 2 FA.

In May 2016, an investigation was conducted to further evaluate the lead-contaminated area immediately east of former Buildings DB-3 and DB-802. This investigation was executed in accordance with the *Letter Work Plan for Pre-Delineation Sampling of Lead-Contaminated Sediment in the Load Line 2 Functional Area* (Leidos 2016), and the field activities and results are presented in the EE/CA (Leidos 2017a). The collective results from this investigation and previous investigations were used to determine the extent of contamination providing potential risk to ecological receptors within the Load Line 2 FA and serve as a basis for determining the removal action volumes in the EE/CA.

The following conclusions were made using this newly obtained information and data:

- The high concentration of lead within Drop Inlet DB22 was confirmed; the drop inlet is a source of lead contamination to the downstream ditch line that can pose risk to ecological resources.
- No removal actions are required from the ditch paralleling the storm sewer lines at Drop Inlets DB17 to DB20. This ditch is on the other side (west) of the railroad tracks and receives

sewer overflow from Drop Inlets DB17 to DB20. Samples LL2sd-652(st) and LL2sd-653(st) were collected from the ditch and had concentrations below 400 mg/kg. In addition, the sediment was covered in railroad ballast which further reduces exposure to ecological resources.

- The ditch line downstream of Drop Inlet DB22 [represented by sample locations LL2sd-654(st) to LL2sd-657(st)] had concentrations of lead that can pose risk to ecological resources. The lead concentration of 400 mg/kg is bound horizontally by the sample location furthest downstream (LL2sd-657); this concentration was present in one sample location [LL2sd-656(st)] at up to 2 ft below ground surface (bgs). It was concluded that a removal action is necessary in this ditch line.

A.1.3 Summary

In summary, the following areas (presented on Figure 6) were identified as having lead contamination in excess of the 400 mg/kg CUG and require removal:

- Storm sewer pipe between Drop Inlets DB-20 and DB-21 and associated sediment and drop inlets.
- Culvert pipe between Drop Inlets DB-21 and DB-22.
- The ditch line downstream of Drop InletDB22 to, at a minimum, sample location LL2sd-657(st) to 2 ft bgs.

A.2 Physical Location

The Load Line 2 FA is in the southeast portion of Camp Ravenna. Camp Ravenna, consisting of 21,683 acres, 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 (Figure 2).

Camp Ravenna occupies east-central Portage County and southwestern Trumbull County. Census projections for 2010 indicated the populations of Portage and Trumbull counties are 161,419 and 210,312, respectively. Population centers closest to Camp Ravenna are Ravenna, with a population of 11,724, and Newton Falls, with a population of 4,795.

The facility is located in a rural area and is not close to any major industrial or developed areas. Approximately 55% of Portage County, in which the majority of Camp Ravenna is located, consists of either woodland or farmland acreage. The closest major recreational area, the Michael J. Kirwan Reservoir (also known as West Branch Reservoir), is located adjacent to the western half of Camp Ravenna, south of State Route 5.

A.3 Site Characteristics

Camp Ravenna is federally owned and licensed to OHARNG for use as a military training site. The former RVAAP was formerly used as a load, assemble, and pack facility for munitions production.

As of September 2013, administrative accountability for the entire acreage of the facility has been transferred to the 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).

Restoration activities at Camp Ravenna are managed by the Army National Guard and OHARNG. Training and related activities at Camp Ravenna include field operations and bivouac training, range firing activities, convoy training, maintaining equipment, C-130 aircraft drop zone operations, helicopter operations, and storing heavy equipment.

There is no current or future use planned for the Facility-wide Sewers AOC; however, the sewers will remain intact and will function as intended until a construction project or military training activity impacts the sewer line causing the need for upgrade or removal. Future use of property, such as military training at Load Line 2, may occur.

All buildings specific to Load Line 2 have been demolished, and floor slabs have been removed. Storm and sanitary sewer lines were not included in the building demolition scope of work. These activities were completed as of June 2008 (MKM 2010).

As part of the CERCLA action to address contamination in soil and dry sediment at Load Line 2, the Army removed 320 tons of polychlorinated biphenyl-contaminated soil and 2,617 tons of nonhazardous contaminated soil from August to November 2007. These activities are summarized in the *Remedial Action Completion Report for the Remediation of Soils and Dry Sediments at RVAAP 08-11 (Load Lines 1-4)* (Shaw 2008). Part of this removal action includes a portion of soil above the storm sewer between Drop Inlets DB20 and DB21. Based on the confirmation sample data, the depth of soil removed is approximately 2.5 ft bgs, slightly above the depth of the storm sewer which is estimated to be 4 ft bgs.

The building demolition activities and CERCLA soil removal have destroyed both Drop Inlets DB20 and DB21, such that they are unable to be identified in the field. A soil boring at sample location LL2sd-615 was installed in 2010 near the location of Drop Inlet DB20. This soil boring encountered pipe material at 4.25 ft bgs, and the sediment within that pipe material had a lead concentration of 29,200 mg/kg, thus confirming the need to remove sewer sediment in this area.

A.4 Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant

Available historical documents do not indicate any incidents or occurrences of intentional dumping or discharging contaminated wastewaters to the Load Line 2 FA storm sewer (SAIC 2012). However, lead-contaminated sediment was identified within the Load Line 2 FA storm sewer and drainage ditch with concentrations exceeding the residential RSL of 400 mg/kg.

Estimated quantities of contaminated sediment and associated culvert and sewer piping are presented in Tables 1 and 2. Waste characterization samples have not been collected to determine if the media is characteristically hazardous. The cost estimate in the EE/CA assumes the material is nonhazardous.

However, the approach to conducting the NTRCA includes waste characterization sampling. Samples will be subjected to full toxicity characteristic leaching procedure (TCLP) characterization to determine disposal requirements.

There is low likelihood of a high rate of release of the contaminated media to downstream sources. The drop inlets within the storm sewer system have been infilled from previous activities, which slows the release to the environment. Additionally, the downgradient ditch is generally dry or has stagnant water. It is evident that contaminant migration from surface water flow is limited, as indicated by the downstream sample LL2sd-657(st) that has lead concentrations below the CUG.

Table 1. Estimated Sediment Volumes Requiring Removal at Load Line 2 FA

Media	Length (ft)	Width (ft)	Depth (ft bgs)	In-situ		In-situ with Constructability[a]		Ex-situ[a,b]	
				Volume (ft^3)	Volume (yd^3)	Volume (ft^3)	Volume (yd^3)	Volume (ft^3)	Volume (yd^3)
Ditch Sediment [DB22 to LL2sd-657(st)]	325	4	2	2600	96	2990	111	3588	133
Sediment near DB-20 [LL2-250 and LL2sd-615(st)]	4	4	4	64.0	2.3	73.6	2.7	88.3	3.3
			Total	**2664**	**98**	**3064**	**114**	**3676**	**136**

[a]Includes 15% constructability factor.
[b]Includes 20% swell factor.
bgs = Below ground surface.
FA = Functional area.
ft^3 = Cubic feet.
ft = Feet.
yd^3 = Cubic yard.

Table 2. Estimated Piping Removal at Load Line 2 FA

Media	Length of Pipe (ft)	Diameter of Pipe (inches)	Weight of Pipe (tons)	Depth to top of Pipe (ft bgs)	Trench Depth (ft bgs)	Trench Width (ft)
Storm sewer pipe between DB-20 and DB-21	250	10	5.6	4	4-5	3
Culvert pipe between DB-21 and DB-22	32	18	2.3	4	4 -5	3

Note: Assume 45 lbs/ft for the 10-inch (5.6 tons) and 141 lbs/ft for 18-inch (2.3 tons) vitrified clay pipe. Assume approximately 1 ton of sediment contained in the pipe. Weight of pipe including sediment for off-site disposal = 8.9 tons.
bgs = Below ground surface.
ft = Feet.

A.5 NPL status

Camp Ravenna is not on the USEPA's National Priorities List (NPL). The NPL is a list of hazardous waste sites that are prioritized for cleanup. Camp Ravenna, however, is included in the USEPA's CERCLIS database. CERCLIS contains information on hazardous waste sites, potential hazardous waste sites, and remedial activities across the nation.

B OTHER ACTIONS TO DATE

B.1 Previous Actions

There have been no government or private actions that have been undertaken specific to the lead contamination within the Load Line 2 FA in the past that have not been previously discussed in this Action Memorandum.

B.2 Current Actions

The Load Line 2 FA is part of the larger Facility-wide Sewers AOC. This AOC is under evaluation in the Draft Facility-wide Sewers RI/FS Report (SAIC 2012) which will be revised to incorporate findings and confirmation of the removal action.

Concurrent to this NTCRA, the Army is developing the *Final FS Addendum for Load Lines 1 through 4 and 12 (RVAAP-08, RVAAP-09, RVAAP-10, RVAAP-11, and RVAAP-12)* (Leidos 2017b) to evaluate residual contaminated soil, sediment, and surface water at Load Lines 1 through 4 and soil at Load Line 12 that pose a potential risk to human health and the environment. This evaluation includes an assessment of risk at Load Line 2 to the Industrial Worker that represents Commercial/Industrial Land Use and the Resident Receptor that represents Unrestricted (Residential) Land Use.

C STATE AND LOCAL AUTHORITIES' ROLE

State and/or local governments did not request USEPA assistance to address contaminated media. The Army, in consultation with Ohio EPA, identified the contaminated media at the Load Line 2 FA and initiated the NTCRA process.

The Army maintains a Community Relations Plan (Vista 2017) for Camp Ravenna to ensure the public has convenient access to information regarding project progress. The community relations program interacts with the public through news releases, public meetings, public workshops, and Restoration Advisory Board meetings with local officials, interest groups, and the general public.

PART III: THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

The Facility-wide Sewers AOC consists of sewer lines containing residual sediment and water, pipe bedding below these sewer lines, and the sewer line discharge points. There is no current or future use planned for this AOC; however, the sewers will remain intact and will function as intended until a construction project or military training activity impacts the sewer line causing the need for upgrade or removal.

Based on the conceptual site exposure model presented in Figure 7, no complete human health exposure pathways exist; sewer pipes and outfalls are not viable exposure units for Camp Ravenna receptors (i.e., National Guard Trainee, Industrial Receptor, and Resident Receptor) because of their extremely small size and the even smaller quantities of sediment/contamination in these small areas. Exposures to construction workers would be addressed through worker protection and safety requirements, such as Occupational Safety and Health Administration [29 Code of Federal Regulations (CFR) 1926] and National Institute of Occupational Safety and Health. The conceptual site exposure model indicates a quantitative human health risk assessment is not required for the Facility-wide Sewers AOC.

Piping segments of the Facility-wide Sewers AOC were determined not to be viable habitat; thus, the ecological risk assessment will not address accumulated sewer sediment and water within the pipelines. With the lack of permanent habitat and receptors, there is no exposure pathway and no ecological risk inside the piping system (SAIC 2012). However, due to possible receptor exposure to the outfall and downstream of the outfall, an ecological risk assessment was conducted for chemicals detected at outfalls. The lead concentration in Drop Inlet DB22 and downgradient drainage ditch indicated there is a potential ecological risk associated with the exposed sediment and source material within the storm sewer lines upgradient of the drainage ditch, as concentrations exceeded the agreed-upon CUG of 400 mg/kg for lead.

PART IV: ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances (lead) from this AOC, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health or welfare or the environment.

PART V: PROPOSED ACTIONS AND COST ESTIMATES

A PROPOSED ACTIONS

The EE/CA was prepared in accordance with CERCLA (42 United States Code 9601 et seq.) requirements to develop and evaluate removal action alternatives. Following the *Conducting Non-time-critical Removal Actions under CERCLA* (USEPA 1993), the EE/CA developed the following RAO to protect the environment:

> The RAO for lead contamination at the Load Line 2 FA is to prevent adverse ecological effects from prior AOC activities and negative surface water impacts from contaminant migration from source media.

The EE/CA also specified the removal action CUG for lead to be 400 mg/kg; identified removal action alternatives; and evaluated the alternatives based on effectiveness, implementability, and cost.

The no action alternative was eliminated during the individual analysis due to the lack of effectiveness. The selected removal action alternative is Alternative LL2-2: Excavation and Off-site Disposal, as this alternative effectively removes lead-contaminated sewer sediment (and associated sewer and culvert piping) and downgradient sediment, and the technology is conventional and readily available. This removal action will achieve the Unrestricted (Residential) Land Use at the Load Line 2 FA.

The EE/CA was submitted in March 2017 for Ohio EPA review and comment. Ohio EPA concurred with the EE/CA, as documented in a letter dated April 14, 2017. Additionally, this EE/CA was provided for public review and comment from May 15, 2017 to June 13, 2017.

The following sections describe the components of the selected removal action.

A.1 Removal Action Work Plan

A removal action work plan (RAWP), referred to as a remedial design (RD) in the EE/CA, will be developed prior to initiating removal actions. This plan will outline construction requirements, site preparation activities (e.g., staging and equipment storage areas, truck routes, and storm water controls), the extent of sediment excavation, sequence of excavation activities, decontamination, and transportation and disposal of the waste. Erosion controls and health and safety controls will be developed as part of the RAWP to ensure protection of site workers and the environment.

As described in Section A.2, characterization sampling will be performed concurrently with the development of the RAWP. Although the EE/CA assumed that the waste will be characterized as non-hazardous, there is a possibility that the characterization sampling will indicate some or all of the waste is characteristically hazardous. In the event that some or all of the waste is characterized as hazardous, the RAWP will specify activities and requirements for handling, transporting, and disposing characteristically hazardous waste.

A.2 Characterization Sampling

Seven soil borings will be installed to collect additional characterization samples from 0–0.5, 0.5–1, and 1–2 ft bgs at each location. As shown on Figure 6, four borings will be installed between LL2sd-657 and LL2-252, one boring will be installed at LL2-252, and two borings will be installed downstream of LL2-252. Samples will be analyzed for lead by USEPA method SW-846-6020. Field duplicates will be collected for analysis at a rate of 10% (1 duplicate per up to 10 primary environmental samples). Matrix spikes/matrix spike duplicates (MS/MSD) will be collected for analysis at a rate of 5% (1 MS/MSD per 20 environmental samples).

When the analytical results are received, they will be compared against the CUG of 400 mg/kg for lead. The removal extent will be modified to include areas that are above the CUG.

Waste characterization sampling of the sediment will also be completed. Samples will be subjected to full TCLP characterization to determine disposal requirements. If the waste characterization results indicate hazardous characteristics, on-site stabilization of sediment will not be economical due to the small volume of sediment requiring disposal.

A.3 Excavation, Removal, and Disposal

Figure 6 presents the estimated extent of contaminant removal. Prior to any ground disturbance, erosion control material such as silt fences and straw bales will be installed to minimize sediment runoff from the excavation area. Dust generation will be minimized during excavation activities by keeping equipment movement areas and excavation areas misted with water. The health and safety of site workers, on-site Camp Ravenna employees, and the general public will be detailed in a site-specific health and safety plan.

To achieve a scenario in which the AOC is protective for Unrestricted (Residential) Land Use, lead-contaminated sediment requiring removal will be removed from the proposed excavation extent shown in Figure 6. The depth of the excavation is approximately 2 ft bgs from immediately downstream of drop inlet DB22 to sample location LL2sd-657(st). The depth of the excavation is approximately 4 ft bgs near drop inlet DB-20. In addition, the storm sewer pipe between drop inlets DB-20 and DB-21 and the culvert pipe between drop inlets DB-21 and DB-22 will be removed for off-site disposal. The excavated sediment and pipe will be directly loaded on to trucks for off-site disposal at a licensed and permitted disposal facility. As presented in Tables 1 and 2, an estimated 136 yd^3 of sediment (ex-situ) and 8.9 tons of pipe will be disposed. For cost estimation purposes, it is assumed the waste will be disposed as non-hazardous waste.

All trucks will be inspected prior to exiting the AOC. Appropriate waste manifests will accompany each waste shipment. Only regulated and licensed transporters and vehicles will be used. All trucks will travel pre-designated routes within Camp Ravenna.

At the end of the removal activities, confirmation samples will be collected at the location of the removed storm sewer pipe, culvert pipe, and drainage ditch. Laboratory results will be compared to

the CUG of 400 mg/kg for lead. If the confirmation samples are below this CUG, removal can be discontinued. If the confirmation samples exceed this CUG, additional removal will be conducted.

A.4 Restoration

The site restoration at Load Line 2 FA will be completed as follows:

- **Restoration between drop inlets DB-20 and DB-21 –** The overburden from storm sewer pipe excavation will be used as backfill to create an open ditch to convey storm water.
- **Restoration between drop inlets DB-21 and DB-22** – A new culvert pipe will be installed, and the overburden from excavating the existing culvert pipe will be used as backfill to ensure railroad bed and access roadway can be used.
- **Restoration of ditch** – The ditch will be restored using backfill material obtained from a clean source that will be sampled and approved. The ditch will be graded to convey storm water.

Following restoration of the areas, workers will apply a seed mixture (as approved by OHARNG) and mulch. Restored areas will be inspected and monitored consistent with best management practices.

A.5 Contribution to Remedial Performance

The removal action will meet the RAO and will achieve quick, protective results at the AOC. The time period to complete this removal action is relatively short and does not include an operations and maintenance (O&M) period to assess impacts from excavating contaminated piping and sediment, as Unrestricted (Residential) Land Use is achieved.

A.6 Applicable or Relevant and Appropriate Requirements

The applicable or relevant and appropriate requirements (ARARs) for the Load Line 2 FA removal action are presented Attachment A. In accordance with the NCP [40 CFR 300.415(j)], on-site removal actions conducted under CERCLA are required to meet ARARs "to the extent practicable, considering the exigencies of the situation." Excavation, handling, and containment of contaminated materials at the Load Line 2 FA will comply with federal, state, and local rules, laws, and regulations. The Army will comply with requirements applicable to off-site actions, such as Resource Conservation and Recovery Act (RCRA) hazardous waste transportation requirements under Ohio Administrative Code (OAC) 3745-52-20 to OAC 3745-52-33, and off-site treatment prior to land disposal as required by the RCRA land disposal restrictions under OAC 3745-270, including alternative land disposal restriction treatment standards for contaminated soil under OAC 3745-270-49.

A.7 Project Schedule

The EE/CA was submitted in March 2017, and the public notification and comment period was conducted from May 15, 2017 to June 13, 2017. Upon development, review, and approval of the

RAWP, the Army will begin with implementing the NTCRA at the Load Line 2 FA. The removal action is anticipated to be completed within 14 days followed by site restoration monitoring and final inspection by OHARNG/ARNG. A Removal Site Closeout Report will be prepared to document the removal actions and submitted to Ohio EPA.

B ESTIMATED COSTS

A cost analyses is provided in the EE/CA. This analysis includes an estimate of the capital cost in dollars, annual O&M cost (if applicable), and indicates the period of time to complete the proposed action.

The present value cost to complete Alternative LL2-2 is approximately $164,482 (in base year 2016 dollars). These costs include implementing the removal, off-site disposal, and site restoration. The time period to complete this removal action is relatively short and does not include an O&M period to assess impacts from excavating lead-contaminated piping and sediment, as Unrestricted (Residential) Land Use is achieved.

PART VI: EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If no action or a delayed action occurs, lead-contaminated sewer media and downgradient sediment would remain in place. Therefore, this scenario would not provide for overall protection of the environment. Removal goals would not be achieved, as this scenario provides for no long-term effectiveness and permanence. There would be no mitigation of potential risks to ecological receptors from lead in sediment under this scenario.

PART VII: OUTSTANDING POLICY ISSUES

Not applicable.

PART VIII: ENFORCEMENT

Ohio EPA is the lead regulatory agency that will oversee this NTCRA. The EE/CA has been prepared in consultation with Ohio EPA. Ohio EPA provided input during the ongoing investigation and report development process to ensure the action ultimately selected meets the needs of the state of Ohio and fulfills the requirements of the DFFO (Ohio EPA 2004).

PART IX: RECOMMENDATION

Alternative LL2-2: Excavation and Off-site Disposal is the recommended removal action alternative for the Load Line 2 FA. A sampling scheme to further characterize the media between LL2sd-657 and downstream of LL2-252 will be implemented. It is estimated that 136 yd^3 of lead-contaminated sediment will be removed from the AOC for off-site disposal. In addition, approximately 8.9 tons of piping (i.e., 250 linear ft of 10-inch storm sewer and 32 linear ft of 18-inch culvert vitrified clay pipes), including sediment, will be removed for off-site disposal. This removal will be conducted as an NTCRA and will achieve quick, protective results and was determined to be cost effective (estimated $164,482 for removal).

SECTION 2:

CC-RVAAP-75 GEORGE ROAD SEWAGE TREATMENT PLANT MERCURY SPILL

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PART I: PURPOSE

The purpose of this Action Memorandum is to request and document approval of the selected removal action of mercury-contaminated sediment and associated sewer piping within the CC-RVAAP-75 George Road Sewage Treatment Plant Mercury Spill AOC at the former RVAAP. The former RVAAP is located within Portage and Trumbull counties, Ohio.

PART II: SITE CONDITIONS AND BACKGROUND

Camp Ravenna is located in northeastern Ohio within Portage and Trumbull counties and is currently used as a military training site. Camp Ravenna is 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 (Figure 2). References in this document to the former 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.

The Army is implementing an NTCRA process to remove mercury-contaminated sediment and associated sewer piping within the CC-RVAAP-75 George Road Sewage Treatment Plant Mercury Spill AOC at the former RVAAP. The George Road Sewage Treatment Plant Mercury Spill AOC is located in the south-central portion of the former RVAAP. The CERCLIS Identifier for RVAAP is OH5210020736.

A SITE DESCRIPTION

The George Road Sewage Treatment Plant Mercury Spill AOC (Figure 8) is located south of the South Service Road and north of South Patrol Road and is about 0.5 miles east of the Administration Area. The George Road Sewage Treatment Plant was operated as part of the former activities associated with the former RVAAP. Administrative accountability for the AOC has been transferred to the Army National Guard who licenses the use to OHARNG for military training. Currently, this AOC is not actively used by OHARNG for military training.

The inactive domestic sewage treatment plant was used to process domestic sewage from Load Line 6 (RVAAP-15) and Load Line 7 (RVAAP-30), including influent from the Administration Area, Hospital, Family Housing, Power House No. 6, and the vehicle maintenance garage. The plant also received sludge from the Depot Sewage Treatment Plant (RVAAP-21). The George Road Sewage Treatment Plant was taken out of service in 1993 and was properly closed under Ohio National Pollutant Discharge Elimination System Permit Number 31000000BD. No records were discovered that document when plant operations began; however, a 1941 site schematic suggests that operations began circa 1941 (SAIC 2011).

The George Road Sewage Treatment Plant consisted of the comminutor building, two Imhoff tanks, two trickling filters, sludge beds contained within greenhouses, and a chlorine building. The Imhoff tanks were abandoned in place and filled with soil, the trickling filters were removed, and sludge from the drying beds was removed. The small brick comminutor and chlorine buildings remain.

A.1 Removal Site Evaluation

A historical records review (SAIC 2011) and site inspection (ECC 2016b) were performed to evaluate the George Road Sewage Treatment Plant Mercury Spill AOC. These investigations are described in the following subsections.

A.1.1 Historical Records Review

The George Road Treatment Plant trickling filters had mercury seals that tended to leak. The trickling filters drained into a collection box; mercury was periodically collected after heavy flows and placed in a pint-sized jar for storage. According to an interviewee cited in the *Historical Records Review Report for the 2010 Phase I RI Services at CR Sites (9 Areas of Concern)* (SAIC 2011), elemental mercury contained in a pint-sized jar reportedly spilled into a floor drain in the comminutor building.

Utility plans indicate that liquids entering the comminutor building floor drain traveled through a 4-inch cast iron pipe to a 15-inch vitrified clay pipe (drain line) located along the northeast corner of the building (Figure 9). This 15-inch drain line discharged into manhole MH-P1 (ECC 2016).

Further investigation was recommended based on the findings of the historical records review, which recommended that the floor drain pipe and pipe trap within the comminutor be further inspected and soil samples be collected immediately surrounding the floor drain pipeline.

The historical records review indicated that potential contaminants in soil may represent a direct exposure pathway for human receptors under current and future land use. Surface and subsurface soil may represent a potential secondary source of contamination. Environmental sampling was recommended to confirm the presence or absence of any potential soil contamination.

A.1.2 Site Inspection

In 2012, a site inspection (SI) was initiated to investigate the historic mercury spill within the comminutor building, as documented in the *Site Inspection Report CC RVAAP-75 George Road Sewage Treatment Plant Mercury Spill* (ECC 2016). The field investigation associated with the SI included conducting a video survey, subsurface soil sampling, and collecting a sediment sample and drainage pipe deposit sample. Figure 9 presents the SI results and the cross-section of decision unit DU01 along the 15-inch drain line. After the field activities were conducted and results were assessed, the SI made the following conclusions:

- Mercury was reported at a concentration of 7.2 mg/kg in the drainage pipe deposit sample located within the 15-inch vitrified clay pipe (drain line) that exceeds the Resident Receptor facility-wide cleanup goal (FWCUG) at a hazard quotient (HQ) of 0.1, target risk (TR) of 1E-06 (2.27 mg/kg). However, the mercury within the drainage deposit sample collected from within the enclosed 15-inch vitrified clay pipe (drain line) is not subsurface soil and therefore is not a potential source of contamination to the environment because there is no complete exposure pathway. This is supported by the following lines of evidence:
    - The end of the drain line is plugged with concrete (at the junction with manhole MH-P1) preventing any migration of the drainage pipe deposit, and this line is no longer used for drainage.
    - The SI sampling results of the subsurface soil surrounding and beneath the 15-inch vitrified clay pipe (drain line) do not contain any potential contamination from the estimated 0.5 grams of mercury contained in the drainage pipe deposit.

- The results of this SI indicate that the subsurface soil is not contaminated; therefore, soil is not a source of groundwater contamination at this AOC. Groundwater associated with CC-RVAAP-75 is currently being addressed separately under RVAAP-66, Facility-wide Groundwater.
- Removal of the drainage pipe, concrete plug, and all contents within will be addressed separately under RVAAP-67, Facility-wide Sewers.

The SI Report recommended no further action for CC-RVAAP-75 George Road Sewage Treatment Plant Mercury Spill AOC. However, in a July 14, 2015 letter, Ohio EPA indicated:

> "Because mercury in the drain pipe deposits is present above the residential FWCUG of 7.2 mg/kg (for soil), steps must be taken to ensure the integrity of the concrete plug in the drain pipe and to ensure construction/excavation workers are not exposed should excavation activities ever occur. This can be accomplished by updating the Site Property Management Plan to include inspection of the concrete plug at regular intervals (such as every five years) and to require precautions during any excavation activities that may occur."

(For clarification of the above comment provided by Ohio EPA, the Resident Receptor FWCUG in soil was at an HQ of 0.1, TR of 1E-06 is 2.7 mg/kg, and the concentration of the drain pipe deposits was 7.2 mg/kg).

Accordingly, the Army has decided to implement this NTCRA to remove the mercury contamination within the 4-inch cast iron drain and 15-inch vitrified clay pipe at the George Road Sewage Treatment Plant Mercury Spill AOC and eliminate the potential risk to future potential users of this site.

A.2 Physical Location

The George Road Sewage Treatment Plant Mercury Spill AOC is in the south-central portion of Camp Ravenna. Camp Ravenna, consisting of 21,683 acres, 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 (Figure 2).

Camp Ravenna occupies east-central Portage County and southwestern Trumbull County. Census projections for 2010 indicated the populations of Portage and Trumbull counties are 161,419 and 210,312, respectively. Population centers closest to Camp Ravenna are Ravenna, with a population of 11,724, and Newton Falls, with a population of 4,795.

The facility is located in a rural area and is not close to any major industrial or developed areas. Approximately 55% of Portage County, in which the majority of Camp Ravenna is located, consists of either woodland or farmland acreage. The closest major recreational area, the Michael J. Kirwan Reservoir (also known as West Branch Reservoir), is located adjacent to the western half of Camp Ravenna, south of State Route 5.

A.3 Site Characteristics

Camp Ravenna is federally owned and licensed to OHARNG for use as a military training site. The former RVAAP was formerly used as a load, assemble, and pack facility for munitions production. As of September 2013, administrative accountability for the entire acreage of the facility has been transferred to the USP&FO for Ohio and subsequently licensed to OHARNG for use as a military training site (Camp Ravenna).

Restoration activities at Camp Ravenna are managed by the Army National Guard and OHARNG. Training and related activities at Camp Ravenna include field operations and bivouac training, range firing activities, convoy training, maintaining equipment, C-130 aircraft drop zone operations, helicopter operations, and storing heavy equipment.

The George Road Sewage Treatment Plant consisted of the comminutor building, two Imhoff tanks, two trickling filters, sludge beds contained within greenhouses, and a chlorine building. The Imhoff tanks were abandoned in place and filled with soil, the trickling filters were removed, and sludge from the drying beds was removed. The small brick comminutor and chlorine buildings remain. There is no current or future use planned for the George Road Sewage Treatment Plant Mercury Spill AOC. Future use of property, such as military training, may occur.

A.4 Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant

The George Road Treatment Plant trickling filters had mercury seals that tended to leak (SAIC 2011). The trickling filters drained into a collection box; mercury was periodically collected after heavy flows and placed in a pint-sized jar for storage. Interviewees indicated elemental mercury contained in a pint-sized jar reportedly spilled into a floor drain in the comminutor building.

Mercury was detected within the drain line deposit sample at a concentration of 7.2 mg/kg, exceeding the Resident Receptor FWCUG at an HQ of 0.1, TR of 1E-06 (2.27 mg/kg). Estimated quantities of contaminated media are presented in Table 3. Waste characterization samples have not been collected to determine if the media is characteristically hazardous. The cost estimate in the EE/CA assumes the material is nonhazardous. However, the approach to conducting the NTRCA includes waste characterization sampling. Samples will be subjected to full TCLP characterization to determine disposal requirements.

There is low likelihood of a high rate of release of the contaminated media to downstream sources. The mercury within the drainage deposit sample collected from within the enclosed 15-inch vitrified clay pipe (drain line) is not subsurface soil and therefore is not a potential source of contamination to the environment because there is no complete exposure pathway.

This is supported by the following lines of evidence:

- The end of the drain line is plugged with concrete (at the junction with manhole MH-P1) preventing any migration of the drainage pipe deposit, and this line is no longer used for drainage.
- The SI sampling results of the subsurface soil surrounding and beneath the 15-inch vitrified clay pipe (drain line) do not contain any potential contamination from the estimated 0.5 grams of mercury contained in the drainage pipe deposit.

Table 3. Estimated Piping Removal at George Road Sewage Treatment Plant Mercury Spill AOC

Media	Length of Pipe (ft)	Diameter of Pipe (inches)	Weight of Pipe (tons)	Depth to top of Pipe (ft bgs)	Trench Depth (ft bgs)	Trench Width (ft)
Pipe containing mercury deposits	20	15	0.9	6	6 -7	3
	18	4	0.04	6	6 – 7	3

Note: Assume 90 lbs/ft for 15-inch (0.9 tons) vitrified clay pipe and 13 lbs/ft for 4-inch (0.04 tons) cast iron pipe. Assume approximately 1 ton of sediment contained in the pipes. Weight of pipe including sediment for off-site disposal = 2 tons.
bgs = Below ground surface.
ft = Feet.

A.5 NPL status

Camp Ravenna is not on the USEPA's NPL. The NPL is a USEPA list of hazardous waste sites that are prioritized for cleanup. Camp Ravenna, however, is included in the USEPA's CERCLIS database. CERCLIS contains information on hazardous waste sites, potential hazardous waste sites, and remedial activities across the nation.

B OTHER ACTIONS TO DATE

B.1 Previous Actions

There have been no government or private actions that have been undertaken in the past specific to the mercury contamination within the George Road Sewage Treatment Plant Mercury Spill AOC that have not been previously discussed in this Action Memorandum.

B.2 Current Actions

With the exception of this NTCRA, no current actions are proposed at the George Road Sewage Treatment Plant Mercury Spill AOC.

C STATE AND LOCAL AUTHORITIES' ROLE

State and/or local governments did not request USEPA assistance to address the contaminated media. The Army, in consultation with Ohio EPA, identified the contaminated media at the George Road Sewage Treatment Plant Mercury Spill AOC and initiated the NTCRA process.

The Army maintains a Community Relations Plan (Vista 2017) for Camp Ravenna to ensure the public has convenient access to information regarding project progress. The community relations program interacts with the public through news releases, public meetings, public workshops, and Restoration Advisory Board meetings with local officials, interest groups, and the general public.

PART III: THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

Mercury was detected within the drain line deposit sample at a concentration of 7.2 mg/kg, exceeding the Resident Receptor FWCUG at an HQ of 0.1, TR of 1E-06 (2.27 mg/kg). The end of the drain line is plugged with concrete (at the junction with manhole MH-P1) preventing any migration of the drainage pipe deposit, and this line is no longer used for drainage. However, in a July 14, 2015 letter, Ohio EPA indicated that "steps must be taken to ensure the integrity of the concrete plug in the drain pipe and to ensure construction/excavation workers are not exposed should excavation activities ever occur." Accordingly, this NTCRA to remove the mercury contamination would eliminate the potential risk to future potential users of this site.

PART IV: ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances (mercury) from this AOC, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health or welfare or the environment.

PART V: PROPOSED ACTIONS AND COST ESTIMATES

A PROPOSED ACTIONS

The EE/CA was prepared in accordance with CERCLA (42 United States Code 9601 et seq.) requirements to develop and evaluate removal action alternatives. Following the *Conducting Non-time-critical Removal Actions under CERCLA* (USEPA 1993), the EE/CA developed the following RAO:

> The RAO for mercury contamination at the George Road Sewage Treatment Plant Mercury Spill AOC is to remove mercury deposits contained within piping at concentrations above the Resident Receptor FWCUG of 2.27 mg/kg.

The EE/CA identified removal action alternatives and evaluated the alternatives based on effectiveness, implementability, and cost.

The no action alternative was eliminated during the individual analysis due to the lack of effectiveness. The selected removal action alternative is Alternative GR-2: Excavation and Off-site Disposal. The contaminated piping and sediment from the AOC will be removed from the former RVAAP facility, hauled to a licensed and permitted disposal facility, and appropriately disposed. The removal areas will be restored with clean fill material. No long-term monitoring or five-year reviews would be required.

The EE/CA was submitted in March 2017 for Ohio EPA review and comment. Ohio EPA concurred with the EE/CA, as documented in a letter dated April 14, 2017. Additionally, this EE/CA was provided for public review and comment from May 15, 2017 to June 13, 2017.

The following sections describe the components of the selected removal action.

A.1 Removal Action Work Plan

A RAWP, referred to as an RD in the EE/CA, will be developed prior to initiating removal actions. This plan will outline construction requirements; site preparation activities (e.g., staging and equipment storage areas, truck routes, and storm water controls); the extent of piping removal; the sequence of excavation activities; decontamination; and segregation, transportation, and disposal of the waste. Erosion controls and health and safety controls will be developed as part of the RAWP to ensure protection of site workers and the environment.

If deemed practical and achievable during the development of the RAWP, waste characterization sampling of the mercury-contaminated sediment also will be completed in unison with the plan development. Samples will be subjected to full TCLP characterization to determine disposal requirements.

For cost estimation purposes, it is assumed the waste will be disposed as non-hazardous waste. Although the EE/CA assumed that the waste will be characterized as non-hazardous, there is a possibility that the characterization sampling indicates some or all of the waste is characteristically hazardous. In the event that some or all of the waste is characterized as hazardous, the RAWP will specify activities and requirements for handling, transporting, and disposing characteristically hazardous waste.

If the waste characterization results indicate hazardous characteristics, on-site stabilization of sediment will not be economical due to the small volume of sediment requiring disposal.

A.2 Excavation, Removal, and Disposal

Prior to any ground disturbance, erosion control material such as silt fences and straw bales will be installed to minimize sediment runoff from the excavation area. Dust generation will be minimized during excavation activities by keeping equipment movement areas and excavation areas misted with water. The health and safety of site workers, on-site Camp Ravenna employees, and the general public will be detailed in a site-specific health and safety plan.

To achieve a scenario in which the AOC is protective for Unrestricted (Residential) Land Use, mercury-contaminated piping and sediment requiring removal will be removed from the proposed excavation extent shown in Figure 10. Approximately 20 linear ft of 15-inch vitrified clay pipe and 18 linear ft of 4-inch cast iron pipe (and associated P-trap) will be removed from approximately 6 ft bgs. The dimensions are presented in Table 3. The soil above the pipe will be removed from the excavation and segregated for reuse.

A 4-inch cast iron pipe (approximately 7.5 ft long) requiring removal is located beneath the floor of the comminutor building, During the SI, the approximately 4-ft long, 3-ft wide, and 6-inch thick concrete floor was removed. Following completion of SI, the pieces of concrete floor were then replaced in their original locations. Additional saw cutting of the concrete floor prior to excavation of the pipe will likely be required.

If the waste characterization sampling is deemed impractical prior to removal and during the development of the RAWP, the material will be removed and placed in roll-off boxes. While in roll-off boxes, the material will undergo waste characterization sampling and will be analyzed for TCLP. If deemed hazardous, the activities will follow the RAWP procedures for handling and disposing characteristically hazardous waste.

If the material was sampled during the development of the RAWP, the excavated piping with sediment will be directly loaded on to trucks for off-site disposal at a licensed and permitted disposal facility.

All trucks will be inspected prior to exiting the AOC. Appropriate waste manifests will accompany each waste shipment. Only regulated and licensed transporters and vehicles will be used. All trucks will travel pre-designated routes within Camp Ravenna.

At the end of the removal activities, confirmation samples will be collected at the location of the removed piping and sediment. Laboratory results will be compared to the CUG of 2.27 mg/kg for mercury. If the confirmation samples are below this CUG, removal can be discontinued. If the confirmation samples exceed this CUG, additional removal will be conducted.

A.3 Restoration

Upon completing the excavation, disturbed areas will be backfilled with overburden from the pipe excavation and clean soil will be used if needed to assist in grading to neighboring contours. Surface restoration with concrete inside the comminutor building is not required. After the exterior area is backfilled and graded, workers will apply a seed mixture (as approved by OHARNG) and mulch. Restored areas will be inspected and monitored consistent with best management practices.

A.4 Contribution to Remedial Performance

The removal action will meet the RAO and will achieve quick, protective results at the AOC. The time period to complete this removal action is relatively short and does not include an O&M period to assess impacts from excavating contaminated piping and sediment, as Unrestricted (Residential) Land Use is achieved.

A.5 Applicable or Relevant and Appropriate Requirements

The ARARs for the George Road Treatment Plant AOC removal action are presented Attachment A. In accordance with the NCP [40 CFR 300.415(j)], on-site removal actions conducted under CERCLA are required to meet ARARs "to the extent practicable, considering the exigencies of the situation." Excavation, handling, and containment of the contaminated materials at the George Road Treatment Plant AOC will comply with federal, state, and local rules, laws and regulations. The Army will comply with requirements applicable to off-site actions, such as RCRA hazardous waste transportation requirements under OAC 3745-52-20 to OAC 3745-52-33, and off-site treatment prior to land disposal as required by the RCRA land disposal restrictions under OAC 3745-270, including alternative land disposal restriction treatment standards for contaminated soil under OAC 3745-270-49.

A.6 Project Schedule

The EE/CA was submitted in March 2017, and the public notification and comment period was conducted from May 15, 2017 to June 13, 2017. Upon development, review, and approval of the RAWP, the Army will begin with implementing the NTCRA at the George Road Treatment Plant AOC. The removal action is anticipated to be completed within 14 days followed by site restoration monitoring and final inspection by OHARNG/ARNG. A Removal Site Closeout Report will be prepared to document the removal actions and submitted to Ohio EPA.

B ESTIMATED COSTS

A cost analyses is provided in the EE/CA. This analysis includes an estimate of the capital cost in dollars, annual O&M cost (if applicable), and indicates the period of time to complete the proposed action.

The present value cost to complete Alternative GR-2 is approximately $63,581 (in base year 2016 dollars). Costs include implementing the removal, off-site disposal, and site restoration. The time period to complete this removal action is relatively short and does not include an O&M period to assess impacts from excavating mercury-contaminated piping and sediment, as Unrestricted (Residential) Land Use is achieved.

PART VI: EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If no action or delayed action occurs, mercury-contaminated sediment would remain in place. Therefore, this scenario would not provide for overall protection of the environment. Removal goals would not be achieved, as this scenario provides for no long-term effectiveness and permanence.

PART VII: OUTSTANDING POLICY ISSUES

Not applicable.

PART VIII: ENFORCEMENT

Ohio EPA is the lead regulatory agency that will oversee this NTCRA. The EE/CA has been prepared in consultation with Ohio EPA. Ohio EPA provided input during the ongoing investigation and report development process to ensure the action ultimately selected meets the needs of the state of Ohio and fulfills the requirements of the DFFO (Ohio EPA 2004).

PART IX: RECOMMENDATION

Alternative GR-2: Excavation and Off-site Disposal is the recommended removal action alternative for the George Road Sewage Treatment Plant. Approximately 2 tons of piping (i.e., 20 linear ft of 15-inch vitrified clay pipe and 18 linear ft of 4-inch cast iron pipe), including mercury-contaminated sediment, will be removed for off-site disposal. This removal will be conducted as an NTCRA and will achieve quick, protective results and was determined to be cost effective (estimated $63,581 for removal).

REFERENCES

DOE (U.S. Department of Energy) 1998. *Non-Time-Critical Removal Actions*. CERCLA Information Brief, DOE/EH-413-9811. April 1998.

ECC (Environmental Chemical Corporation) 2016. *Site Inspection Report, CC RVAAP-75 George Road Sewage Treatment Plant Mercury Spill, Revision 0, Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio*. January 2016.

Leidos 2016. *Letter Work Plan for Pre-Delineation Sampling of Lead-Contaminated Sediment in the Load Line 2 Functional Area of the Ravenna Army Ammunition Plant, Facility-wide Sewers Area of Concern*. May 2016.

Leidos 2017a. *Engineering Evaluation/Cost Analysis for RVAAP-67 Facility-wide Sewers: Load Line 2 Functional Area and CC-RVAAP-75 George Road Sewage Treatment Plant Mercury Spill, Former Ravenna Army Ammunition Plant Portage and Trumbull Counties, Ohio.* March 2017.

Leidos 2017b. *Final FS Addendum for Load Lines 1 through 4 and 12 (RVAAP-08, RVAAP-09, RVAAP-10, RVAAP-11, and RVAAP-12)*. June 2017.

MKM (MKM Engineers, Inc.) 2010. *Final Construction Completion Report for Munitions Response For the Demolition of RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, and RVAAP-11 Load Line 4 at the Ravenna Army Ammunition Plant*. July 2010.

Ohio EPA (Ohio Environmental Protection Agency) 2004. *Director's Final Findings and Orders for RVAAP*. June 2004.

SAIC (Science Applications International Corporation) 2011. *Historical Records Review Report for the 2010 Phase I RI Services at CR Sites (9 Areas of Concern) Revision 0, at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. December 2011.

SAIC 2012. *Draft Remedial Investigation/Feasibility Study Report for RVAAP-67 Facility-wide Sewers at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. September 2012.

Shaw 2004. *Phase II Remedial Investigation Report for Load Line 2 at the Ravenna Army Ammunition Plant*. July 2004.

Shaw 2008. *Remedial Action Completion Report for the Remediation of Soils and Dry Sediments at RVAAP 08-11 (Load Lines 1-4)*. June 2008.

USEPA (U.S. Environmental Protection Agency) 1993. *Guidance for Conducting Non-Time-Critical Removal Actions under CERCLA*. August 1993.

USEPA 2009. *Superfund Removal Guidance for Preparing Action Memoranda.* September 2009.

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

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FIGURES

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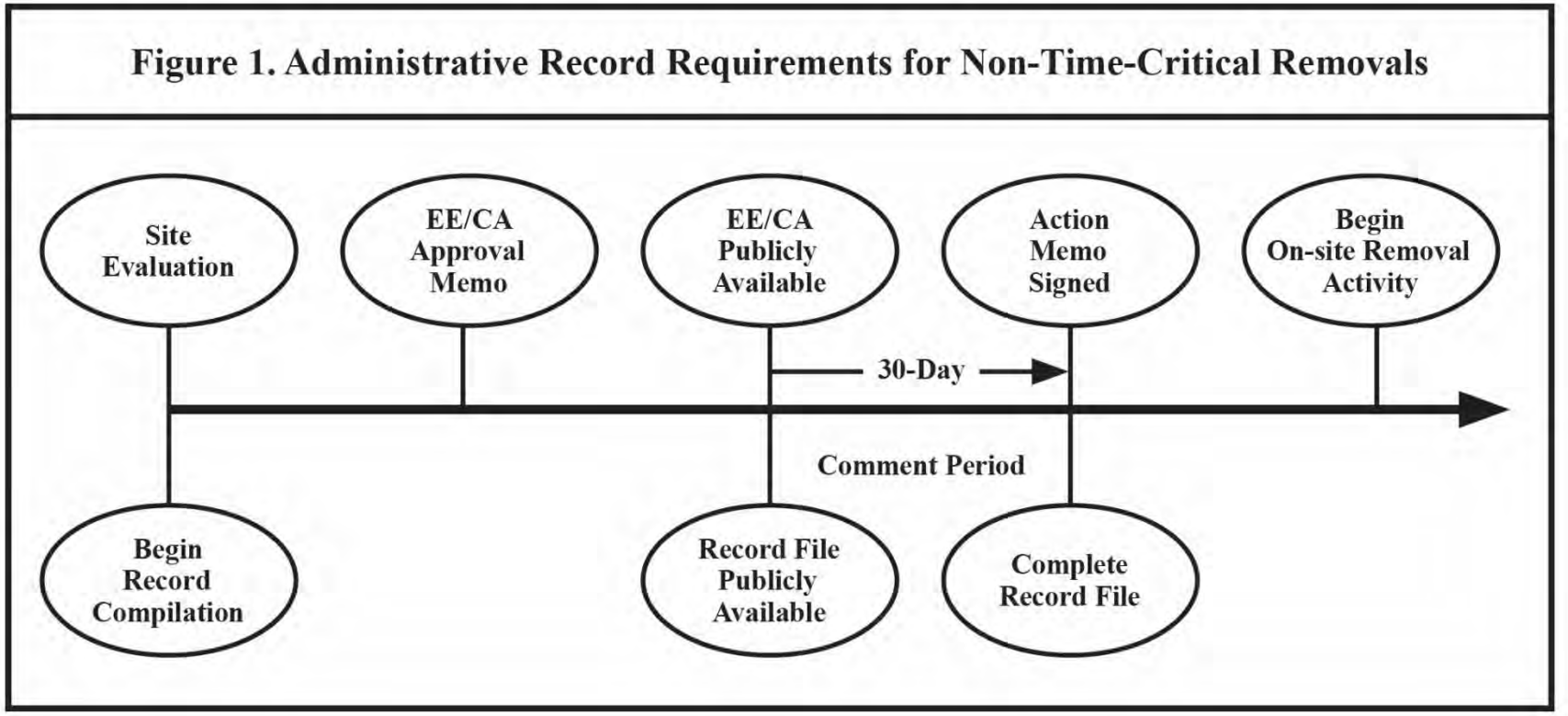


Figure 1. Administrative Record Requirements for Non-Time-Critical Removals

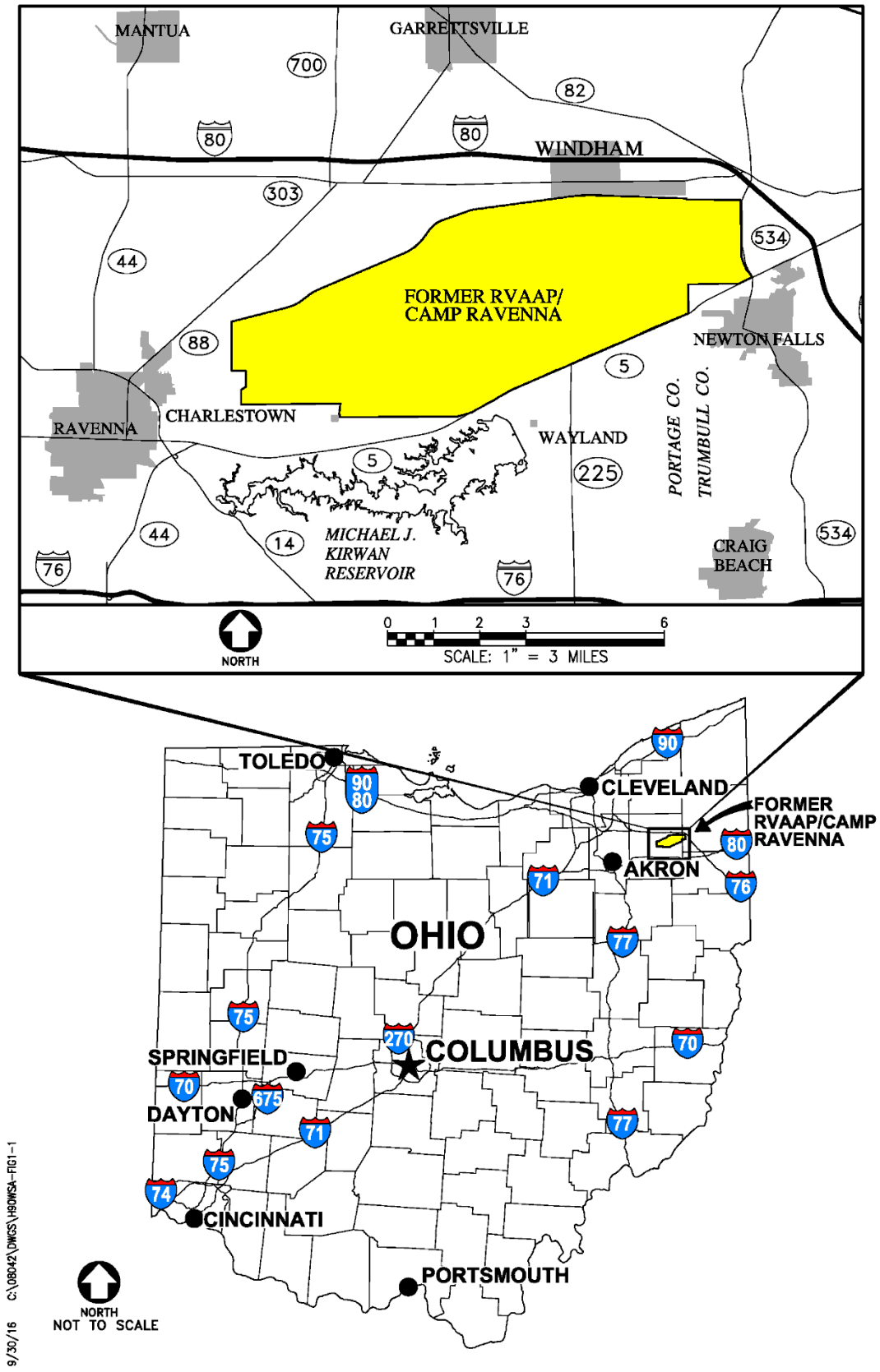
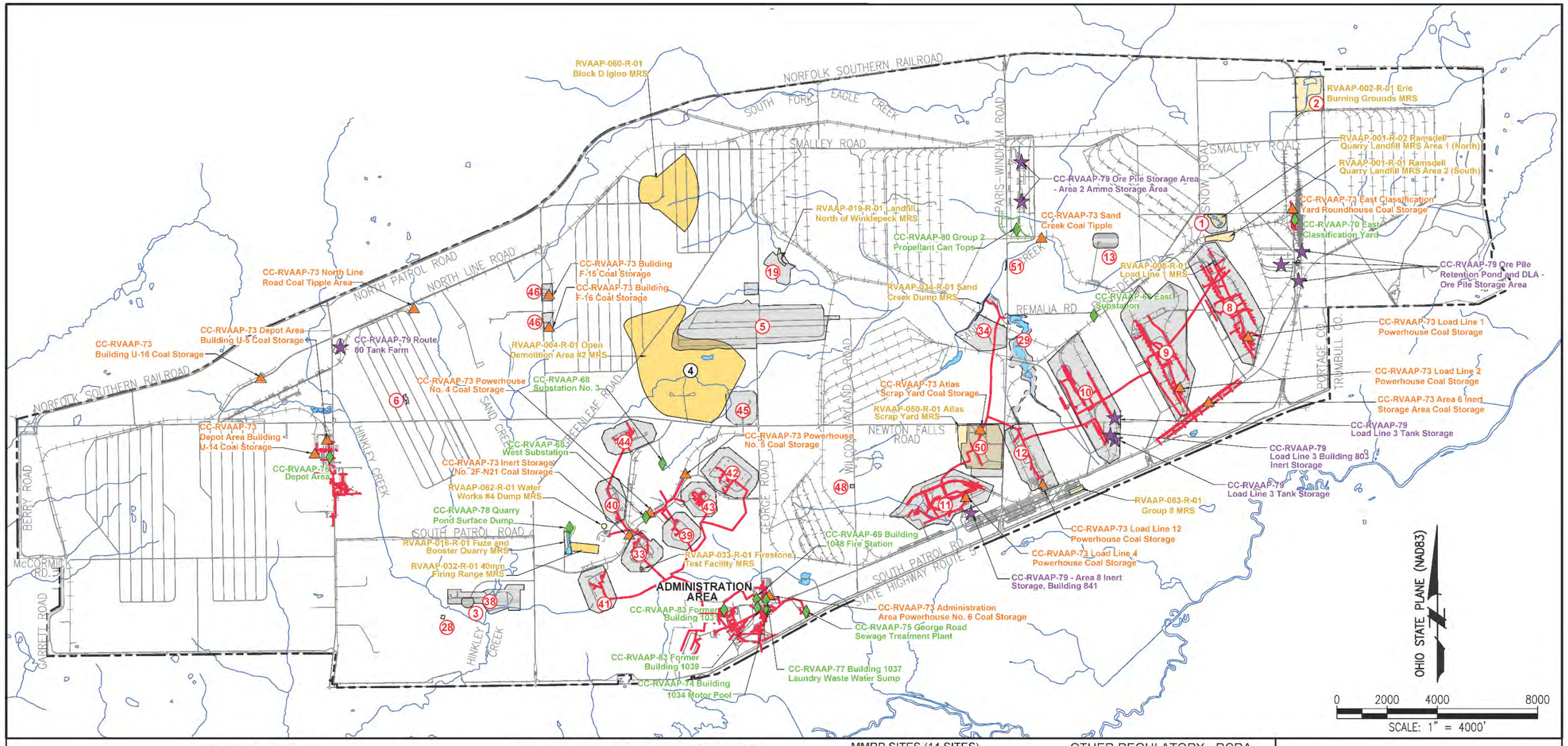


Figure 2. General Location and Orientation of RVAAP/Camp Ravenna



IRP SITES - CERCLA

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

COMPLIANCE RESTORATION SITES (13 SITES)

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

MMRP SITES (14 SITES)

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

OTHER REGULATORY - RCRA

4 RVAAP-04 — OPEN DEMOLITION AREA #2

LEGEND:

- COMPLIANCE RESTORATION SITES – APPROVED
- DLA ORE STORAGE AREAS (7 SITES)
- COAL STORAGE AREAS (17 SITES)
- AOC SITES
- MMRP SITES
- RAILROAD TRACKS
- FENCELINE
- STREAM OR CREEK
- SANITARY/STORM LINES

leidos

FORMER RVAAP/CAMP RAVENNA
PORTAGE & TRUMBULL CO., OHIO

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P. HOLM	1– 4/14/17	R54-FWS-FIG2

Figure 3. Location of AOCs and Munitions Response Sites at Camp Ravenna

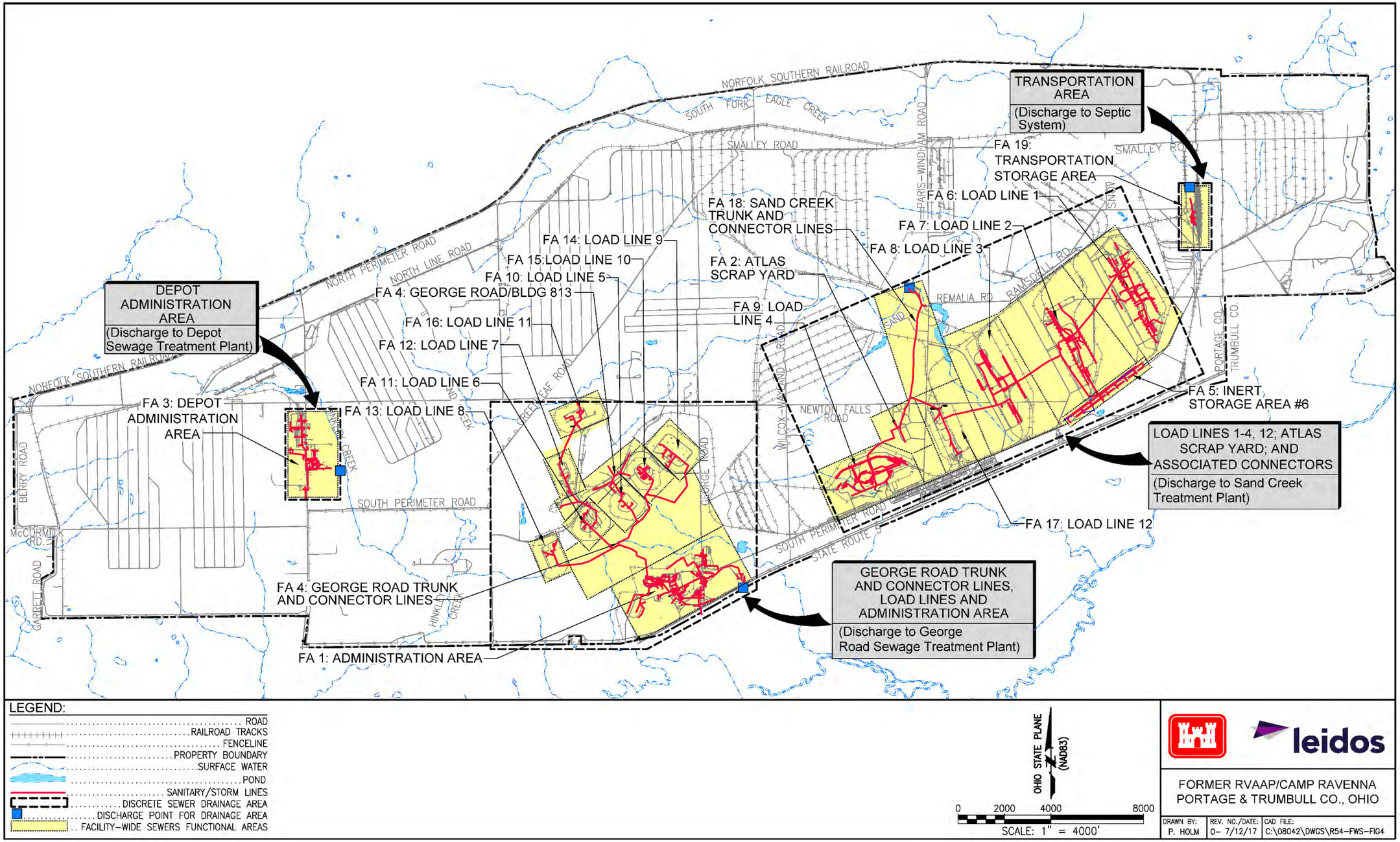

Figure 4. Facility-wide Sewers Drainage Networks and Functional Areas

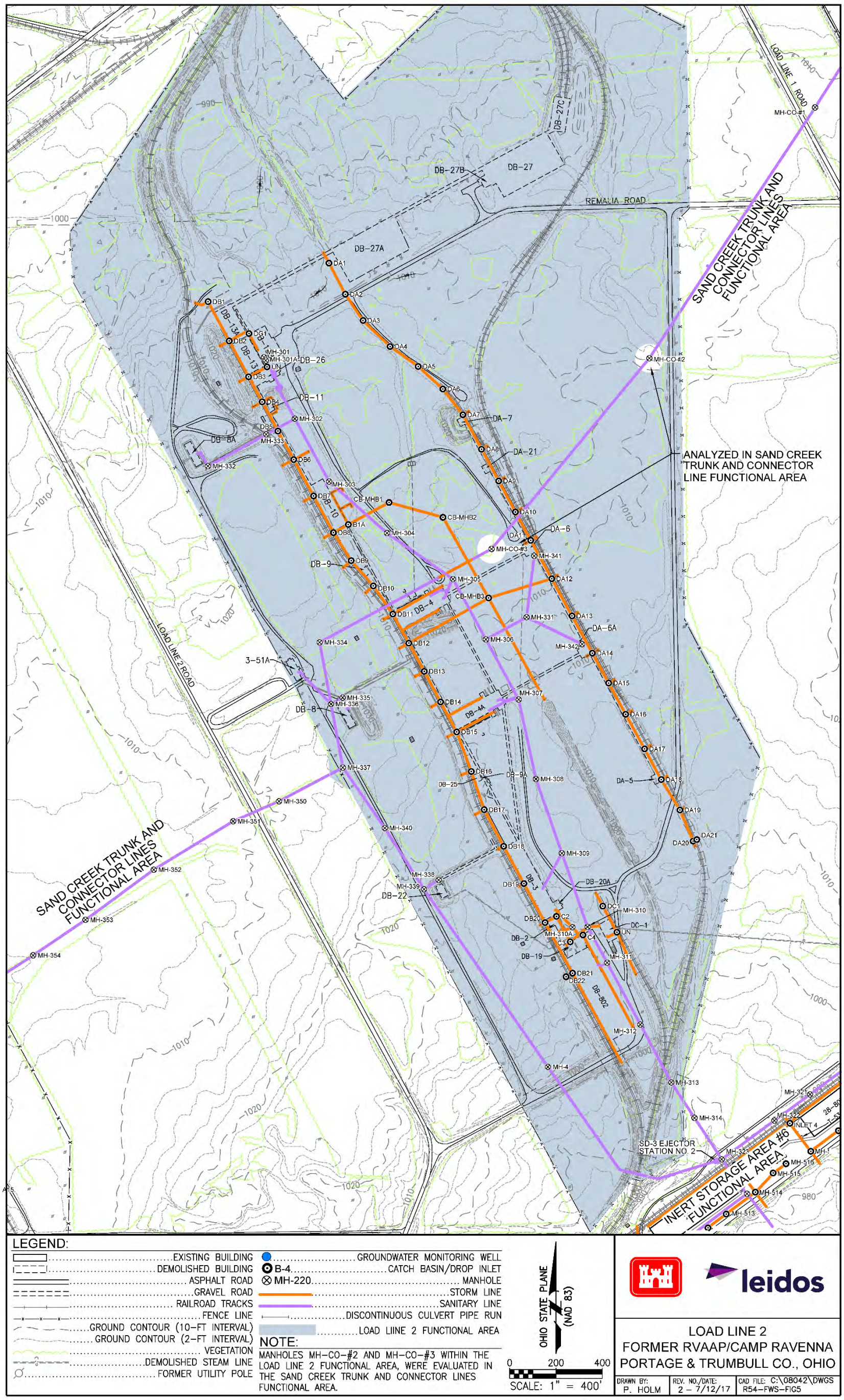

Figure 5. Load Line 2 Functional Area - Sanitary and Storm Sewers

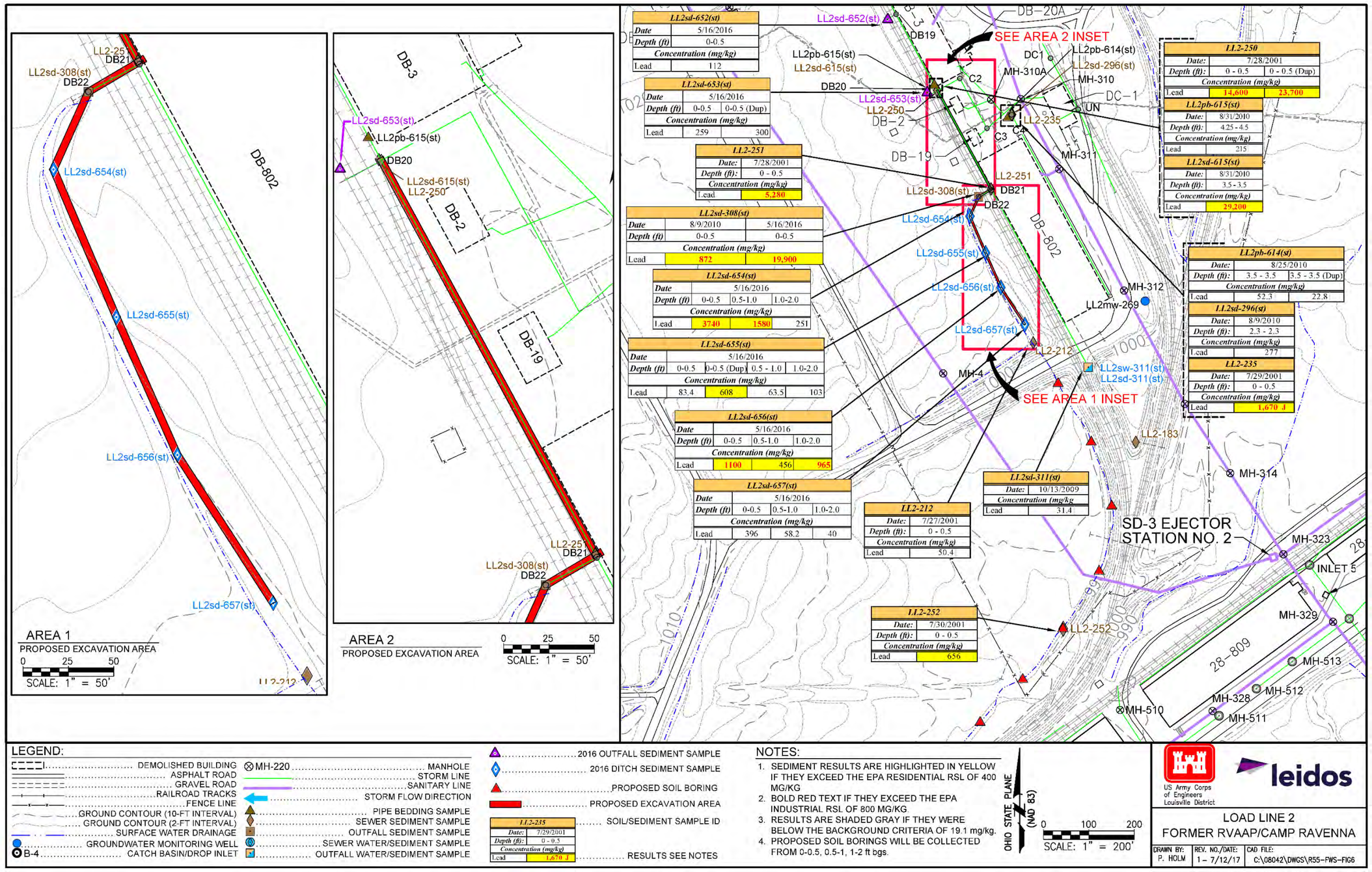

Figure 6. Load Line 2 Functional Area - Investigation Results and Proposed Removal Area

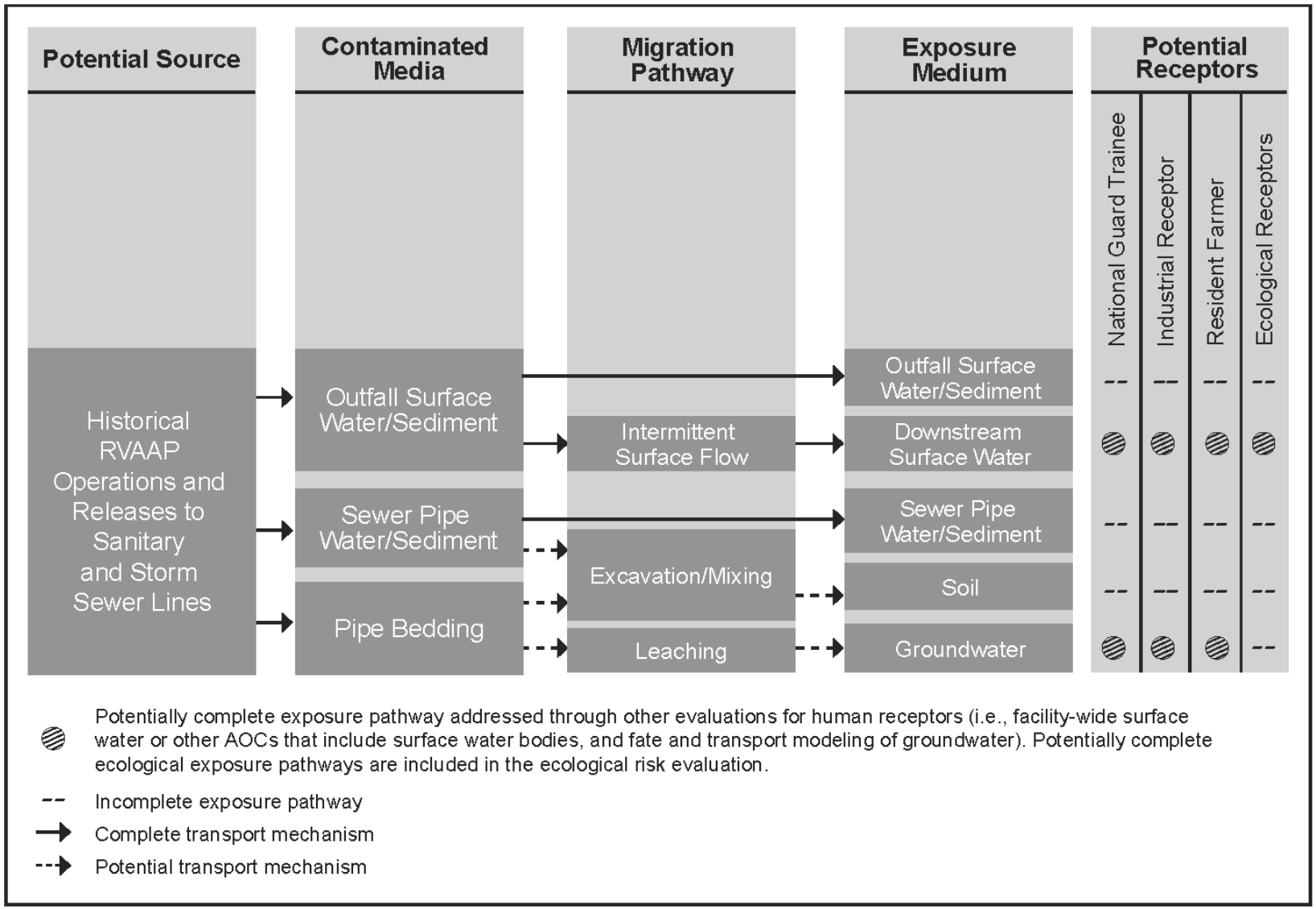

Figure 7. Load Line 2 Functional Area – Conceptual Site Exposure Model

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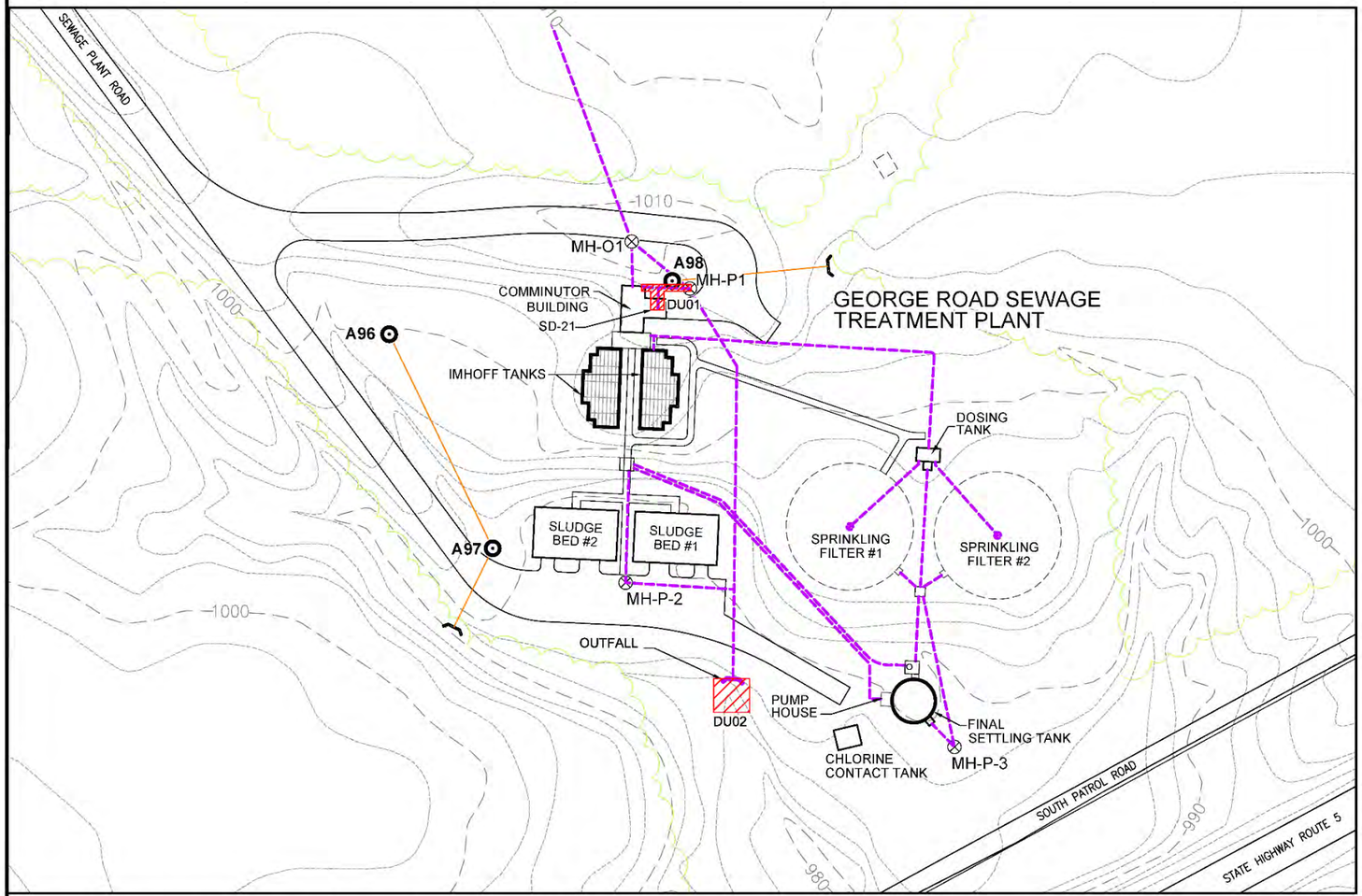
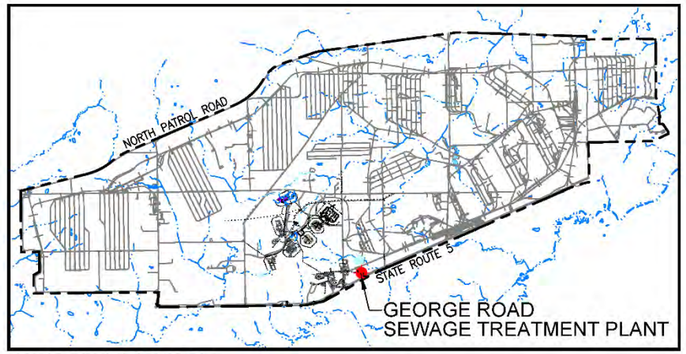


CC-RVAAP-75: GEORGE ROAD SEWAGE TREATMENT PLANT

0 40 80 160

SCALE: 1" = 80'



RVAAP KEY MAP

0 1.25 2.5

SCALE:1"=2.5 MILES

GEORGE ROAD SEWAGE TREATMENT PLANT MAIN BUILDING

LEGEND:

- EXISTING BUILDING
- DEMOLISHED BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- VEGETATION
- GROUND CONTOUR (10-FT INTERVAL)
- GROUND CONTOUR (2-FT INTERVAL)
- B-4 ..... STORM CATCH BASIN/DROP INLET
- MH-220 ..... SANITARY MANHOLE
- STORM SEWER LINES
- SANITARY SEWER LINES
- DECISION UNIT

OHIO STATE PLANE (NAD 83)

US Army Corps of Engineers Louisville District

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GEORGE ROAD SEWAGE TREATMENT PLANT
FORMER RVAAP/CAMP RAVENNA

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Figure 8. George Road Sewage Treatment Plant - Site Map

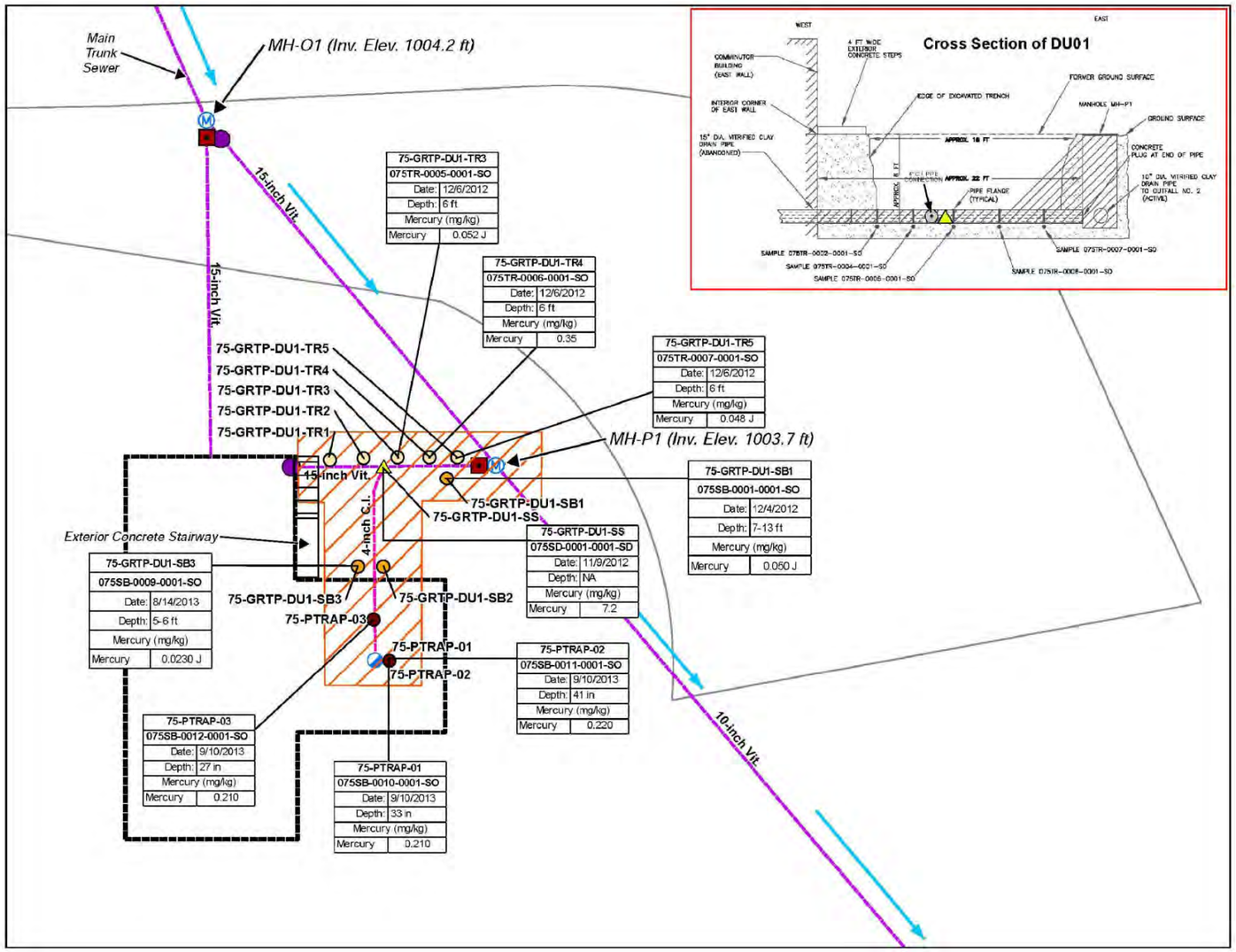

Figure 9. George Road Sewage Treatment Plant – Site Investigation Results

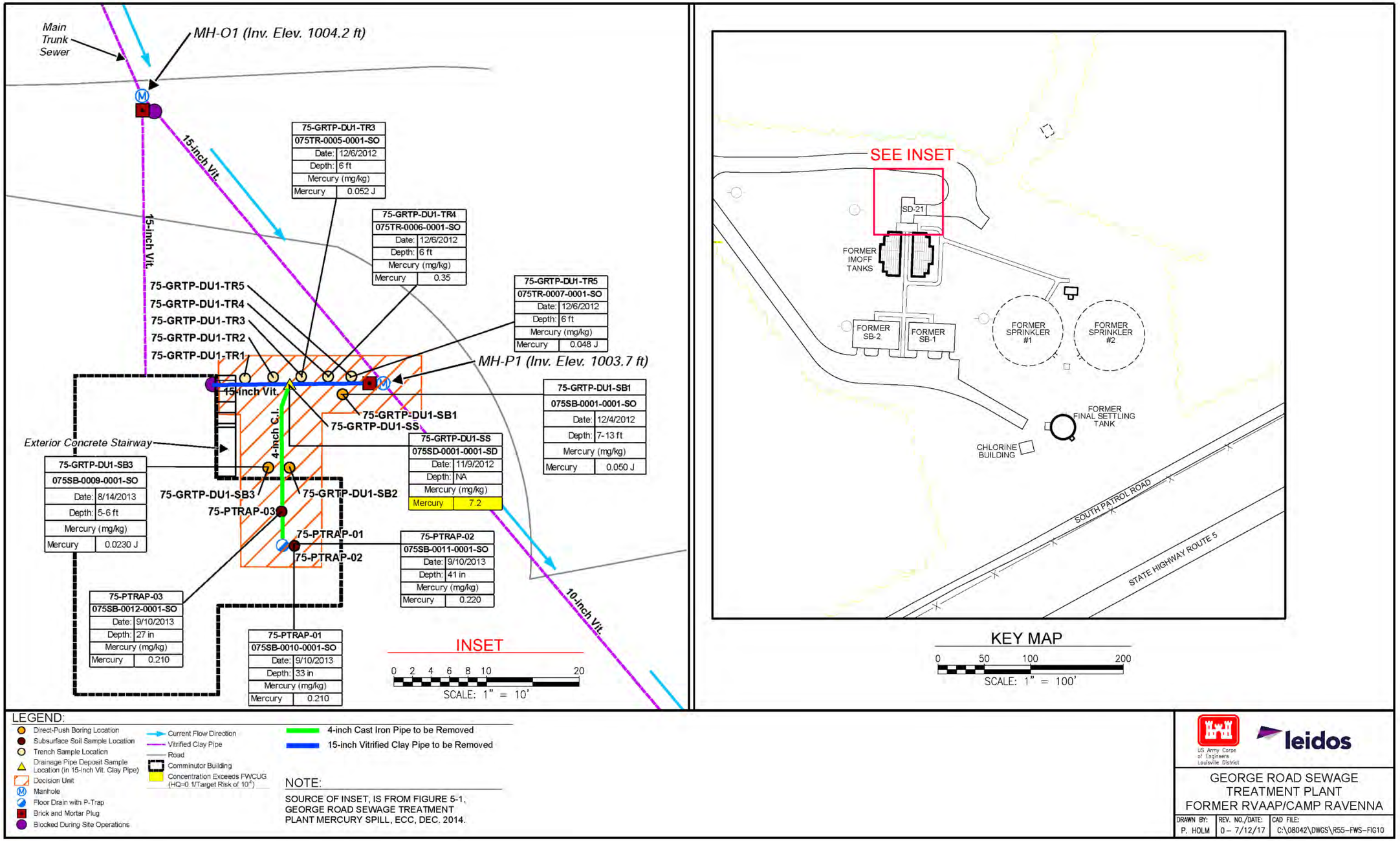

Figure 10. George Road Sewage Treatment Plant – Proposed Removal Area

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ATTACHMENT A.

Applicable or Relevant and Appropriate Requirements

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Table 1. Potential Action-specific ARARs

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

Table 1. Potential Action-specific ARARs (continued)

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Soil contaminated with RCRA hazardous waste OAC Section 3745-270-48 UTS OAC Section 3745-270-49 Soil	These rules prohibit land disposal of RCRA hazardous waste subject to them, unless the waste is treated to meet certain standards that are protective of human health and the environment. Standards for treating hazardous-waste-contaminated soil prior to disposal are set forth in the two cited rules. Using the greater of either technology-based standards or UTS is prescribed.	LDRs apply only to RCRA hazardous waste. These rules are considered for ARAR status only upon generation of a RCRA hazardous waste. If any soil is determined to be RCRA hazardous and will be disposed of on site; this rule is potentially applicable to disposal of the soil. These rules may be relevant to the sewer sediment since the regulatory definition of soil includes soil mixtures with liquid (i.e., sediment).	All soil subject to treatment must be treated as follows: 1. For non-metals, treatment must achieve a 90% reduction in total constituent concentration (i.e., the primary constituent for which the waste is characteristically hazardous as well as for any organic or metal UHC), subject to three below. 2. For metals, carbon disulfide, cyclohexanone, and methanol, treatment must achieve a 90% reduction in constituent concentrations as measured in leachate from the treated media (tested according to TCLP) or a 90% reduction in total constituent concentrations (when a metal removal treatment technology is used), subject to three below. 2. When treating any constituent subject to treatment to a 90% reduction standard would result in a concentration less than 10 times the UTS for that constituent, treatment to achieve constituent concentrations less than 10 times the UTS is not required. This is commonly referred to as “90% capped by 10xUTS.”

Table 1. Potential Action-specific ARARs (continued)

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Debris Contaminated with RCRA Hazardous Waste OAC Section 3745-270-45	These rules prescribe conditions and standards for land disposal of debris contaminated with RCRA hazardous waste. Debris subject to this requirement for characteristic RCRA contamination that no longer exhibits the hazardous characteristic after treatment does not need to be disposed of as a hazardous waste. Debris contaminated with listed RCRA contamination remains subject to hazardous waste disposal requirements.	If RCRA hazardous debris is disposed of on site, these rules are potentially applicable to disposal of the debris.	Standards are extraction or destruction methods prescribed in OAC Section 3745-270-45. Treatment residues continue to be subject to RCRA hazardous waste requirements.
Soil/Debris Contaminated with RCRA Hazardous Waste – Variance OAC Section 3745-270-44	The Ohio EPA Director will recognize a variance approved by USEPA from the alternative treatment standards for hazardous contaminated waste material.	Potentially applicable to RCRA hazardous waste material that is generated and placed back into a unit and that will be land disposed of on site.	Where the treatment standard is expressed as a concentration in a waste and the waste cannot be treated to the specific level, the generator may petition for a variance. A site-specific variance from the soil treatment standards can be used when treating concentrations of hazardous constituents greater than those specified in the soil treatment standards minimizes short- and long-term threats to human health and the environment. In this way, on a case-by-case basis, risk-based LDR treatment standards approved through a variance process could supersede the soil treatment standards.

Table 1. Potential Action-specific ARARs (continued)

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Solid waste material that is contaminated but not a hazardous waste for disposal. OAC Section 3745-27-05	Establishes standard for disposal of solid waste within the state of Ohio.	Potentially applicable to contaminated solid waste material disposed of offsite under state solid waste disposal requirements.	Establishes allowable methods of solid waste disposal and prohibits management by open burning or dumping.

AOC = Area of concern.
ARAR = Applicable or Relevant and Appropriate Requirements
CFR = Code of Federal Regulations.
LDR = Land disposal restrictions.
OAC = Ohio Administrative Code.
Ohio EPA = Ohio Environmental Protection Agency.
RCRA = Resource Conservation and Recovery Act.
TCLP = Toxicity characteristic leaching procedure.
UHC = Underlying hazardous constituent.
USEPA = U.S. Environmental Protection Agency.
UTS = Universal Treatment Standard.

Table 2. Location-specific ARARs

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Presence of wetlands as defined in 10 CFR 1022.4(v).	Establishes the requirements to evaluate any action taken within a wetland to ensure that impacts are minimized or averted as required in 10 CFR 1022.3 (a) – (d).	Potentially applicable for activities that result in the impact of a wetland as defined.	To the extent possible, avoid the long- and short-term adverse effects associated with destruction, occupancy, and modification of wetlands. Measures to mitigate adverse effects of actions in a wetland include, but are not limited to, minimum grading requirements, runoff controls, design and construction constraints, and protection of ecologically sensitive areas in 10 CFR 1022.12(a)(3). To the extent practicable, take action to minimize destruction, loss, or degradation of wetlands and to preserve, restore, and enhance the nature and beneficial value of wetlands. Potential effects of any new construction in wetlands that are not in a floodplain shall be evaluated to identify and, as appropriate, implement alternative actions that may avoid or mitigate adverse impacts on wetlands.

ARAR = Applicable or Relevant and Appropriate Requirements.
CFR = Code of Federal Regulations.

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