Second Five-Year Review Report for
Load Lines 1 – 4
Load Line 12
Winklepeck Burning Grounds
Ramsdell Quarry Landfill

Camp Ravenna Joint Military Training Center
Portage and Trumbull Counties, Ohio

June 2017

Prepared for:

Army National Guard Directorate
Camp Ravenna Joint Military Training Center
U.S. Army Environmental Command

Prepared by:

U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207

REPORT DOCUMENTATION PAGE

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Portage and Trumbull Counties

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Second five-year review report of remedial actions at Camp Ravenna sites RVAAP-01 Ramsdell Quarry Landfill, RVAAP-05 Winklepeck Burning Grounds, RVAAP-08 Load Line 1, RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, RVAAP-11 Load Line 4 and RVAAP-12 Load Line 12. The report summarizes issues identified during the review and includes recommendations and follow-up actions for them.

15. SUBJECT TERMS

Five-Year Review, RVAAP-01 Ramsdell Quarry Landfill, RVAAP-05 Winklepeck Burning Grounds, RVAAP-08 Load Line 1, RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, RVAAP-11 Load Line 4, RVAAP-12 Load Line 12

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Ohio Environmental Protection Agency

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

August 8, 2017

Mr. Mark Leeper
Army National Guard Directorate
ARNGD-ILE Clean Up
111 South George Mason Drive
Arlington, VA 22204

Re: US Army Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
267000859232

Subject: Ravenna Army Ammunition Plant, Portage/Trumbull Counties. Approval of the final "Second Five-Year Review Report for Load Lines 1-4, Load Line 12, Winklepeck Burning Grounds, Ramsdell Quarry Landfill" at the Former Ravenna Army Ammunition Plant, Ravenna, Ohio, Dated June 30, 2017, Ohio EPA ID # 267-000859-232

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the "Second Five-Year Review Report for Load Lines 1-4, Load Line 12, Winklepeck Burning Grounds, Ramsdell Quarry Landfill" at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. The final document was received at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) on July 10, 2017. The report was prepared for the Army National Guard Directorate by the U.S. Army Corps of Engineers (USACE) Buffalo District.

The final document was reviewed by personnel from Ohio EPA's DERR. Pursuant to the Director's Findings and Orders paragraph 39 (b), Ohio EPA considers the document final and approved.

If you have any questions, please call me at (330) 963-1168.

Sincerely,

Bob Princic for

Megan Oravec, Environmental Specialist
Division of Environmental Response and Revitalization

MO/nvr

cc: Rebecca Shreffler/Gail Harris, VISTA Sciences Corp.
ec: Bob Princic, Ohio EPA, NEDO DERR
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Katie Tait, OHARNG RTLS

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15 AUG 2017 -

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for
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Load Line 12
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Camp Ravenna Joint Military Training Center
Portage and Trumbull Counties, Ohio

June 2017

Prepared for:
Army National Guard Directorate
Camp Ravenna Joint Military Training Center
U.S. Army Environmental Command

Approved by: **Date:**

William E. Meade 12 June 2017

WILLIAM E. MEADE
COL, FA, OHARNG
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DOCUMENT DISTRIBUTION

Second Five-Year Review Report for Load Lines 1-4, Load Line 12, Winklepeck Burning Grounds, Ramsdell Quarry Landfill, Camp Ravenna Joint Military Training Center

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AR = Administrative Record
ARNG - Camp Ravenna = Army National Guard – Camp Ravenna Joint Military Training
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OHARNG – Camp Ravenna = Ohio Army National Guard – Camp Ravenna Joint Military Training Center
Ohio EPA – CO = Ohio Environmental Protection Agency – Central Office
Ohio EPA – NEDO = Ohio Environmental Protection Agency Northeast District Office
USACE = U.S. Army Corps of Engineers

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ACRONYMS AND ABBREVIATIONS

ACM	asbestos-containing material
Alliant	Alliant Corporation
AMEC	AMEC Environment and Infrastructure, Inc.
amsl	above mean sea level
AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
ARNG	Army National Guard
AST	above ground storage tank
bgs	below ground surface
BRACD	Base Realignment and Closure Division
CB&I	CB&I Federal Services, Inc.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
COC	constituent of concern
COPC	constituent of potential concern
DERP	Defense Environmental Restoration Program
DQO	data quality objective
ECC	Environmental Chemical Corporation
EE/CA	engineering evaluation/cost analysis
EQM	Environmental Quality Management, Inc.
ER,A	Environmental Restoration, Army
ESD	explanation of significant differences
FS	feasibility study
ft	foot (feet)
ft^2	square feet
FYR	five-year review
GIS	geographic information system
HI	hazard index
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HVAC	heating, ventilation, and air conditioning
ILCR	incremental lifetime cancer risk
IRA	interim remedial action

IRP	Installation Restoration Program
Leidos	Leidos Engineering of Ohio, Inc.
LUC	land use control
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
MJR	Major
MKM	MKM Engineers, Inc.
MMRP	Military Munitions Response Program
MPPEH	material potentially presenting an explosive hazard
MRS	Munitions Response Site
NA	not applicable
NCP	National Contingency Plan
NFA	no further action
NGB	National Guard Bureau
NPL	National Priorities List
OAC	Ohio Administrative Code
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PA	preliminary assessment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PIKA	PIKA International, Inc.
PMP	Property Management Plan
PP	proposed plan
Prudent	Prudent Technologies, Inc.
QA/QC	quality assurance/quality control
RAB	Restoration Advisory Board
RA(C)	remedial action (construction)
RAO	remedial action objective
RCRA	Resource Conservation Recovery Act
RDX	1,3,5-trinitroperhydro-1,3,5-triazine
RI	remedial investigation
ROD	record of decision

RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
Shaw	Shaw E&I/Shaw Environmental, Inc.
SI	site inspection
SVOC	semi-volatile organic compound
SWPPP	storm water pollution prevention plan
TBC	to-be-considered
TCRA	time-critical removal action
TEC-Weston	TEC-Weston Joint Venture
TNT	trinitrotoluene
USACE	U.S. Army Corps of Engineers
USAEHA	U.S. Army Environmental Health Administration
USEPA	U.S. Environmental Protection Agency
URS	URS Corporation
UST	underground storage tank
UU/UE	unlimited use/unrestricted exposure
UXO	unexploded ordnance
Vista	Vista Sciences Corporation
VOC	volatile organic compound
yd^3	cubic yards

EXECUTIVE SUMMARY

This is the second five-year review of remedial actions taken at Installation Restoration Program sites on Camp Ravenna: Load Line 1, Load Line 2, Load Line 3, Load Line 4, Load Line 12, Winklepeck Burning Grounds, and Ramsdell Quarry Landfill. The purpose of this review is to determine if remedial actions implemented at these sites are and will continue to be protective of human health and the environment.

The U.S. Army prepared this review consistent with applicable requirements of the Comprehensive Environmental Response, Compensation, and Liability Act § 121 and the National Oil and Hazardous Substances Pollution Contingency Plan. This five-year review is required because hazardous substances remain at the sites at levels that do not allow for unlimited use and unrestricted exposure. The methods, findings, and conclusions of the review, identified issues, and recommendations are documented in this report. The triggering action for this five-year review was completion of the first five-year review on August 31, 2012.

Camp Ravenna

Camp Ravenna, formerly known as the Ravenna Army Ammunition Plant (RVAAP), is located in northeastern Ohio within Portage and Trumbull counties. The installation was constructed in 1940 and 1941 and used for ammunition assembly, loading, and demilitarization activities. It originally encompassed 21,683 acres. Administrative accountability for the property was transferred to the U.S. Property and Fiscal Officer in several transfers with the last being in September 2013. The property is licensed to the Ohio Army National Guard (OHARNG) as a military training site known as Camp Ravenna Joint Military Training Center (Camp Ravenna). The installation is approximately one mile northwest of the city of Newton Falls (Figure 1). The surrounding areas are predominately woodland or farm acreage with the remainder residential. The location of sites evaluated in this five-year review is shown in Figure 2.

Load Lines 1 Through 4

Industrial operations at RVAAP primarily consisted of 12 munitions assembly facilities referred to as “load lines.” Load Lines 1, 2, 3, and 4 are 150, 212, 167, and 125 acres, respectively, and were used for industrial operations associated with munitions loading, assembly, packaging, reconditioning, demilitarization, and quality assurance/quality control operations. Explosives (2,4,6-trinitrotoluene [TNT], octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine [HMX], and 1,3,5-trinitroperhydro-1,3,5-triazine [RDX]) were handled, processed, loaded into large-caliber shells, and removed from munitions during demilitarization activities. These operations, together with ancillary activities associated with maintenance, power generation, and wastewater treatment, resulted in the contamination of soil and dry sediment in the vicinity of former site buildings. Chemical contaminants detected in soil and dry sediment above risk-based cleanup goals consisted of inorganics (aluminum, antimony, arsenic, barium, cadmium, hexavalent chromium, lead, and manganese), explosives (2,4,6-TNT and RDX), polychlorinated biphenyls (PCBs) (Aroclor-1254), and polycyclic aromatic hydrocarbons (PAHs) (benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene).

The selected remedy consisted of excavation and off-site disposal of contaminated soil and dry sediment, groundwater monitoring, and maintenance of former building slabs to prevent leaching of potentially contaminated soil and dry sediment. An Interim Record of Decision (ROD) for soil and dry sediment was signed on June 4, 2007 and the remedial actions were implemented during August to November 2007. Subsequent environmental activities were conducted that included removal of the building slabs, characterization and removal of chemically contaminated soil and dry sediment beneath and adjacent to the slabs, and preparation of a feasibility study addendum. Groundwater monitoring has been performed as part of a facility-wide groundwater monitoring program.

According to the Interim ROD, the intended future use of the sites is for OHARNG mounted training. To date, the OHARNG has not used the sites.

Load Line 12

Load Line 12 is an 80-acre parcel situated in the southeastern portion of the Camp Ravenna. It was used for the production of ammonium nitrate and aluminum chloride and for demilitarization activities to recover explosives from bombs. A wastewater treatment plant was also operated on the site. Remedial activities performed prior to the ROD removed large quantities of explosives-contaminated soil. Only arsenic-contaminated soil and dry sediment remained within a portion of a main drainage ditch at levels above risk-based cleanup goals.

The selected remedy consisted of excavation and off-site disposal of contaminated soil and dry sediment, and implementation of land use controls (LUCs). A ROD was signed on August 10, 2009 and the remedial action was implemented in 2010. LUCs have not been officially implemented for Load Line 12 through a Property Management Plan (PMP). Subsequent environmental activities included the preparation of a feasibility study addendum.

According to the ROD, the intended future use of the site is for OHARNG mounted training. To date, the OHARNG has not used the site.

Winklepeck Burning Grounds

Winklepeck Burning Grounds was used for open burning activities in unlined pits, pads, on roads, along roadside ditch lines, and in refractory-lined trays. Prior to 1980, burning was conducted on the bare ground, and the ash was abandoned at the site. Materials that were burned included TNT, RDX, Composition B, antimony sulfide, lead azide, propellants, black powder, waste oils, sludge from the load lines, domestic wastes, explosives-contaminated waste, and small amounts of laboratory chemicals. Chemical contaminants detected in soils and dry sediments above risk-based cleanup goals consisted of 2,4,6-TNT, RDX and benzo(a)pyrene. Asbestos-containing materials (ACM) also were present at former burning pads 61, 61A and 70. The total burning ground area consists of approximately 200 acres in the central portion of Camp Ravenna. The site is used as a Mark 19 Grenade Machine Gun range.

The selected remedy consisted of the excavation and off-site disposal of chemically contaminated soil and dry sediment from three former burning pads (61, 61A, and 67) and of ACM-contaminated soil and dry sediment. It also included screening and removal of any munitions. A ROD was signed August 19, 2008 and the remedial action was completed in 2008 and 2009. LUCs have been implemented through a PMP. Future plans for the site include development and use as a Multipurpose Machine Gun range. Subsequent environmental activities have been performed that included preparation of a remedial investigation/feasibility study (RI/FS) supplement, an explanation of significant differences to enable development of the Multipurpose Machine Gun range, and a remedial design for post ROD changes.

Ramsdell Quarry Landfill

Ramsdell Quarry Landfill is a 14-acre site located in the eastern section of Camp Ravenna. The site was an abandoned quarry with a 4-acre unlined landfill that was used for solid domestic waste. Land-surface burning also was performed outside of the landfill to destroy waste explosives from Load Line 1 and napalm bombs. Chemical contaminants detected in soil and dry sediment above risk-based cleanup goals consisted of PAHs (benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd) pyrene).

A ROD was signed on August 20, 2009 that established excavation and off-site disposal of chemically contaminated soil and dry sediment and LUCs as the selected remedy. Remediation started in 2010 and was not completed because ACM was encountered in the subsurface. The presence of ACM in the landfill was not known prior to discovery and the ROD did not account for this material. The excavation was stopped once ACM was no longer visible and excavated ACM was disposed off-site. Not all of the chemically contaminated areas were remediated. An engineering evaluation was performed and a ROD amendment was prepared. The ROD amendment remedy consisted of security fencing with warning signs installed around the site and removal of ACM from the ground surface. It was implemented in 2014 and routine inspections are being performed to verify that the LUCs are functioning as intended.

Protectiveness Statements

The remedy at Load Lines 1 - 4 currently protects human health and the environment because:

- Contaminated soil/dry sediment identified in the Interim ROD was remediated

However, in order for the remedy to be protective in the long-term, the following action needs to be taken to ensure protectiveness:

- Determine if unacceptable risk associated with remaining contaminated soils at Load Lines 1 - 4 exists and remediate in a manner consistent with the Interim ROD, if necessary to mitigate risk

The remedy at Load Line 12 is protective of human health and the environment because:

- Contaminated soil/dry sediment identified in the ROD was remediated
- The site is not being used and access is restricted by a perimeter fence with warning signs

The remedy at Winklepeck Burning Grounds is protective of human health and the environment because:

- Contaminated soil/dry sediment identified in the ROD was remediated
- LUCs have been implemented; they are being employed and maintained in accordance with the ROD

The remedy at Ramsdell Quarry Landfill is protective of human health and the environment because:

- Contaminated soil/dry sediment identified in the ROD was partially remediated
- A perimeter fence with warning signs was installed and surficial ACM was removed by non-intrusive/no-digging methods in accordance with the ROD amendment
- LUCs have been implemented; training, access restrictions, and land uses are being performed/maintained consistent with the ROD

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Camp Ravenna		
EPA ID: OH5210020736		
Region: 5	**State:** OH	**City/County** Ravenna/Portage and Trumbull Counties

SITE STATUS	
NPL Status: Non-NPL	
Multiple AOCs? Yes Load Lines 1 - 4 Load Line 12 Winklepeck Burning Grounds Ramsdell Quarry Landfill	**Has the site achieved construction completion?** No

REVIEW STATUS
Lead agency: Other Federal Agency **If "Other Federal Agency" was selected above, enter Agency name:** U.S. Army
Author name (Federal or State Project Manager): Mark Leeper
Author affiliation: Army National Guard
Review period: May 21, 2016 – August 31, 2017
Date of site inspection: August 10, 2016
Type of review: Statutory
Review number: 2
Triggering action date: August 31, 2012
Due date *(five years after triggering action date)*: August 31, 2017

Issues/Recommendations				
AOC(s) without Issues/Recommendations Identified in the Five-Year Review:				
Ramsdell Quarry Landfill, Winklepeck Burning Grounds, and Load Line 12				
Issues and Recommendations Identified in the Five-Year Review:				
AOC(s): Load Lines 1 -4	**Issue Category:** New information at Load Lines 1 - 4 that calls into question the protectiveness of the remedy			
	Issue: Contaminated soils and dry sediment are present above site cleanup goals at Load Lines 1 - 4 and may be accessible to installation personnel during future military training activities			
	Recommendation: Determine if unacceptable risk associated with remaining contaminated soils at Load Lines 1 - 4 exists and remediate in a manner consistent with the Interim ROD, if necessary to mitigate risk.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	State	September 2017

Protectiveness Statement(s)		
AOC: Load Lines 1 - 4	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):* Not Applicable
AOC: Load Line 12	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
AOCs: Winklepeck Burning Grounds	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
AOC: Ramsdell Quarry Landfill	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable

Protectiveness Statement:

The remedy at Load Lines 1 - 4 currently protects human health and the environment because:

- Contaminated soil/dry sediment identified in the Interim ROD was remediated

However, in order for the remedy to be protective in the long-term, the following action needs to be taken to ensure protectiveness:

- Determine if unacceptable risk associated with remaining contaminated soils at Load Lines 1 - 4 exists and remediate in a manner consistent with the Interim ROD, if necessary to mitigate risk

The remedy at Load Line 12 is protective of human health and the environment because:

- Contaminated soil/dry sediment identified in the ROD was remediated
- The site is not being used and access is restricted by a perimeter fence with warning signs

The remedy at Winklepeck Burning Grounds is protective of human health and the environment because:

- Contaminated soil identified in the ROD was remediated
- LUCs have been implemented; they are being employed and maintained in accordance with the ROD

The remedy at Ramsdell Quarry Landfill is protective of human health and the environment because:

- Contaminated soil identified in the ROD was partially remediated
- A perimeter fence with warning signs was installed and surficial ACM was removed by non-intrusive/no-digging methods in accordance with the ROD amendment
- LUCs have been implemented; training, access restrictions, and land uses are being performed/maintained consistent with the ROD

1.0 INTRODUCTION

This review was conducted to determine whether previous remedial actions at seven areas of concern (AOCs) on Camp Ravenna are and will continue to be protective of human health and the environment. The methods, findings, and conclusions of the review are documented in this report. Also identified are issues found during the review and recommendations to address them.

The U.S. Army prepared this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The U.S. Environmental Protection Agency (USEPA) interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

There are currently 84 AOCs at Camp Ravenna that are being investigated and/or remediated under the U.S. Army's Installation Restoration Program (IRP) and the Military Munitions Response Program (MMRP) (refer to Table 1). Management of these sites follows the *Director's Final Findings and Orders,* which was signed by the U.S. Army and Ohio Environmental Protection Agency (Ohio EPA) in June 2004. These orders were entered into by the U.S. Army pursuant to authority vested in the Secretary of the Army by CERCLA, 42 U.S.C. Section 9601, et seq.; the Defense Environmental Restoration Program (DERP), 10 U.S.C. Section 2701. et seq.; and the NCP, 40 C.F.R. Part 300. Camp Ravenna is not on the National Priorities List (NPL).

This five-year review addresses remedial actions at the following sites:

- Load Lines 1 – 4
- Load Line 12
- Winklepeck Burning Grounds
- Ramsdell Quarry Landfill

The U.S. Army conducted the review of remedial actions implemented at these sites from May 21, 2016 to August 31, 2017. This is the second five-year review for these sites, which was triggered by completion of the first five-year review on August 31, 2012. Review is required because the remedies do not allow unlimited use/unrestricted exposure (UU/UE) after the cleanup actions were completed and the cleanup goals met.

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Table 1 - Summary of Camp Ravenna Environmental Restoration Program Sites

AOC	Site	CERCLA Phase Completed	Affected Media	COCs/COPCs	Status	Evaluated in FYR? (Y/N)
Compliance Restoration Sites						
CC-RVAAP-68	Electric Substations (E, W, No. 3)	SI	None	None	RI and PP ongoing, draft PP recommends NFA	N
CC-RVAAP-69	Building 1048 – Fire Station	SI	Soil	VOCs	RI ongoing	N
CC-RVAAP-70	East Classification Yard	PA	Soil and dry sediment	Explosives, herbicides, metals, PAHs, PCBs, pesticides, SVOCs, and VOCs	SI ongoing	N
CC-RVAAP-71	Barn No. 5 Petroleum Release	SI	None	None	SI report recommended NFA, Ohio EPA issued approval letter on February 19, 2015	N
CC-RVAAP-72	Facility-Wide USTs	SI	None	None	SI report recommended NFA, Ohio EPA issued approval letter on July 14, 2015	N
CC-RVAAP-73	Facility-Wide Coal Storage	SI	None	None	RI ongoing, draft report recommends NFA	N
CC-RVAAP-74	Building 1034 Motor Pool Hydraulic Lift	SI	None	None	RI ongoing, draft report recommends NFA	N
CC-RVAAP-75	George Road STP Mercury Spill	SI	None	None	SI report recommended NFA	N
CC-RVAAP-76	Depot Area	SI	Soil	PAHs	RI/FS ongoing	N
CC-RVAAP-77	Building 1037 Laundry Wastewater Sump	SI	None	None	SI report recommended NFA, Ohio EPA issued approval letter on February 19, 2015	N
CC-RVAAP-78	Quarry Pond Surface Dump	PA	Soil	ACM, explosives, herbicides, metals, PAHs, PCBs, pesticides, propellants, and SVOCs	SI ongoing, draft report recommends proceeding to RI phase	N
CC-RVAAP-79	DLA Ore Storage Sites	SI	Soil	Metals	SI ongoing, preliminary draft reports recommend: · Proceeding to RI phase for the Main Storage Area · NFA for remaining ore sites	N
CC-RVAAP-80	Group 2 Propellant Can Tops	PA	None	None	SI ongoing, preliminary draft report indicates no evidence of a release of propellants and/or other munitions constituents	N
CC-RVAAP-83	Former Buildings 1031 and 1039	SI	None	None	SI report recommended NFA, Ohio EPA issued approval letter on July 29, 2015	N
Installation Restoration Program Sites						
RVAAP-01	Ramsdell Quarry Landfill	RA(C)	Soil and dry sediment	PAHs and ACM	Remedial actions complete, maintenance and monitoring ongoing	Y
RVAAP-02	Erie Burning Grounds	ROD	None	None	NFA ROD signed by Ohio EPA in January 2008	N

Table 1 - Summary of Camp Ravenna Environmental Restoration Program Sites

AOC	Site	CERCLA Phase Completed	Affected Media	COCs/COPCs	Status	Evaluated in FYR? (Y/N)
RVAAP-03	Open Demolition Area #1	RI/FS	Soil and dry sediment	Explosives and PAHs	RI and PP ongoing	N
RVAAP-04	Open Demolition Area #2	ROD	None	None	NFA ROD signed by Ohio EPA in January 2008	N
RVAAP-05	Winklepeck Burning Grounds	RA(C), ROD ESD	Soil and dry sediment	Explosives and PAHs	Remedial action conducted 2008 – 2009; RD for post ROD changes ongoing.	Y
RVAAP-06	C Block Quarry	SI	Soil	Total and hexavalent chromium, ACM	RI/FS ongoing	N
RVAAP-07	Building 1601 Hazardous Waste Storage	NA	None	None	Closed under RCRA; Ohio EPA closure approval letter dated February 12, 1998	N
RVAAP-08	Load Line 1	RA(C)	Soil and dry sediment	Metals, explosives, PCBs, and PAHs	Remedial action conducted in 2007; RI/FS ongoing to further characterize the site for unrestricted or industrial use	Y
RVAAP-09	Load Line 2	RA(C)	Soil and dry sediment	Metals, explosives, PCBs, and PAHs	Remedial action conducted in 2007; RI/FS ongoing to further characterize the site for unrestricted or industrial use	Y
RVAAP-10	Load Line 3	RA(C)	Soil and dry sediment	Metals, explosives, PCBs, and PAHs	Remedial action conducted in 2007; RI/FS ongoing to further characterize the site for unrestricted or industrial use	Y
RVAAP-11	Load Line 4	RA(C)	Soil and dry sediment	Metals, explosives, PCBs, and PAHs	Remedial action conducted in 2007; RI/FS ongoing to further characterize the site for unrestricted or industrial use	Y
RVAAP-12	Load Line 12	RA(C)	Soil and sediment	Metals (arsenic)	Remedial action conducted in 2010; RI/FS ongoing to further characterize the site for unrestricted or industrial use	Y
RVAAP-13	Building 1200	RA(C)	Soil	Metals (manganese)	Remedial action conducted 2014 – 2015; UU/UE attained	N
RVAAP-14	Load Line 6 Evaporation Unit	None	None	None	Ohio EPA closure approval letter dated January 20, 1993	N
RVAAP-15	Load Line 6 Treatment Plant	None	See status column	See status column	Not eligible for ER,A funding	N
RVAAP-16	Fuze & Booster Quarry Landfill/Pond	None	None	None	NFA ROD signed by Ohio EPA in January 2008	N
RVAAP-17	Deactivation Furnace	NA	None	None	Closed under RCRA; soil and groundwater are covered under RVAAP-05 (Winklepeck Burning Grounds)	N
RVAAP-18	Load Line 12 Waste Water Treatment Plant	None	None	None	NFA date March 1997	N
RVAAP-19	Landfill North of Winklepeck Burning Grounds	SI	None	None	Draft RI/FS recommends removing surface debris to ensure integrity of the landfill	N
RVAAP-20	Sand Creek Sewage Treatment Plant	None	None	None	NFA date June 1989	N
RVAAP-21	Depot Sewage Treatment Plant	None	None	None	NFA date June 1989	N
RVAAP-22	George Road Sewage Treatment Plant	None	See status column	See status column	Activities for this site are carried under CC-RVAAP-75	N

Table 1 - Summary of Camp Ravenna Environmental Restoration Program Sites

AOC	Site	CERCLA Phase Completed	Affected Media	COCs/COPCs	Status	Evaluated in FYR? (Y/N)
RVAAP-23	Unit Training Equipment Site UST	None	None	None	Ohio EPA issued a closure approval letter on February 5, 2003	N
RVAAP-24	Waste Oil Tank	None	See status column	See status column	Activities for this site are carried under CC-RVAAP-75	N
RVAAP-25	Building 1034 Motor Pool AST	None	See status column	See status column	Not eligible for ER,A funding	N
RVAAP-26	Fuze Booster Area Settling Tanks	None	See status column	See status column	15 tanks total, located in Load Line 5 (1 tank), Load Line7 (1 tank that was removed in 1988), Load Line 10 (1 AST & 8 USTs), Load Line 11 (3 tanks); all were emptied and cleaned. Soils are being investigated under RVAAP-39, -40, -42, -43, & -44.	N
RVAAP-27	Building 854 PCB Storage	None	None	None	Ohio EPA issued a NFA approval letter on September1, 1999	N
RVAAP-28	Mustard Agent Burial Site	SI	None	None	EE/CA ongoing, draft report recommends no action.	N
RVAAP-29	Upper and Lower Cobbs Ponds	SI	Soil, sediment, surface water	Hexavalent chromium, metals, and PAHs	RI/FS ongoing, draft report recommends LUCs	N
RVAAP-30	Load Line 7 Pink Waste Water Treatment Plant	None	None	None	NFA date January 2000	N
RVAAP-31	Ore Pile Retention Pond	None	None	None	NFA date January 2000	N
RVAAP-32	40 MM Firing Range	None	None	None	Any concerns are being addressed under the MMRP	N
RVAAP-33	Load Line 6 Fuze and Booster	SI	None	None	RI ongoing, draft report recommends NFA	N
RVAAP-34	Sand Creek Disposal Road Landfill	SI	Soil	Metals and PAHs	RI/FS and PP ongoing; draft PP recommends excavation of contaminated soils, off-site disposal, and LUCs	N
RVAAP-35	Building 1037 Laundry Waste Water Sump	None	See status column	See status column	Activities for this site are carried under CC-RVAAP-77	N
RVAAP-36	Pistol Range	None	See status column	See status column	Active range being used by OHARNG. Ohio EPA letter dated February 14, 2006 approved the delay of any environmental restoration until the range is no longer being used.	N
RVAAP-37	Pesticide Building S-4452	None	None	None	Ohio EPA issued a closure approval letter on September 19, 2000	N
RVAAP-38	NACA Test Area	SI	Soil	Metals (lead) and PAHs	RI/FS ongoing; draft report recommends excavation of contaminated soil and LUCs	N
RVAAP-39	Load Line 5	SI	None	None	RI ongoing, draft report recommends NFA	N
RVAAP-40	Load Line 7	SI	Soil	PAHs	RI/FS ongoing, draft report recommends *ex-situ* thermal treatment of contaminated soils	N
RVAAP-41	Load Line 8	SI	None	None	RI ongoing, draft report recommends NFA	N

Table 1 - Summary of Camp Ravenna Environmental Restoration Program Sites

AOC	Site	CERCLA Phase Completed	Affected Media	COCs/COPCs	Status	Evaluated in FYR? (Y/N)
RVAAP-42	Load Line 9	SI	Soil	Metals, PAHs	RI/FS ongoing, draft report recommends excavation and off-site disposal and *ex-situ* thermal treatment of contaminated soil	N
RVAAP-43	Load Line 10	RI	None	None	PP ongoing, draft report recommends NFA	N
RVAAP-44	Load Line 11	SI	None	None	RI ongoing, draft report recommends NFA	N
RVAAP-45	Wet Storage Area	SI	None	None	RI ongoing, draft report recommends NFA	N
RVAAP-46	Building F-15 and F-16	SI	None	None	RI ongoing, draft report recommends NFA	N
RVAAP-47	Building T-5301	IRA	None	None	IRA conducted in 2000, no contamination left in place	N
RVAAP-48	Anchor Test Area	RA(C)	Soil	Metals (arsenic)	RA completed in 2014, UU/UE attained	N
RVAAP-49	Central Burn Pits	ROD	None	None	NFA ROD signed by Ohio EPA in January 2008	N
RVAAP-50	Atlas Scrap Yard	RI	Soil	PAHs	FS and pilot study for soil treatment ongoing	N
RVAAP-51	Dump Along Paris Windham Road	RI/FS	Soil	PAHs	PP ongoing, draft document recommends LUCs	N
RVAAP-66	Facility-Wide Groundwater	SI	Groundwater	Explosives, metals, PAHs, SVOCs, and VOCs	RI/FS ongoing	N
RVAAP-67	Facility-Wide Sewers	SI	Sediment	Metals	RI/FS ongoing, draft report recommends removal of underground sewer pipes and related structures and contaminated sediment	N
Military Munitions Response Program Sites						
RVAAP-001-R-01	Ramsdell Quarry Landfill MRS	RI	NA	MEC or MPPEH	RI report recommends FS	N
RVAAP-002-R-01	Erie Burning Grounds MRS	RI	NA	MEC or MPPEH	RI report recommends FS	N
RVAAP-004-R-01	Open Demolition Area #2 MRS	RI	NA	MEC or MPPEH	TCRA proposed to clear MEC and implement site improvement activities	N
RVAAP-005-R-01	Winklepeck Burning Grounds	None	See status column	See status column	Operational range, ineligible for ER,A funding	N
RVAAP-008-R-01	Load Line 1 MRS	ROD	None	None	NFA ROD issued August 14, 2015, Ohio EPA concurrence letter issued September 21, 2015	N
RVAAP-012-R-01	Load Line 12 MRS	SI	None	None	SI report recommends NFA	N
RVAAP-016-R-01	Fuze and Booster Quarry MRS	RI	NA	MEC or MPPEH	RI report recommends FS	N

Table 1 - Summary of Camp Ravenna Environmental Restoration Program Sites

AOC	Site	CERCLA Phase Completed	Affected Media	COCs/COPCs	Status	Evaluated in FYR? (Y/N)
RVAAP-019-R-01	Landfill north of Winklepeck MRS	RI	None	None	RI recommends NFA	N
RVAAP-032-R-01	40mm Firing Range MRS	RI	NA	MEC or MPPEH	RI report recommends FS	N
RVAAP-033-R-01	Firestone Test Facility MRS	ROD	None	None	NFA ROD issued August 14, 2015, Ohio EPA concurrence letter issued July 27, 2015	N
RVAAP-034-R-01	Sand Creek Dump MRS	ROD	None	None	NFA ROD issued August 14, 2015, Ohio EPA concurrence letter issued September 21, 2015	N
RVAAP-046-R-01	Building F-15 and F-16	SI	None	None	SI report recommends NFA	N
RVAAP-048-R-01	Anchor Test Area	SI	None	None	SI report recommends NFA	N
RVAAP-050-R-01	Atlas Scrap Yard MRS	RI	None	None	RI report recommends NFA	N
RVAAP-060-R-01	Block D Igloo MRS	RI	NA	MEC or MPPEH	RI report recommends FS	N
RVAAP-061-R-01	Block D Igloo – TD MRS	SI	NA	MEC or MPPEH	RI/FS ongoing	N
RVAAP-062-R-01	Water Works #4 Dump MRS	ROD	None	None	NFA ROD issued September 29, 2015, Ohio EPA concurrence letter issued December 3, 2015	N
RVAAP-063-R-01	Group 8 MRS	RI	NA	MEC or MPPEH	RI report recommends FS	N
RVAAP-064-R-01	Old Hay Field MRS	None	See status column	See status column	Operational range, ineligible for ER,A funding	N

Notes:

ACM	asbestos-containing material
AOC	area of concern
AST	above ground storage tank
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
COC	constituent of concern
COPC	constituent of potential concern
EE/CA	engineering evaluation/cost analysis
ER,A	Environmental Restoration, Army
ESD	explanation of significant differences
FS	feasibility study

FYR	five-year review
IRA	interim remedial action
LUCs	land use controls
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
MPPEH	material potentially presenting an explosive hazard
MRS	Munitions Response Site
NA	not applicable
NFA	no further action
OHARNG	Ohio Army National Guard
PA	preliminary assessment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PP	proposed plan
RA(C)	remedial action (construction)
RI	remedial investigation
ROD	record of decision
RVAAP	Ravenna Army Ammunition Plant
SI	site inspection
SVOC	semi-volatile organic compound
TCRA	time-critical removal action
UST	underground storage tank
UU/UE	unlimited use/unrestricted exposure
VOC	volatile organic compound

2.0 SITE CHRONOLOGY

The following table lists the dates of important events for Camp Ravenna and the sites evaluated in this five-year review.

Table 2 Chronology of Site Events

Event	Date
Facility-Wide	
U.S. Government purchased approximately 25,000 acres in the northeastern part of Ohio in Portage and Trumbull counties and started the construction of facilities for loading, assembling, and packaging of large caliber ammunition and for depot storage	August 1940
The Atlas Powder Company operated the RVAAP for the Ordnance Department	September 1940
RVAAP was placed on standby status	1945
RVAAP was reactivated during the Korean War	April 1951
All production activities ended	August 1957
RVAAP was placed in a standby condition	October 1957
Three load lines and two component lines were reactivated to produce munitions for the Vietnam War	May 1968
The active load lines and component lines were deactivated and demilitarization of munitions continued on a periodic basis	August 1972
RVAAP received a Resource Conservation and Recovery Act (RCRA) Part A permit for the storage and treatment of off-specification munitions and munitions-related waste	1980
Munitions demilitarization activities were discontinued	1992
RVAAP submitted a RCRA Part B permit application for an open burning/open detonation grounds and a hazardous waste storage building. The application was withdrawn because it was determined that there was no longer a need for active demolition work.	1992
Operations and Support Command transferred control and operation of 16,164 acres to the National Guard Bureau (NGB)	May 1999
An agreement was signed to transfer an additional 3,774 uncontaminated acres to the NGB with the remaining acreage to be transferred as restoration of sites was completed	March 2002
The U.S. Army and Ohio EPA sign the *Director's Final Findings and Orders* to authorize groundwater monitoring at Ramsdell Quarry Landfill and to authorize activities at other RVAAP sites	June 2004

Table 2 Chronology of Site Events

Event	Date
Multiple property transfers to the NGB for use by OHARNG	1999 - 2013
Load Line 1	
Melt and load activities (Trinitrotoluene [TNT] and Composition B) conducted	1941 - 1945, and 1951 - 1957
Soils contaminated with explosives and waste water lines were removed and replaced	1951
Munitions rehabilitation activities (dismantling, replacing components, and repainting of mines) conducted	1961 – 1967
Preliminary site assessment completed	February 1996
Phase I RI performed	1996
Salvage and demolition activities performed, which included the removal of friable asbestos shielding, transite siding, roofing, steel piping, trim, overhead lighting (with PCB ballasts), and structural steel	1996 - 2000
Site buildings demolished	1999 and 2007
Technical Memorandum for Human Health and Ecological Risk Assessment Approach issued	August 2002
Phase II RI performed	2003
Supplemental Baseline Human Health Risk Assessment for Load Line 1 Alternative Receptors issued	July 2004
Focused FS completed	May 2005
Proposed Plan for Remediation of Soil and Dry Sediment at Load Lines 1-4 issued	July 2005
Final Interim ROD for the Remediation of Soils at Load Lines 1-4 issued	January 2007
Remedial action work plan completed	April 2007
Soil and dry sediment remedial action performed	August – November 2007
Letter issued from U.S. Army Base Realignment and Closure Division (BRACD) to Ohio EPA describing additional removal actions beneath the floor slabs	January 2008
Building floor slabs removed	May 2009
Surface and subsurface soil sampling performed at former building slab areas	October - November 2009
Sampling and characterization of surface soils around former building slabs performed	December 2009

Table 2 Chronology of Site Events

Event	Date
Sampling and characterization of deeper soils beneath the former building slabs performed	August - September 2010
Sub slab soil remedial action performed	September 2010
Comprehensive data gap sampling of subsurface soil below former building floor slabs and surface soil adjacent to former buildings performed to guide future remedial and administrative measures at the site	June - July 2011
Final characterization sampling report issued	March 2013
Load Line 2	
Melt and load activities (TNT and Composition B) and demilitarization activities conducted	1941 - 1945, 1951 - 1957, and 1969-1971
Preliminary site assessment completed	February 1996
Phase I RI performed	1996
Site buildings demolished	1999 and 2007
Phase II RI performed	2004
Focused FS completed	May 2005
Proposed Plan for Remediation of Soil and Dry Sediment at Load Lines 1-4 issued	July 2005
Final Interim ROD for the Remediation of Soils at Load Lines 1-4 issued	January 2007
Remedial action work plan completed	April 2007
Soil and dry sediment RA performed	August – November 2007
Letter issued from BRACD to Ohio EPA describing additional removal actions beneath the floor slabs	January 2008
Building floor slabs removed	March - June 2008
Surface and subsurface soil sampling performed at former building slab areas	March - October 2008
Sampling and characterization of surface soils around former building slabs performed	December 2009
Sub slab soil remedial action performed	June 2010
Sampling and characterization of deeper soils beneath the former building slabs performed	August - September 2010

Table 2 Chronology of Site Events

Event	Date
Comprehensive data gap sampling of subsurface soil below former building floor slabs and surface soil adjacent to former buildings performed to guide future remedial and administrative measures at the site	June - July 2011
Final characterization sampling report issued	March 2013
Load Line 3	
Melt and load activities (Composition B) and demilitarization activities conducted	1941 - 1945, 1951 - 1957, and 1969 - 1971
Preliminary site assessment completed	February 1996
Phase I RI performed	1996
Site buildings demolished	1999 and 2007
Phase II RI performed	2004
Focused FS completed	May 2005
Proposed Plan for the Remediation of Soil and Dry Sediment at Load Lines 1-4 issued	July 2005
Final Interim ROD for the Remediation of Soils at Load Lines 1-4 issued	January 2007
Remedial action work plan completed	April 2007
Soil and dry sediment remedial action performed	August – November 2007
Letter issued from BRACD to Ohio EPA describing additional removal actions beneath the floor slabs	January 2008
Building floor slabs removed	March - June 2008
Surface and subsurface soil sampling performed at former building slab areas	March-October 2008 and October - November 2009
Sampling and characterization of surface soils around former building slabs performed	December 2009
Sub slab soil remedial action performed	June 2010
Sampling and characterization of deeper soils beneath the former building slabs performed	August - September 2010

Table 2 Chronology of Site Events

Event	Date
Comprehensive data gap sampling of subsurface soil below former building floor slabs and surface soil adjacent to former buildings performed to guide future remedial and administrative measures at the site	June - July 2011
Final characterization sampling report issued	March 2013
Load Line 4	
Melt and load activities (TNT) conducted	1941 - 1945, and 1951 - 1957
Preliminary site assessment completed	February 1996
Phase I RI performed	1996
Site buildings demolished	1999 and 2007
Phase II RI performed	2004
Focused FS completed	May 2005
Proposed Plan for the Remediation of Soil and Dry Sediment at Load Lines 1-4 issued	July 2005
Final Interim ROD for the Remediation of Soils at Load Lines 1-4 issued	January 2007
Remedial action work plan completed	April 2007
Soil and dry sediment remedial action performed	August – November 2007
Letter issued from BRACD to Ohio EPA describing additional removal actions beneath the floor slabs	January 2008
Building floor slabs removed	March - June 2008
Surface and subsurface soil sampling performed at former building slab areas	March - October 2008 and October - November 2009
Sampling and characterization of surface soils around former building slabs performed	December 2009
Excavated soil stockpile restoration activities performed	June 2010
Sampling and characterization of deeper soils beneath the former building slabs performed	August - September 2010
Comprehensive data gap sampling of subsurface soil below former building floor slabs and surface soil adjacent to former buildings performed to guide future remedial and administrative measures at the site	June - July 2011

Table 2 Chronology of Site Events

Event	Date
Final characterization sampling report issued	March 2013
Load Line 12	
Ammonium nitrate production operations conducted	November 1941 - May 1943
Buildings 900, 904, and 905 converted for the demilitarization of munitions	June 1944
An ammonium nitrate line was operated by the Silas Mason Company for the production of ammonium nitrate fertilizer	1946 - 1950
A private contractor leased building FF-19 to produce aluminum chloride	1965 - 1967
Load Line 12 was used to melt-out and recover explosives from bombs	January 1961 - July 1961
Site buildings demolished	1973 - 1975, 1980, and 1998 - 2000
A pink water treatment plant was built to treat effluent prior to discharge	1981
Preliminary site assessment completed	February 1996
Phase I RI performed	1996
A relative risk site evaluation was performed by the U.S. Army Center for Health Promotion and Preventative Medicine	1996
Approximately 1,500 cubic feet of soil removed from four pits near Building 904	1999
Additional sampling performed by the U.S. Army Corps of Engineers (USACE)	August 2001
Phase II RI performed	2000
Supplemental phase II RI performed	2004 - 2005
Preliminary draft characterization report issued	2005
FS completed	July 2006
Proposed Plan for Soil and Dry Sediment issued	March 2007
ROD for Soil and Dry Sediment Remediation issued	March 2009
Remedial design completed	October 2009
Soil and dry sediment remedial action performed	June 2010
Surface soil samples collected to guide future remedial and administrative measures at the site	June - July 2011

Table 2 Chronology of Site Events

Event	Date
Final characterization sampling report issued	March 2013
Winklepeck Burning Grounds	
Open burning of explosives from artillery projectiles conducted in four burn pits, on burn pads, and sometimes on roads	Prior to 1980
Thermal treatment of munitions and explosives conducted in a 1-acre RCRA area at former burn pad 37 using metal, refractory-lined trays set on top of crushed slag	After 1980
Hazardous waste management study conducted by the U.S. Army Environmental Health Administration (USAEHA) issued	1983
Soils, groundwater, and surface water characterization report issued by USAEHA	1992
Preliminary site assessment completed	February 1996
Phase I RI performed	1996
Soil sample analysis performed	1997
RCRA field investigation report issued	1998
Phase II RI performed	1998
Biological field truthing effort report issued	March 2003
MEC density survey performed	2004
MEC cleanup performed in various portions of the site	2004 - 2005 and 2008 - 2009
Deactivation furnace soils transferred from RCRA to CERCLA under *Director's Final Findings and Orders*	June 2004
Phase III RI report issued	March 2005
Focused FS issued	March 2005
Removal action conducted, which included soil contaminated with MEC, chemicals, and asbestos-containing material (ACM)	March - August 2005
Proposed plan for soil and dry sediment issued	October 2005
U.S. Army transferred approximately 180 acres to the NGB for the construction of a Mark 19 Grenade Machine Gun range	2006
Construction of Mark 19 Machine Gun range completed	December 2006
Remedial action work plan issued	July 2008
ROD for soil and dry sediment remediation issued	August 2008

Table 2 Chronology of Site Events

Event	Date
Contract awarded for data quality objectives (DQO) study for MEC and chemical contaminants	September 2005
Soil and dry sediment remedial action for burning pads 61/61A, 67, and 70 performed	September 2008 - May 2009
Remedial action completion report issued	November 19, 2009
DQO Report issued	June 2011
Final Property Management Plan (PMP) issued (identifies LUCs for Winklepeck Burning Grounds)	August 2012
Explanation of significant differences (ESD) for post-ROD changes to the remedy issued	Match 2015
Remedial design for post-ROD changes to the remedy issued	August 27, 2015
Ramsdell Quarry Landfill	
Quarry operations discontinued	1941
Quarry used for landfilling of non-hazardous solid waste	1941 - 1989
Bottom of the landfill used to burn waste explosives from Load Line 1	1946 - 1950
A portion of the quarry was permitted as a sanitary landfill by the state of Ohio	1978
Landfilling operations ceased	September 1989
Landfill closed under state of Ohio solid waste regulations	May 1990
Initial phase groundwater investigation performed	July 1998
Follow-on phase groundwater investigation performed	July 1999
Phase I RI performed	October 2003 - January 2004
The U.S. Army and Ohio EPA sign the *Director's Final Findings and Orders* to authorize groundwater monitoring at Ramsdell Quarry Landfill to be performed under a facility-wide groundwater monitoring program	June 2004
FS issued	October 2006
Proposed plan for soil and dry sediment issued	March 2007
ROD for soil and dry sediment issued	March 2009
20 acres of the site that contained four burn pads with soil and dry sediment contamination transferred to the Army National Guard	June 2010
Revised final remedial design issued	June 2010

Table 2 Chronology of Site Events

Event	Date
Soil and dry sediment remedial activities started (not completed due to presence of ACM)	July 2010
Engineering evaluation for soil and dry sediment issued	September 2011
Modified proposed plan for soil and dry sediment issued	October 2012
ROD amendment for soil and dry sediment issued	May 2013
Remedial design for soil and dry sediment issued	April 2014
ROD amendment remedial action performed	August - November 2014
Remedial action report for soil and dry sediment issued	January 2015
LUCs established	December 2014

3.0 BACKGROUND

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

Prior to 2002, RVAAP was a 21,419-acre installation. In 2003 the property boundary was resurveyed and found to be 21,683 acres. As of September 2013, administrative accountability for the facility entire acreage has been transferred to the U.S. Property and Fiscal Officer for Ohio and subsequently licensed to the OHARNG for use as a military training site known as Camp Ravenna.

3.1 PHYSICAL CHARACTERISTICS

Camp Ravenna is located in northeastern Ohio within Portage and Trumbull counties, approximately three miles east-northeast of the city of Ravenna and approximately one mile northwest of the city of Newton Falls (Figure 1). The facility is approximately 11 miles long and 3.5 miles wide and is bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad to the south, Garret, McCormick, and Berry roads to the west, the Norfolk Southern Railroad to the north, and State Route 534 to the east.

3.1.1 Load Line 1

Load Line 1 is situated in the southeastern portion of Camp Ravenna (Figure 2). Physical characteristics of the site are illustrated on Figure 3.

The ground surface is hummocky due to development associated with the load line buildings and infrastructure. Elevations range from approximately 40 to 1,016 feet (ft) above mean sea level (amsl). Outside of the main production area and to the southeast, the ground slopes southeastward. All buildings have been demolished and most of the site is heavily vegetated with grasses, scrub vegetation, and immature hardwoods. The original security fence around the load line and access gates are intact. Unimproved access roads and former railroad beds traverse portions of the site.

3.1.2 Load Line 2

Load Line 2 is situated in the southeastern portion of Camp Ravenna (Figure 2). Physical characteristics of the site are illustrated on Figure 4.

Ground surface elevations range from approximately 990 to 1,010 ft amsl. The land surface generally slopes from the center of the load line in all directions. All buildings have been demolished and most of the site is heavily vegetated with grasses, scrub vegetation, and immature hardwoods. The original security fence around the load line and access gates are intact. Unimproved access roads and former railroad beds traverse portions of the site.

3.1.3 Load Line 3

Load Line 3 is situated in the southeastern portion of Camp Ravenna (Figure 2). Physical characteristics of the site are illustrated on Figure 5.

Ground surface elevations range from approximately 980 to 1,020 ft amsl. The land surface generally slopes from northeast to southwest. All buildings have been demolished and most of the site is heavily vegetated with grasses, scrub vegetation, and immature hardwoods. The original security fence around the load line and access gates are intact. Unimproved access roads and former railroad beds traverse portions of the site.

3.1.4 Load Line 4

Load Line 4 is situated in the southeastern portion of Camp Ravenna (Figure 2). Physical characteristics of the site are illustrated on Figure 6.

Berms are present around former buildings G-12, G-12A, G-16, G-19, and G-19A. Elsewhere at the site, the ground surface elevations range from approximately 980 to 1,000 ft amsl. The overall topography slopes gently from north to south. Load Line 4 Pond is located in the southern portion of the site.

All buildings have been demolished and most of the site is heavily vegetated with grasses, scrub vegetation, and immature hardwoods. The original security fence around the load line and access gates are intact. Unimproved access roads and former railroad beds traverse portions of the site.

3.1.5 Load Line 12

Load Line 12 is situated in the southeastern portion of Camp Ravenna (Figure 2). Physical characteristics of the site are illustrated on Figure 7.

Elevations across the site range from approximately 970 to 990 ft amsl. The land surface gently slopes from the west and east towards a main ditch. All buildings have been demolished and most of the site is heavily vegetated with grasses, scrub vegetation, and immature hardwoods. The original security fence around the load line and access gates are intact. Unimproved access roads and former railroad beds traverse portions of the site.

3.1.6 Winklepeck Burning Grounds

Winklepeck Burning Grounds is situated in the center of Camp Ravenna (Figure 2). Physical characteristics of the site are illustrated in Figure 8.

The site is an open area with gently undulating topography. Ground surface elevations decrease from west to east and vary from approximately 1,085 to 990 ft amsl. Gravel or dirt roads extend east to west and are tied together with connecting roads at the eastern and western ends of the site. Former burn pads (70 total) were located alongside of the east-west trending roads.

3.1.7 Ramsdell Quarry Landfill

Ramsdell Quarry Landfill is located in the eastern portion of Camp Ravenna. Physical characteristics of the site are illustrated in Figure 9.

The site is a 14-acre parcel with a 4-acre unlined landfill located in an abandoned quarry. The quarry was excavated to the underlying Sharon Sandstone/Conglomerate and the landfill is 30 to 40 ft deep. A pool of water is intermittently present in the bottom of the quarry.

Ground surface elevations range from approximately 955 to 990 ft amsl. Prominent features include the former quarry, the landfill, access roads, and a former rail line. The land surface in a large portion of the site slopes into the former quarry. The quarry bottom is approximately 40 ft below the surrounding area. No surface water outlet exists from the quarry, which causes surface water to accumulate at the quarry bottom.

3.2 GEOLOGY

Geology at Camp Ravenna consists of horizontal to gently dipping sedimentary bedrock that is overlain by unconsolidated glacial deposits consisting of till and outwash. Soils are generally derived from silty clay glacial till. Much of the soil was reworked or removed during construction activities in operational areas. In general, the soils at the load lines are poorly drained and consist of silty clay or clay loam formed over glacial till. Runoff is typically medium to rapid and the soil is seasonally wet. The thickness of the soils ranges from thin to absent in the eastern and northwestern portions of Camp Ravenna to an estimated 150 ft in the central portion (TEC-Weston 2016).

The uppermost bedrock consists of several units of the Pottsville Formation, which varies from coarse, permeable sandstones to impermeable shales (TEC-Weston 2016). The Sharon Sandstone Member is a highly porous, loosely cemented, permeable sandstone that is frequently fractured and weathered. It contains local conglomeratic zones that are referred to as the Sharon Conglomerate. Thin shale lenses also occur in the upper portion of the Sharon Sandstone.

Figures showing surface geology and geologic cross sections are provided in Attachment 10.

3.2.1 Load Line 1

Soil cover is thin to absent in the vicinity of former buildings CB-4, CB-4A, CA-6, CA-6A, and CB-14. Native soil at the load line belongs to the Mahoning silt loam series.

The Sharon Conglomerate is exposed at the ground surface throughout the load line. Its presumed thickness exceeds 40 ft. (Leidos 2016j).

3.2.2 Load Line 2

Poorly drained soils of the Trumbull, Mitiwanga, and Mahoning series are present. Unconsolidated zone characteristics vary widely across the load line due to lateral discontinuities within the glacial till and site disturbances (Leidos 2016j).

The Sharon Conglomerate is the uppermost bedrock unit. It consists of fine to medium grained sandstone with shale lenses.

3.2.3 Load Line 3

Poorly drained soils of the Mitiwanga and Mahoning series are present. Unconsolidated zone characteristics vary widely across the load line due to lateral discontinuities within the glacial till and site disturbances (Leidos 2016j). The Sharon Conglomerate is the uppermost bedrock unit.

3.2.4 Load Line 4

Poorly drained soils of the Mahoning series are present. The Sharon Conglomerate is the uppermost bedrock unit.

3.2.5 Load Line 12

Silty to clayey soil derived from glacial sediments overly shale bedrock, except where disturbed by previous site activities (SAIC 2009b). The Sharon Conglomerate is the uppermost bedrock unit.

3.2.6 Winklepeck Burning Grounds

The site contains low permeability soil and glacial sediments except where the native materials have been eroded, removed, or covered during previous site operations. The dominant soil types are silt loam and clay loam. Glacial sediments vary across the site and overlay shale/sandstone bedrock at 18 to 43 ft below ground surface (bgs).

3.2.7 Ramsdell Quarry Landfill

The landfill is underlain by weathered, fractured, fine- to medium grained sandstone of the Sharon Conglomerate. Overburden is thin or absent across much of the landfill, particularly within the quarry bottom.

3.3 HYDROLOGY

Groundwater at Camp Ravenna is present in the unconsolidated glacial deposits, at the glacial till-bedrock contact, and in the bedrock. The principal water-bearing aquifer is the Sharon Sandstone/Conglomerate. Depending on the existence and depth of overburden, the Sharon ranges from an unconfined to a leaky artesian aquifer. Groundwater in the unconsolidated deposits is limited to sandy lenses in the glacial tills, saturated lake sediments, outwash material, and alluvial deposits. Groundwater within the unconsolidated water-bearing zone and Sharon aquifer predominately flows in an eastward direction with local radial and/or southerly components (TEC-Weston 2016).

The unconsolidated water-bearing zone has numerous local flow variations that are influenced by topography and site drainage patterns. These local variations in flow direction have been interpreted to indicate that groundwater is generally in direct hydraulic communication with surface water and surface water drainage ways may also act as groundwater discharge locations (USACE 2004). Groundwater in the bedrock generally flows from higher areas in the western portion of Camp Ravenna toward stream valleys in the eastern portion that act as discharge areas. Figures showing potentiometric surfaces in the unconsolidated water-bearing zone and sandstone aquifer are provided in Attachment 10.

Outside of Camp Ravenna, domestic water wells and small public water supplies obtain reasonable quantities of water from wells completed in unconsolidated deposits.

3.3.1 Load Lines

3.3.1.1 Load Line 1

The water table surface typically varies from 19 to 35 ft bgs (USACE 2004). Groundwater is present within the unconsolidated water bearing zone, the Upper Sharon Aquifer, and the Lower Sharon Aquifer. Potentiometric surface contours are consistent with topography and exhibit radial flow away from the center of the load line (Attachment 10, Figure 3-1 and Figure 3-3).

Surface water drainage generally flows easterly with northeasterly and southeasterly components in the northern and southern half of the load line, respectively (Leidos 2016j). Runoff from the former main production area flows via ditches and storm sewers to discharge points along the perimeter of the load line.

3.3.1.2 Load Line 2

Groundwater is present in the Upper Sharon and Lower Sharon aquifers. The water table surface varies between 5 to 15 ft bgs and mimics surface topography. Groundwater flows radially in all directions within the Upper Sharon Aquifer (Attachment 10, Figure 3-3). The general direction of flow within the Lower Sharon Aquifer is northeast (Attachment 10, Figure 3-4).

Intermittent surface water flows to the north and south from the center of the load line. The majority of the surface water flows to the south through a series of manmade ditches that connect on the south end of the load line and ultimately discharges into Kelly's Pond. Surface water also flows north through a smaller network of ditches to ponds at the north end of the load line (Leidos 2016j).

3.3.1.3 Load Line 3

The water table surface typically varies between 10 to 30 ft bgs. Groundwater is present in the Upper Sharon and Lower Sharon aquifers. Within the Upper Sharon Aquifer, the general direction of flow is southwest from a high area centered at the load line (Attachment 10, Figure 3-3). The general direction of flow within the Lower Sharon Aquifer is the northeast (Attachment 10, Figure 3-4).

A series of drainage ditches convey surface water west across the load line to Cobbs Pond.

3.3.1.4 Load Line 4

The water table surface typically varies between 8 to 27ft bgs and mimics topography. Groundwater is present within the unconsolidated water bearing zone, the Upper Sharon Aquifer, and the Lower Sharon Aquifer. It flows west-northwest towards a tributary entering Cobbs Ponds (Leidos 2016j). In the southern portion of the load line, groundwater flows south (refer to Attachment 10, Figure 3-1, Figure 3-3, and Figure 3-4).

Surface water flow into and out of the pond is from the southeast to northwest.

3.3.1.5 Load Line 12

The water table surface at Load Line 12 is typically less than 15 ft bgs (USACE 2004). Groundwater is present within the unconsolidated water bearing zone, the Upper Sharon Aquifer, and the Lower Sharon Aquifer. Groundwater flow within the unconsolidated water bearing zone and the Upper Sharon Aquifer generally mimics the topography and surface water drainage patterns (Attachment 10, Figure 3-1 and Figure 3-3). The general direction of flow within the Lower Sharon Aquifer is northeast (Attachment 10, Figure 3-4).

Surface water drainage generally flows from south to north across the site. A main ditch bisects the central part of the site and flows north. An active channel traverses the site from west to east and intercepts the main ditch near the northern boundary of the site. Drainage ditches within Load Line 12 are primarily dry, except during rain events.

3.3.2 Winklepeck Burning Grounds

The groundwater flow pattern mimics site topography and surface water drainage patterns, it generally flows to the east-southeast (SAIC 2005a).

Surface water drainage generally flows from west to east/southeast across the site and ultimately discharges to Sand Creek. No perennial streams exist within the site.

3.3.3 Ramsdell Quarry Landfill

The water table surface is typically less than 25 ft bgs and groundwater flow is generally from the southwest to northeast.

3.4 LAND AND RESOURCE USE

Camp Ravenna is surrounded by several communities. Windham is to the north; Garrettsville is six miles to the northwest; Newton Falls is one mile to the southeast; Charlestown is immediately southwest; and Wayland is three miles to the south. It is located in a rural area, access by the public is controlled, and it is not near any major industrial or developed areas. The majority of surrounding land is woodland or farm acreage with the remainder residential.

Restricted land use and sound forest management practices within Camp Ravenna have preserved and enabled forest tracts to mature (SAIC 2005a). The Northern Long Eared Bat was listed by the U.S. Fish and Wildlife Service as a federally threatened species in 2015 in Ohio. This species is known to reside at Camp Ravenna. According to the *Updated Integrated Natural Resources Management Plan* (OHARNG 2014), several State-listed threatened and endangered species have been confirmed at Camp Ravenna.

Jurisdictional wetland delineations at Camp Ravenna have surveyed approximately 26 percent (5,680 acres) of the land. Approximately 13 percent (715 acres) of the surveyed area has been delineated as jurisdictional wetlands. The wetland communities consist of submergent marsh, floating-leaved marsh, mixed emergent marsh, cat-tail marsh, sedge-grass marsh, mixed shrub swamp, button bush swamp, oak-maple swamp forest, mixed swamp forest, mixed floodplain forest, wet fields, and red maple woods (OHARNG 2014).

Camp Ravenna is used by OHARNG for military training. Training and related activities include ranges, field operations and bivouac training, convoy training, equipment maintenance, and storage of heavy equipment. The facility is fenced and access is controlled.

Anticipated future land uses for the sites are identified below.

- Load Lines 1 - 4 and 12; military training (vehicle maneuver area)
- Winklepeck Burning Grounds; small arms range (Mark 19 Grenade Machine Gun and Multi-Purpose Machine Gun)
- Ramsdell Quarry Landfill; closed landfill, restricted access

3.5 HISTORY OF CONTAMINATION

3.5.1 Load Lines 1 Through 4

Load Lines 1 - 4 were used to melt and load TNT, Composition B (a mixture of TNT and RDX [1,3,5-trinitroperhydro-1,3,5-triazine], and HMX [octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine]) into large-caliber shells. The load lines also were used for munitions rehabilitation activities (production and reconditioning of anti-tank mines) and the demilitarization of projectiles. Previous industrial operations conducted at these sites are summarized below.

- Handling and screening of bulk TNT, RDX, and HMX
- Melting and loading TNT, Composition B, and HMX explosives into large-caliber shells
- Painting, drilling and boostering shells
- Munitions rehabilitation activities (dismantling, replacing components, and repainting mines)
- Quality assurance/quality control (QA/QC) using x-ray units
- Truck and equipment maintenance
- Paint, oil, solvent, and equipment storage

- Ancillary facilities for heating, ventilation, and air conditioning (HVAC), steam plant and power house, waste water treatment, elevator machine house, shipping, cafeteria, and worker change houses

The operations produced explosive dust, spills, and vapors that collected on the floors and walls of each building. Periodically, the floors and walls were cleaned with water and steam. The liquid, containing TNT and Composition B, was known as "pink water" for its characteristic color. Soil and dry sediment became contaminated as a result of these operations.

3.5.2 Load Line 12

Load Line 12 was originally known as the Ammonium Nitrate Plant. Operations started on November 25, 1941. Structures related to the production of ammonium nitrate included a Neutral Liquor Building (Building FF-19) and seven evaporation/crystallization units (Buildings 900, 901, 902, 903, 904, 905, and 906). From 1949 to 1993, munitions were periodically demilitarized at the site. Building wash-down water and wastewater from bomb melt-out operations, performed intermittently following the end of ammonium nitrate production, was collected in a house gutter system and flowed through a piping system into two stainless steel tanks. The first tank was used for settling and the second tank was used for filtration. Prior to 1980, the water leaked under the building and ponded there. Wash-down water from Building F-904 was also swept out through doorways onto the ground surrounding the building. Other structures included Water Works No. 2 and Power House No. 3 (Building FE-17), which housed support operations. A drainage ditch (main ditch) approximately bisects the site.

3.5.3 Winklepeck Burning Grounds

Winklepeck Burning Grounds is approximately 200 acres and was operated from 1948 to 1998. Prior to 1980, open burning activities were performed in unlined pits, pads, and sometimes on roads and ditch lines within the area. Materials that were burned included TNT, RDX, Composition B, antimony sulfide, lead azide, propellants, black powder, waste oils, sludge from the load lines, domestic wastes, hospital waste, explosives-contaminated waste, and small amounts of laboratory chemicals. The resulting ash was abandoned in-place. Munitions, munitions debris (primarily scrap metal), and explosive constituents were present at the site. From 1980 to 1989, burning of scrap explosives, propellants, and explosives-contaminated materials was conducted within raised refractory-lined trays located within a 1.5-acre area.

3.5.4 Ramsdell Quarry Landfill

The landfill was used from 1941 to 1989. From 1946 to 1950 the site also was used as a land-surface burning site to thermally destroy waste explosives from Load Line 1 and napalm bombs. From 1976 to 1989 a portion of the site was used as a nonhazardous solid domestic waste landfill. The landfill ceased operations in September 1989 and was closed in May 1990 in accordance with State of Ohio solid waste regulations. The landfill has been capped and covers approximately four acres. The four-acre closed landfill is regulated under RCRA while the remaining bottom portion of the quarry is regulated under CERCLA.

3.6 INITIAL RESPONSE

3.6.1 Load Lines 1 Through 4

In 1951, soil contaminated with explosives was removed from Load Line 1 and replaced with clean fill. Building demolition and salvage activities occurred in 1999 and 2007.

3.6.2 Load Line 12

Site buildings were demolished in 1973 to 1975, 1980, and 1998 to 2000.

3.6.3 Winklepeck Burning Grounds

MEC cleanup activities were performed on various portions of the site during 2004 to 2005 and 2008 to 2009.

3.6.4 Ramsdell Quarry Landfill

Ramsdell Quarry Landfill was operated as a State of Ohio permitted sanitary landfill in 1978 and was closed under state of Ohio solid waste regulations in 1990.

3.7 BASIS FOR TAKING ACTION

The basis for taking action at each site is summarized on forms provided in Attachment 3 and discussed below.

3.7.1 Load Lines 1 Through 4

Table 3 lists COCs that were detected in soil and dry sediment at Load Lines 1 - 4. They were present at concentrations that exceeded human health criteria associated with a National Guard trainee receptor (incremental lifetime cancer risk [ILCR] greater than 10^{-5} and/or hazard index [HI] greater than one). Potentially complete exposure pathways were identified in the risk assessment for inhalation, ingestion, and direct contact.

Table 3 COCs in Soil and Dry Sediment at Load Lines 1 Through 4

COC	Load Line			
	1	2	3	4
Inorganics				
Aluminum		X	X	X
Antimony		X		
Arsenic	X	X	X	X
Barium			X	
Cadmium			X	
Chromium, hexavalent		X		
Lead	X			
Manganese	X	X	X	X
Explosives				
2,4,6-TNT	X	X	X	
RDX	X	X		
PCBs				
Aroclor-1254	X	X	X	X
SVOCs				
Benz(a)anthracene	X			
Benzo(a)pyrene	X	X	X	
Benzo(b)fluoranthene	X			
Dibenz(a,h)anthracene	X			

3.7.2 Load Line 12

Soil and dry sediment within a section of the main ditch contained arsenic at concentrations that exceeded an ILCR of 10^{-5} for a National Guard trainee receptor. Arsenic is the sole COC for Load Line 12. Potentially complete exposure pathways were identified in the risk assessment for inhalation, ingestion, and direct contact.

3.7.3 Winklepeck Burning Grounds

The COCs listed below were present in soil and dry sediment at concentrations that exceeded risk-based levels. Potentially complete exposure pathways were identified in the risk assessment for inhalation, ingestion, and direct contact associated with an OHARNG range maintenance soldier.

- RDX
- Benz(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Dibenz(a,h)anthracene
- Indeno(1,2,3-cd)pyrene

3.7.4 Ramsdell Quarry Landfill

The COCs listed below were present in soil and dry sediment at concentrations that exceeded risk-based levels for a National Guard security guard/maintenance worker. Potentially complete exposure pathways were identified in the risk assessment for inhalation, ingestion, and direct contact.

- Benz(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Dibenz(a,h)anthracene
- Indeno(1,2,3-cd)pyrene

4.0 REMEDIAL ACTIONS

Remedial action summaries for each site are provided in Attachment 3 and discussed below.

4.1 LOAD LINES 1 THROUGH 4

4.1.1 Remedy Selection

The remedial action objective (RAO) identified in the 2007 Interim ROD was established to prevent ingestion, inhalation, or direct contact with COCs exceeding cleanup goals (identified in Table 4) for soil and dry sediment. Interim status was applied to the ROD because soil beneath the former building slabs was excluded.

Table 4 Load Lines 1 Through 4 Soil Cleanup Goals

COC	Cleanup Goal (mg/kg) [1,2]
Inorganics	
Aluminum	34,942
Antimony	2,458
Arsenic	31
Barium	3,483
Cadmium	109
Chromium, hexavalent	16
Manganese (surface soils)	1,800
Manganese (subsurface soils)	3,030
Lead	1,995
Explosives	
2,4,6-TNT	1,646
RDX	838
PCBs	
Aroclor-1254	35
SVOCs	
Benz(a)anthracene	105
Benzo(a)pyrene	10
Benzo(b)fluoranthene	105
Dibenz(a,h)anthracene	10

Notes:

mg/kg - milligrams per kilogram

[1] Soil 0 to 4 ft bgs is used for a National Guard trainee. Surface soils refer to the interval from 0 to 1 ft bgs and subsurface soil is greater than 1 ft bgs.
[2] Cleanup goals are based on an individual ILCR of 10^{-5} and/or a HI of 1.

The selected remedy for surface and subsurface soil and dry sediment at Load Lines 1 - 4 was excavation and off-site disposal. This remedy included the following components (USACE 2007):

- Excavation of discrete areas of contaminated surface and subsurface soil and dry sediment that contained COCs at concentrations exceeding the cleanup goals
- Temporary on-site storage of excavated soil and dry sediment via stockpiling for characterization
- Off-site disposal of excavated soil and dry sediment at a permitted landfill and, as needed, at a TSCA and/or RCRA permitted landfill
- Replacement of excavated material with compacted clean backfill
- Groundwater monitoring to ensure the remedy does not impact groundwater
- Maintenance of building slabs and foundations

The Interim ROD required groundwater monitoring for five years to ensure that the remedial activities did not impact groundwater and to determine pre-remedial conditions. No numerical goals were established to interpret the groundwater data. Sampling was required on a semi-annual basis for the first two years after the remedy was implemented. After the initial two-year period, the sampling frequency would be determined based on the analytical results. The following monitoring wells to be used were listed in the *Final Remedial Action Work Plan Remediation of Soils at Load Lines 1, 2, 3, and 4* (Shaw 2007):

- LL1mw-067, -078, -081, -082, -084, -085
- LL2mw-262, -263, -266, -267, -269
- LL3mw-236, -238, -239
- LL4mw-196, -197, -198

Results would be evaluated in the context of a facility-wide groundwater monitoring program and any follow-up actions would be determined by the U.S. Army with Ohio EPA approval. Groundwater remedial action is deferred pending the completion of this facility-wide groundwater monitoring program.

The concrete slabs and building foundations that remained in place after remediation would be inspected periodically to ensure that their integrity was not compromised.

4.1.2 Remedy Implementation

The Interim ROD remedy was implemented during August to November 2007. A total of 11,241 tons of contaminated soil and dry sediment was removed from 119 locations and disposed off-site. The excavated material included 1,752 tons of PCB-contaminated soil/dry sediment and 9,489 tons of non-hazardous soil/dry sediment (Table 5). The maximum depth of the excavations was 3 ft bgs and most excavations were typically 2 ft bgs. The excavated areas are illustrated in Figures 3 to 6.

Table 5 Volume of PCB Contaminated and Non-Hazardous Soil and Dry Sediment Excavated from Load Lines 1 Through 4

Load Line	Excavated Soil and Dry Sediment (tons)	
	PCB Contaminated	Non-Hazardous
1	539	3,126
2	320	2,617
3	893	2,538
4	0	1,208
Totals	1,752	9,489

Soil and dry sediment confirmation sampling was performed using a multi-increment sampling method. All cleanup goals were met. Each excavation area was restored by placing clean fill from an off-site source and seeding. Baseline groundwater samples were collected in accordance with the *Final Remedial Action Work Plan Remediation of Soils at Load Lines 1, 2, 3, and 4* (Shaw 2007).

Soils from beneath the slabs and adjacent to the slabs were sampled in 2008 (Load lines 2, 3, and 4) and 2009 (Load lines 1, 3, and 4). The building slabs and foundations were removed in 2008 and 2009. Contaminated soil and dry sediment was subsequently removed and disposed off-site. This activity was not specified in the Interim ROD. It was documented in U.S. Army correspondence to Ohio EPA (BRACD 2008).

Sampling, analysis, and remedial actions performed in areas not addressed by the Interim ROD have been discussed in other documents, which include:

- *Final Multi-Increment Sampling and Analysis of Soils Below Floor Slabs at RVAAP-09 Load Line 2, RVAAP-10,, Load Line 3, and RVAAP-11 Load Line 4* (December 2009)
- *Final Sampling and Analysis of Soils Below Floor Slabs at RVAAP-08 Load Line 1 and Other Building Locations* (September 2010)
- *Final Remedial Action Completion Report Sub-Slab Soils at RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, and RVAAP-11 Load Line 4* (December 2010)
- *Final Sampling Report of Surface and Subsurface Incremental Sampling Methodology at Load Lines 1, 2, 3, and 4 (RVAAP-08, 09, 10, and 11) Ravenna Army Ammunition Plant* (March 2011)
- *Final Remedial Action Completion Report Sub-Slab Soils at RVAAP-08 Load Line 1* (March 2011)
- *Final Characterization Sampling Report of Surface and Subsurface Incremental Sampling Methodology at Load Lines 1, 2, 3, 4 and 12 (RVAAP-08, 09, 10, 11, and 12) Ravenna Army Ammunition Plant Ravenna, Ohio* (March 2013)

Load Lines 1–4 are currently undergoing a FS addendum to evaluate the need for additional soil and dry sediment remediation to achieve less restrictive use (residential or commercial/ industrial) of the sites. This activity was not identified in the Interim ROD. It is being performed to remove the need for access restrictions and site controls that would hamper future military training activities. The final FS addendum has not been released. A ROD amendment will be prepared to address any additional remediation needed to achieve less restrictive use of the sites (ARNG 2016).

4.1.3 Maintenance and Monitoring

4.1.3.1 Groundwater

In general, groundwater samples have been collected for soil COCs from monitoring wells identified in the Interim ROD. Groundwater at Camp Ravenna is managed through a facility-wide approach called the "Facility-Wide Groundwater Monitoring Program", which is a component of the *Director's Final Findings and Orders*. A separate RI/FS will be completed for facility-wide groundwater. These activities are being performed outside of the Interim ROD requirements.

4.1.3.2 Building Slabs and Foundations

Inspection and maintenance of the building slabs and foundations required by the Interim ROD was not performed because these structures were removed in 2008 and 2009.

4.2 LOAD LINE 12

4.2.1 Remedy Selection

The RAO presented in the 2009 ROD was established to prevent a National Guard trainee from exposure to contamination in surface soil and dry sediment in the main ditch, which was defined as the top 4 ft of soil. The cleanup goal for arsenic was 31 mg/kg.[3,4]

The selected remedy included the following components (SAIC 2009a):

- Preparation of a remedial design plan to detail preparatory activities, the extent of excavation, construction implementation and sequencing, decontamination, segregation, transportation, disposal of various waste streams, and LUCs
- Excavation and off-site disposal of contaminated soil and dry sediment from the main ditch to a depth of 4 ft bgs
- Handling of excavated materials and truck transportation to a licensed and permitted disposal facility
- Confirmatory sampling to verify that the cleanup goal had been achieved
- Restoration of the remediated area by backfilling with clean soil and revegetation
- Implementation of LUCs until the arsenic concentrations in soil and groundwater are reduced to levels that allow for unrestricted use

Details of the LUC implementation, maintenance, and periodic inspections were provided in the *Final Remedial Design for the RVAAP-12 Load Line 12* (SAIC 2009c). The LUC performance objectives included:

- Maintenance of the Camp Ravenna perimeter fence
- Restricting future land use to mounted training (military use)
- Maintenance of the LUC program

[3] Sediment from the main ditch aggregate
[4] Total ICLR greater than 10^{-5} to a National Guard trainee from contaminants in the main ditch

- Limiting activities to tracked and wheeled operations that are consistent with a National Guard mounted training scenario and other essential security, safety, and natural resources management activities
- Prohibiting digging beyond 4 ft bgs, except for ground surface repairs resulting from maneuver damage and routine maintenance of the roads, ditches, and culverts

The remedial design also established the following actions to ensure that the LUC objectives are met:

- Preparing geographic information system (GIS) data and a map indicating the location and dimensions of the AOC with the LUC location. This would include signage and markers placed in locations to identify areas where the LUC applies
- Incorporating an environmental overlay and appropriate Ohio EPA notice procedures into a PMP
- Through the PMP, prohibiting digging or excavation activities beyond 4 ft bgs, except for routine maintenance of roads, ditches, and culverts; and ground surface repairs resulting from maneuvering damage
- Through the PMP, maintaining the Camp Ravenna perimeter fence and limiting activities to tracked and wheeled operations that are consistent with a National Guard mounted training scenario and other essential security, safety, and natural resource management activities
- Periodic monitoring in the form of site inspections conducted by the U.S. Army to confirm whether the LUCs remain effective and meet LUC objectives

LUCs concerning disturbance of soil and restriction to military training use were expected to remain in place indefinitely unless further action was taken to reduce the concentrations of hazardous substances in soil to levels that allow for other uses of the site.

Site inspections would be conducted as necessary, but not less than once per year. Monitoring results would be reported in an annual LUC report, which would be used for the CERCLA 121(c) five-year review. A written certification was required in the LUC monitoring report stating whether or not the LUCs remain in place and are effective.

4.2.2 Remedy Implementation

The remedy was implemented in 2010. A total of 1,181 tons of sediment were removed from the main ditch and disposed off-site (SAIC 2010c). Figure 7 shows the location of remediated areas. All confirmation sampling results were below the cleanup goal. Approved backfill from an off-site source was placed and graded to match the existing drainage channel and neighboring elevations. The ditch and disturbed construction support areas were revegetated after backfilling and grading was completed.

Surface soil samples were collected in 2011 to address data gaps that were identified in a comprehensive assessment of previous environmental data that was conducted to guide future remedial and administrative measures at the site (Prudent 2013). The results were compared to cleanup goals for National Guard trainee and resident adult farmer receptors presented in the *Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (SAIC 2010a). These activities were not identified in the ROD.

Load Line 12 is currently undergoing a FS addendum to evaluate the need for additional soil and dry sediment remediation to achieve less restrictive use (residential and commercial/industrial) of the site. This activity was not identified in the ROD. It is being performed to remove the need for access restrictions and site controls that would hamper future military training activities. The final FS addendum has not been released. A ROD amendment will be prepared to address any additional remediation needed to achieve unrestricted use of the site (ARNG 2016).

LUCs, including site inspections and preparation of a LUC monitoring report, have not been officially implemented.

4.2.3 Maintenance and Monitoring

No maintenance and monitoring activities associated with the ROD have been conducted at the site since the remedy was implemented in 2010. The site has not been used for military training since the ROD was issued.

4.3 WINKLEPECK BURNING GROUNDS

Two separate remedies were selected for the site. They represent remedial actions identified in a ROD (2008) and in a subsequent ESD (2015).

4.3.1 Remedy Selection

4.3.1.1 ROD Remedy

The RAO identified in the 2008 ROD was established to prevent exposure of a National Guard range maintenance soldier to contaminants in soil and dry sediment exceeding risk based cleanup goals to a maximum depth of 4 ft bgs. These cleanup goals are listed in Table 6.

Table 6 Winklepeck Burning Grounds Soil Cleanup Goals for 2008 ROD Remedial Action

COC	Cleanup Goal (mg/kg) [5,6]
Explosives	
RDX	617
SVOCs	
Benz(a)anthracene	75
Benzo(a)pyrene	7.5
Benzo(b)fluoranthene	75
Dibenz(a,h)anthracene	7.5
Indeno(1,2,3-cd)pyrene	75

The selected remedy for former burning pads 61, 61A, and 67 was removal and off-site disposal of chemically contaminated soil and dry sediment concurrent with munitions and explosives of concern (MEC) removal. The selected remedy for former burning pad 70 was ACM removal. These remedies included the following components (SAIC 2008):

- Clearing of vegetation

[5] Soil 0 to 4 ft bgs, National Guard range maintenance soldier
[6] Cleanup goals are based on a cumulative ILCR greater than 10^{-5} to an OHARNG range maintenance soldier

- Geophysical surveys and visual inspections to identify metal debris
- Removal of transite and friable asbestos from the surface and subsurface within the footprint of pad 70
- Excavation of contaminated soil by layers to depths of 1 to 4 ft
- Screening (sifting) of the excavated soil for metal debris (potential MEC)
- Confirmation sampling to determine chemical characteristics of the remaining soil and to verify the absence of visible asbestos within the sides and bottom of the excavation
- Multi-increment sampling and testing of sifted soil to determine disposal requirements
- Disposal of contaminated soil at an approved off-site facility
- Backfilling the excavations using material from a source approved by the U.S. Army and Ohio EPA
- Site restoration
- Implementing LUCs for the AOC

LUC details were provided in the *Final Remedial Action Work Plan [for] Winklepeck Burning Grounds* (MKM 2008). The LUC performance objectives included:

- Maintenance of the Camp Ravenna perimeter fence
- Restricting future land use as a small arms weapons range
- Limiting activities to target practice; maintenance of targetry and associated lifting mechanisms; range maintenance, compatible natural resource management activities, and other activities that are consistent with a range maintenance soldier exposure scenario
- Prohibiting digging or excavation at the AOC outside of any unexploded ordnance (UXO)/MEC/discarded military munitions

The remedial action work plan (MKM 2008) also established the following actions to ensure that the LUC objectives are met:

- Preparing GIS data and a map indicating the location and dimensions of the AOC and the known extent of soil contamination with the LUC location. Signage and/or fencing would be placed in locations that do not conflict with the range impact area to identify the areas of known soil contamination.
- Incorporating an environmental overlay and appropriate procedures into the PMP
- Through the PMP, prohibiting all digging or excavation activities except for routine maintenance of roads, ditches, and culverts; ground surface repairs by authorized range personnel in support of range activities; and digging along target array areas by authorized range personnel to a depth of 1 ft bgs
- Through the PMP, maintaining the Camp Ravenna perimeter fence and restricting land use of the AOC as a small arms weapons range

LUCs concerning disturbance of soil in the AOC outside of UXO/MEC-cleared areas are expected to remain in place indefinitely. LUCs restricting use of the range are expected to remain in place indefinitely unless further action is taken to reduce the concentrations of hazardous substances in soil to levels that allow for UU/UE.

Periodic monitoring of the LUCs is required. It consists of conducting site inspections to confirm whether the LUCs remain effective and meet objectives for continued remedy protectiveness. The frequency of the inspections is not less than once per quarter and as necessary. Monitoring results are to be included in an annual LUC monitoring report that is provided to the Ohio EPA and used for five-year reviews. The LUC monitoring reports require written certification stating whether or not the LUCs remain in place and are effective.

4.3.1.2 ESD Remedy

An ESD (USACE 2015a) was prepared to enable using the site as a Multi-Purpose Machine Gun range, which requires more flexibility for training than currently allowed for the Mark 19 Grenade Machine Gun range. A RAO was identified in the *Remedial Design for Post ROD Changes to the Remedy at RVAAP-05 Winklepeck Burning Grounds* (USACE 2015c) as:

> *"Prevent exposure to soils with contaminant concentrations greater than cleanup goals which are based on USEPA Industrial RSLs."*

COCs and cleanup goals identified in the 2015 ESD include PAHs, RDX, and TNT at concentrations that meet the 10^{-5} cumulative excess lifetime cancer risk and a non-cancer HI of 1 for a full-time military workers (commercial/industrial land use). Remedial action requirements for these COCs are expressed in terms of areas, depths, and volumes of contaminated soil to be removed. The *Draft Remedial Investigation/Feasibility Study Supplement for RVAAP-05 Winklepeck Burning Grounds* (USACE 2014) provides COC concentrations corresponding to these cleanup goals, which are listed in Table 7.

Table 7 Winklepeck Burning Grounds Soil Cleanup Goals for 2015 ESD Remedial Action

COC	Cleanup Goal (mg/kg)	Basis[7]
Explosives		
RDX	240	1
2,4,6-TNT	420	2
SVOCs		
Benzo(a)pyrene	2.1	1

1 Target cancer cumulative risk = 10^{-5}

2 Total hazard quotient = 1

The remedy requires removal of approximately 5,280 cubic yards (yd^3) of contaminated soil from former burning pads 38, 61/61A, and 66/67.

4.3.2 Remedy Implementation

4.3.2.1 ROD Remedy

4.3.2.1.1 Soil Excavation

The ROD remedy was implemented in 2008 and 2009. A total of 7,384 yd^3 of soil was removed and disposed off-site (Table 8). The excavated areas are illustrated in Figure 8.

[7] USEPA Industrial Soil Risk Screening Levels

Table 8 Volume of Excavated Soil and Dry Sediment from Winklepeck Burning Grounds

Location	Excavated Soil and Dry Sediment (yd³)
Pad 61	2,334
Pad 61 Berm	2,000
Pad 61A	2,160
Pad 67	90
Pad 70	800
Total	7,384

A total of 19 MEC items were recovered and demolished during the remedial action, which included Mark II hand grenades, 40-millimeter practice grenades, point detonating fuses, point detonating device M52B1, grenade fuses, and a base detonating fuse. Recovered scrap metal was inspected to ensure that explosive materials were absent. It was subsequently shipped off-site for recycling.

ACM was discovered during excavation activities at burning pads 61 and 61A. Work was paused while health and safety concerns were addressed; the excavation was then resumed as planned. All confirmation samples from the excavations were below the site cleanup goals.

4.3.2.1.2 LUCs

A final PMP was issued in 2012 (USACE 2012b). It describes LUCs and restrictions for AOCs at Camp Ravenna. Land use and engineering controls for Winklepeck Burning Grounds are provided in an appendix to the PMP that includes:

- A description of land use and activities
- A map showing the location and dimensions of the AOC
- A description of the LUCs
- Monitoring and reporting requirements

4.3.2.2 ESD Remedy

The ESD remedial action was started in November 2016.

4.3.3 Maintenance and Monitoring

Quarterly LUC inspections have been conducted at Winklepeck Burning Grounds since February 2013. They included:

- A review of training applicable to the site-specific LUCs
- An inspection of the Camp Ravenna perimeter fence to ensure that it is maintained in a manner that is protective and deters trespassers
- A review of current land uses at the site to determine if they are in compliance with the LUCs
- A description of any noted LUC deficiencies, any corrective actions taken to remedy the deficiencies, and/or any recommended corrective action

Annual and quarterly reports have been issued since 2013. Results are summarized below.

- LUC awareness training and refresher training has been provided annually to all Camp Ravenna staff and tenant units at Camp Ravenna. Military units have also been briefed prior to using the range.
- The entire Camp Ravenna perimeter fence has been inspected quarterly. Breaches in the fence that would allow an adult unlawful access to the installation were documented and compiled on GIS-based figures. Overall, the fence has been intact and in good condition. The ARNG has been notified of any breaches and subsequent LUC inspections checked these areas to verify whether required repairs have been made.
- Land use has been consistent with LUC requirements
- Quarterly and annual LUC monitoring reports have been prepared in accordance with the requirements

4.4 RAMSDELL QUARRY LANDFILL

4.4.1 Remedy Selection

Two separate remedies were selected and implemented at the site. They represent remedial actions identified in a ROD and in a subsequent ROD amendment.

4.4.1.1 ROD Remedy

The ROD for soil and dry sediment at Ramsdell Quarry Landfill was issued in March 2009 (SAIC 2009b). The RAO was to prevent security guard/maintenance worker exposure to contaminants in soil and dry sediment that exceeded cleanup goals listed in Table 9 to a depth of 1 ft bgs.

Table 9 Ramsdell Quarry Landfill Cleanup Goals

COC	Cleanup Goal (mg/kg)
Benz(a)anthracene	13
Benzo(a)pyrene	1.3
Benzo(b)fluoranthene	13
Dibenz(a,h)anthracene	1.3
Indeno(1,2,3-cd)pyrene	13

The selected remedy involved excavation and off-site disposal of contaminated soil and dry sediment that exceeded cleanup goals for reasonably anticipated activities performed at the site. The remedy included the following components:

- Preparation of a remedial design plan
- Excavation of contaminated soil and dry sediment
- Handling of excavated materials
- Off-site disposal
- Confirmatory sampling
- Site restoration
- LUCs

Post-closure care and maintenance of the landfill would continue in accordance with Ohio solid waste regulations.

LUC details were provided in the *Revised Final Remedial Design* (SAIC 2010b). The LUC performance objectives included:

- Maintenance of the Camp Ravenna perimeter fence
- Restricting future land use as "restricted access"
- Maintaining a LUC training program
- Limiting site activities to those that are consistent with the security guard/maintenance worker exposure scenario, which includes site security, safety, natural resources management, and landfill management
- Wetland monitoring for a minimum of five years after completion of the remedial action
- Prohibiting digging or excavation within the AOC boundary with the exception of the sanitary landfill where post-closure care and maintenance activities would be governed by Ohio solid waste regulations

The remedial design established the following actions to ensure that the LUC objectives were met:

- Preparing GIS data and a map identifying the AOC boundary and the LUC location signage/markers would be placed in locations to identify the areas where the LUCs apply
- Incorporating an environmental overlay and appropriate notice procedures into the PMP
- Through the PMP, prohibiting all digging or excavation activities except for ground surface repairs by authorized personnel in support of landfill cap integrity
- Through the PMP, maintaining the Camp Ravenna perimeter fence and restricted access land use of the landfill
- Through the PMP, implementing wetlands monitoring for a minimum of five years after the completion of the remedial action, which would include:
    - Weekly monitoring of the site until storm water pollution prevention plan (SWPPP) requirements were met
    - Quarterly monitoring of the mitigated wetland once the SWPPP controls were achieved
    - Removal of invasive species to ensure that no more than 25 percent invasive species were present in the established wetland
    - Preparation of an annual report that summarizes quarterly monitoring activities

LUCs would be maintained until the contaminant concentrations in soil and groundwater were reduced to levels that allow for unrestricted use. Wetland monitoring may be discontinued after a minimum five year period.

4.4.1.2 ROD Amendment Remedy

An engineering evaluation (SAIC 2011b) was performed to address friable ACM that was encountered during implementation of the remedial action. A ROD amendment (SAIC 2013) was issued in May 2013 because the presence of friable ACM was considered a fundamental change to the basic features of the remedy selected in the ROD with respect to scope, performance, or cost. The following RAO for this amended remedial action was presented in the *Final Remedial Design for Soil and Dry Sediment at RVAAP-01 Ramsdell Quarry Landfill* (Leidos 2014b):

- Protect future receptors from remaining COCs in soil above site cleanup goals and residual asbestos by restricting access to the AOC.

The amended remedy consisted of:

- A fence at the perimeter of the site to encompass the closed landfill, quarry bottom, and wetlands
- Implementing best management practices to remove surficial ACM through non-intrusive/no-digging methods

4.4.2 Remedy Implementation

4.4.2.1 ROD Remedy

The remedial action was started in 2010 with the excavation of soil and dry sediment in the quarry bottom at the northeastern section of the site. Debris was encountered in the excavation that included construction and miscellaneous material that was suspected ACM. ACM was not identified as a COC in the ROD and the following actions were taken:

- Samples were collected to verify the waste profile, which confirmed that friable ACM was present
- A plan was developed to handle, transport, and dispose of the soil/ACM
- The excavation was continued until ACM was no longer visible
- The area was restored

Approximately 1,100 tons of soil and construction debris (considered friable ACM) was removed and disposed off-site. The excavation area encompassed approximately 10,000 square feet (ft^2) and extended approximately 5,800 ft^2 beyond the delineated excavation area. Figure 9 shows the location of the excavation area. The remedial action was not completed because the presence of ACM in the quarry bottom was considered an appreciable change in scope, performance, and cost of attaining the remedy for soil and dry sediment.

LUCs were instituted in December 2014, they consisted of:

- Prohibiting all digging or excavation within the quarry bottom
- Installation and maintenance of permanent warning signs, every 300 ft, on the landfill perimeter fences and gates in accordance with Ohio Administrative Code (OAC) 3745-20-07(B)(1)(b)
- A requirement to brief any personnel entering the quarry bottom on the asbestos hazards and a requirement to sign an access log sheet for each entry/exit

4.4.2.2 ROD Amendment Remedy

The ROD amendment remedy was implemented in August to November 2014. It consisted of:

- Installation of 914 ft of chain-link security fence at the landfill boundary with Ramsdell Road
- Installation of five-strand high tensile wire fence at the eastern, southern, and western perimeter of the landfill
- Placement of asbestos warning signs on the perimeter fences at 300 ft centers
- Removal of approximately 200 pounds of ACM from the ground surface, containerization, and off-site disposal

Figure 9 shows the location of the perimeter fence.

4.4.3 Maintenance and Monitoring

Inspections are conducted annually to confirm that the LUCs are effective. They consist of:

- A review of LUC training, correspondence, maintenance logs, access logs, and other documentation applicable to the site
- An evaluation of site activities to ensure that established digging restrictions and exposure limits (i.e. one hour per day for 250 days per year for 25 years) are being complied with
- Inspection of the warning signs, fencing, and gates

Any LUC deficiencies or inconsistent land uses will be identified on an inspection form and reported to ANRG and OHARNG.

One annual inspection has been performed since the LUCs were instituted in December 2014. Results were documented in a 2015 Annual Land Use Control Monitoring Report (Vista 2016a) and are summarized below. No deficiencies were noted.

- Land use has not changed at the site
- Repairs to the high tensile wire fence were made (single strand wire breaks)
- Eroded areas outside of the landfill cap were repaired
- Annual mowing was conducted in October 2015
- Weekly inspections of the landfill were performed in accordance with state of Ohio solid waste regulations and the *Director's Final Findings and Orders*
- Exposures to personnel entering the site were tracked on sign in/out sheets
- The warning signs were present and in good condition
- The perimeter fences and gates were intact and in good condition; no deficiencies were noted
- Annual LUC training was provided to Camp Ravenna staff and tenants in March 2015
- A "LUC brief for contractors/personnel" was conducted for all individuals that entered the site

5.0 PROGRESS SINCE LAST REVIEW

The first five-year review of Load Lines 1-4, Load Line 12, Winklepeck Burning Grounds, and Ramsdell Quarry Landfill was performed and a report was issued in August 2012. The following protectiveness statements were provided in the first five-year review report:

- **Load Lines 1, 2, and 4** (Protective) The remedies at Load Lines 1, 2, and 4 are protective of a OHARNG trainee engaged in mounted training with no digging because contaminated soil and dry sediment exceeding cleanup levels has been excavated and disposed off-site.
- **Load Line 3** (Short-term protective) The remedy at Load Line 3 currently protects an OHARNG trainee engaged in mounted training with no digging because the site is fenced and OHARNG has not used the site. However, in order for the remedy to be protective in the long-term, environmental data should be evaluated to determine if additional sampling and/or remediation is needed to address the presence of benzo(a)pyrene, Aroclor-1254, and manganese above cleanup levels specified in the Interim ROD.
- **Load Line 12** (Short-term protective) The remedy at Load Line 12 currently protects an OHARNG trainee engaged in mounted training with no digging because contaminated soil and dry sediment exceeding the cleanup level has been excavated and disposed off-site. The site is not used by OHARNG and access is restricted by a perimeter fence. However, in order for the remedy to be protective in the long-term, LUCs must be officially implemented through a PMP.
- **Winklepeck Burning Grounds** (Short-term protective) The remedy at Winklepeck Burning Grounds currently protects the OHARNG range maintenance soldier because contaminated soil and dry sediment exceeding cleanup levels at former burning pads 61, 61A, 67, and 70 has been excavated and disposed offsite. The site is used by OHARNG as a firing range and access is restricted by OHARNG. However, in order for the remedy to be protective in the long-term, LUCs must be officially implemented through a PMP.
- **Ramsdell Quarry Landfill** (Not protective) The remedy at Ramsdell Quarry is not protective because the remedial action was not completed. It does not protect a current or future security guard/maintenance worker from contaminated soil and dry sediment that are present at the site.

Table 10 lists issues and recommendations identified in the first five-year review.

Table 10 Issues Identified and Recommendations Provided in the First Five-Year Review

Issue	Recommendation	Affects Protectiveness?	
		Short-term	Long-term
1. LUCs have not been officially implemented through a PMP on Load Line 12, Winklepeck Burning Grounds, and the Ramsdell Quarry Landfill.	Complete the Facility-Wide PMP currently being drafted for each of the RVAAP sites to ensure future protectiveness and officially implement the LUCs	No	Yes
2. Benzo(a)pyrene, Aroclor-1254, and manganese were detected in soil and dry sediment at Load Line 3 at concentrations that exceeded the cleanup goals specified in the Interim ROD	Evaluate current environmental data and determine if additional sampling and/or remediation is needed at Load Line 3 to address the presence of benzo(a)pyrene, Aroclor-1254, and manganese above the cleanup levels specified in the Interim ROD	No	Yes
3. The remedial action was not completed at Ramsdell Quarry Landfill due to the presence of ACM in the subsurface	Reevaluate remedial alternatives for Ramsdell Quarry Landfill due to the fundamental change resulting from the presence of friable ACM encountered during the remedial action	Yes	Yes

The status of these recommendations and actions taken since the last five-year review to address them are discussed below.

<u>Issue 1</u>: A facility-wide PMP was issued in August 2012. It identifies LUCs and restrictions for Winklepeck Burning Grounds and provides mechanisms to implement and manage those LUCs. LUCs for Ramsdell Quarry Landfill and Load Line 12 have not been added to the PMP. LUC details for Ramsdell Quarry Landfill are provided in the remedial design report (SAIC 2010b) and have been implemented since December 2014. LUCs for Load Line 12 will be incorporated into the PMP in 2017. This site has not been used since the previous five-year review.

<u>Issue 2</u>: Environmental data has been collected and is being evaluated in a FS Addendum; a draft report was issued in November 2016. Load Line 3 has not been used since the previous five-year review.

<u>Issue 3</u>: Remedial alternatives were reevaluated in a ROD amendment that was issued in 2013. The revised remedy was implemented in 2014.

There were no other prior issues at these sites.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

The following activities were performed for the five-year review:

- Potentially interested parties and the local community were notified of the start of the five-year review
- Documents and site data were reviewed
- Site inspections were performed
- Interviews were conducted with ARNG, Camp Ravenna employees and contractors, USACE Louisville District employees, Ohio EPA, and a community Restoration Advisory Board (RAB) member

This five-year review report was conducted and written by staff of the USACE Buffalo District.

- Laura Allen, Environmental Engineer
- Michelle Barker, FE, PMP, HTRW Regional Technical Specialist
- Karen Keil, PhD, Environmental Toxicologist
- Jim Stachowski, PE, Environmental Engineer

Staff from Camp Ravenna also provided assistance.

- Kevin Sedlak, Restoration Project Manager
- Katie Tait, Environmental Specialist

6.2 Community Notification and Involvement

A public notice was issued to potentially interested parties and community RAB members that the five-year review process had begun. The notice was published in two local newspapers, the Akron Beacon Journal (August 21, 2016) and the Record-Courier (August 28, 2016). Copies of the notice and newspaper articles are provided in Attachment 9.

The five-year review report will be made available to the public once it has been finalized. Copies of the report will be placed in the repositories identified below.

Reed Memorial Library
167 East Main Street
Ravenna, Ohio 44266

Newton Falls Public Library
204 South Canal Street
Newton Falls, Ohio 44444

An electronic copy will also be available at http://www.rvaap.org.

Upon completion of the five-year review report, a public notice will be placed in the Akron Beacon Journal, the Record-Courier, and the Tribune Chronicle to announce availability of the report in the document repositories.

6.3 DOCUMENT REVIEW

Relevant, site-related documents were reviewed, including the RODs, remedial design reports, ESD, remedial action completion reports, PMP, and monitoring/inspection reports. A complete list of documents reviewed is provided in Attachment 2.

6.4 DATA REVIEW

6.4.1 Load Lines 1 Through 4

6.4.1.1 Soil and Dry Sediment

New soil and dry sediment data since the previous five-year review is documented in the *Final Characterization Sampling Report of Surface and Subsurface Incremental Sampling Methodology at RVAAP-08, 09, 10, 11, and 12, Load Lines 1, 2, 3, 4 and 12* (Prudent 2013) and the *Draft Feasibility Study Addendum for Soil, Sediment, and Surface Water at RVAAP Load Lines 1, 2, 3, 4, and 12* (Leidos 2016j). This five-year review compared analytical results to the Interim ROD cleanup goals (Table 4). Concentrations that exceed these cleanup goals are summarized below. Data summary tables from the reports are provided in Attachment 11.

6.4.1.1.1 Load Line 1

Interim ROD cleanup goals were exceeded at sample location LL1SB-638M13, which was situated near former building CB-4A. A discrete sample from 1.0 to 5.0 ft bgs contained RDX at 1,500 mg/kg and 2,4,6-TNT at 2,700 mg/kg.

6.4.1.1.2 Load Line 2

An Interim ROD cleanup goal was exceeded at sample location LL2SD-631, which was situated in drainage channel. A discrete sample from 0 to 1 ft bgs contained benzo(a)pyrene at 23.6 mg/kg.

6.4.1.1.3 Load Line 3

Interim ROD cleanup goal exceedances were identified in the previous five-year review at three sample locations:

- LL3SB-414M-0102-SO, situated near former building EB-10A. An incremental sample from 3.0 to 5.0 ft bgs contained benzo(a)pyrene at 47 mg/kg.
- LL3SB-413M-0101-SO, situated near former building EB-4. An incremental sample from 1.0 to 3.0 ft bgs contained Aroclor 1254 at 100 mg/kg.
- LL3SD-416-001-SO, situated in a creek bed at the southwest section of the site. A discrete sample from 0 to 0.5 ft bgs contained manganese at 3,700 mg/kg. This location also includes co-located quality control and quality assurance samples LL3SD-417M-001-SO (3,400 mg/kg) and LL3SD-418M-001-SO (4,880 mg/kg).

Exceedances of the Interim ROD cleanup goals were not identified in soil and dry sediment data obtained since the previous five-year review.

6.4.1.2 Load Line 4

An Interim ROD cleanup goal was exceeded at sample location LL4SB-402M07, which was situated near former building G-8. A sample from 1 to 7.0 ft bgs contained benzo(a)pyrene at 51 mg/kg.

6.4.1.3 Groundwater

Groundwater data from monitoring wells at Load Lines 1-4 was evaluated in this five-year review to determine whether the remedial activities impacted groundwater and to determine pre-remedial groundwater conditions. Groundwater sampling has been performed under the Facility-Wide Groundwater Monitoring Program and did not follow the frequencies identified in the Interim ROD. Table 11 provides a summary of pre-remedial groundwater conditions. Results of the data evaluation are provided in Attachment 10 and discussed below.

6.4.1.3.1 Load Line 1

Analytical data for Interim ROD COCs from monitoring wells LL1mw-067, -078, -081, -082, -084, and -085 was evaluated. Information provided in Attachment 10, Table A10-1 (Load Line 1 Groundwater Data Summary) and Table A10-3 (Load Line 1 Groundwater Trend Plots) indicates that no impacts were observed.

- All PCB and PAH results since the remedial action have been non-detect.
- Most explosives results were non-detect. Trend plots for well LL1mw-084 show no apparent trends for 2,4,6-TNT and RDX.
- Many of the inorganic COC results were non-detect. Trend plots for wells that contained detectable concentrations of inorganic COCs and Mann-Kendall trend analysis (where appropriate) show no apparent trends or downward trends.

6.4.1.3.2 Load Line 2

Analytical data for Interim ROD COCs from monitoring wells LL2mw-262, -263, -266, -267, and -269 was evaluated. Information provided in Attachment 10, Table A10-4 (Load Line 2 Groundwater Data Summary) and Table A10-6 (Load Line 2 Groundwater Trend Plots) indicates that no impacts were observed.

- All PCB and PAH results since the remedial action have been non-detect.
- Explosives results for wells LL2mw-262, -263, -266, -267, and -269 were non-detect. Trend plots and Mann-Kendall trend analysis for 2,4,6-TNT and RDX at LL2mw-267 show no trend.
- Many of the inorganic COC results were non-detect. Trend plots for wells that contained detectable concentrations of inorganic COCs and Mann-Kendall trend analysis (where appropriate) show no apparent trends or downward trends.

6.4.1.3.3 Load Line 3

Analytical data for Interim ROD COCs from monitoring wells LL3mw-236, -238, and -239 was evaluated. Information provided in Attachment 10, Table A10-7 (Load Line 3 Groundwater Data Summary) and Table A10-9 (Load Line 3 Groundwater Trend Plots) indicates that no impacts were observed.

- All PCB and PAH results since the remedial action have been non-detect.
- Trend plots and Mann-Kendall trend analysis for 2,4,6-TNT and RDX at LL3mw-236 and -238 were either non-detect or showed downward trends. Trends at LL3mw-239 were downward for 2,4,6-TNT and upward for RDX. The RDX trend plot shows that post remedial action groundwater sampling was first conducted approximately three years after the contaminated soil was excavated. It is unlikely that the excavations at former

building EB-4A (nearest area remediated) is the cause of the apparent upward trend for RDX.

- Many of the inorganic COC results were non-detect. Trend plots for wells that contained detectable concentrations of inorganic COCs and Mann-Kendall trend analysis (where appropriate) show no apparent trends or downward trends.

6.4.1.3.4 Load Line 4

Analytical data for Interim ROD COCs from monitoring wells LL4mw-196, -197, and -198 was evaluated. Information provided in Attachment 10, Table A10-10 (Load Line 4 Groundwater Data Summary) and Table A10-12 (Load Line 4 Groundwater Trend Plots) indicates that no impacts were observed.

- All PCB and PAH results since the remedial action have been non-detect.
- All RDX results and most 2,4,6-TNT results were non-detect.
- Many of the inorganic COC results were non-detect. Trend plots for wells that contained detectable concentrations of inorganic COCs and Mann-Kendall trend analysis (where appropriate) show no apparent trends.

6.4.2 Load Line 12

No exceedances of the arsenic cleanup goal were identified in new soil and dry sediment data since the previous five-year review.

6.4.3 Winklepeck Burning Grounds

No new soil and dry sediment data were available for review since the previous five-year review.

6.4.4 Ramsdell Quarry Landfill

No new soil and dry sediment data were available for review since the previous five-year review.

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Table 11 Pre-remedial Groundwater Conditions at Load Lines 1 Through 4 [1]

Well	Date	COC													
		2,4,6-TNT	RDX	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoroanthene	Dibenz(a,h)anthracene	PCB-1254	Aluminum	Antimony	Arsenic	Barium	Cadmium	Lead	Manganese
Load Line 1															
LL1-MW-067	8/1/2007	0.001	0.001	0.00549	0.00549	0.00549	0.00549	0.00051	0.1	0.00088	0.001	0.0203	0.01	0.001	0.0454
LL1-MW-078	8/2/2007	0.00102	0.00102	0.0051	0.0051	0.0051	0.0051	0.0005	0.1	0.000385	0.001	0.0115	0.01	0.001	0.0559
LL1-MW-081	8/2/2007	0.00102	0.00102	0.0051	0.0051	0.0051	0.0051	0.0005	0.1	0.001	0.00102	0.0236	0.01	0.001	2.09
LL1-MW-082	8/2/2007	0.001	0.001	0.0051	0.0051	0.0051	0.0051	0.0005	0.1	0.001	0.00191	0.0103	0.01	0.001	0.693
LL1-MW-084	8/2/2007	0.00918	0.00242	0.0051	0.0051	0.0051	0.0051	0.000538	1.59	0.000322	0.001	0.0166	0.01	0.00281	0.306
LL1-MW-085	8/2/2007	0.00105	0.00105	0.005	0.005	0.005	0.005	0.00051	1.59	0.000322	0.001	0.0166	0.01	0.00281	0.306
Load Line 2															
LL2mw-262	8/1/2007	0.00105	0.00105	0.00538	0.00538	0.00538	0.00538	0.000526	0.1	0.000315	0.000312	0.0151	0.01	0.001	0.291
LL2mw-263	8/1/2007	0.00102	0.00102	0.00538	0.00538	0.00538	0.00538	0.000521	0.1	0.001	0.0104	0.0311	0.01	0.001	0.837
LL2mw-266	8/1/2007	0.00103	0.00103	0.00532	0.00532	0.00532	0.00532	0.000549	0.1	0.000452	0.00488	0.0215	0.01	0.001	1.12
LL2mw-267	8/1/2007	0.00104	0.00104	0.005	0.005	0.005	0.005	0.000532	0.1	0.000525	0.00438	0.0241	0.01	0.001	0.594
LL2mw-269	7/31/2007	0.00104	0.00104	0.00521	0.00521	0.00521	0.00521	0.00051	0.1	0.001	0.000623	0.263	0.01	0.000423	1.78
Load Line 3															
LL3mw-236	7/31/2007	0.00105	0.00105	0.00526	0.00526	0.00526	0.00526	0.000562	0.1	0.001	0.000277	0.01	0.01	0.001	0.599
LL3mw-238	7/31/2007	0.0642	0.00842	0.0051	0.0051	0.0051	0.0051	0.00051	0.1	0.001	0.000434	0.01	0.01	0.001	0.01
LL3mw-239	7/30/2007	0.00105	0.00105	0.00521	0.00521	0.00521	0.00521	0.000532	0.1	0.00053	0.000981	0.0133	0.01	0.001	0.413
Load Line 4															
LL4mw-196	7/30/2007	0.00102	0.00102	0.0051	0.0051	0.0051	0.0051	0.00051	0.1	0.001	0.000709	0.0284	0.01	0.001	0.115
LL4mw-197	7/30/2007	0.00102	0.00102	0.0051	0.0051	0.0051	0.0051	0.00051	0.1	0.000333	0.000268	0.00397	0.01	0.000333	0.01
LL4mw-198	7/30/2007	0.00102	0.00102	0.00556	0.00556	0.00556	0.00556	0.0005	0.1	0.001	0.000421	0.00941	0.01	0.001	1.23

1 All results are mg/L

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6.5 SITE INSPECTIONS

Site inspections were conducted by USACE on August 10, 2016 to obtain familiarity with the sites, review records, examine the remediated areas, and assess protectiveness of the remedies. Observations are summarized below. Completed site inspection checklist forms are provided in Attachment 4 and site photographs are provided in Attachment 5.

6.5.1 Load Lines

Site conditions have not changed since the first five-year review. No additional remedial activities have occurred and the sites have not been used for military training. Load Lines 1, 2, 3, 4 and 12 are surrounded by perimeter fences with warning signs and reflective tape placed in strategic areas to prevent access by OHARNG personnel. The former buildings, including floor slabs, have been removed and the building footprints consist of grass-covered, open areas. Concrete walkways that previously connected these buildings are present. Railroad tracks and site roads have been removed and their corridors are now used to provide access for site maintenance and environmental sampling. The remainder of the sites consists of open grassland, scrub-brush, and forested areas. Remedial action areas have been backfilled to surrounding grades and revegetated. There was no evidence of unauthorized access or use of the sites. The monitoring wells were observed to be secure and in good condition.

6.5.2 Winklepeck Burning Grounds

Winklepeck Burning Grounds is an active firing range used by OHARNG. The site consists of open grass-covered land with gently undulating topography. East-west trending gravel or dirt roads traverse the site and are connected on each end by north-south trending roadways. An observation/control building is located at the western end of the site and other range infrastructure is present. Evidence of the former burning pads was not apparent. Remediated areas have been backfilled to surrounding grades and re-vegetated. Site access is restricted by OHARNG due to its use as a firing range.

6.5.3 Ramsdell Quarry Landfill

Ramsdell Quarry Landfill is a closed landfill located within a former quarry. The site is bounded to the north by Ramsdell Road and to the south by a rail line. The landfill surface slopes to the quarry bottom from the south and west. A wetland is present in the quarry bottom. The landfill cap is a grass-covered, maintained surface that appeared to be intact with no evidence of erosion or slope failure. Monitoring wells are secure and in good condition. The remediated area has been backfilled and revegetated. The landfill is surrounded by a perimeter fence that consists of a chain link fence at the boundary with Ramsdell Road and a five-strand wire fence at the eastern, southern, and western perimeter. Two types of warning signs are posted on the fences, an asbestos warning sign and a “danger unauthorized personnel keep out” sign. Two fence gates along Ramsdell Road were locked and a sign in/out form was available for authorized personnel who access the site. There was no evidence of trespass or OHARNG use. No significant maintenance issues were identified during the site inspection.

6.6 INTERVIEWS

Interviews were conducted with ARNG, OHARNG (Camp Ravenna), USACE (Louisville District), Vista Sciences Corporation, Ohio EPA, and the RVAAP RAB to provide additional information about the status of sites evaluated in the five-year review. A summary of relevant issues from the interviews is provided below. Complete interview records are provided in Attachment 6.

6.6.1 Army National Guard Directorate

Mark Leeper, ARNG Environmental Cleanup Program Manager, did not identify any complaints, violations, or other incidents at the sites that required a response by his office. He was also not aware of any information that could call into question the protectiveness of the remedies.

6.6.2 Camp Ravenna

Kevin Sedlak, Camp Ravenna Restoration Program Manager, and Katie Tait, OHARNG Environmental Specialist, were interviewed.

Kevin's interview provided the following relevant information:

- The load line sites could not be used for military training after the removal actions were performed because of restrictions placed on their use. Additional samples have been collected and a FS addendum is being prepared.
- LUCs for Ramsdell Quarry Landfill will be incorporated into an upcoming version of the PMP.
- ESD removal actions are ongoing at Winklepeck Burning Grounds and are expected to be completed by the end of November 2016.

Katie's interview provided the following relevant information:

- A FS addendum is being performed for Load Lines 1, 2, 3, 4, and 12 to evaluate any additional remedial options that may be required to clean up the sites to a residential or commercial/industrial standard. The sites are being maintained for restricted access and perimeter gates are kept locked. A Camp Ravenna annual training memo identifies these areas as "restricted access".
- A paper copy of the PMP at Camp Ravenna has been updated to include the LUC requirements for Ramsdell Quarry Landfill.
- The ESD remedy at Winklepeck Burning Grounds is ongoing (November 2016). Pursuant to agreement with Ohio EPA, the Camp Ravenna perimeter fence will no longer be inspected during the routine Winklepeck Burning Grounds LUC inspections.

6.6.3 USACE Louisville District

Gregory Moore, Project Manager, Nathaniel Peters, Environmental Engineer, and Angela Schmidt, Risk Assessor, were interviewed.

Greg's interview provided the following relevant information:

- LUCs at the load line sites, as interpreted by Ohio EPA, have been too restrictive. The sites are currently undergoing a soil optimization study to eliminate the need for full cleaning of military vehicles during training.
- LUCs for Ramsdell Quarry Landfill will be incorporated into an upcoming version of the PMP. (Planned for fiscal year 2017).

- Soil removal actions at Winklepeck Burning Grounds will occur in November 2016.

Nathaniel's interview provided the following relevant information:

- A FS addendum is being prepared to assess the need for additional remediation to achieve residential or commercial/industrial land use standards. The document will incorporate environmental actions that have occurred at the sites since the Interim ROD remedial actions (Load Lines 1 - 4) and the ROD remedial action (Load Line 12).
- LUC monitoring and maintenance activities have been implemented at Ramsdell Quarry Landfill and an update to the PMP, which includes these LUCs, is draft form.
- The ESD for Winklepeck Burning Grounds changed the LUC requirements and inspection of the Camp Ravenna perimeter fence is no longer necessary. This change will be in effect after the ESD remedial action is completed.

Angela indicated that the load line sites cannot be used as intended (military training, vehicle maneuver area) due to monitoring requirements that would be implemented during the training. Additional sampling and analysis is ongoing and the sites will be remediated to residential or commercial/industrial land use criteria. A FS addendum is being prepared.

6.6.4 Vista Sciences Corporation

Allan Brillinger, Program Manager for Vista Sciences Corporation, (Camp Ravenna monitoring and maintenance contractor) indicated quarterly inspections of the Ramsdell Quarry Landfill will be started in September 2016 using a *Closed Municipal Solid Waste Landfill Inspection* checklist. The completed checklists and an annual report will be submitted to Ohio EPA to comply with Ohio regulations for closed municipal solid waste landfills.

6.6.5 Ohio EPA

Interview responses were provided by Ohio EPA employees Rodney Beals, Sue Watkins, and Nicholas Roope. Relevant information is summarized below.

6.6.5.1 Load Lines 1 Through 4

Ohio EPA would like more detail about the status of ongoing activities (particularly sampling) at these sites.

6.6.5.2 Load Line 12

Ohio EPA would like more detail about the status of ongoing activities (particularly sampling) at this site.

6.6.5.3 Winklepeck Burning Grounds

The Camp Ravenna fence will no longer be needed as a LUC after remedial activities outlined in the 2015 ESD are completed.

6.6.5.4 Ramsdell Quarry Landfill

Solid waste and ACM were observed at the quarry bottom during an inspection conducted when the water level in the pond was low. The waste and ACM are uncapped and may result in environmental impact and human exposure.

6.6.6 Restoration Advisory Board

Tom Tadsen, RVAAP RAB Co-Chair, indicated that the surrounding communities are concerned about potential contamination leaving the installation (Camp Ravenna) via groundwater. The communities have also expressed concerns about perceived increased cancer incidences, and the establishment and enforcement of LUCs at Camp Ravenna. He suggested that OHARNG provide an update regarding intended range (Winklepeck Burning Grounds) modifications, environmental considerations, and any potential problems. Infrequent instances of trespassing and vandalism have occurred at Camp Ravenna.

7.0 TECHNICAL ASSESSMENT

7.1 LOAD LINES 1 THROUGH 4

7.1.1 Question A:

Is the Remedy Functioning as Intended by the Decision Document?

Yes, the remedy is functioning as intended by the Interim ROD.

The soil removal action was implemented and is complete. Closure report documentation and site observations indicate that the remedy was properly executed and satisfied the RAO. Contaminated soil and dry sediment was removed in accordance with the Interim ROD and disposed off-site.

Analytical data for Interim ROD COCs from wells identified in the *Final Remedial Action Work Plan of Soils at Load Lines 1, 2, 3, and 4* (Shaw 2007) showed no impacts to groundwater from the remedial action. Groundwater monitoring has been conducted in accordance with a facility-wide monitoring program, which obeys the spirit of the Interim ROD.

There are no operation, maintenance, and monitoring activities associated with the soil/dry sediment remedy. Groundwater monitoring at the sites is conducted on a facility-wide basis that is not included in the Interim ROD.

There are no early indicators of potential problems. The five-year review did not identify opportunities for optimization.

7.1.2 Question B:

Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of the Remedy Still Valid?

The exposure assumptions used at the time of the remedy are not valid. The building slabs were removed in 2008 and contaminated soil beneath and adjacent to the slabs was subsequently removed.

The toxicity data, cleanup levels, and RAO used at the time of the remedy selection are still valid. The USEPA’s current recommended default exposure factor values are generally less conservative than what was used to initially assess risk and develop site-specific cleanup goals, so the basis of the exposure assessment remains protective. There have been no changes in land use since the Interim ROD was issued and exposures are not occurring at the site. No new toxicity criteria changes have occurred since the previous five-year review that would affect the protectiveness of the cleanup goals. A more complete risk assessment and toxicology evaluation is provided in Attachment 8.

No chemical-specific applicable or relevant and appropriate requirements (ARARs) were identified in the Interim ROD. Attachment 7 provides a comprehensive ARAR evaluation.

7.1.3 Question C:

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

Yes, information has come to light that could call into question the protectiveness of the remedy. Results of soil/dry sediment sampling conducted after the Interim ROD remedial action indicate that soil/dry sediment contamination above the cleanup goals is present at one location on Load Line 1, one location on Load Line 2, three locations on Load Line 3, and one location on Load Line 4. Exceedances were documented for 2,4,6-TNT, RDX, benzo(a)pyrene, Aroclor-1254, and manganese.

Natural disasters have not occurred since the remedial action was conducted in 2007.

7.1.4 Summary

The remedy is functioning as intended by the Interim ROD; it was implemented and is complete. Closure report documentation and site observations indicate that the remedy was properly executed and satisfies the RAO. No impacts to groundwater from the remedial action were observed.

Additional investigations and remedial actions have been conducted since the remedy was implemented. Results of soil/dry sediment sampling conducted after the Interim ROD remedial action indicate that soil/dry sediment contamination above the cleanup goals is present. The sites are currently undergoing a FS addendum to evaluate the need for additional soil and dry sediment remediation to enable less restrictive use. These activities were not identified in Interim ROD.

The exposure assumptions used at the time of the remedy are not valid, although land use has not changed since the Interim ROD was issued and exposures are not occurring. The toxicity data, cleanup levels, and RAO used at the time of the remedy selection are still valid. No chemical-specific ARARs were identified in the Interim ROD.

No other information has come to light that could call into question the protectiveness of the remedy.

7.2 LOAD LINE 12

7.2.1 Question A:

Is the Remedy Functioning as Intended by the Decision Document?

Yes, the remedy is functioning as intended by the ROD.

The removal action was implemented and is complete. Closure report documentation and site observations indicate that the remedy was properly executed and satisfied the RAO. Contaminated soil and dry sediment was removed in accordance with the ROD and disposed off-site.

LUCs have not been implemented. Access to the site is restricted by a perimeter fence and warning signs. OHARNG is not using the site and does not permit troop training in this area. The five-year review site inspection did not identify evidence of site use or trespass. Camp Ravenna is planning to implement LUCs at the site after additional remediation (if needed) to attain less restrictive use is completed. This is scheduled for 2017.

There are no early indicators of potential problems. The five-year review did not identify opportunities for optimization.

7.2.2 Question B:

Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of the Remedy Still Valid?

Yes, the exposure assumptions, toxicity data, cleanup levels, and RAO used at the time of the remedy selection for soil and dry sediment are still valid. The USEPA's current recommended default exposure factor values are generally less conservative than what was used to initially assess risk and develop site-specific cleanup goals. The basis of the exposure assessment used to develop site cleanup goals remains protective. There have been no changes in the exposure pathways and land use since the ROD was issued and exposures are not currently occurring at the site. No new toxicity criteria changes have occurred since the previous five-year review that would affect the protectiveness of the cleanup goals. A more complete risk assessment and toxicology evaluation is provided in Attachment 8.

No chemical-specific ARARs were identified in the ROD. Attachment 7 provides a comprehensive ARAR evaluation.

7.2.3 Question C:

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has come to light that could call into question the protectiveness of the remedy. Additional characterization of wet sediment and surface water indicated that there are no COCs that pose an unacceptable risk to human health or the environment in these media at this site. The Phase III RIR determined that quantitative ecological cleanup goals were not required (SAIC 2012a). Natural disasters have not occurred since the remedial action was conducted in 2010.

7.2.4 Summary

The remedy is functioning as intended by the ROD; it was implemented and is complete. Closure report documentation and site observations indicate that the remedy was properly executed and satisfies the RAO. Additional investigations have been conducted since the remedy was implemented. These activities were not identified in the ROD.

There is no unacceptable risk and the remedy remains protective of human health and the environment. The exposure assumptions, toxicity data, cleanup levels, and RAO used at the time of the remedy selection are still valid. There have been no changes in toxicity criteria or potential exposures to soil COCs since the cleanup goals were presented in the ROD. The soil/dry sediment risk-based cleanup goals are protective for a National Guard Trainee to a depth of 4 ft bgs. The site has not changed since the remedy was implemented; it is not being used and unauthorized access is prevented by a perimeter fence. No chemical-specific ARARs were identified in the Interim ROD.

No other information has come to light that could call into question the protectiveness of the remedy.

7.3 Winklepeck Burning Grounds

7.3.1 Question A:

Is the Remedy Functioning as Intended by the Decision Document?

Yes, the remedy is functioning as intended by the ROD.

The removal action was implemented and is complete. Closure report documentation and site observations indicate that the remedy was properly executed and satisfies the RAO. An ESD was prepared to enable use of the site as a Multi-Purpose Machine Gun range. The ESD remedy has not been completed.

LUCs have been implemented in accordance with the ROD. Quarterly monitoring and inspections have documented that LUC awareness training, access restrictions, and land uses are being performed/maintained consistent with the ROD. The five-year review site inspection did not identify any unauthorized uses of the site.

There are no early indicators of potential problems. Opportunities for optimization were not identified.

7.3.2 Question B:

Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of the Remedy Still Valid?

Yes, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection (2008 ROD and 2015 ESD) are still valid. There have been no changes in land use and no new exposure pathways since the ESD. A more complete risk assessment and toxicology evaluation is provided in Attachment 8.

No chemical-specific ARARs were identified in the ROD or ESD. Attachment 7 provides a comprehensive ARAR evaluation.

7.3.3 Question C:

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has come to light that could call into question the protectiveness of the remedy. The ROD indicated that mitigation of risks to ecological receptors will be achieved through remediation to protect a range maintenance soldier. Natural disasters have not occurred since the remedial action was implemented in 2008 and 2009.

7.3.4 Summary

The remedy is functioning as intended by the ROD; it was implemented and is complete. Closure report documentation and site observations indicate that the remedy was properly executed and satisfies the RAO. Quarterly monitoring indicates that the LUCs have been implemented and are maintained consistent with the ROD. An ESD was prepared to enable use of the site as a Multi-Purpose Machine Gun Range.

There is no unacceptable risk and the remedy remains protective of human health and the environment. The exposure assumptions, toxicity data, cleanup levels, and RAO used at the time of the remedy selection are still valid. There have been no changes in toxicity criteria or potential exposures to soil COCs since the cleanup goals were presented in the ROD. The soil/dry sediment risk-based cleanup goals are protective for a National Guard Trainee to a depth of 4 ft bgs. Additional removal actions identified in the ESD will remediate COCs exceeding USEPA commercial/industrial risk-based screening levels. This remedial action is currently ongoing.

No other information has come to light that would call into question the protectiveness of the remedy.

7.4 RAMSDELL QUARRY LANDFILL

7.4.1 Question A:

Is the Remedy Functioning as Intended by the Decision Document?

Yes, the remedy is functioning as intended by the ROD and ROD amendment.

The removal action was implemented and is complete. Closure report documentation indicates that the soil removal action was partially executed and terminated due to the presence of friable ACM in the subsurface. A perimeter fence with warning signs was installed and surficial ACM was removed by non-intrusive/no-digging methods. The RAOs identified in the ROD and ROD amendment have been attained.

According to Ohio EPA, solid waste and ACM were observed at the quarry bottom during an inspection conducted when the water level in the pond was low. This five-year review has determined that the perimeter fence and LUCs protect human receptors from any remaining COCs in soil above site cleanup goals and residual asbestos by restricting access to the area.

LUCs have been implemented in accordance with the ROD. The first annual inspection has documented that LUC training, access restrictions, and land uses are being performed/maintained consistent with the ROD. The LUCs have not been officially incorporated into the PMP, although this will be completed in the next version of the PMP. The five-year review site inspection did not identify any unauthorized uses of the site.

7.4.2 Question B:

Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of the Remedy Still Valid?

Yes, the RAOs identified in the ROD and ROD amendment were established to eliminate exposure to site contaminants. Fencing was installed, LUCs were implemented, and training activities are not allowed on the site. There have been no changes in land use or exposure pathways since these decision documents were issued. The RAOs used at the time of remedy selection are still valid and functioning to eliminate the exposure that could lead to unacceptable risks. A more complete risk assessment and toxicology evaluation is provided in Attachment 8.

7.4.3 Question C:

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has come to light that would call into question the protectiveness of the remedy. The ROD indicated that remediation to meet human health cleanup goals will reduce the overall contaminant concentrations and ecological risk. Natural disasters have not occurred since the remedial actions were implemented in 2010 and 2014.

7.4.4 Summary

The remedy is functioning as intended by the ROD and ROD amendment; it is complete. Closure report documentation and site observations indicate that they satisfy the RAOs. Annual LUC inspection indicates that training, access restrictions, and land uses are consistent with ROD requirements.

8.0 ISSUES

Table 12 summarizes issues that affect protectiveness for sites evaluated in this five-year review.

Table 12 Current Issues for the Camp Ravenna Sites That Affect Protectiveness

Issue	Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)
Contaminated soils and dry sediment are present above site cleanup goals at Load Lines 1 - 4 and may be accessible to installation personnel during future military training activities	No	Yes

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 13 provides recommendations to address issues that affect protectiveness at Camp Ravenna sites evaluated in this five-year review.

Table 13 Recommendations to Address Issues That Affect Protectiveness at Camp Ravenna Sites

Issue	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
1	Determine if unacceptable risk associated with remaining contaminated soils at Load Lines 1 - 4 exists and remediate in a manner consistent with the Interim ROD, if necessary to mitigate risk.	Camp Ravenna/ NGB	Ohio EPA	September 2017	No	Yes

Table 14 provides recommendations to address concerns that do not affect protectiveness at Camp Ravenna sites evaluated in this five-year review.

Table 14 Recommendations for Concerns That Do Not Affect Protectiveness at Camp Ravenna Sites

Concern	Recommendations/ Follow-up Actions	Party Responsible
Load Line 12		
LUCs have not been implemented in accordance with the ROD	Incorporate LUCs into the PMP and fully implement them after actions to achieve residential or commercial/industrial use of the site are achieved. In the interim, do not use the site or provide access to the site for activities other than environmental monitoring and remediation.	Camp Ravenna/NGB
Ramsdell Quarry Landfill		
LUCs have not been incorporated into the PMP	Incorporate LUCs into the PMP.	Camp Ravenna/NGB

10.0 PROTECTIVENESS STATEMENTS

10.1 LOAD LINES 1 THROUGH 4

The remedy at Load Lines 1 - 4 currently protects human health and the environment because:

- Contaminated soil/dry sediment identified in the Interim ROD was remediated

However, in order for the remedy to be protective in the long-term, the following action needs to be taken to ensure protectiveness:

- Determine if unacceptable risk associated with remaining contaminated soils at Load Lines 1 - 4 exists and remediate in a manner consistent with the Interim ROD, if necessary to mitigate risk

10.2 LOAD LINE 12

The remedy at Load Line 12 is protective of human health and the environment because:

- Contaminated soil/dry sediment identified in the ROD was remediated
- The site is not being used and access is restricted by a perimeter fence with warning signs

10.3 WINKLEPECK BURNING GROUNDS

The remedy at Winklepeck Burning Grounds is protective of human health and the environment because:

- Contaminated soil/dry sediment identified in the ROD was remediated
- LUCs have been implemented; they are being employed and maintained in accordance with the ROD

10.4 RAMSDELL QUARRY LANDFILL

The remedy at Ramsdell Quarry Landfill is protective of human health and the environment because:

- Contaminated soil/dry sediment was partially remediated
- A perimeter fence with warning signs was installed and surficial ACM was removed by non-intrusive/no-digging methods in accordance with the ROD amendment
- LUCs have been implemented; training, access restrictions, and land uses are being performed/maintained consistent with the ROD

11.0 NEXT REVIEW

The next five-year review of Camp Ravenna sites addressed in this report will be conducted by August 31, 2022.

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ATTACHMENT 1

Figures

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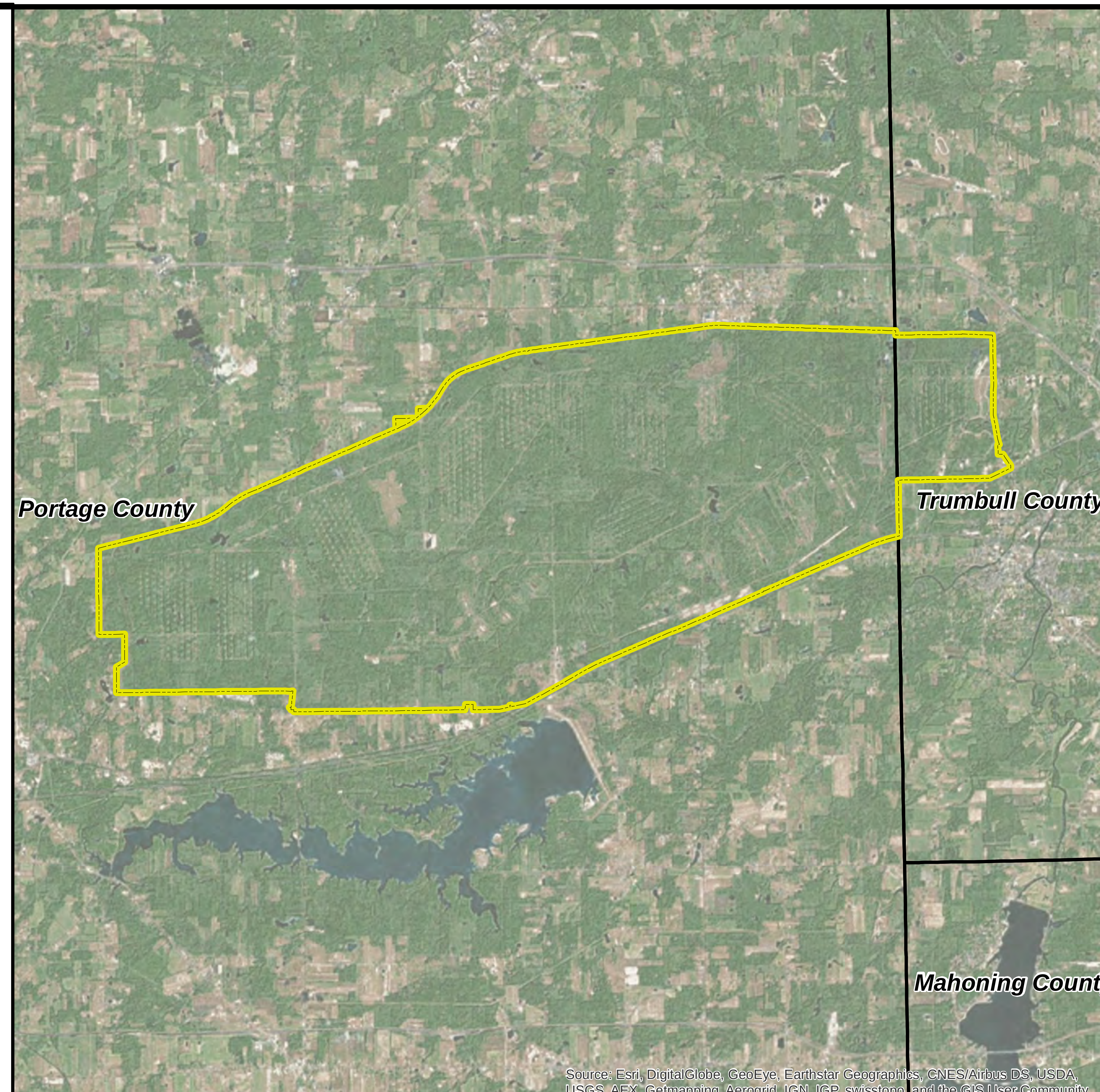

Camp Ravenna Boundary

CountyBoundary

US Army Corps of Engineers
Buffalo District

Camp Ravenna Site Location

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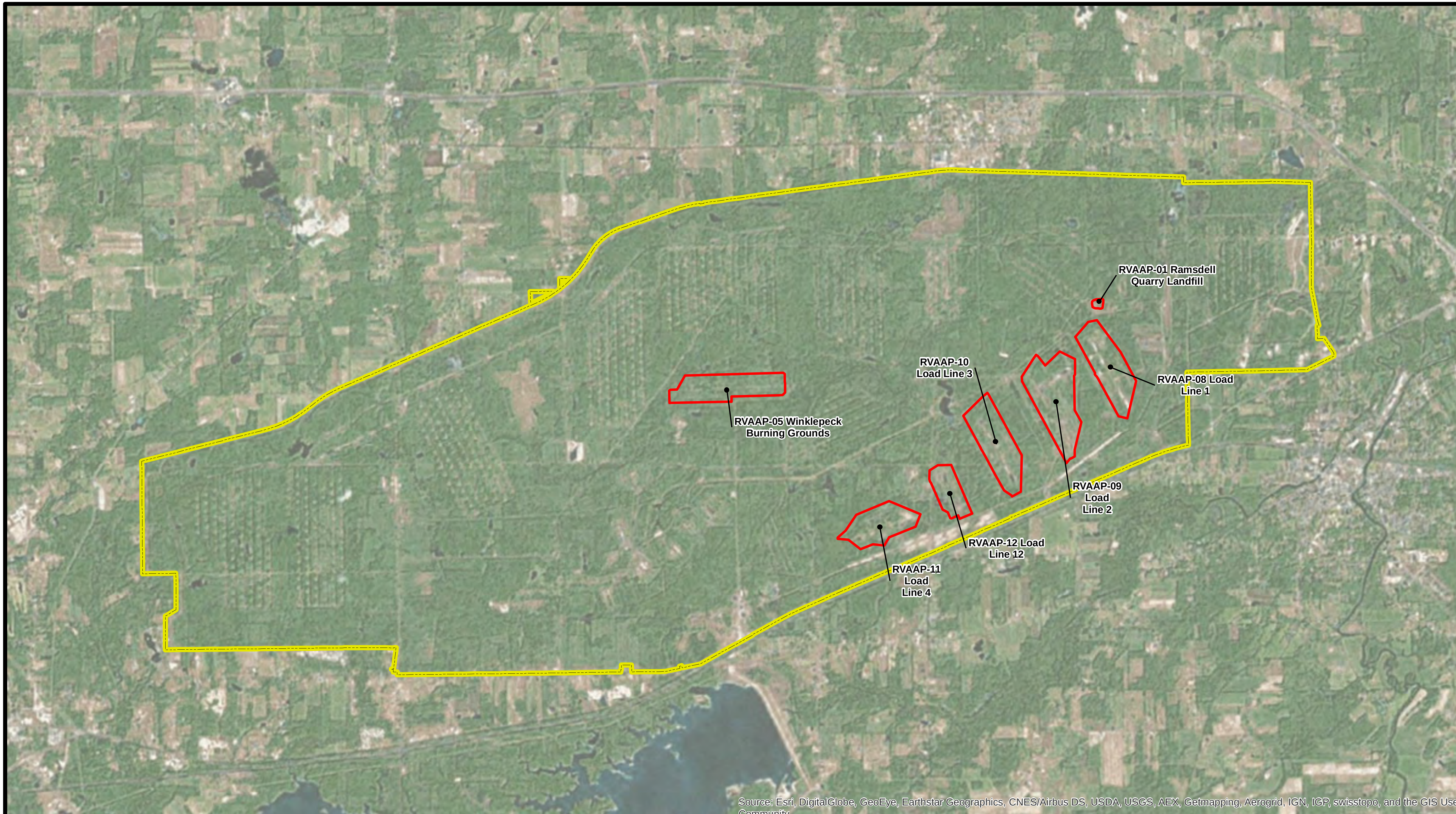
Camp Ravenna
Portage and Trumbull
Counties, Ohio

Figure 1



Camp Ravenna Boundary

Area of Concern

N W E S

0 0.5 1 2 Miles

US Army Corps of Engineers
Buffalo District

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Areas of Concern Evaluated in Five-Year Review

Camp Ravenna
Portage and Trumball
Counties, Ohio

Figure 2

Monitoring Well

Monitoring Well (Identified in Interim ROD)

Fence Line

Former Railroad

Roads

Excavation Area

Excavation Area (2010 - Not Included in Interm ROD)

Area of Concern

Former Building/Structure

0 150 300 600 Feet

US Army Corps of Engineers
Buffalo District

Load Line #1

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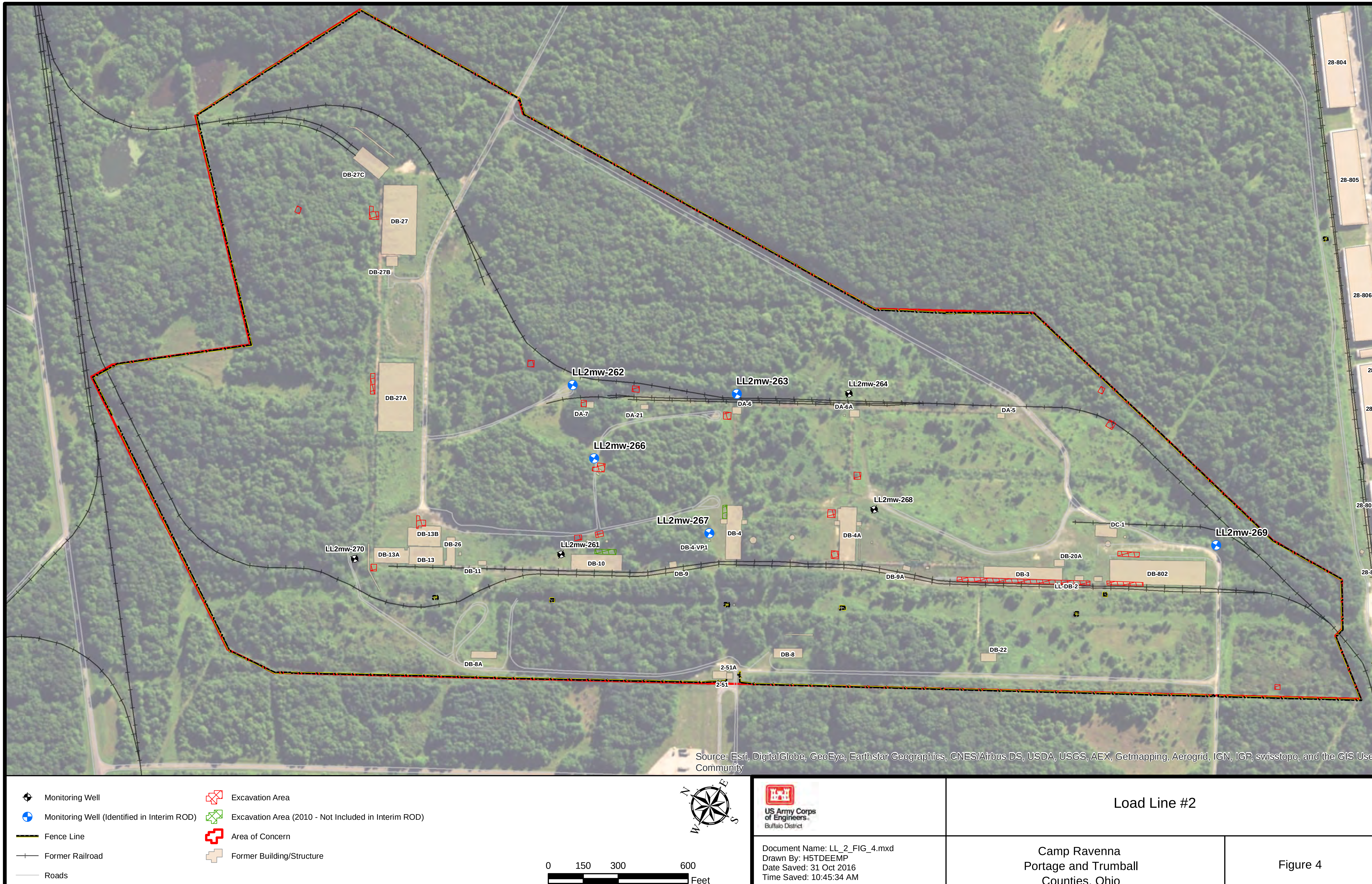
Camp Ravenna
Portage and Trumball
Counties, Ohio

Figure 3



US Army Corps of Engineers
Buffalo District

Load Line #2

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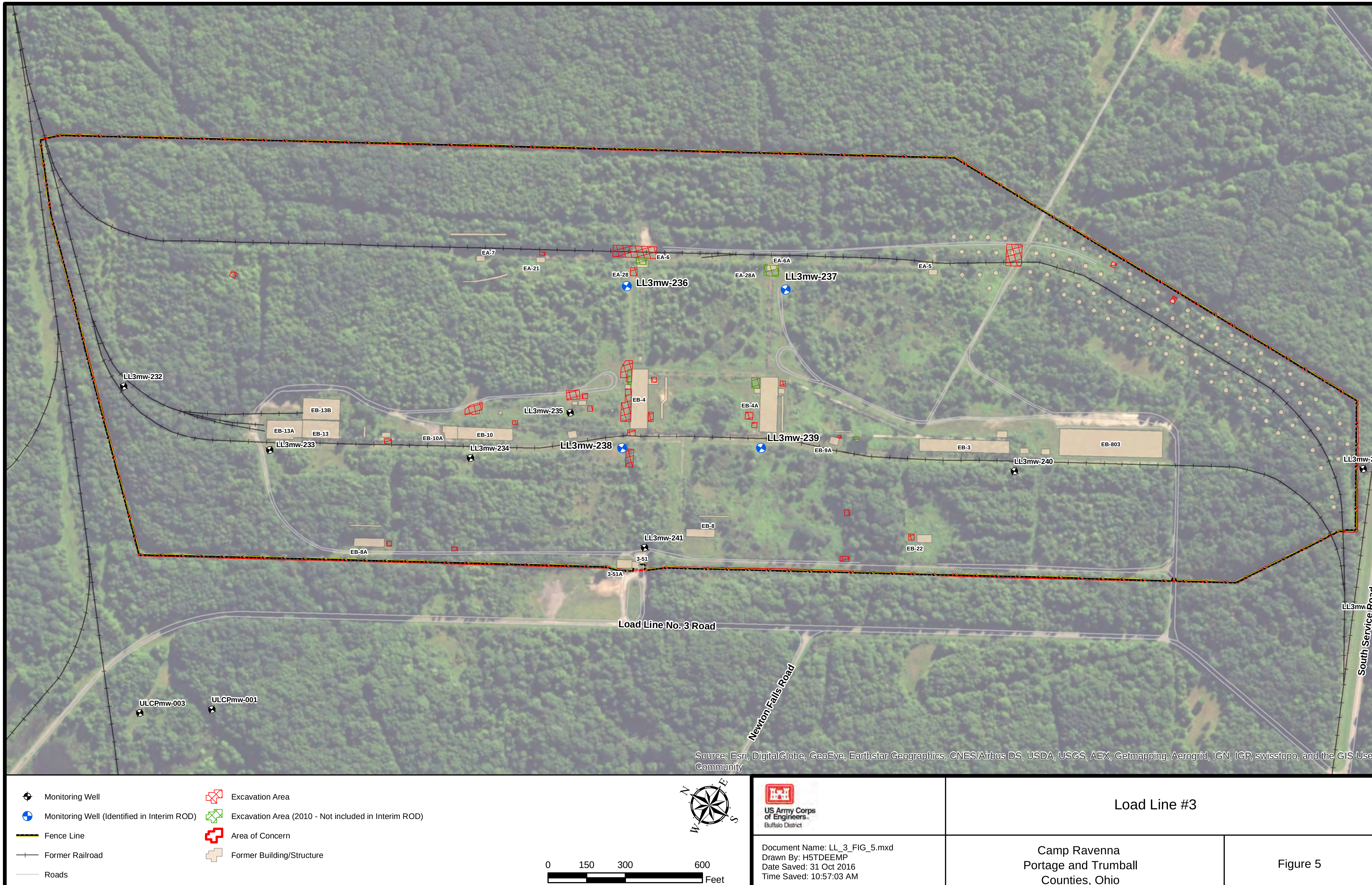
Camp Ravenna
Portage and Trumball
Counties, Ohio

Figure 4



US Army Corps of Engineers
Buffalo District

Load Line #3

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Camp Ravenna
Portage and Trumbull
Counties, Ohio

Figure 5

Monitoring Well

Monitoring Well (Identified in Interim ROD)

Fence Line

Former Railroad

Roads

Excavation Area

Soil Stockpile Area (2010 - Not Included in Interim ROD)

Area of Concern

Former Building/Structure

N W E S

0 150 300 600 Feet

US Army Corps of Engineers® Buffalo District

Load Line #4

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Camp Ravenna
Portage and Trumbull
Counties, Ohio

Figure 6

Monitoring Well
Roads
Former Building/Structure
Fence Line
Excavation Area
Former Railroad
Area of Concern

0 250 500 Feet

US Army Corps of Engineers
Buffalo District

Load Line #12

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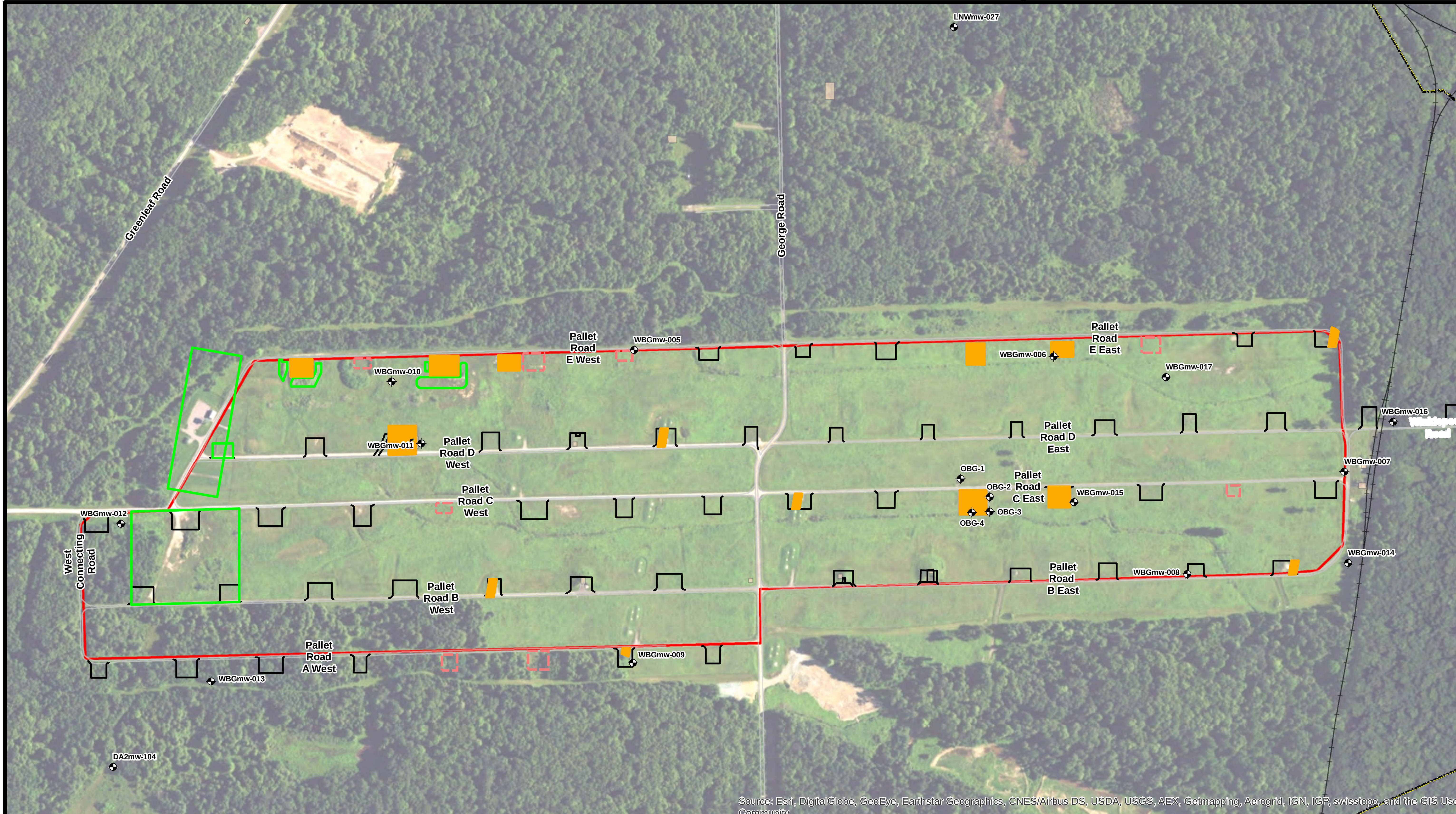
Camp Ravenna
Portage and Trumbull
Counties, Ohio

Figure 7



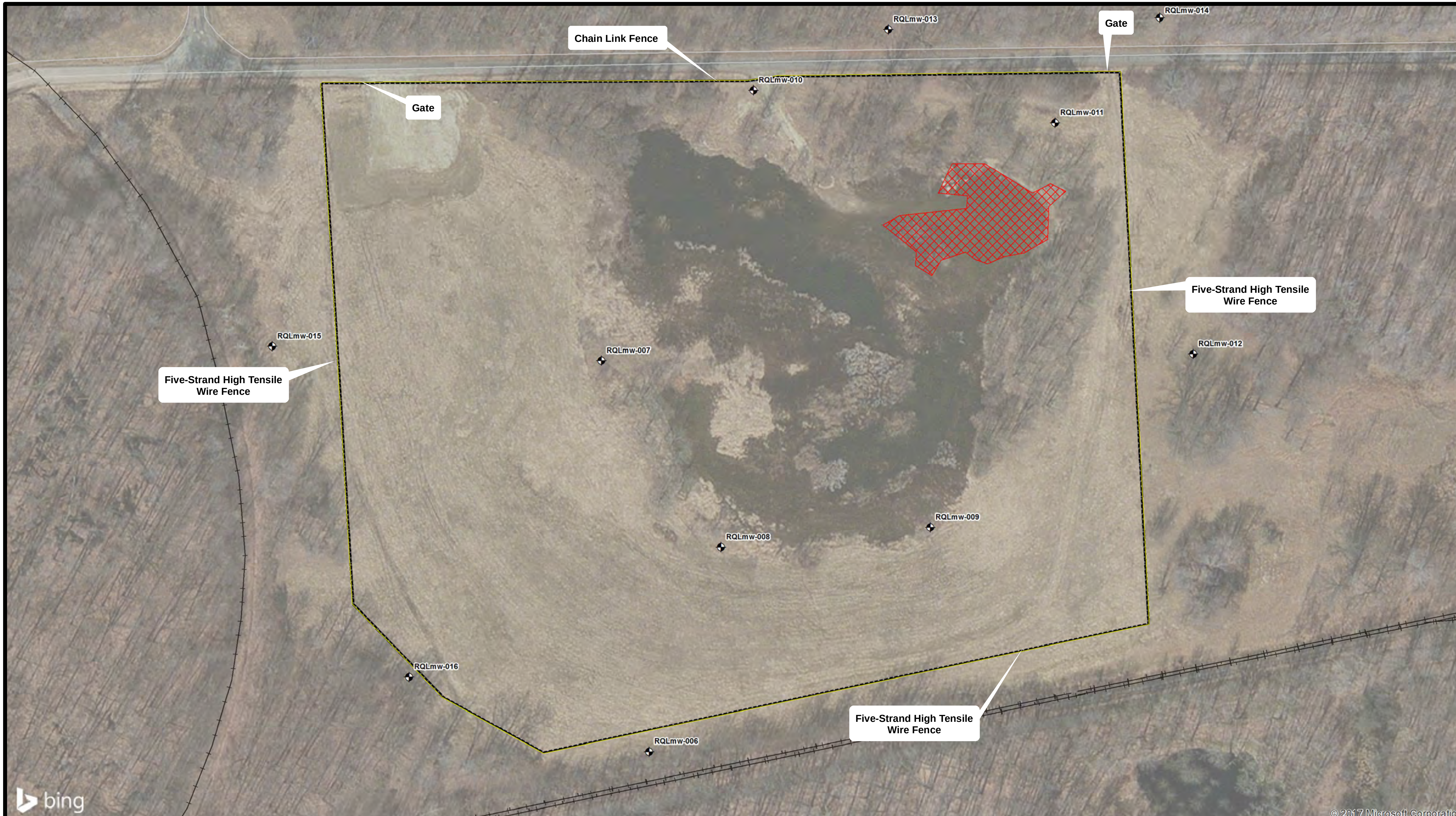
- Monitoring Well
- Fence Line
- Former Railroad
- Roads
- Former Burn Pad
- Surface Cleared of MEC
- Former Burn Pad Scheduled for MEC Removal and Environmental Remediation
- Area Cleared of MEC to 1ft BGS
- Excavation Area
- Area of Concern
- Former Building/Structure

N E S W

0 500 1,000 Feet

US Army Corps of Engineers
Buffalo District

	Winklepeck Burning Grounds	
Document Name: WPBG_FIG_8.mxd Drawn By: H5TDEEMP Date Saved: 01 Nov 2016 Time Saved: 9:55:19 AM	Camp Ravenna Portage and Trumbull Counties, Ohio	Figure 8



Monitoring Well	Roads
Fence Line	Excavation Area
Railroads	

N W E S

0 125 250 Feet

US Army Corps of Engineers
Buffalo District

Ramsdell Quarry Landfill

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Time Saved: 6:10:25 AM

Camp Ravenna
Portage and Trumbull
Counties, Ohio

Figure 9

ATTACHMENT 2

Documents Reviewed

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DOCUMENTS REVIEWED

Alliant Corporation (Alliant) 2015. *Draft Work Plan for a Pilot Study and Feasibility Study at Atlas Scrap Yard.* October 14

Army National Guard (ARNG) 2015. Memorandum for Administrative File: *Finalization of "Summary of the Findings of the Historical Review and Risk Evaluation of the Storage Magazines and Appended Information Paper for the Former Ravenna Army Ammunition Plant, Dated January 29, 2015."* June 30

ARNG 2016. *FY2015 Ravenna Army Ammunition Plant Army Defense Environmental Restoration Program Installation Action Plan.* March

CB&I Federal Services LLC (CB&I) 2014a. *Final Remedial Investigation Report for RVAAP-002-R-01 Erie Burning Grounds MRS.* August 27

CB&I 2014b. *Final Remedial Investigation Report for RVAAP-050-R-01 Atlas Scrap Yard MRS.* August 25

CB&I 2014c. *Final Remedial Investigation Report for RVAAP-008-R-01 Load Line #1A MRS.* August 28

CB&I 2015a. *Final Remedial Investigation Report for RVAAP-001-R-01 Ramsdell Quarry Landfill MRS.* January 27

CB&I 2015b. *Final Remedial Investigation Report for RVAAP-004-R-01 Open Demolition Area #2 MRS.* February 27

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ATTACHMENT 3

Decision Document Summaries

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Table A3-1 Decision Document Summary
Component: Background/Basis for Taking Action - Load Lines 1 Through 4

Decision Document Titles	1. Interim Record of Decision for the Remediation of Soils at Load Lines 1 Through 4 at the Ravenna Army Ammunition Plant (IROD) (January 2007) 2. Department of the Army letter to Ohio EPA-Southwest District Office regarding removal of building slabs at Load Lines 1 through 4. (January 7, 2008)
Regulatory Framework	CERCLA Non-NPL
Remedy Chosen	1. Alternative Soil and Dry Sediment 3 (SDS3) – Excavation and Off-site Disposal (IROD) 2. Building slab removal (January 7, 2008 letter)
Media of Concern	Surface and subsurface soils and dry sediment
Constituents of Concern (COCs)	***Inorganics:*** aluminum, antimony, arsenic, barium, cadmium, hexavalent chromium, manganese, and lead ***Explosives:*** 2,4,6-TNT and RDX ***PCBs:*** Aroclor-1254 ***SVOCs:*** benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene COCs identified in soil at load lines 1-4 are presented in tables 2 and 3 of the IROD. (Pgs. 8 & 11)
Land Use	***Current:*** Not used, vacant ***Future:*** National Guard mounted training, no digging
Receptors	National Guard Trainee (IROD pg. 9)
Exposure Pathway	Inhalation, ingestion or direct contact (IROD pg. 9)
Ecological Risk	*"Based on the expected impact to site conditions at LLs 1-4 from remediation associated with achieving human health clean-up goals and proposed vehicular training activities (e.g., soil compaction, vegetation damage, etc.), ecologically based clean-up goals have been determined to be unnecessary."* (IROD pg. 10)

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Table A3-2 Decision Document Summary
Component: Remedial Action - Load Lines 1 Through 4
Page 1 of 2

Decision Document Titles	1. Interim Record of Decision for the Remediation of Soils at Load Lines 1 Through 4 at the Ravenna Army Ammunition Plant (IROD) (January 2007) 2. Department of the Army letter to Ohio EPA-Southwest District Office regarding removal of building slabs at Load Lines 1 through 4. (January 7, 2008)
Remedy Chosen	1. Alternative Soil and Dry Sediment 3 (SDS3) – Excavation and Off-site Disposal (IROD) 2. Building slab removal (January 7, 2008 letter)
Remedial Action Objective (RAO)	Prevent the ingestion, inhalation, or direct contact with COCs exceeding cleanup goals for soil and dry sediment.
Clean-Up Goals	*"Clean-up goals for surface and subsurface soils and dry sediment at LLs 1-4 at RVAAP were determined based on risk-based and site-specific considerations, including background concentrations, duration of reasonable maximum human exposures, and reasonably anticipated future land use (National Guard mounted training, no digging). The resulting clean-up goals for the National Guard Trainee for soil at LLs 1-4 are presented in Table 3."* (IROD pgs.10 &11)
Applicable or Relevant and Appropriate Requirements (ARARs)	There are no chemical-specific ARARs. Action- and location-specific ARARs for each alternative are varied and numerous. They are identified for the selected remedy in IROD Attachment 1 (Pg.14).

Table A3-2 Decision Document Summary
Component: Remedial Action - Load Lines 1 Through 4
Page 2 of 2

Components of the Remedy	***1. IROD*** · Excavation of discrete areas of contaminated surface and subsurface soils and dry sediment with concentrations of contaminants exceeding clean-up goals · Temporary on-site storage via stockpiling for characterization · Off-site disposal of soils at a permitted solid waste landfill and, as needed, disposal at a TSCA and/or RCRA permitted hazardous waste landfill · Replacement of excavated material with clean compacted backfill · Groundwater monitoring to ensure the Selected Remedy did not impact groundwater · Maintenance of building slabs and foundations ***2. January 7, 2008 letter*** · Building slab removal

Table A3-3 Decision Document Summary
Component: Background/Basis for Taking Action - Load Line 12

Decision Document Title	Final Record of Decision for Soil and Dry Sediment for the RVAAP-12 Load Line 12 (March 2009)
Regulatory Framework	CERCLA Non-NPL
Remedy Chosen	Alternative 3: Excavation and Off-site Disposal – National Guard Trainee Land Use
Media of Concern	Soil and dry sediment
COCs	***Inorganics:*** arsenic ROD Part II, Table 2 (Pg. 12)
Land Use	***Current:*** Not used, vacant ***Future:*** National Guard mounted training, no digging
Receptors	National Guard Trainee (ROD pg. 10)
Exposure Pathway	ROD: *"The Baseline Risk Assessment (BRA) identifies the exposure pathways, COCs, if any, and provides a basis for the remedial decisions."* (Pg. 10) BRA: Inhalation, ingestion, and dermal contact (Phase II RI, Section 6.3.2)
Ecological Risk	*"The Feasibility Study presents a weight-of-evidence evaluation that no quantitative ecological clean-up goals be developed at LL12."* (ROD pg. 11)

Table A3-4 Decision Document Summary
Component: Remedial Action - Load Line 12

Decision Document Title	Final Record of Decision for Soil and Dry Sediment for the RVAAP-12 Load Line 12 (March 2009)
Remedy Chosen	Alternative 3: Excavation and Off-site Disposal – National Guard Trainee Land Use
RAO	Prevent National Guard Trainee exposure to contaminants in soil and dry sediment that exceed the clean-up goals to a depth of 4 ft bgs. (ROD pg. 11)
Clean-Up Goal	Arsenic – 31 mg/kg (ROD Part II, Table 2, pg. 12)
ARARs	*"There are no identified chemical-specific or location-specific applicable and relevant or appropriate requirements (ARARs)."* *"Action-specific ARARs were identified for Alternative 3."* (ROD pg. 16)
Components of the Remedy	· Remedial design plan · Excavation · Handling of waste materials · Off-site disposal · Confirmatory sampling · Restoration · Land-use controls Institutional Control Components: *"Land use controls (LUCs) shall be maintained until the concentrations of hazardous substances in the soil and groundwater are reduced to levels that allow for unrestricted use. The Remedial Design (RD) shall include a LUC component describing the details of LUC implementation and maintenance, including periodic inspections."* (ROD pg. 21)

Table A3-5 Decision Document Summary
Component: Background/Basis for Taking Action – Winklepeck Burning Grounds
Page 1 of 2

Decision Document Titles	1. Record of Decision (ROD) for Soil and Dry Sediment at the RVAAP-05 Winklepeck Burning Grounds (August 2008) 2. Final Explanation of Significant Differences (ESD) for Post-ROD Changes to the Remedy at RVAAP-05 Winklepeck Burning Grounds (March 2015)
Regulatory Framework	CERCLA Non-NPL
Remedy Chosen	1. ***ROD:*** Alternative 2: Chemical Contamination Removal Concurrent with MEC Removal Action – Excavation, Screen for Potential MEC, Composite Sampling, and Disposal. (ROD pg. II-27) 2. ***ESD:*** Removal of contaminated soil at Pad 38, Pad 61/61A, and Pad 66/67 (ESD pg. 10)
Media of Concern	Soil and dry sediment
COCs	1. ROD (Table II, Pg. II-4) ***Explosives:*** RDX ***SVOCs:*** benzo(a)pyrene, dibenz(a,h)anthracene, benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene 2. ESD (Table 1, Pg. 10) ***Explosives:*** RDX & TNT ***SVOCs:*** PAHs
Land Use	Current: Military training, Mark 19 Grenade Machine Gun range Future: Military training, Mark 19 Grenade Machine Gun range & Multi-Purpose Machine Gun range (ESD pgs. 3 & 9)
Receptors	Range Maintenance Soldier (ROD pg. II-12) Full-time military worker (ESD pg. 10)
Exposure Pathway	Inhalation, ingestion, or direct contact (Phase II RI, Section 6 Baseline Risk Assessment)

Table A3-5 Decision Document Summary
Component: Background/Basis for Taking Action – Winklepeck Burning Grounds
Page 2 of 2

Ecological Risk	*"Mitigation of relatively small current risks to ecological resources will be achieved through remediation and any concurrent MEC removal to protect the Range Maintenance Soldier."* (ROD pg. II-13).

Table A3-6 Decision Document Summary
Component: Remedial Action - Winklepeck Burning Grounds
Page 1 of 2

Decision Document Titles	1. Record of Decision (ROD) for Soil and Dry Sediment at the RVAAP-05 Winklepeck Burning Grounds (August 2008) 2. Final Explanation of Significant Differences (ESD) for Post-ROD Changes to the Remedy at RVAAP-05 Winklepeck Burning Grounds (March 2015)
Remedy Chosen	1. ***ROD:*** Alternative 2: Chemical Contamination Removal Concurrent with MEC Removal Action – Excavation, Screen for Potential MEC, Composite Sampling, and Disposal. (ROD pg. II-27) 2. ***ESD:*** Removal of contaminated soil at Pad 38, Pad 61/61A, and Pad 66/67 (ESD pg. 10)
RAOs	1. ***ROD:*** Prevent exposure of the National Guard Range Maintenance Soldier to contaminants in soil that exceeding risk-based cleanup goals extending to a maximum depth of 4 ft below ground surface. (ROD section 4.0, pgs. II-5 & II-6). 2. ***ESD:*** Prevent exposure to soils with contaminant concentrations greater than cleanup goals which are based on USEPA Industrial RSLs.
Clean-Up Goals	1. ***ROD:*** RDX (617 mg/kg), benz(a)anthracene (75 mg/kg), benzo(a)pyrene (7.5 mg/kg), benzo(b)flouranthene (75 mg/kg), dibenz(a,h)anthracene (7.5 mg/kg), and indeno(1,2,3-cd)pyrene (75 mg/kg) (ROD Table II, pg. II-4) 2. ***ESD:*** TNT (420 mg/kg), RDX (240 mg/kg) (Remedial Design, Sec. 4.3) and benzo(a)pyrene (2.1 mg/kg) (draft RI/FS Supplement, Table 2-2)
ARARs	*"There are no identified chemical-specific ARARs for WBG soil remediation alternatives. Location- and action-specific ARARS for alternatives are listed in Table 4."* (ROD pg. II-17)

Table A3-6 Decision Document Summary
Component: Remedial Action - Winklepeck Burning Grounds
Page 2 of 2

Components of the Remedies	1. ***ROD:*** · Clearing of vegetation · Geophysical surveys and visual inspections for identifying metal debris · Removal or transite and friable asbestos from the surface and subsurface within the footprint of Pad 70 · Excavation of contaminated soil by layers to a depth of 0.3 to 1.2 m (1 to 4 ft) · Screening (sifting) of the excavated soil for metal debris (potential MEC) · Confirmation sampling of the chemical characteristics of the remaining soil and for the absence of visible asbestos within the sides and bottom of the excavation · Multi-increment sampling and testing of sifted soil to determine disposal requirements · Disposal of contaminated soil (above remediation goals) at an approved off-site facility · Backfill of the excavations using fill material from a source approved by the U.S. Army and Ohio EPA · Site restoration · Implementation of LUCs for the AOC ***2. ESD:*** · Removal of contaminated soil at pads 38, 61/61A, and 66/67 in accordance with ESD Table 1 (Pg. 10) · Revised restrictions/land use controls (Secs. 4.4 – 4.6, pgs. 13 - 14)

Table A3-7 Decision Document Summary
Component: Background/Basis for Taking Action – Ramsdell Quarry Landfill
Page 1 of 2

Decision Document Titles	1. Final Record of Decision for Soil and Dry Sediment for the RVAAP-01 Ramsdell Quarry Landfill (ROD) (March 2009) 2. Final Record of Decision Amendment for Soil and Dry Sediment at the RVAAP-01 Ramsdell Quarry Landfill (ROD Amendment) (May 2013)
Regulatory Framework	CERCLA Non-NPL
Remedies Chosen	1. ***ROD:*** Alternative 3 Excavation and Off-site Disposal, Security Guard/Maintenance Worker Land Use. 2. ***ROD Amendment:*** Alternative 8 Perimeter Fence – Security Guard/Maintenance Worker with Restricted Land Use
Media of Concern	Soil and dry sediment
COCs	Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, & indeno(1,2,3-cd)pyrene (ROD Table II, part II, pg. 12)
Land Use	Current: Closed landfill, restricted access for security, maintenance and monitoring activities Future: As above
Receptors	Security Guard/Maintenance Worker (ROD part II, pg. 10)
Exposure Pathway	*"The BRA identifies the exposure pathways, COCs, if any, and provides a basis for the remedial decisions."* (ROD part II, pg. 10) Baseline Risk Assessment (BRA): Inhalation, ingestion, and dermal contact (Phase II RI, Table 6-15)
Ecological Risk	*"Remediation to meet human health cleanup goals will reduce overall contaminant concentrations and ecological risk."* (ROD Part II, pg. 11)

Table A3-8 Decision Document Summary
Component: Remedial Action – Ramsdell Quarry Landfill
Page 1 of 2

Decision Document Titles	1. Final Record of Decision for Soil and Dry Sediment for the RVAAP-01 Ramsdell Quarry Landfill (ROD) (March 2009) 2. Final Record of Decision Amendment for Soil and Dry Sediment at the RVAAP-01 Ramsdell Quarry Landfill (ROD Amendment) (May 2013)
Remedies Chosen	1. ***ROD:*** Alternative 3 Excavation and Off-site Disposal, Security Guard/Maintenance Worker Land Use. 2. ***ROD Amendment:*** Alternative 8 – Perimeter Fence – Security Guard/Maintenance Worker with Restricted Land Use
RAOs	1. ***ROD:*** Prevent National Guard Security Guard/Maintenance Worker exposure to contaminants in soil and dry sediment that exceed clean-up goals to a depth of 1 ft bgs. (ROD Part II pg. 12) 2. ***ROD Amendment:*** Protect future receptors from remaining COCs in soil above cleanup goals and residual asbestos by restricting access to the AOC. (Remedial Design, section 4.0, page 4-1)
Clean-Up Goals	Benz(a)anthracene (13 mg/kg), benzo(a)pyrene (1.3 mg/kg), benzo(b)fluoranthene (13 mg/kg), dibenz(a,h)anthracene (1.3 mg/kg), and indeno(1,2,3-cd)pyrene (13 mg/kg). (ROD Part II. Pg. 23)
ARARs	There are no location and chemical specific ARARS. *"The selected remedy will comply with the action-specific ARARs listed in Attachment A."* (ROD Part II Pg 23) *"The presence of ACM within the contaminated area triggers a relevant and appropriate requirement for this activity under OAC 3745-20-07(A)(2) to cover asbestos-containing waste material with a least six inches of compacted non-ACM, and grow and maintain a cover of vegetation on the area adequate to prevent exposure of the asbestos-containing material."* (Final Engineering Evaluation, section 5.4.2.2, pgs. 5-6 & 5-7).

Table A3-8 Decision Document Summary
Component: Remedial Action – Ramsdell Quarry Landfill
Page 2 of 2

Components of the Remedies	1. ***ROD*** (Part II, pg.19): · Preparation of a remedial design plan · Excavation · Handling of waste materials · Off-site disposal · Confirmatory sampling · Site restoration · Land use controls 2. ***ROD Amendment*** (Part IV, pg. 11): · [Installation of] a fence at the perimeter of the site to encompass the closed landfill, quarry bottom, and wetlands · Implementing best management practices to remove surficial ACM through non-intrusive/no-digging methods

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ATTACHMENT 4

Site Inspection Checklists

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Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 1

I. SITE INFORMATION	
Site name: *Camp Ravenna Joint Military Training Center Load Line 1 (RVAAP-08)*	**Date of inspection:** *August 10, 2016*
Location and Region: *Portage and Trumball Counties Ohio*	**EPA ID:** *OH5210020736 (CERCLIS)*
Agency, office, or company leading the five-year review: *US Army Corps of Engineers, Buffalo District*	**Weather/temperature:** *~85ºF, partly cloudy, humid*

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other Excavation and off-site disposal of contaminated surface and subsurface soil and dry sediment that exceeded cleanup goals identified in the *Interim Record of Decision for the Remediation of Soils at Load Lines 1 Through 4 at the Ravenna Army Ammunition Plant (January 2007)* (Interim ROD). Groundwater monitoring is required.

Attachments: ☐ Inspection team roster attached ☒ Site map attached (Attachment 1)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Al Brillinger (Vista Environmental Services) | Program Manager | 11/07/16
   Name | Title | Date
   Interviewed ☐ at site ☐ at office ☒ by email Phone no. (502) 315-6892
   Problems, suggestions; ☒ Report attached

2. **O&M staff** ____ | ____ | ____
   Name | Title | Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ____
   Problems, suggestions; ☐ Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency Ohio Environmental Protection Agency
   Contact Rodney Beals | ____ | ____ | (330) 963-1218
   Name | Title | Date | Phone no.
   Problems; suggestions; ☒ Report attached

4. **Other interviews** (optional) ☒ Reports attached. (Attachment 6)

- Mark Leeper, PG, MBA, Army National Guard Directorate, Environmental Cleanup Program Manager
- Kevin Sedlak, National Guard Bureau, Restoration Project Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 1

- Gregory Moore, USACE Louisville District Project Manager
- Nathaniel Peters, USACE Louisville District Environmental Engineer
- Angela Schmidt, USACE Louisville District Risk Assessor
- Allan Brillinger, Vista Environmental Sciences Program Manager
- Rodney Beals, Sue Watkins, and Nicholas Roope, Ohio EPA
- Tom Tadsen, RAB Co-Chair

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☒ As-built drawings	☒ Readily available	☐ Up to date	☐ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks: Remedial action completion drawings are provided in *Final Remedial Action Completion Report for the Remediation of Soils and Dry Sediments at RVAAP 08-11 (Load Lines 1-4) (June 2008), Final Construction Completion Report – Removal of Buildings and Concrete Floor Slabs at RVAAP-08 Load Line 1 & Other Miscellaneous Buildings and Removal & Disposal of Pallets (July 14, 2010)*, and *Final Remediation Completion Report Sub-Slab Soils at RVAAP-08 Load Line 1 (March 10, 2011).*

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks: *Draft Site Safety & Health Plan Camp Ravenna Environmental Program Support Services Portage and Trumball Counties, Ohio (Vista Sciences Corporation, February 2, 2016).*

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: ____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits____	☐ Readily available	☐ Up to date	☒ N/A

Remarks: ____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: ____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks : ____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: Groundwater monitoring at Camp Ravenna is performed on a facility-wide basis. The most recent available report is *Final Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Report on the March 2015 Sampling Event Former Ravenna Army Ammunition Plant Portage and Trumball Counties, Ohio (September 21, 2015).*

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 1

8.	**Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A Remarks	
9.	**Discharge Compliance Records** ☐ Air ☐ Readily available ☐ Up to date ☒ N/A ☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A Remarks:	
10.	**Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A Remarks: Daily access/security logs are not maintained.	
	IV. O&M COSTS	
1.	**O&M Organization** ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP ☐ Federal Facility in-house ☒ Contractor for Federal Facility (Vista Sciences Corporation) ☐ Other:	
2.	**O&M Cost Records** ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place Original O&M cost estimate: Not applicable ☐ Breakdown attached Total annual cost by year for review period if available (not available)	
3.	**Unanticipated or Unusually High O&M Costs During Review Period** Describe costs and reasons: Not applicable	
	V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☒ N/A	
A.	**Fencing**	
1.	**Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A Remarks: Access controls are not part of the remedy. Load Line 1 is surrounded by a chain link fence with locked gate. The fence appears to be intact, although some isolated areas are in poor condition and show signs of distress. Camp Ravenna is surrounded by a perimeter fence that consists of six feet high chain link fence fabric with steel I-beam shaped posts set on 10 to 12 feet centers set in concrete footers. Annual LUC inspection reports for Winklepeck Burning Grounds and Ramsdell Quarry Landfill document any major defects in the perimeter fence and actions taken to repair the defects.	

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 1

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks: Access controls are not part of the remedy. The Load Line 1 fence is absent at a former Gate House building. Access at this location is restricted using warning signs and a cable barricade with reflective tape markers. Warning signs restricting access are also posted at the site entrance gate.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☒ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) None
Frequency
Responsible party/agency
Contact

Name Title Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☒ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☒ N/A
Violations have been reported ☐ Yes ☐ No ☒ N/A
Other problems or suggestions: ☐ Report attached
ICs are not part of the remedy.

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☒ N/A

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks

2. **Land use changes on site** ☒ N/A
Remarks: The site is not used for activities other than environmental monitoring, sampling, and remediation.

3. **Land use changes off site** ☒ N/A
Remarks:

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☒ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks: Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for environmental monitoring activities.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 1

B. Other Site Conditions

Remarks The former buildings, including floor slabs, have been removed. Elevated concrete walkways between the former buildings remain in place. The site consists of open grass-covered areas and areas containing trees and brush. Monitoring wells are present.

Note: Sections VII through IX were removed from this checklist because they are not applicable

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

Remarks : There are no other remedies at the site.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy was implemented to protect human health and the environment from exposure to contaminants (inorganics, explosives, PCBs, and SVOCs) attributed to former site operations associated with the assembly and demilitarization of large caliber projectiles, general-purpose bombs, and parts from these munitions. The remedy consisted of excavation and off-site disposal of contaminated surface and subsurface soil and dry sediment that exceeded cleanup goals identified in the Interim ROD. Clean soils were backfilled in the excavations and graded. The former buildings, including floor slabs, were subsequently removed. The site inspection did not identify evidence of trespass or OHARNG training.

The remedy is effective and functioning as designed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Maintenance activities consist of keeping site gates closed, keeping site roads passable (i.e. snow plowing), culvert maintenance, mowing (once per year), and clearing vegetation. Inspection and maintenance of building slabs, prescribed in the Interim ROD, is no longer required because the slabs and contaminated soil beneath the slabs were removed and disposed offsite.

Monitoring activities consist of quarterly sampling and analysis of groundwater for VOCs, SVOCs, PCBs, pesticides, explosives, propellants, inorganics, and cyanide. All monitoring wells are properly secured/locked, in good condition, and routinely sampled. Subsequent sampling and analysis has been conducted to evaluate the presence and extent of contamination in sub slab soils and underground utility lines.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

No issues or observations were identified that would suggest the protectiveness of the remedy may be compromised in the future.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 1

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
	Opportunities for optimization were not identified.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 2

I. SITE INFORMATION	
Site name: *Camp Ravenna Joint Military Training Center Load Line 2 (RVAAP-09)*	**Date of inspection:** *August 10, 2016*
Location and Region: *Portage and Trumball Counties Ohio*	**EPA ID:** *OH5210020736 (CERCLIS)*
Agency, office, or company leading the five-year review: *US Army Corps of Engineers, Buffalo District*	**Weather/temperature:** *~85ºF, partly cloudy, humid*

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment ☐ Monitored natural attenuation
☐ Access controls ☐ Groundwater containment
☐ Institutional controls ☐ Vertical barrier walls
☐ Groundwater pump and treatment
☐ Surface water collection and treatment
☒ Other Excavation and off-site disposal of contaminated surface and subsurface soil and dry sediment that exceeded cleanup goals identified in the *Interim Record of Decision for the Remediation of Soils at Load Lines 1 Through 4 at the Ravenna Army Ammunition Plant (January 2007)* (Interim ROD). Groundwater monitoring is required.

Attachments: ☐ Inspection team roster attached ☒ Site map attached (Attachment 1)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Al Brillinger (Vista Environmental Services) (Name) Program Manager (Title) 11/07/16 (Date)
   Interviewed ☐ at site ☐ at office ☒ by email Phone no. (502) 315-6892
   Problems, suggestions; ☒ Report attached

2. **O&M staff** ______ (Name) ______ (Title) ______ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency Ohio Environmental Protection Agency
   Contact Rodney Beals (Name) ______ (Title) ______ (Date) (330) 963-1218 (Phone no.)
   Problems; suggestions; ☒ Report attached

4. **Other interviews** (optional) ☒ Reports attached. (Attachment 6)

- Mark Leeper, PG, MBA, Army National Guard Directorate, Environmental Cleanup Program Manager
- Kevin Sedlak, National Guard Bureau, Restoration Project Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 2

- Gregory Moore, USACE Louisville District Project Manager
- Nathaniel Peters, USACE Louisville District Environmental Engineer
- Angela Schmidt, USACE Louisville District Risk Assessor
- Rodney Beals, Sue Watkins, and Nicholas Roope, Ohio EPA
- Allan Brillinger, Vista Environmental Sciences Program Manager
- Tom Tadsen, RAB Co-Chair

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☒ As-built drawings	☒ Readily available	☐ Up to date	☐ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks: Remedial action completion drawings are provided in *Final Remedial Action Completion Report for the Remediation of Soils and Dry Sediments at RVAAP 08-11 (Load Lines 1-4) (June 2008)* and *Final Remedial Action Completion Report Sub-Slab Soils at RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, and RVAAP-11, Load Line 4 (December 17, 2010).*

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks: *Draft Site Safety & Health Plan Camp Ravenna Environmental Program Support Services Portage and Trumball Counties, Ohio (Vista Sciences Corporation, February 2, 2016).*

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks:

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits______	☐ Readily available	☐ Up to date	☒ N/A

Remarks:

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks:

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks :

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: Groundwater monitoring at Camp Ravenna is performed on a facility-wide basis. The most recent available report is *Final Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Report on the March 2015 Sampling Event Former Ravenna Army Ammunition Plant Portage and Trumball Counties, Ohio (September 21, 2015).*

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 2

8.	**Leachate Extraction Records** Remarks	☐ Readily available	☐ Up to date	☒ N/A
9.	**Discharge Compliance Records** ☐ Air ☐ Water (effluent) Remarks:	 ☐ Readily available ☐ Readily available	 ☐ Up to date ☐ Up to date	 ☒ N/A ☒ N/A
10.	**Daily Access/Security Logs** Remarks:	☐ Readily available	☐ Up to date	☒ N/A
	IV. O&M COSTS			
1.	**O&M Organization** ☐ State in-house ☐ PRP in-house ☐ Federal Facility in-house ☐ Other:	 ☐ Contractor for State ☐ Contractor for PRP ☒ Contractor for Federal Facility (Vista Sciences Corporation)		
2.	**O&M Cost Records** ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place Original O&M cost estimate: Not applicable ☐ Breakdown attached Total annual cost by year for review period if available (not available)			
3.	**Unanticipated or Unusually High O&M Costs During Review Period** Describe costs and reasons: Not applicable			
	V. ACCESS AND INSTITUTIONAL CONTROLS	☒ Applicable		☐ N/A
A.	**Fencing**			
1.	**Fencing damaged**	☐ Location shown on site map	☒ Gates secured	☐ N/A
	Remarks: Access controls are not part of the remedy. Load Line 2 is surrounded by a chain link fence with locked gate. The fence appears to be intact, although some isolated areas are in poor condition and show signs of distress. Camp Ravenna is surrounded by a perimeter fence that consists of six feet high chain link fence fabric with steel I-beam shaped posts set on 10 to 12 feet centers set in concrete footers. Annual LUC inspection reports for Winklepeck Burning Grounds and Ramsdell Quarry Landfill document any major defects in the perimeter fence and actions taken to repair the defects.			

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 2

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks: The Load Line 2 fence is absent at a former Gate House building. Access at this location is restricted using warning signs and a cable barricade with reflective tape markers. Warning signs restricting access are also posted at the site entrance gate.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☒ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) None
Frequency
Responsible party/agency
Contact
Name Title Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☒ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☒ N/A
Violations have been reported ☐ Yes ☐ No ☒ N/A
Other problems or suggestions: ☐ Report attached
ICs are not part of the remedy for Load Line 2.

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☒ N/A

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks

2. **Land use changes on site** ☒ N/A
Remarks: The site is not used for activities other than environmental monitoring, sampling, and remediation.

3. **Land use changes off site** ☒ N/A
Remarks:

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☒ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks: Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for range operations and environmental monitoring activities.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 2

B.	**Other Site Conditions**	
	Remarks	The former buildings, including floor slabs, have been removed. Elevated concrete walkways between the former buildings remain in place. The site consists of open grass-covered areas and areas containing trees and brush. Monitoring wells are present.
Note: Sections VII through IX were removed from this checklist because they are not applicable		
X. OTHER REMEDIES		
	If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. Remarks : There are no other remedies at the site.	
XI. OVERALL OBSERVATIONS		
A.	**Implementation of the Remedy**	
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). The remedy was implemented to protect human health and the environment from exposure to contaminants (inorganics, explosives, PCBs, and SVOCs) attributed to former site operations associated with the assembly and demilitarization of large caliber projectiles, general-purpose bombs, and parts from these munitions. The remedy consisted of excavation and off-site disposal of contaminated surface and subsurface soil and dry sediment that exceeded cleanup goals identified in the Interim ROD. Clean soils were backfilled in the excavations and graded. The former buildings, including floor slabs, were subsequently removed. The site inspection did not identify evidence of OHARNG use or trespass by the public. Groundwater monitoring is performed under a facility-wide program. The remedy is effective and functioning as designed.	
B.	**Adequacy of O&M**	
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. Maintenance activities consist of keeping site gates closed, keeping site roads passable (i.e. snow plowing), culvert maintenance, mowing (once per year), and clearing vegetation. Inspection and maintenance of building slabs, prescribed in the Interim ROD, is no longer required because the slabs and contaminated soil beneath the slabs were removed and disposed offsite. Monitoring activities consist of quarterly sampling and analysis of groundwater for VOCs, SVOCs, PCBs, pesticides, explosives, propellants, inorganics, and cyanide. All monitoring wells are properly secured/locked, in good condition, and routinely sampled. Subsequent sampling and analysis has been conducted to evaluate the presence and extent of contamination in sub slab soils and underground utility lines.	

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 2

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. No issues or observations were identified that would suggest the protectiveness of the remedy may be compromised in the future.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Opportunities for optimization were not identified.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 3

I. SITE INFORMATION	
Site name: *Camp Ravenna Joint Military Training Center Load Line 3 (RVAAP-10)*	**Date of inspection:** *August 10, 2016*
Location and Region: *Portage and Trumball Counties Ohio*	**EPA ID:** *OH5210020736 (CERCLIS)*
Agency, office, or company leading the five-year review: *US Army Corps of Engineers, Buffalo District*	**Weather/temperature:** *~90ºF, partly cloudy, humid*

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment ☐ Monitored natural attenuation
☐ Access controls ☐ Groundwater containment
☐ Institutional controls ☐ Vertical barrier walls
☐ Groundwater pump and treatment
☐ Surface water collection and treatment
☒ Other Excavation and off-site disposal of contaminated surface and subsurface soil and dry sediment that exceeded cleanup goals identified in the *Interim Record of Decision for the Remediation of Soils at Load Lines 1 Through 4 at the Ravenna Army Ammunition Plant (January 2007)* (Interim ROD). Groundwater monitoring is required.

Attachments: ☐ Inspection team roster attached ☒ Site map attached (Attachment 1)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Al Brillinger (Vista Environmental Services) — Program Manager — 11/07/16
Name — Title — Date
Interviewed ☐ at site ☐ at office ☒ by email Phone no. (502) 315-6892
Problems, suggestions; ☒ Report attached

2. **O&M staff** ________ ________ ________
Name — Title — Date
Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ________
Problems, suggestions; ☐ Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Ohio Environmental Protection Agency
Contact Rodney Beals ________ ________ (330) 963-1218
Name — Title — Date — Phone no.
Problems; suggestions; ☒ Report attached

4. **Other interviews** (optional) ☒ Reports attached. (Attachment 6)

- Mark Leeper, PG, MBA, Army National Guard Directorate, Environmental Cleanup Program Manager
- Kevin Sedlak, National Guard Bureau, Restoration Project Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 3

- Gregory Moore, USACE Louisville District Project Manager
- Nathaniel Peters, USACE Louisville District Environmental Engineer
- Angela Schmidt, USACE Louisville District Risk Assessor
- Allan Brillinger, Vista Environmental Sciences Program Manager
- Rodney Beals, Sue Watkins, and Nicholas Roope, Ohio EPA
- Tom Tadsen, RAB Co-Chair

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
☐ O&M manual ☐ Readily available ☐ Up to date ☒ N/A
☒ As-built drawings ☒ Readily available ☐ Up to date ☐ N/A
☐ Maintenance logs ☐ Readily available ☐ Up to date ☒ N/A
Remarks: Remedial action completion drawings are provided in *Final Remedial Action Completion Report for the Remediation of Soils and Dry Sediments at RVAAP 08-11 (Load Lines 1-4) (June 2008)* and *Final Remedial Action Completion Report Sub-Slab Soils at RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, and RVAAP-11, Load Line 4 (December 17, 2010).*

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A
Remarks: *Draft Site Safety & Health Plan Camp Ravenna Environmental Program Support Services Portage and Trumball Counties, Ohio (Vista Sciences Corporation, February 2, 2016).*

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks:

4. **Permits and Service Agreements**
☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A
☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A
☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A
☐ Other permits______________________ ☐ Readily available ☐ Up to date ☒ N/A
Remarks:

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks:

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks :

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
Remarks: Groundwater monitoring at Camp Ravenna is performed on a facility-wide basis. The most recent available report is *Final Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Report on the March 2015 Sampling Event Former Ravenna Army Ammunition Plant Portage and Trumball Counties, Ohio (September 21, 2015).*

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 3

8.	**Leachate Extraction Records** Remarks	☐ Readily available	☐ Up to date	☒ N/A	
9.	**Discharge Compliance Records** ☐ Air ☐ Water (effluent) Remarks:	 ☐ Readily available ☐ Readily available	 ☐ Up to date ☐ Up to date	 ☒ N/A ☒ N/A	
10.	**Daily Access/Security Logs** Remarks:	☐ Readily available	☐ Up to date	☒ N/A	
	IV. O&M COSTS				
1.	**O&M Organization** ☐ State in-house ☐ PRP in-house ☐ Federal Facility in-house ☐ Other:	 ☐ Contractor for State ☐ Contractor for PRP ☒ Contractor for Federal Facility (Vista Sciences Corporation)			
2.	**O&M Cost Records** ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place Original O&M cost estimate: Not applicable ☐ Breakdown attached Total annual cost by year for review period if available (not available)				
3.	**Unanticipated or Unusually High O&M Costs During Review Period** Describe costs and reasons: Not applicable				
	V. ACCESS AND INSTITUTIONAL CONTROLS	☒ Applicable		☐ N/A	
A.	**Fencing**				
1.	**Fencing damaged**	☐ Location shown on site map	☒ Gates secured	☐ N/A	
	Remarks: Access controls are not part of the remedy. Load Line 3 is surrounded by a chain link fence with locked gate. The fence appears to be intact, although some isolated areas are in poor condition and show signs of distress. Camp Ravenna is surrounded by a perimeter fence that consists of six feet high chain link fence fabric with steel I-beam shaped posts set on 10 to 12 feet centers set in concrete footers. Annual LUC inspection reports for Winklepeck Burning Grounds and Ramsdell Quarry Landfill document any major defects in the perimeter fence and actions taken to repair the defects.				

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 3

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks: Access controls are not part of the remedy. The Load Line 3 fence is absent at a former Gate House building. Access at this location is restricted using warning signs and a cable barricade with reflective tape markers. Warning signs restricting access are also posted at the site entrance gate.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented	☐ Yes	☐ No	☒ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	☐ No	☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) None
Frequency ______
Responsible party/agency ______
Contact ______ ______ ______
Name Title Phone no.

Reporting is up-to-date	☐ Yes	☐ No	☒ N/A
Reports are verified by the lead agency	☐ Yes	☐ No	☒ N/A
Specific requirements in deed or decision documents have been met	☐ Yes	☐ No	☒ N/A
Violations have been reported	☐ Yes	☐ No	☒ N/A

Other problems or suggestions: ☐ Report attached
ICs are not part of the remedy for Load Line 3.

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☒ N/A

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks______

2. **Land use changes on site** ☒ N/A
Remarks: The site is not used for activities other than environmental monitoring, sampling, and remediation.

3. **Land use changes off site** ☒ N/A
Remarks: ______

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☒ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks: Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for range operations and environmental monitoring activities.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 3

B. Other Site Conditions

Remarks The former buildings, including floor slabs, have been removed. Elevated concrete walkways between the former buildings remain in place. The site consists of open grass-covered areas and areas containing trees and brush. Monitoring wells are present.

Note: Sections VII through IX were removed from this checklist because they are not applicable

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

Remarks : There are no other remedies at the site.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy was implemented to protect human health and the environment from exposure to contaminants (inorganics, explosives, PCBs, and SVOCs) attributed to former site operations associated with the assembly and demilitarization of large caliber projectiles, general-purpose bombs, and parts from these munitions. The remedy consisted of excavation and off-site disposal of contaminated surface and subsurface soil and dry sediment that exceeded cleanup goals identified in the Interim ROD. Clean soils were backfilled in the excavations and graded. The former buildings, including floor slabs, were subsequently removed. The site inspection did not identify evidence of OHARNG use or trespass by the public. Groundwater monitoring is performed under a facility-wide program.

The remedy is effective and functioning as designed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Maintenance activities consist of keeping site gates closed, keeping site roads passable (i.e. snow plowing), culvert maintenance, mowing (once per year), and clearing vegetation. Inspection and maintenance of building slabs, prescribed in the Interim ROD, is no longer required because the slabs and contaminated soil beneath the slabs were removed and disposed offsite.

Monitoring activities consist of quarterly sampling and analysis of groundwater for VOCs, SVOCs, PCBs, pesticides, explosives, propellants, inorganics, and cyanide. All monitoring wells are properly secured/locked, in good condition, and routinely sampled. Subsequent sampling and analysis has been conducted to evaluate the presence and extent of contamination in sub slab soils and underground utility lines.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 3

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. No issues or observations were identified that would suggest the protectiveness of the remedy may be compromised in the future.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Opportunities for optimization were not identified.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 4

I. SITE INFORMATION	
Site name: *Camp Ravenna Joint Military Training Center Load Line 4 (RVAAP-11)*	**Date of inspection:** *August 10, 2016*
Location and Region: *Portage and Trumball Counties Ohio*	**EPA ID:** *OH5210020736 (CERCLIS)*
Agency, office, or company leading the five-year review: *US Army Corps of Engineers, Buffalo District*	**Weather/temperature:** *~90ºF, partly cloudy, humid*

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other Excavation and off-site disposal of contaminated surface and subsurface soil and dry sediment that exceeded cleanup goals identified in the *Interim Record of Decision for the Remediation of Soils at Load Lines 1 Through 4 at the Ravenna Army Ammunition Plant (January 2007)* (Interim ROD). Groundwater monitoring is required.

Attachments: ☐ Inspection team roster attached ☒ Site map attached (Attachment 1)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Al Brillinger (Vista Environmental Services) (Name) Program Manager (Title) 11/07/16 (Date)
   Interviewed ☐ at site ☐ at office ☒ by email Phone no. (502) 315-6892
   Problems, suggestions; ☒ Report attached

2. **O&M staff** ______ (Name) ______ (Title) ______ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.
   Agency Ohio Environmental Protection Agency
   Contact Rodney Beals (Name) ______ (Title) ______ (Date) (330) 963-1218 (Phone no.)
   Problems; suggestions; ☒ Report attached

4. **Other interviews** (optional) ☒ Reports attached. (Attachment 6)

- Mark Leeper, PG, MBA, Army National Guard Directorate, Environmental Cleanup Program Manager
- Kevin Sedlak, National Guard Bureau, Restoration Project Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 4

- Gregory Moore, USACE Louisville District Project Manager
- Nathaniel Peters, USACE Louisville District Environmental Engineer
- Angela Schmidt, USACE Louisville District Risk Assessor
- Allan Brillinger, Vista Environmental Sciences Program Manager
- Rodney Beals, Sue Watkins, and Nicholas Roope, Ohio EPA
- Tom Tadsen, RAB Co-Chair

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual ☐ Readily available ☐ Up to date ☒ N/A
☒ As-built drawings ☒ Readily available ☐ Up to date ☐ N/A
☐ Maintenance logs ☐ Readily available ☐ Up to date ☒ N/A

Remarks: Remedial action completion drawings are provided in *Final Remedial Action Completion Report for the Remediation of Soils and Dry Sediments at RVAAP 08-11 (Load Lines 1-4) (June 2008)* and *Final Remedial Action Completion Report Sub-Slab Soils at RVAAP-09 Load Line 2, RVAAP-10 Load Line 3, and RVAAP-11, Load Line 4 (December 17, 2010).*

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks: *Draft Site Safety & Health Plan Camp Ravenna Environmental Program Support Services Portage and Trumball Counties, Ohio (Vista Sciences Corporation, February 2, 2016).*

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: ____________

4. **Permits and Service Agreements**

☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A
☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A
☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A
☐ Other permits____________ ☐ Readily available ☐ Up to date ☒ N/A

Remarks: ____________

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: ____________

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks : ____________

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: Groundwater monitoring at Camp Ravenna is performed on a facility-wide basis. The most recent available report is *Final Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Report on the March 2015 Sampling Event Former Ravenna Army Ammunition Plant Portage and Trumball Counties, Ohio (September 21, 2015).*

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 4

8.	**Leachate Extraction Records** Remarks	☐ Readily available	☐ Up to date	☒ N/A	
9.	**Discharge Compliance Records** ☐ Air ☐ Water (effluent) Remarks:	 ☐ Readily available ☐ Readily available	 ☐ Up to date ☐ Up to date	 ☒ N/A ☒ N/A	
10.	**Daily Access/Security Logs** Remarks:	☐ Readily available	☐ Up to date	☒ N/A	
	IV. O&M COSTS				
1.	**O&M Organization** ☐ State in-house ☐ PRP in-house ☐ Federal Facility in-house ☐ Other:	 ☐ Contractor for State ☐ Contractor for PRP ☒ Contractor for Federal Facility (Vista Sciences Corporation)			
2.	**O&M Cost Records** ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place Original O&M cost estimate: Not applicable ☐ Breakdown attached Total annual cost by year for review period if available (not available)				
3.	**Unanticipated or Unusually High O&M Costs During Review Period** Describe costs and reasons: Not applicable				
	V. ACCESS AND INSTITUTIONAL CONTROLS	☒ Applicable		☐ N/A	
A.	**Fencing**				
1.	**Fencing damaged**	☐ Location shown on site map	☒ Gates secured	☐ N/A	
	Remarks: Access controls are not part of the remedy. Load Line 4 is surrounded by a chain link fence with locked gate. The fence appears to be intact, although some isolated areas are in poor condition and show signs of distress. Camp Ravenna is surrounded by a perimeter fence that consists of six feet high chain link fence fabric with steel I-beam shaped posts set on 10 to 12 feet centers set in concrete footers. Annual LUC inspection reports for Winklepeck Burning Grounds and Ramsdell Quarry Landfill document any major defects in the perimeter fence and actions taken to repair the defects.				

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 4

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks: Warning signs restricting access are also posted at the site entrance gate.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☒ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) None
Frequency
Responsible party/agency
Contact
Name Title Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☒ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☒ N/A
Violations have been reported ☐ Yes ☐ No ☒ N/A
Other problems or suggestions: ☐ Report attached
ICs are not part of the remedy for Load Line 4.

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☒ N/A

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks

2. **Land use changes on site** ☒ N/A
Remarks: The site is not used for activities other than environmental monitoring, sampling, and remediation.

3. **Land use changes off site** ☒ N/A
Remarks:

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☒ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks: Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for range operations and environmental monitoring activities.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 4

B. Other Site Conditions

Remarks The former buildings, including floor slabs, have been removed. Elevated concrete walkways between the former buildings remain in place. The site consists of open grass-covered areas and areas containing trees and brush. Monitoring wells are present.

Note: Sections VII through IX were removed from this checklist because they are not applicable

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

Remarks : There are no other remedies at the site.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy was implemented to protect human health and the environment from exposure to contaminants (inorganics, explosives, PCBs, and SVOCs) attributed to former site operations associated with the assembly and demilitarization of large caliber projectiles, general-purpose bombs, and parts from these munitions. The remedy consisted of excavation and off-site disposal of contaminated surface and subsurface soil and dry sediment that exceeded cleanup goals identified in the Interim ROD. Clean soils were backfilled in the excavations and graded. The former buildings, including floor slabs, were subsequently removed. The site inspection did not identify evidence of OHARNG use or trespass by the public. Groundwater monitoring is performed under a facility-wide program.

The remedy is effective and functioning as designed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Maintenance activities consist of keeping site gates closed, keeping site roads passable (i.e. snow plowing), culvert maintenance, mowing (once per year), and clearing vegetation. Inspection and maintenance of building slabs, prescribed in the Interim ROD, is no longer required because the slabs and contaminated soil beneath the slabs were removed and disposed offsite.

Monitoring activities consist of quarterly sampling and analysis of groundwater for VOCs, SVOCs, PCBs, pesticides, explosives, propellants, inorganics, and cyanide. All monitoring wells are properly secured/locked, in good condition, and routinely sampled. Subsequent sampling and analysis has been conducted to evaluate the presence and extent of contamination in sub slab soils and underground utility lines.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 4

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. No issues or observations were identified that would suggest the protectiveness of the remedy may be compromised in the future.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Opportunities for optimization were not identified.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 12

I. SITE INFORMATION

Site name: *Camp Ravenna Joint Military Training Center Load Line 12 (RVAAP-12)*	**Date of inspection:** *August 10, 2016*
Location and Region: *Portage and Trumball Counties Ohio*	**EPA ID:** *OH5210020736 (CERCLIS)*
Agency, office, or company leading the five-year review: *US Army Corps of Engineers, Buffalo District*	**Weather/temperature:** *~90ºF, partly cloudy, humid*

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other Excavation and off-site disposal of contaminated surface and subsurface soil and dry sediment that exceeded cleanup goals identified in the *Final Record of Decision for Soil and Dry Sediment for the RVAAP12 Load Line 12 (March 2009)* (ROD).

Attachments: ☐ Inspection team roster attached ☒ Site map attached (Attachment 1)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Al Brillinger (Vista Environmental Services) | Program Manager | 11/07/16
   Name | Title | Date
   Interviewed ☐ at site ☐ at office ☒ by email Phone no. (502) 315-6892
   Problems, suggestions; ☒ Report attached

2. **O&M staff** ______ ______ ______
   Name | Title | Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency Ohio Environmental Protection Agency
   Contact Rodney Beals ______ ______ (330) 963-1218
   Name | Title | Date | Phone no.
   Problems; suggestions; ☒ Report attached

4. **Other interviews** (optional) ☒ Reports attached. (Attachment 6)

- Mark Leeper, PG, MBA, Army National Guard Directorate, Environmental Cleanup Program Manager
- Kevin Sedlak, National Guard Bureau, Restoration Project Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 12

- Gregory Moore, USACE Louisville District Project Manager
- Nathaniel Peters, USACE Louisville District Environmental Engineer
- Angela Schmidt, USACE Louisville District Risk Assessor
- Allan Brillinger, Vista Environmental Sciences Program Manager
- Rodney Beals, Sue Watkins, and Nicholas Roope, Ohio EPA
- Tom Tadsen, RAB Co-Chair

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☒ As-built drawings	☒ Readily available	☐ Up to date	☐ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks: Remedial action completion drawings are provided in *Final Remedial Action Report for the RVAAP-12 Load Line 12 (August 9, 2010).*

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks: *Draft Site Safety & Health Plan Camp Ravenna Environmental Program Support Services Portage and Trumball Counties, Ohio (Vista Sciences Corporation, February 2, 2016).*

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: ______

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits______	☐ Readily available	☐ Up to date	☒ N/A

Remarks: ______

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: ______

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks : ______

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: Groundwater monitoring at Camp Ravenna is performed on a facility-wide basis. The most recent available report is *Final Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Report on the March 2015 Sampling Event Former Ravenna Army Ammunition Plant Portage and Trumball Counties, Ohio (September 21, 2015).*

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks ______

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 12

9.	**Discharge Compliance Records** ☐ Air ☐ Readily available ☐ Up to date ☒ N/A ☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A Remarks:
10.	**Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☐ N/A Remarks: Daily access/security logs are not maintained.
	IV. O&M COSTS
1.	**O&M Organization** ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP ☐ Federal Facility in-house ☒ Contractor for Federal Facility (Vista Sciences Corporation) ☐ Other:
2.	**O&M Cost Records** ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place Original O&M cost estimate: Not applicable ☐ Breakdown attached Total annual cost by year for review period if available (not available)
3.	**Unanticipated or Unusually High O&M Costs During Review Period** Describe costs and reasons: Not applicable
	V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A
A.	**Fencing**
1.	**Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A Remarks: Load Line 12 is surrounded by a chain link fence with locked gate. The fence appears to be intact, although some isolated areas are in poor condition and show signs of distress. Camp Ravenna is surrounded by a perimeter fence that consists of six feet high chain link fence fabric with steel I-beam shaped posts set on 10 to 12 feet centers set in concrete footers. Annual LUC inspection reports for Winklepeck Burning Grounds and Ramsdell Quarry Landfill document any major defects in the perimeter fence and actions taken to repair the defects.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 12

B.	**Other Access Restrictions**
1.	**Signs and other security measures** ☐ Location shown on site map ☐ N/A Remarks: Warning signs restricting access are also posted at the site entrance gate.
C.	**Institutional Controls (ICs)**
1.	**Implementation and enforcement** Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A Type of monitoring (*e.g.*, self-reporting, drive by) None Frequency Responsible party/agency Vista Sciences Corporation Contact Al Brillinger (Name) Program Manager (Title) (502) 315-6892 (Phone no.) Reporting is up-to-date ☐ Yes ☒ No ☐ N/A Reports are verified by the lead agency ☐ Yes ☒ No ☐ N/A Specific requirements in deed or decision documents have been met ☐ Yes ☒ No ☐ N/A Violations have been reported ☐ Yes ☐ No ☒ N/A Other problems or suggestions: ☐ Report attached The site is not being used.
2.	**Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
D.	**General**
1.	**Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident Remarks
2.	**Land use changes on site** ☒ N/A Remarks: The site is not used for activities other than environmental monitoring, sampling, and remediation.
3.	**Land use changes off site** ☒ N/A Remarks:
	VI. GENERAL SITE CONDITIONS
A.	**Roads** ☒ Applicable ☐ N/A
1.	**Roads damaged** ☒ Location shown on site map ☒ Roads adequate ☐ N/A Remarks: Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for range operations and environmental monitoring activities.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 12

B. Other Site Conditions

Remarks The former buildings, including floor slabs, have been removed. Elevated concrete walkways between the former buildings remain in place. The site consists of open grass-covered areas and areas containing trees and brush. Monitoring wells are present.

Note: Sections VII through IX were removed from this checklist because they are not applicable

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

Remarks : There are no other remedies at the site.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy was implemented to protect human health and the environment from actual or potential exposure to arsenic in soil and dry sediment. The remedy consisted of excavation and off-site disposal of contaminated soil and dry sediment from a ditch on the eastern end of the site that contained arsenic at concentrations above the cleanup goal identified in the ROD. Clean soils were backfilled in the remediated area and graded. Engineering controls consist of a perimeter fence with warning signs. Access by the general public is restricted by a Camp Ravenna facility-wide perimeter fence and security gates. The site inspection did not identify evidence of trespass or OHARNG training.

The remedy is effective and functioning as designed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Maintenance activities consist of keeping site gates closed, keeping site roads passable (i.e. snow plowing), culvert maintenance, mowing (once per year), and clearing vegetation. Inspection and maintenance of building slabs, prescribed in the Interim ROD, is no longer required because the slabs and contaminated soil beneath the slabs were removed and disposed offsite.

Monitoring activities consist of quarterly sampling and analysis of groundwater for VOCs, SVOCs, PCBs, pesticides, explosives, propellants, inorganics, and cyanide. All monitoring wells are properly secured/locked, in good condition, and routinely sampled. Subsequent sampling and analysis has been conducted to evaluate the presence and extent of contamination in in soil and dry sediment and underground utility lines (to address data gaps).

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

No issues or observations were identified that would suggest the protectiveness of the remedy may be compromised in the future.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Load Line 12

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Opportunities for optimization were not identified.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Winklepeck Burning Grounds

I. SITE INFORMATION	
Site name: *Camp Ravenna Joint Military Training Center Winklepeck Burning Grounds (RVAAP-05)*	**Date of inspection:** *August 10, 2016*
Location and Region: *Portage and Trumball Counties Ohio*	**EPA ID:** *OH5210020736 (CERCLIS)*
Agency, office, or company leading the five-year review: *US Army Corps of Engineers, Buffalo District*	**Weather/temperature:** *~80ºF, partly cloudy, humid*

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other Excavation and off-site disposal of contaminated soils and dry sediment that exceeded cleanup goals identified in the *Final Record of Decision for Soil and Dry Sediment at the RVAAP-05 Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant (August 2008)* (ROD)

Attachments: ☐ Inspection team roster attached ☒ Site map attached (Attachment 1)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Al Brillinger (Vista Environmental Services) | Program Manager | 11/07/16
   Name | Title | Date
   Interviewed ☐ at site ☐ at office ☒ by email Phone no. (502) 315-6892
   Problems, suggestions; ☒ Report attached

2. **O&M staff** ______ ______ ______
   Name | Title | Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency Ohio Environmental Protection Agency
   Contact Rodney Beals ______ ______ (330) 963-1218
   Name | Title | Date | Phone no.
   Problems; suggestions; ☒ Report attached

4. **Other interviews** (optional) ☒ Reports attached. (Attachment 6)

- Mark Leeper, PG, MBA, Army National Guard Directorate, Environmental Cleanup Program Manager
- Kevin Sedlak, National Guard Bureau, Restoration Project Manager

Five-Year Review Site Inspection Checklist
Camp Ravenna, Winklepeck Burning Grounds

- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2
- Gregory Moore, USACE Louisville District Project Manager
- Nathaniel Peters, USACE Louisville District Environmental Engineer
- Angela Schmidt, USACE Louisville District Risk Assessor
- Allan Brillinger, Vista Environmental Sciences Program Manager
- Rodney Beals, Sue Watkins, and Nicholas Roope, Ohio EPA
- Tom Tadsen, RAB Co-Chair

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual (see remark 1) ☐ Readily available ☐ Up to date ☒ N/A
☒ As-built drawings (see remark 2) ☒ Readily available ☐ Up to date ☐ N/A
☒ Maintenance logs (see remark 3) ☒ Readily available ☒ Up to date ☐ N/A
Remarks: 1. Land use control (LUC) requirements are provided in *Draft Property Management Plan for the Designated Areas of Concerns Ravenna Army Ammunition Plant Ravenna, Ohio (August 10, 2010).* 2. Excavation drawings are provided in *Final Remedial Action Completion Report for RVAAP-05 Winklepeck Burning Grounds Pads 61/61A, 67, and 70 (November 19, 2009).* 3. LUC inspection results are provided in quarterly inspection reports and annual LUC monitoring reports.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A
Remarks: *Draft Site Safety & Health Plan Camp Ravenna Environmental Program Support Services Portage and Trumball Counties, Ohio (Vista Sciences Corporation, February 2, 2016).*

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks: ______

4. **Permits and Service Agreements**

☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A
☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A
☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A
☐ Other permits______ ☐ Readily available ☐ Up to date ☒ N/A
Remarks: ______

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks: ______

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks : ______

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
Remarks: Groundwater monitoring at Camp Ravenna is performed on a facility-wide basis. The most recent available report is *Final Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Report on the March 2015 Sampling Event Former Ravenna Army Ammunition Plant Portage and Trumball Counties, Ohio (September 21, 2015).*

Five-Year Review Site Inspection Checklist
Camp Ravenna, Winklepeck Burning Grounds

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks

9. **Discharge Compliance Records**
☐ Air ☐ Readily available ☐ Up to date ☒ N/A
☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A
Remarks:

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks: Winklepeck Burning Grounds (WBG) is used as a small arms range (including a Mark 19 Grenade Machine Gun Range) by the Army National Guard. Access is restricted due to range activities.

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☒ Contractor for Federal Facility (Vista Sciences Corporation)
☐ Other:

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate: Not available ☐ Breakdown attached

Total annual cost by year for review period if available (not available)

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: Not applicable

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: There is no fence surrounding WBG. The only facility-wide engineering control is a perimeter fence for Camp Ravenna. It consists of six feet high chain link fence fabric with steel I-beam shaped posts set on 10 to 12 feet centers set in concrete footers. The LUC inspection reports document any major defects in the perimeter fence and actions taken to repair the defects.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks: Signs (caution, impact area keep out) have been installed at 200 meter intervals.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Winklepeck Burning Grounds

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self-reporting
Frequency Quarterly
Responsible party/agency Camp Ravenna/OHARNG
Contact Al Brillinger (Vista Sciences Corporation) (Name) Program Manager (Title) (502) 315-6892 (Phone no.)

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☒ Yes ☐ No ☐ N/A
Other problems or suggestions: ☐ Report attached
LUC inspection reports (quarterly inspection reports and annual LUC monitoring reports) are documented in Attachment 2.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks

2. **Land use changes on site** ☐ N/A
Remarks: The site is not used for activities other than as a small arms and Mark 19 Grenade Machine Gum range, range maintenance, and environmental monitoring, sampling, and remediation.

3. **Land use changes off site** ☒ N/A
Remarks:

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☒ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks: Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for range operations and environmental monitoring activities.

B. Other Site Conditions

Remarks The former WBG encompasses 211.66 acres in the central portion of Camp Ravenna. The site is open and used as a target range by OHARNG. Topography is gently undulating and elevations decrease from west to east. Gravel/dirt roads running east to west are tied together with connecting roads at the eastern and western ends of the site. There are no perennial streams. Monitoring wells are situated throughout the site.

Note: Sections VII through IX were removed from this checklist because they are not applicable

Five-Year Review Site Inspection Checklist
Camp Ravenna, Winklepeck Burning Grounds

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

Remarks: There are no other remedies at the site.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy was implemented to protect human health and the environment from exposure to contaminants attributed to former Ravenna Army Ammunition Plant operations at burning pads 61, 61A, 67, and 70. The selected remedy consisted of excavation and off-site disposal of approximately 5,965 cubic yards of soil and dry sediment and LUCs. It was implemented in 2009. An Explanation of Significant Differences (ESD) was prepared in 2015 to enable using the site as a Mark 19 Grenade Machine Gun Range. Implementation of the remedy was started in November 2016.

The ROD remedy is effective and functioning as designed. The ESD remedy has not been completed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Range maintenance activities conducted by OHARNG consist of grass cutting, maintenance of targetry and associated mechanisms, and natural resources management activities.

Monitoring activities consist of quarterly LUC inspections that include: 1) A review of LUC training and documentation as applicable to WBG, 2) Evaluation of the Camp Ravenna perimeter fence to ensure that it is maintained in a manner that is effective and deters trespassers, 3) Evaluation of activities at WBG to ensure that they are in compliance with OHARNG range safety regulations/standard operating procedures, established digging restrictions, and established exposure limits, and 4) Evaluation to ensure that groundwater activities are being conducted in a manner consistent with established LUCS.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

No issues or observations were identified that would suggest the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Opportunities for optimization were not identified.

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Five-Year Review Site Inspection Checklist
Camp Ravenna, Ramsdell Quarry Landfill

I. SITE INFORMATION

Site name: *Camp Ravenna Joint Military Training Center* *Ramsdell Quarry Landfill (RVAAP-01)*	**Date of inspection:** *August 10, 2016*
Location and Region: *Portage and Trumball Counties Ohio*	**EPA ID:** *OH5210020736 (CERCLIS)*
Agency, office, or company leading the five-year review: *US Army Corps of Engineers, Buffalo District*	**Weather/temperature:** *~90ºF, partly cloudy, humid*

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
☒ Access controls
☒ Institutional controls
☐ Groundwater pump and treatment
☐ Surface water collection and treatment
☐ Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☒ Other Excavation and off-site disposal of contaminated soil and dry sediment that exceeded cleanup goals identified in the *Final Record of Decision for Soil and Dry Sediment for the RVAAP-01 Ramsdell Quarry Landfill (March 2009) (ROD).*

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Al Brillinger (Vista Environmental Services) — Program Manager — 11/07/16
   Name / Title / Date
   Interviewed ☐ at site ☐ at office ☒ by email Phone no. (502) 315-6892
   Problems, suggestions; ☒ Report attached

2. **O&M staff** ______ ______ ______
   Name / Title / Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency Ohio Environmental Protection Agency
   Contact Rodney Beals ______ ______ (330) 963-1218
   Name / Title / Date / Phone no.
   Problems; suggestions; ☒ Report attached

4. **Other interviews** (optional) ☒ Reports attached.

- Mark Leeper, PG, MBA, Army National Guard Directorate, Environmental Cleanup Program Manager
- Kevin Sedlak, National Guard Bureau, Restoration Project Manager

Five-Year Review Site Inspection Checklist
Camp Ravenna, Ramsdell Quarry Landfill

- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2
- Gregory Moore, USACE Louisville District Project Manager
- Nathaniel Peters, USACE Louisville District Environmental Engineer
- Angela Schmidt, USACE Louisville District Risk Assessor
- Allan Brillinger, Vista Environmental Sciences Program Manager
- Rodney Beals, Sue Watkins, and Nicholas Roope, Ohio EPA
- Tom Tadsen, RAB Co-Chair

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
☒ O&M manual (see remark 1) ☒ Readily available ☒ Up to date ☐ N/A
☒ As-built drawings (see remark 2) ☒ Readily available ☐ Up to date ☐ N/A
☒ Maintenance logs (see remark 3) ☒ Readily available ☒ Up to date ☐ N/A
Remarks: 1. Land use control (LUC) requirements are provided in *Final Remedial Design for Soil and Dry Sediment at RVAAP-01 Ramsdell Quarry Landfill*. 2. Extent of excavation drawings are provided in *Final Engineering Evaluation for Soil and Dry Sediment at RVAAP-01 Ramsdell Quarry Landfill (September 2, 2011)*. 3. LUC inspection results are provided in annual monitoring reports.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A
Remarks: *Draft Site Safety & Health Plan Camp Ravenna Environmental Program Support Services Portage and Trumball Counties, Ohio (Vista Sciences Corporation, February 2, 2016).*

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks: ______

4. **Permits and Service Agreements**
☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A
☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A
☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A
☐ Other permits______ ☐ Readily available ☐ Up to date ☒ N/A
Remarks: ______

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks: ______

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks : ______

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
Remarks: Base line and quarterly monitoring has been conducted for VOCs, SVOCs, pesticides, PCBs, explosives, propellants, inorganics, cyanide, nitrate, and perchlorate.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Ramsdell Quarry Landfill

8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks				
9.	**Discharge Compliance Records**				
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A	
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks:				
10.	**Daily Access/Security Logs**	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks:				
	IV. O&M COSTS				
1.	**O&M Organization**				
	☐ State in-house	☐ Contractor for State			
	☐ PRP in-house	☐ Contractor for PRP			
	☐ Federal Facility in-house	☒ Contractor for Federal Facility (Vista Sciences Corporation)			
	☐ Other:				
2.	**O&M Cost Records**				
	☐ Readily available	☐ Up to date			
	☐ Funding mechanism/agreement in place				
	Original O&M cost estimate: Not available	☐ Breakdown attached			
	Total annual cost by year for review period if available (not available)				
3.	**Unanticipated or Unusually High O&M Costs During Review Period**				
	Describe costs and reasons: Not applicable				
	V. ACCESS AND INSTITUTIONAL CONTROLS	☒ Applicable	☐ N/A		
A.	**Fencing**				
1.	**Fencing damaged**	☐ Location shown on site map	☒ Gates secured	☐ N/A	
	Remarks: Fencing at the Ramsdell Quarry Landfill consists of a chain-link security fence and five-strand, high tensile wire fence. The chain-link fabric is located on the Ramsdell Road side of the site and fastened to a top reinforcing wire and a bottom tension wire. Two locked double-swing steel chain-link gates are present along Ramsdell Road. The landfill fence was observed to be in good condition with no damage noted.				
	A Camp Ravenna perimeter fence is also present. It consists of six feet high chain link fence fabric with steel I-beam shaped posts set on 10 to 12 feet centers set in concrete footers. LUC inspection reports document any major defects in the perimeter fence and actions taken to repair the defects.				

Five-Year Review Site Inspection Checklist
Camp Ravenna, Ramsdell Quarry Landfill

B. Other Access Restrictions

1. **Signs and other security measures** ☒ Location shown on site map ☐ N/A

Remarks: Warning signs (20" by 14") are located every 300 ft on the landfill perimeter fence, *"KEEP OUT RESTRICTED ACCESS SITE AUTHORIZED PERSONNEL ONLY. DANGER ASBESTOS WASTE DISPOSAL SITE DO NOT CREATE DUST BREATHING ASBESTOS IS HAZARDOUS TO YOUR HEALTH."*

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self-reporting
Frequency Annual
Responsible party/agency Camp Ravenna/OHARNG
Contact Al Brillinger (Vista Sciences Corporation) Program Manager (502) 315-6892
Name Title Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ☒ N/A
Other problems or suggestions: ☐ Report attached
LUC monitoring reports) are documented in Attachment 2.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks

2. **Land use changes on site** ☒ N/A

Remarks: The site is not used for activities other than landfill cap maintenance, environmental monitoring and sampling.

3. **Land use changes off site** ☒ N/A

Remarks:

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☒ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks: Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for range operations and environmental monitoring activities.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Ramsdell Quarry Landfill

B.	**Other Site Conditions**
	Remarks The Ramsdell Quarry Landfill encompasses approximately 14 acres. The land surface in a large portion of the landfill slopes into a former quarry, which is about 40 feet below the surrounding area. Surface water runoff collects in an isolated wetland on the bottom of the former quarry. There is no surface water drainage outlet from the quarry. The landfill has been closed and has a clay cap with topsoil/grass layer at surface. The cap is mowed. Monitoring wells are situated around the site.
	VII. LANDFILL COVERS ☐ Applicable ☒ N/A The Ramsdell Quarry Landfill has been closed under State of Ohio solid waste regulations and is covered. The landfill cover is not a component of the remedial action subject to this five-year review. Aspects of the landfill cover are identified below to provide information about site conditions.
A.	**Landfill Surface** ☒ Applicable ☐ N/A
1.	**Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident Areal extent________ Depth ________ Remarks:
2.	**Cracks** ☐ Location shown on site map ☒ Cracking not evident Lengths________ Widths________ Depths______ Remarks:
3.	**Erosion** ☐ Location shown on site map ☒ Erosion not evident Areal extent________ Depth ________ Remarks :
4.	**Holes** ☐ Location shown on site map ☒ Holes not evident Areal extent________ Depth ________ Remarks :
5.	**Vegetative Cover** ☐ Grass ☐ Cover properly established ☒ No signs of stress ☐ Trees/Shrubs (indicate size and locations on a diagram) Remarks:
6.	**Alternative Cover (armored rock, concrete, etc.)** ☒ N/A Remarks:
7.	**Bulges** ☐ Location shown on site map ☒ Bulges not evident Areal extent________ Height ________ Remarks:

Five-Year Review Site Inspection Checklist
Camp Ravenna, Ramsdell Quarry Landfill

8.	**Wet Areas/Water Damage** ☐ Wet areas/water damage not evident ☐ Wet areas ☐ Location shown on site map Areal extent ______ ☒ Ponding ☒ Location shown on site map Areal extent see Attachment 1 ☐ Seeps ☐ Location shown on site map Areal extent ______ ☐ Soft subgrade ☐ Location shown on site map Areal extent ______ Remarks: ______	
9.	**Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability Areal extent______ Remarks: ______	
B.	**Benches** ☐ Applicable ☒ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)	
C.	**Letdown Channels** ☐ Applicable ☒ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)	
D.	**Cover Penetrations** ☒ Applicable ☐ N/A	
1.	**Gas Vents** ☐ Active ☐ Passive ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A Remarks ______	
2.	**Gas Monitoring Probes** ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A Remarks ______	
3.	**Monitoring Wells** (within surface area of landfill) ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks ______	
4.	**Leachate Extraction Wells** ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A Remarks ______	
5.	**Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A Remarks ______	
E.	**Gas Collection and Treatment** ☐ Applicable ☒N/A	

Five-Year Review Site Inspection Checklist
Camp Ravenna, Ramsdell Quarry Landfill

F.	**Cover Drainage Layer**	☐ Applicable	☒ N/A
G.	**Detention/Sedimentation Ponds**	☐ Applicable	☒ N/A
H.	**Retaining Walls**	☐ Applicable	☒ N/A
I.	**Perimeter Ditches/Off-Site Discharge**	☐ Applicable	☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

Remarks : There are no other remedies at the site. The landfill was closed in 1990 under State of Ohio solid waste regulations.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy was implemented to protect human health and the environment from exposure to contaminants attributed to former landfilling operations. The selected remedy consisted of excavation and off-site disposal of approximately 423 cubic yards (*in-situ*) of soil and dry sediment. The remedy was not fully implemented because friable asbestos-containing material (ACM) was encountered during implementation of the remedy. A new remedy was implemented that consisted of 1) installation of a perimeter fence at the perimeter of the landfill to encompass the closed landfill, quarry bottom, and wetlands, and 2) implementing best management practices to remove surficial ACM through non-intrusive.no digging methods.

The remedies are effective and functioning as designed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Maintenance activities consist of annual mowing of the landfill cap and monthly inspections by the Portage County Health Department.

Monitoring activities consist of quarterly sampling and analysis of groundwater for VOCs, SVOCs, PCBs, pesticides, explosives, propellants, inorganics, cyanide, nitrate, and perchlorate. All monitoring wells are properly secured/locked and in good condition.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

No issues or observations were identified that would suggest the protectiveness of the remedy may be compromised in the future.

Five-Year Review Site Inspection Checklist
Camp Ravenna, Ramsdell Quarry Landfill

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
	None

ATTACHMENT 5

Photographic Record

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Photograph Location and Direction

Fence Line

Former Railroad

Roads

Excavation Area

Excavation Area (2010 - Not Included in Interm ROD)

Area of Concern

Former Building/Structure

N E S W

0 150 300 600 Feet

US Army Corps of Engineers
Buffalo District

Document Name: LL_1_PhotoLoc.mxd
Drawn By: H5TDEEMP
Date Saved: 31 Oct 2016
Time Saved: 8:42:33 AM

Load Line #1
Photo Locations

Camp Ravenna
Portage and Trumball
Counties, Ohio

Figure A5 - 1

Photograph Location and Direction

Fence Line

Former Railroad

Roads

Excavation Area

Excavation Area (2010 - Not Included in Interim ROD)

Area of Concern

Former Building/Structure

0 150 300 600 Feet

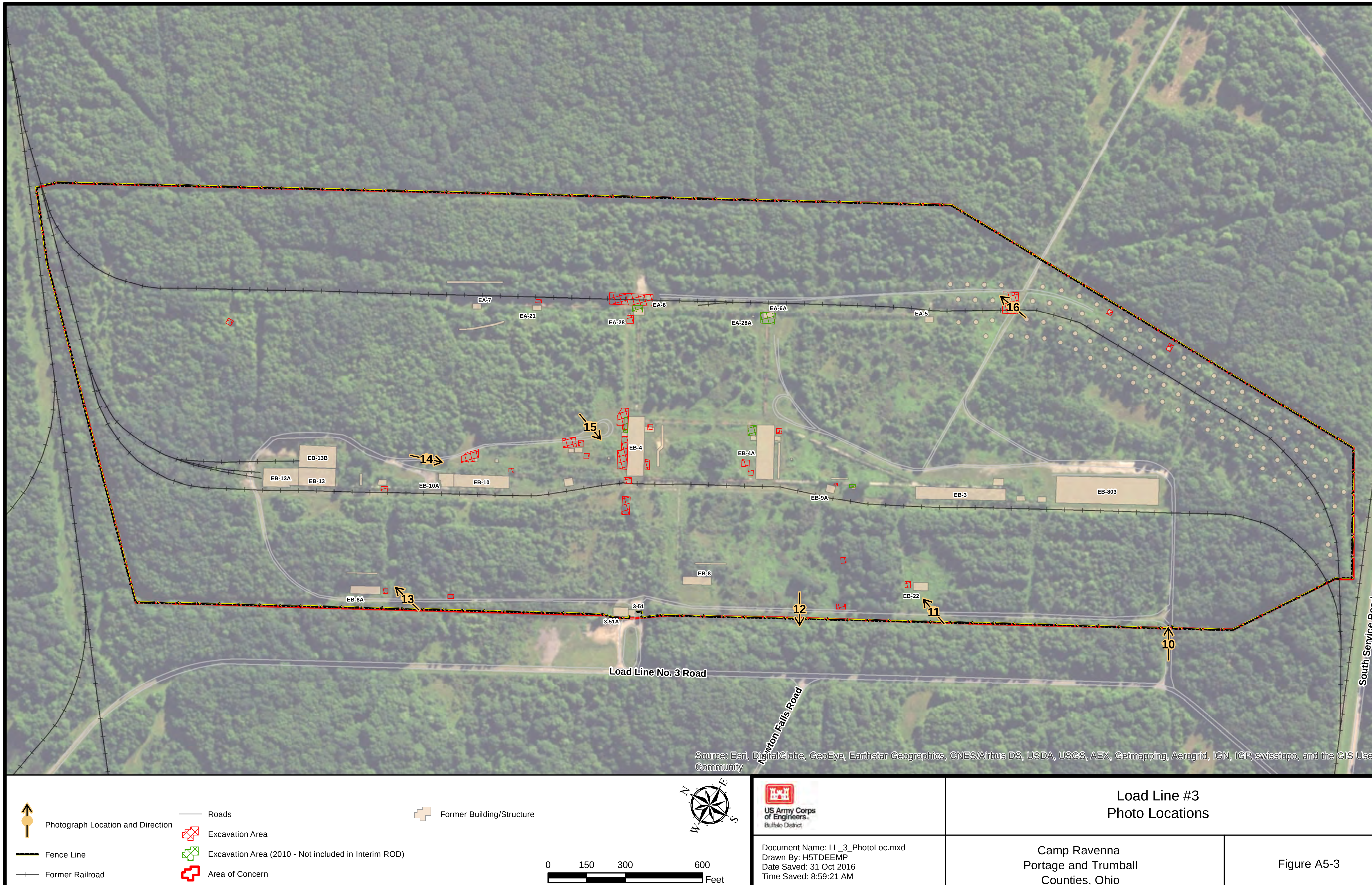
US Army Corps of Engineers
Buffalo District

Load Line #2
Photo Locations

Document Name: LL_2_PhotoLoc.mxd
Drawn By: H5TDEEMP
Date Saved: 31 Oct 2016
Time Saved: 8:52:36 AM

Camp Ravenna
Portage and Trumball
Counties, Ohio

Figure A5 - 2



US Army Corps of Engineers
Buffalo District

Load Line #3
Photo Locations

Document Name: LL_3_PhotoLoc.mxd
Drawn By: H5TDEEMP
Date Saved: 31 Oct 2016
Time Saved: 8:59:21 AM

Camp Ravenna
Portage and Trumbull
Counties, Ohio

Figure A5-3

Photograph Location and Direction

Fence Line

Former Railroad

Roads

Excavation Area

Soil Stockpile Area (2010 - Not Included in Interim ROD)

Area of Concern

Former Building/Structure

0 150 300 600 Feet

US Army Corps of Engineers® Buffalo District

Load Line #4
Photo Locations

Document Name: LL_4_PhotoLoc.mxd
Drawn By: H5TDEEMP
Date Saved: 31 Oct 2016
Time Saved: 9:04:52 AM

Camp Ravenna
Portage and Trumball
Counties, Ohio

Figure A5 - 4

US Army Corps of Engineers
Buffalo District

Load Line #12
Photo Locations

Document Name: LL_12_PhotoLoc.mxd
Drawn By: H5TDEEMP
Date Saved: 31 Oct 2016
Time Saved: 9:08:39 AM

Camp Ravenna
Portage and Trumbull
Counties, Ohio

Figure A5 - 5

Photograph Location and Direction

Fence Line

Former Railroad

Roads

Excavation Area

Area of Concern

Former Building/Structure

0 500 1,000 Feet

N E S W

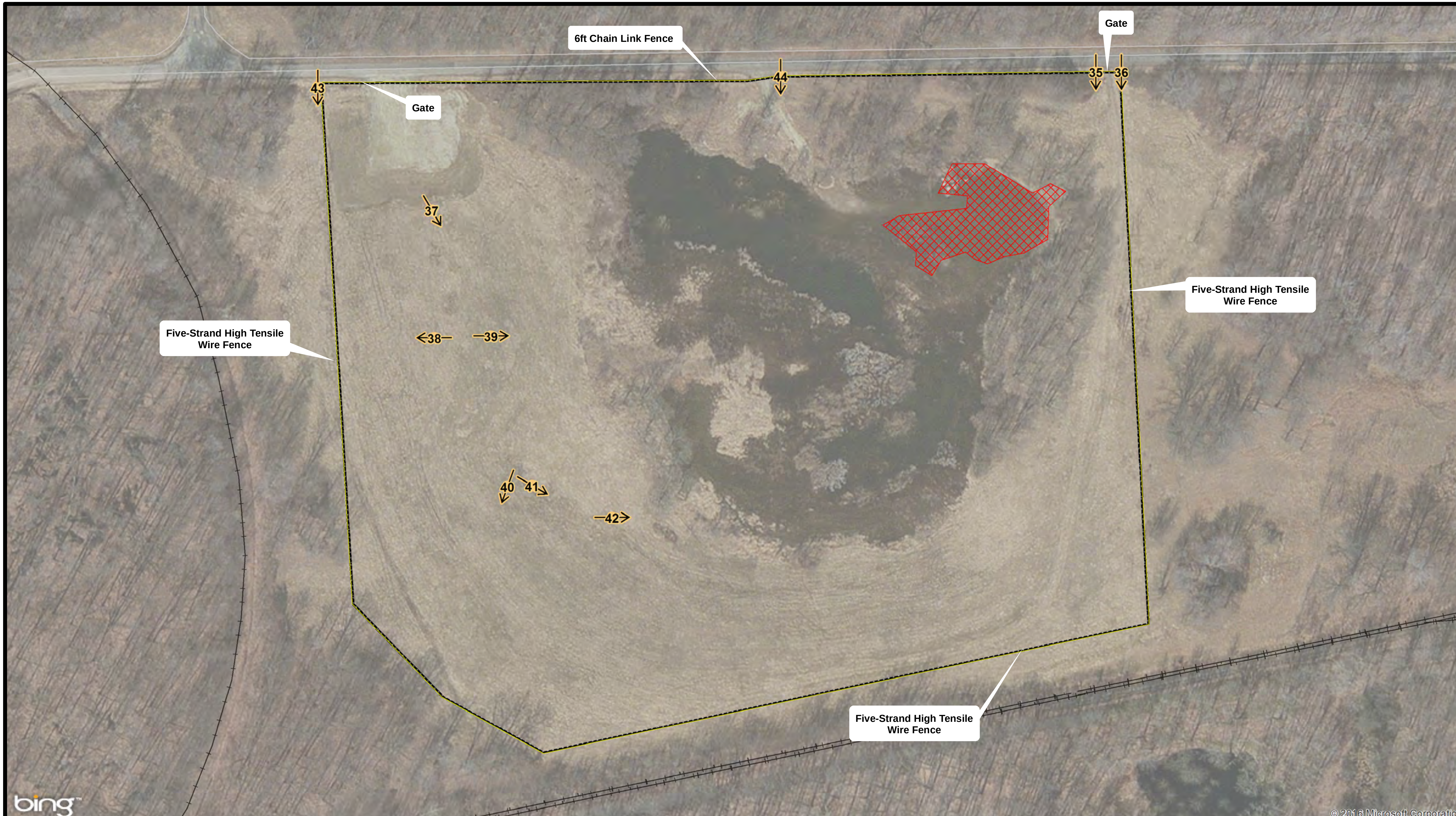
US Army Corps of Engineers
Buffalo District

Winklepeck Burning Grounds
Photo Locations

Document Name: WPBG_PhotoLoc.mxd
Drawn By: H5TDEEMP
Date Saved: 31 Oct 2016
Time Saved: 9:21:12 AM

Camp Ravenna
Portage and Trumball
Counties, Ohio

Figure A5 - 6



Photograph Location and Direction

Fence Line

Railroads

Roads

Excavation Area

0 125 250 Feet

N W E S

US Army Corps of Engineers
Buffalo District

Ramsdell Quarry Landfill
Photo Locations

Document Name: RQL_PhotoLoc.mxd
Drawn By: H5TDEEMP
Date Saved: 31 Oct 2016
Time Saved: 9:28:33 AM

Camp Ravenna
Portage and Trumbull
Counties, Ohio

Figure A5 - 7

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PHOTOGRAPHIC RECORD
Camp Ravenna

Load Line 1 (RVAAP-08)

Photo No. 1 (August 10, 2016) <u>Description</u>: Locked entrance gate and warning signs	
Photo No. 2 (August 10, 2016) <u>Description</u>: Remediated area between former buildings CB-3 and CB-4A	

<table>
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Camp Ravenna</td></tr>
<tr><td colspan="2">Load Line 1 (RVAAP-08)</td></tr>
<tr><td>Photo No. 3
(August 10, 2016)

<u>Description</u>:

Remediated areas at former building CB-4</td><td></td></tr>
<tr><td>Photo No. 4
(August 10, 2016)

<u>Description</u>:

Remediated area at former building CB-10</td><td></td></tr>
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PHOTOGRAPHIC RECORD
Camp Ravenna

Load Line 1 (RVAAP-08)

Photo No. 5
(August 10, 2016)

Description:

Remediated area at former building CB-13-A

Load Line 2 (RVAAP-09)

Photo No. 6
(August 10, 2016)

Description:

Locked entrance gate and warning signs

PHOTOGRAPHIC RECORD **Camp Ravenna**	
Load Line 2 (RVAAP-09)	
Photo No. 7 (August 10, 2016) Description: Remediated area at former building DB-3	
Photo No. 8 (August 10, 2016) Description: Remediated area at former buildings DB-13, DB-13A, and DB-13B	

PHOTOGRAPHIC RECORD
Camp Ravenna

Load Line 2 (RVAAP-09)

Photo No. 9
(August 10, 2016)

Description:

Remediated area at former building DB-27

Load Line 3 (RVAAP-03)

Photo No. 10
(August 10, 2016)

Description:

Locked entrance gate and warning signs

PHOTOGRAPHIC RECORD
Camp Ravenna

Load Line 3 (RVAAP-03)

Photo No. 11 (August 10, 2016) Description: Remediated area at former building EB-22	
Photo No. 12 (August 10, 2016) Description: Damaged fence	

PHOTOGRAPHIC RECORD
Camp Ravenna

Load Line 3 (RVAAP-03)

Photo No. 13
(August 10, 2016)

Description:

Remediated area at former building EB-8A

Photo No. 14
(August 10, 2016)

Description:

Remediated area at former building EB 10/10A

PHOTOGRAPHIC RECORD Camp Ravenna	
Load Line 3 (RVAAP-03)	
Photo No. 15 (August 10, 2016) Description: Remediated area at former building EB-4	
Photo No. 16 (August 10, 2016) Description: Remediated area at northern section of the site	

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<tr><td colspan="2">Load Line 4 (RVAAP-11)</td></tr>
<tr><td>Photo No. 17
(August 10, 2016)

<u>Description</u>:

Locked entrance gate and warning sign</td><td>
</td></tr>
<tr><td>Photo No. 18
(August 10, 2016)

<u>Description</u>:

Remediated area at former building G-1A</td><td></td></tr>
</table>

PHOTOGRAPHIC RECORD
Camp Ravenna

Load Line 4 (RVAAP-11)

Photo No. 19
(August 10, 2016)

Description:

Remediated area at former building G-4

Photo No. 20
(August 10, 2016)

Description:

Remediated area at former rail line

PHOTOGRAPHIC RECORD
Camp Ravenna

Load Line 4 (RVAAP-11)

Photo No. 21 (August 10, 2016) <u>Description</u>: Remediated area at former building G-12	

Load Line 12 (RVAAP-12)

Photo No. 22 (August 10, 2016) <u>Description</u>: Locked entrance gate and warning signs	

PHOTOGRAPHIC RECORD **Camp Ravenna**	
Load Line 12 (RVAAP-12)	
Photo No. 23 (August 10, 2016) Description: Remediated area at drainage ditch	
Photo No. 24 (August 10, 2016) Description: Remediated area at drainage ditch	

PHOTOGRAPHIC RECORD **Camp Ravenna**	
Winklepeck Burning Grounds (RVAAP-05)	
Photo No. 25 (August 10, 2016) Description: Former burn pad 58 where MEC clearing was performed	
Photo No. 26 (August 10, 2016) Description: Monitoring well	

PHOTOGRAPHIC RECORD
Camp Ravenna

Winklepeck Burning Grounds (RVAAP-05)

Photo No. 27
(August 10, 2016)

Description:

Former burn pad 66 where soil remediation will be performed

Photo No. 28
(August 10, 2016)

Description:

Former burn pad 67 where soil remediation will be performed

PHOTOGRAPHIC RECORD **Camp Ravenna**	
Winklepeck Burning Grounds (RVAAP-05)	
Photo No. 29 (August 10, 2016) <u>Description</u>: Former burn pad 70 where MEC clearing was performed	
Photo No. 30 (August 10, 2016) <u>Description</u>: Former burn pad 38 where soil remediation will be performed	

PHOTOGRAPHIC RECORD
Camp Ravenna

Winklepeck Burning Grounds (RVAAP-05)

Photo No. 31 (August 10, 2016)	
Description: Former burn pad 37 where MEC clearing was performed	
Photo No. 32 (August 10, 2016)	
Description: Former burn pad 45 where MEC clearing was performed. Monitoring well in background.	

PHOTOGRAPHIC RECORD
Camp Ravenna

Ramsdell Quarry Landfill (RVAAP-01)

Photo No. 33
(August 10, 2016)

Description:

Locked entrance gate and warning signs at the northeast corner of the landfill

Photo No. 34
(August 10, 2016)

Description:

Warning sign on landfill fence

PHOTOGRAPHIC RECORD
Camp Ravenna

Ramsdell Quarry Landfill (RVAAP-01)

Photo No. 35
(August 10, 2016)

Description:

Warning sign on perimeter fence

Photo No. 36
(August 10, 2016)

Description:

Fencing at northeast corner of landfill.

PHOTOGRAPHIC RECORD **Camp Ravenna**	
Ramsdell Quarry Landfill (RVAAP-01)	
Photo No. 37 (August 10, 2016) <u>Description</u>: West side of landfill	
Photo No. 38 (August 10, 2016) <u>Description</u>: Monitoring well RQLmw-15 and perimeter fence at west side of landfill	

PHOTOGRAPHIC RECORD
Camp Ravenna

Ramsdell Quarry Landfill (RVAAP-01)

Photo No. 39 (August 10, 2016) <u>Description</u>: Site interior showing low area (wetland)	
Photo No. 40 (August 10, 2016) <u>Description</u>: Southwest section of landfill	

PHOTOGRAPHIC RECORD **Camp Ravenna**	
Ramsdell Quarry Landfill (RVAAP-01)	
Photo No. 41 (August 10, 2016) <u>Description</u>: Southwest section of landfill	
Photo No. 42 (August 10, 2016) <u>Description</u>: Site interior	

PHOTOGRAPHIC RECORD **Camp Ravenna**	
Ramsdell Quarry Landfill (RVAAP-01)	
Photo No. 43 (August 10, 2016) Description: Perimeter fence on west side of landfill	
Photo No. 44 (August 10, 2016) Description: Wetland at interior of site	

ATTACHMENT 6

Interview Records

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INTERVIEW DOCUMENTATION FORM

Camp Ravenna

The following is a list of individuals interviewed for this five-year review. See the attached interview records for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
Mark Leeper, P.G., MBA	*Environmental Cleanup Program Manager*	*ARNG*	*Nov. 7, 2016*
Kevin Sedlak	*Restoration Program Manager*	*ARNG*	*Nov. 4, 2016*
Katie Tait	*Environmental Specialist*	*Camp Ravenna (OHARNG)*	*Nov. 9, 2016*
Gregory Moore	*Project Manager*	*USACE Louisville District*	*Oct. 19, 2016*
Nathaniel Peters	*Environmental Engineer*	*USACE Louisville District*	*Nov. 15, 2016*
Angela Schmidt	*Risk Assessor*	*USACE Louisville District*	*Nov. 7, 2016*
Allan Brillinger	*Program Manager*	*Vista Sciences Corporation*	*Nov. 7, 2016*
Various	*NEDO DERR*	*Ohio EPA*	*Nov. 23, 2016*
Tom Tadsen	*Restoration Advisory Board (RAB) Co-Chair*	*RVAAP RAB*	*Nov. 5, 2016*

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INTERVIEW RECORD

Site Name: *Camp Ravenna*		**EPA ID No.:** *OH5210020736*	
Subject: *Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*		**Time:**	**Date:** *Nov. 7, 2016*
Type: ☐ Telephone ☐ Visit ☒ Other (email) **Location of Visit:** *Not applicable*		☐ Incoming ☐ Outgoing	

Contact Made By

Name: *James R Stachowski, PE*	**Title:** *Environmental Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted

Name: *Mark Leeper, P.G., MBA*	**Title:** *Environmental Cleanup Program Manager*	**Organization:** *Army National Guard*

Telephone No: *(703) 607-7955* **Fax No:** **E-Mail Address:** *mark.s.leeper.civ@mail.mil*	**Street Address:** *111 South George Mason Drive* **City, State, Zip:** *Arlington, VA 22204*

Summary Of Conversation

General

1. What is your role and responsibility with these projects?
   I am the acting Restoration Branch Chief with program manager duties that include Camp Ravenna. I serve as the budgetary POC for Camp Ravenna and also participate in Ohio EPA, contractor and Army only meetings. I work with the Louisville COE regarding contracts and budget for Camp Ravenna.

Load Lines 1, 2, 3, and 4 (RVAAP-08, -09, -10, & -11)

2. What is your overall impression of the project (general sentiment)?
   The load lines sites are moving well through the system.
3. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results
   I travel to Camp Ravenna approximately four times/year to complete site walks and attend meetings. I am in communication with Kevin Sedlak and Katie Tait at least three times per week.
4. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.
   No
5. Do you feel well informed about the site's activities and progress?
   Absolutely
6. Is the remedy functioning as intended?
   Yes
7. Has any other information come to light that could call into question the protectiveness of the remedy?
   No
8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
   No

INTERVIEW RECORD

Site Name:	*Camp Ravenna*	**EPA ID No.:** *OH5210020736*	
Subject:	*Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*	**Time:**	**Date:** *Nov. 7, 2016*

Load Line 12 (RVAAP-12)

9. What is your overall impression of the project (general sentiment)?
The project is moving nicely. We submitted a Revised Phase II Remedial Investigation Report for Wet Sediment and Surface Water at RVAAP-12 Load Line 12 and have received Ohio EPA comments. We are pushing for no further action.
10. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results
Yes, we have been in communication on a weekly basis to discuss the path forward and responses to comments.
11. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.
No
12. Do you feel well informed about the site's activities and progress?
Yes
13. Is the remedy functioning as intended?
Not applicable
14. Has any other information come to light that could call into question the protectiveness of the remedy?
Not to my knowledge
15. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
No

Ramsdell Quarry Landfill (RVAAP-01)

16. What is your overall impression of the project (general sentiment)?
Land use controls are in place and the site is included the five-year review process. It appears the system is working well.
17. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results
Yes, there has been routine communication regarding the site.
18. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.
No
19. Do you feel well informed about the site's activities and progress?
Yes
20. Is the remedy functioning as intended?
Yes, the site is fenced-in, which restricts access.
21. Has any other information come to light that could call into question the protectiveness of the remedy?
There was liquid noticed at the RQL cap, it was not clear if it was leachate or runoff. No notice of violation is typically associated with this issue.
22. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
No

INTERVIEW RECORD

Site Name: *Camp Ravenna*		**EPA ID No.:** *OH5210020736*	
Subject: *Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*		**Time:**	**Date:** *Nov. 7, 2016*

Winklepeck Burning Grounds (RVAAP-05)

23. What is your overall impression of the project (general sentiment)?
We are reopening the site for additional remediation so digging restrictions will be pulled and LUCs for the perimeter fence will not be required.

24. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results
Yes, there has been routine communication regarding the site activities. Ohio EPA has approved the Final Remedial Design for the ROD amendment.

25. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.
No

26. Do you feel well informed about the site's activities and progress?
Yes

27. Is the remedy functioning as intended?
Yes

28. Has any other information come to light that could call into question the protectiveness of the remedy?
No

29. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
No

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INTERVIEW RECORD

Site Name: *Camp Ravenna*	**EPA ID No.:** *OH5210020736*
Subject: *Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*	**Time:** *14:00* / **Date:** *Nov. 4, 2016*
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** *Not applicable*	☐ Incoming ☐ Outgoing

Contact Made By

Name: *James R Stachowski, PE*	**Title:** *Environmental Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted

Name: *Kevin Sedlak*	**Title:** *Camp Ravenna Restoration Project Manager*	**Organization:** *Army National Guard*
Telephone No: *(614) 336-6000 (x 2053)* **Fax No:** **E-Mail Address:** *kevin.m.sedlak.ctr@mail.mil*	**Street Address:** *1438 State Route 534 SW* **City, State, Zip:** *Newton Falls, OH 44444*	

Summary Of Conversation

Load Lines 1, 2, 3, and 4 (RVAAP-08, -09, -10, & -11)

1. What is your involvement with the project?
I oversee the project, review contractor documents, and provide comments and clarification, where necessary. I also work with Ohio EPA, provide requested information, and attend all meetings with Ohio EPA, USACE, and contractors.
2. Have any problems been encountered that required or will require changes to the remedial design or Record of Decision (ROD)?
The sites couldn't be used for military training after the Interim ROD removal action.
3. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
None
4. What is the status of additional characterization sampling and the feasibility study (FS) addendum for these sites?
The FS addendum is being prepared.
5. What is the intended future use of the sites?
Military training (maneuver range)
6. Has environmental data been evaluated to determine if additional sampling and/or remediation is needed at Load Line 3 to address the presence of benzo(a)pyrene, Aroclor-1254, and manganese above the cleanup levels identified in the Interim ROD? (First Five-Year Review report recommendation #2)
Check with our contractor (Leidos) on the status of these results.
7. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
No, although the grass is cut annually to prevent tree growth and snow is occasionally plowed to provide access.
8. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
None required.

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9. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
   Not applicable

10. Is the remedy functioning as intended?
    Yes, it functioned as originally intended. However, the remedy is no longer compatible with the intended use of the property because of restrictions placed on their use. The sites haven't been used since the Interim ROD remedy was implemented

11. Has any other information come to light that could call into question the protectiveness of the remedy?
    None

12. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    None

Load Line 12 (RVAAP-12)

13. What is your involvement with the project?
    I oversee the project, review contractor documents, and provide comments and clarification, where necessary. I also work with Ohio EPA, provide requested information, and attend all meetings with Ohio EPA, USACE, and contractors.

14. Have any problems been encountered that required or will require changes to the remedial design or ROD?
    The sites couldn't be used for intended military training after the ROD removal action. Note, this site was used for ammonium nitrate production (as opposed to munitions load, assemble, and package operations).

15. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
    None

16. What is the intended future use of the site?
    Military training (maneuver range)

17. What is the status of additional characterization sampling and the FS addendum for this site?
    The FS addendum is being prepared.

18. Has the Property Management Plan (PMP) been updated to include the land use control requirements identified in the ROD and remedial design?
    Not yet

19. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
    No, although the grass is cut annually to prevent tree growth and snow is occasionally plowed to provide access.

20. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
    None are required.

21. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
    Not applicable

22. Is the remedy functioning as intended?
    Yes, it functioned as originally intended. However, the remedy is no longer compatible with the intended use of the property because of restrictions placed on their use. The site hasn't been used since the ROD remedy was implemented

INTERVIEW RECORD

Site Name: *Camp Ravenna*		**EPA ID No.:** *OH5210020736*	
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23. Has any other information come to light that could call into question the protectiveness of the remedy?
None
24. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
None

Ramsdell Quarry Landfill (RVAAP-01)

25. What is your involvement with the project?
I oversee the project, review contractor documents, and provide comments and clarification, where necessary. I also work with Ohio EPA, provide requested information, and attend all meetings with Ohio EPA, USACE, and contractors.
26. Have any problems been encountered that required or will require changes to the remedial design or ROD?
An Engineering Evaluation/Cost Analysis and ROD Amendment were prepared because friable asbestos was encountered during the ROD removal action. The revised remedial action (restricted access) has been implemented.
27. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
None
28. Has the PMP been updated to include the land use control requirements identified in the ROD, ROD amendment, and remedial designs?
Land use requirements will be incorporated into a new version of the PMP (not released yet).
29. What is the intended future use of the site?
Restricted access.
30. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
None
31. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
None
32. Is the remedy functioning as intended?
Yes
33. Has any other information come to light that could call into question the protectiveness of the remedy?
None
34. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
None

Winklepeck Burning Grounds (RVAAP-05)

35. What is your involvement with the project?
I oversee the project, review contractor documents, and provide comments and clarification, where necessary. I also work with Ohio EPA, provide requested information, and attend all meetings with Ohio EPA, USACE, and contractors.
36. Have any problems been encountered that required or will require changes to the remedial design or ROD?
Additional sampling was performed and an Explanation of Significant Differences was prepared to enable use of the site as a multi-purpose machine gun range.

INTERVIEW RECORD

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Subject:	*Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*	**Time:** *14:00*	**Date:** *Nov. 4, 2016*

37. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
    None
38. What is the status of the remedial action for post-ROD changes?
    The removal actions are ongoing and expected to be complete by the end of November, 2016.
39. What is the intended future use of the site?
    Multi-purpose machine gun range.
40. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
    None
41. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
    Not applicable
42. Is the remedy functioning as intended?
    Yes, it functioned as originally intended. However, training requirements have changed and the remedy is no longer compatible with the intended use of the property.
43. Has any other information come to light that could call into question the protectiveness of the remedy?
    None
44. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    None

INTERVIEW RECORD

Site Name: *Camp Ravenna*		**EPA ID No.:** *OH5210020736*	
Subject: *Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*		**Time:** *15:00*	**Date:** *Nov. 9, 2016*
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** *Not applicable*		☐ Incoming ☐ Outgoing	

Contact Made By

Name: *James R Stachowski, PE*	**Title:** *Environmental Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted

Name: *Katie Tait*	**Title:** *Environmental Specialist 2*	**Organization:** *Ohio Army National Guard*
Telephone No: *(614) 336-6136* **Fax No:** **E-Mail Address:** *Kathryn.s.tait.nfg@mail.mil*	**Street Address:** *1438 State Route 534 SW* **City, State, Zip:** *Newton Falls, OH 44444*	

Summary Of Conversation

Load Lines 1, 2, 3, and 4 (RVAAP-08, -09, -10, & -11)

1. What is your involvement with the project?
   I am the Camp Ravenna Restoration Program Manager for OHARNG. I represent OHARNG and their interests for the RVAAP restoration program. I also serve as a liaison for the OHARNG with Ohio EPA.
2. Have any problems been encountered that required or will require changes to the remedial design or Record of Decision (ROD)?
   None
3. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
   None, the project is moving forward as intended.
4. What is the status of additional characterization sampling and a feasibility study (FS) addendum for these sites?
   The FS addendum is being prepared. Additional sampling wasn't done at LL-1, -3, and -4 because adequate data was available for soil and dry sediment at these sites. Additional sediment samples were collected at LL-2. The plan is to clean up the sites to a commercial/industrial standard.
5. What is the intended future use of the sites?
   Heavy maneuver area (tank obstacle course).
6. Has environmental data been evaluated to determine if additional sampling and/or remediation is needed at Load Line 3 to address the presence of benzo(a)pyrene, Aroclor-1254, and manganese above the cleanup levels identified in the Interim ROD? (First Five-Year Review report recommendation #2)
   Additional sampling has not been done at this site. The FS addendum should evaluate this data.
7. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
   The sites are maintained for restricted access and the gates are kept locked. An annual training memo identifies these areas as "restricted access". Occasional grass mowing and natural resources management activities are performed.

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8. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
Not applicable

9. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
Not applicable

10. Is the remedy functioning as intended?
Yes, exposures are not occurring because access to the sites is restricted.

11. Has any other information come to light that could call into question the protectiveness of the remedy?
None

12. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
None

Load Line 12 (RVAAP-12)

13. What is your involvement with the project?
I am the Camp Ravenna Restoration Program Manager for OHARNG. I represent OHARNG and their interests for the RVAAP restoration program. I also serve as a liaison for the OHARNG with Ohio EPA.

14. Have any problems been encountered that required or will require changes to the remedial design or ROD?
None

15. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
None, the project is moving forward as intended.

16. What is the intended future use of the site?
Heavy maneuver area (tank obstacle course).

17. What is the status of additional characterization sampling and a FS addendum for the site?
The FS addendum is being prepared. Additional sampling wasn't done because adequate data was available for soil and dry sediment at these sites. The plan is to clean up the sites to a commercial/ industrial standard.

18. Has the Property Management Plan (PMP) been updated to include the land use control requirements identified in the ROD and remedial design?
No, it will be included in a future edition of the PMP.

19. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
The site is maintained for restricted access and the gate is kept locked. An annual training memo identifies these areas as "restricted access". Occasional grass mowing and natural resources management activities are performed.

20. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
Not applicable

21. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
Not applicable

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22. Is the remedy functioning as intended?
    Yes, exposures are not occurring because access to the sites is restricted.
23. Has any other information come to light that could call into question the protectiveness of the remedy?
    None
24. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    None

Ramsdell Quarry Landfill (RVAAP-01)

25. What is your involvement with the project?
    I am the Camp Ravenna Restoration Program Manager for OHARNG. I represent OHARNG and their interests for the RVAAP restoration program. I also serve as a liaison for the OHARNG with Ohio EPA and administer LUC awareness contractor briefs for the site.
26. Have any problems been encountered that required or will require changes to the remedial design or ROD?
    None since the ROD addendum
27. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
    None
28. Has the PMP been updated to include the land use control (LUC) requirements identified in the ROD, ROD amendment, and remedial designs?
    A paper copy of the PMP at Camp Ravenna has been updated to include these LUC requirements.
29. What is the intended future use of the site?
    Restricted access
30. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
    None
31. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
    None
32. Are the remedies functioning as intended?
    Yes
33. Has any other information come to light that could call into question the protectiveness of the remedy?
    No
34. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    None

Winklepeck Burning Grounds (RVAAP-05)

35. What is your involvement with the project?
    I am the Camp Ravenna Restoration Program Manager for OHARNG. I represent OHARNG and their interests for the RVAAP restoration program. I also serve as a liaison for the OHARNG with Ohio EPA and administer LUC awareness contractor briefs for the site.
36. Have any problems been encountered that required or will require changes to the remedial design or ROD?
    An Explanation of Significant Differences (ESD) was prepared.

INTERVIEW RECORD

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37. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
    None

38. What is the status of the remedial action for post-ROD changes?
    The ESD remedy is being implemented (Nov. 2016).

39. What is the intended future use of the site?
    Machine gun range

40. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
    None

41. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
    The time and cost required to inspect the Camp Ravenna perimeter fence was significant. Ohio EPA agreed that this is no longer required.

42. Is the remedy functioning as intended?
    Yes

43. Has any other information come to light that could call into question the protectiveness of the remedy?
    None

44. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    None

INTERVIEW RECORD

Site Name: *Camp Ravenna*		**EPA ID No.:** *OH5210020736*	
Subject: *Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*		**Time:** *1045 - 1125*	**Date:** *Oct 19, 2016*
Type: ☐ Telephone ☒ Visit ☒ Other (completed via email) **Location of Visit:** *US Army Corps of Engineers, Louisville District Office (CELRL)*		☐ Incoming ☐ Outgoing	

Contact Made By

Name: *Karen Keil*	**Title:** *Environmental Toxicologist*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted

Name: *Gregory Moore*	**Title:** *Project Manager*	**Organization:** *CELRL*
Telephone No: *(502) 315-6902* **Fax No:** **E-Mail Address:** *Gregory .F.Moore@usace.army.mil*	**Street Address:** *600 Dr. Martin Luther King Pl.* **City, State, Zip:** *Louisville, KY 40402*	

Summary Of Conversation

Load Lines 1, 2, 3, and 4 (RVAAP-08, -09, -10, & -10)

1. What is your involvement with the project?
I have been the USACE Project Manager for a little over 2 years.
2. Have any problems been encountered that required or will require changes to the remedial design or Record of Decision (ROD)?
LUCs, as interpreted by Ohio EPA, would be too restrictive for the Army during training (e.g., fence maintenance and monitoring requirements). LL 12 is currently undergoing a "soil optimization study" to eliminate the need for full cleaning of military vehicles (wheels) when traversing the load lines during training. A preliminary draft FS addendum is currently under Army review; you may get a copy from Angela Schmidt. The objective is to meet industrial land use clean up goals.
3. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
See above, remove restrictions on the end user.
4. What is the status of additional characterization sampling and the FS addendum for these sites?
PBA-2013 (performance based acquisition contract) to look at LL 1 -4 and surface water (site-wide) is currently on-going.
5. What is the intended future use of the sites?
Military training
6. Has environmental data been evaluated to determine if additional sampling and/or remediation is needed at Load Line 3 to address the presence of benzo(a)pyrene, Aroclor-1254, and manganese above the cleanup levels identified in the Interim ROD? (First Five-Year Review report recommendation #2)
I don't know, ask Nate Peters or Angela Schmidt.

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7. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
   I'm not sure if inspections are performed. Check with Camp Ravenna staff and/or Vista Sciences Corp. (Environmental support contractor).
8. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
   Yes, see above. We're looking at changing the remedies, especially the interim remedies at the load lines.
9. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
   The sites have not been used and there are no ongoing monitoring and maintenance activities associated with the Interim ROD remedy.
10. Is the remedy functioning as intended?
    Maybe
11. Has any other information come to light that could call into question the protectiveness of the remedy?
    No new data or evidence of soil impact on surface water has been obtained. There are explosives in groundwater south of the LL's that appear to be leaving the installation, but we don't know what the source is yet. This is being investigated under facility-wide groundwater (RVAAP 66).
12. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    No, I am awaiting the next round of sampling results.

Load Line 12 (RVAAP-12)

13. What is your involvement with the project?
    I have been the USACE Project Manager for a little over 2 years.
14. Have any problems been encountered that required or will require changes to the remedial design or ROD?
    LUCs, as interpreted by Ohio EPA, would be too restrictive for the Army during training (e.g., fence maintenance and monitoring requirements). LL 12 is currently undergoing a "soil optimization study" to eliminate the need for full cleaning of military vehicles (wheels) when traversing the load lines during training. A preliminary draft FS addendum is currently under Army review; you may get a copy from Angela Schmidt. The objective is to meet industrial land use clean up goals.
15. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
    See above, remove restrictions on the end user.
16. What is the intended future use of the site?
    Military training.
17. What is the status of additional characterization sampling and the FS addendum for this site?
    PBA-2013 (performance based acquisition contract) to look at LL 12 and surface water (site-wide) is currently on-going.
18. Has the Property Management Plan (PMP) been updated to include the land use control requirements identified in the ROD and remedial design?
    We have this planned in [fiscal year] FY 17.
19. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
    I'm not sure if inspections are performed. Check with Camp Ravenna staff and/or Vista Sciences Corp. (Environmental support contractor).

INTERVIEW RECORD

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Subject:	*Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*	**Time:** *1045 - 1125*	**Date:** *Oct 19, 2016*

20. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
Yes, see above. We're looking at changing the remedies, especially the interim remedies at the load lines.
21. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
The site has not been used and there are no ongoing monitoring and maintenance activities associated with the ROD remedy.
22. Is the remedy functioning as intended?
Maybe
23. Has any other information come to light that could call into question the protectiveness of the remedy?
No new data or evidence of soil impact on surface water. For example, there are explosives in groundwater south of the LL's that appear to be leaving the installation, but we don't know what the source is yet. This is investigated under facility wide groundwater (RVAAP 66).
24. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
No, I am awaiting the next round of sampling.

Ramsdell Quarry Landfill (RVAAP-01)

25. What is your involvement with the project?
I have been the USACE Project Manager for a little over 2 years.
26. Have any problems been encountered that required or will require changes to the remedial design or ROD?
Nothing is going on except groundwater and surface water monitoring. Results indicate that conditions are fairly stable.
27. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
No
28. Has the PMP been updated to include the land use control requirements identified in the ROD, ROD amendment, and remedial designs?
Planned in FY 17.
29. What is the intended future use of the site?
As s landfill.
30. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
No
31. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
No
32. Is the remedy functioning as intended?
Yes, quarterly inspections of the fence and landfill are performed. The wetlands are avoided.
33. Has any other information come to light that could call into question the protectiveness of the remedy?
No
34. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
None

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Subject:	*Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*	**Time:** *1045 - 1125*	**Date:** *Oct 19, 2016*

Winklepeck Burning Grounds (RVAAP-05)

35. What is your involvement with the project?
I have been the USACE Project Manager for a little over 2 years.

36. Have any problems been encountered that required or will require changes to the remedial design or ROD?
An Explanation of Significant Differences (ESD) and remedial design were completed. Additional soil removal will take place next month.

37. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
Currently under construction

38. What is the status of the remedial action for post-ROD changes?
A contract (with TetraTech) for soil removal is currently on-going.

39. What is the intended future use of the site?
Machine Gun Range/Military Training.

40. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
Currently under construction

41. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
Difficulties in maintaining the LUCs (perimeter fence repairs).

42. Is the remedy functioning as intended?
Currently under construction

43. Has any other information come to light that could call into question the protectiveness of the remedy?
The ESD is resolving issues that will make the site more protective.

44. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
None

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Subject:	*Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*	**Time:**	**Date:** *Nov. 15, 2016*
Type:	☐ Telephone ☒ Visit ☒ Other (completed via email)	☐ Incoming ☐ Outgoing	
Location of Visit:	*US Army Corps of Engineers, Louisville District Office*		

Contact Made By

Name: *Karen Keil*	**Title:** *Environmental Toxicologist*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted

Name: *Nathaniel Peters*	**Title:** *Environmental Engineer*	**Organization:** *CELRL*
Telephone No: *502-315-2624* **Fax No:** **E-Mail Address:** *Nathaniel.Peters.II@usace.army.mil*	**Street Address:** *600 Dr. Martin Luther King Pl.* **City, State, Zip:** *Louisville, KY 40402*	

Summary Of Conversation

Load Lines 1, 2, 3, and 4 (RVAAP-08, -09, -10, & -10)

1. What is your involvement with the project?
   I am the contracting officer's representative (COR) for a contract to develop a Feasibility Study Amendment (FSA) for LL1 – 4 and -12, a senior engineer for the technical team, and a senior engineer reviewer/ technical team lead.
2. Have any problems been encountered that required or will require changes to the remedial design or Record of Decision (ROD)?
   No, soil removal is the decision. We've already cleaned the site to be protective of a National Guard Trainee exposure. The established risk assessment approach was changed by the Army National Guard (ARNG) and Ohio EPA in a 2014 Tech Memo. The Ohio EPA didn't want all 12 exposures, just industrial or residential land use. Ohio EPA equates the exposure to land uses, which was always military training. Ohio EPA wants the USEPA RSL applied for industrial exposure. The OHARNG agreed but Ohio EPA indicates a need to monitor the military training exposure. For example, a guard shack could be built on the site. The FSA will evaluate further cleanup to residential or industrial land uses. It should not be necessary to review all trainees' exposures because the exposure assessment was already comprehensive and conservative. Bottom line is that we may perform more soil removal for residential or industrial land use, but the remedy still remains soil removal unless a treatment option is used for PAHs.
3. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
   I will support the recommendations that will be coming out of the FSA. The building slabs were removed after the 1st interim ROD was signed. Originally, the slabs were intended as a cap for the soil contamination. After slabs were removed, more TNT was found, and additional removals were performed. This FSA covers everything (incorporates all sampling and results) and all previous removal actions.
4. What is the status of additional characterization sampling and the Remedial Investigation/Feasibility (RI/FS) supplement for these sites?
   Sampling and analytical results will be incorporated into the FSA. The pre-draft is currently under USACE review and the draft will be available in early November. The Buffalo District can get a copy at that time.

INTERVIEW RECORD

Site Name: *Camp Ravenna*		**EPA ID No.:** *OH5210020736*	
Subject: *Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*		**Time:**	**Date:** *Nov. 15, 2016*

5. What is the intended future use of the sites?
   Military training, but it will be called commercial/industrial so that full-time workers are protected and all personnel (trainees and civilians) can work there without being monitored.
6. Has environmental data been evaluated to determine if additional sampling and/or remediation is needed at Load Line 3 to address the presence of benzo(a)pyrene, Aroclor-1254, and manganese above the cleanup levels identified in the Interim ROD? (First Five-Year Review report recommendation #2)
   Yes, it will be included in the FSA.
7. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
   No, because it's not used. Instead, it is fenced and closed. As soon as they removed the slabs, a decision was made not to use the sites until a re-evaluation was completed.
8. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
   No, because the sites are not currently being used. If they were being used, OHARNG would have to monitor the exposure of the trainees. The Ohio EPA wants hot spot exposure point concentrations determined, so we will look to remove LUCs on large outlying areas.
9. Have there been unexpected monitoring/maintenance difficulties or increased costs at the sites since start-up? If so, please give details.
   No because the OHARNG is not using them.
10. Is the remedy functioning as intended?
    Yes, it made it protective for National Guard Trainees.
11. Has any other information come to light that could call into question the protectiveness of the remedy?
    Although the commercial/industrial USEPA regional risk-based screening levels may not match the military trainee exposure at the site, it should be noted that perhaps the chosen risk-based cleanup levels for the military trainee are over protective because they are identified at the 10^{-5} cancer risk level (as per Ohio EPA preference). The military trainee cleanup goals are all lower than the 10^{-4} level of the EPA regional risk-based cleanup levels for industrial/commercial use (but I will defer to the risk assessor expertise on this question).
12. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    No

Load Line 12 (RVAAP-12)

13. What is your involvement with the project?
    I am the COR for the LL1 – 4 and 12 FSA contract, senior engineer for the technical team, and senior engineer reviewer/technical team lead.
14. Have any problems been encountered that required or will require changes to the remedial design or ROD?
    I will support the recommendations that will be coming out of the FSA. The building slabs were removed after the 1st interim ROD was signed. The slabs were intended as a cap for the soil contamination. After slabs were removed, more TNT was found, and additional removals were performed. This FSA covers everything (incorporates all sampling and results) and all previous removal actions.
15. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
    The Army will need to implement the preferred alternate identified in the FSA for LL – 4 and -12.

INTERVIEW RECORD

Site Name:	*Camp Ravenna*	**EPA ID No.:** *OH5210020736*	
Subject:	*Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*	**Time:**	**Date:** *Nov. 15, 2016*

16. What is the intended future use of the site?
    Military training, but it will be called commercial/industrial so that full-time workers are protected and all personnel (trainees and civilians) can work there without being monitored.
17. What is the status of additional characterization sampling and the RI/FS supplement for this site?
    Sampling and analyses will be incorporated into the FSA. The pre-draft is currently under USACE review and the draft will be available in early November. The Buffalo District can get a copy at that time.
18. Has the Property Management Plan (PMP) been updated to include the land use control requirements identified in the ROD and remedial design?
    No, because it's not used. Instead, it is fenced and closed. As soon as they removed the slabs, a decision was made not to use the sites until a re-evaluation was completed.
19. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
    Same as above.
20. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
    No, because the sites are not currently being used. If they were being used, OHARNG would have to monitor the exposure of the trainees. Now that Ohio EPA wants hot spot exposure point concentrations determined, we will look to remove LUCs on large outlying areas.
21. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
    No because the OHARNG is not using them.
22. Is the remedy functioning as intended?
    Yes, it made it protective for National Guard Trainees.
23. Has any other information come to light that could call into question the protectiveness of the remedy?
    No, see question #11.
24. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    No

Ramsdell Quarry Landfill (RVAAP-01)

25. What is your involvement with the project?
    I am the COR for the LL1 – 4 and 12 FSA contract, senior engineer for the technical team, and senior engineer reviewer/technical team lead.
26. Have any problems been encountered that required or will require changes to the remedial design or ROD?
    No
27. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
    No
28. Has the PMP been updated to include the land use control requirements identified in the ROD, ROD amendment, and remedial designs?
    An update to the PMP is in draft form, monitoring and maintenance requirements have been implemented.
29. What is the intended future use of the site?
    It is intended to remain as a landfill with no other use planned.

INTERVIEW RECORD

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30. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
No

31. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
No

32. Is the remedy functioning as intended?
Yes

33. Has any other information come to light that could call into question the protectiveness of the remedy?
No

34. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
No

Winklepeck Burning Grounds (RVAAP-05)

35. What is your involvement with the project?
I am the COR for the LL1 – 4 and 12 FSA contract, senior engineer for the technical team, and senior engineer reviewer/technical team lead.

36. Have any problems been encountered that required or will require changes to the remedial design or ROD?
An ESD and RD for post-ROD changes have been written and accepted to perform additional soil removal. That Remedial Action in in progress now. The purpose is to remove some soil that previously met NGT standards, but does not meet the industrial RSLs for fulltime worker exposure. The ARNG made the decision to do additional soil removal to support the potential for fulltime workers in the future.

37. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
No

38. What is the status of the remedial action for post-ROD changes?
That remedial action began in early November and the field work is expected to be completed by the middle of December.

39. What is the intended future use of the site?
Military Training is the intended future use. Specifically the site is slated to be used as a Multi-Purpose Machine Gun Range.

40. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
No

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41. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
    The original ROD identified the Camp Ravenna perimeter fence as an engineering control for this site. Consequently, Camp Ravenna is required to perform very time-consuming and costly inspections of the full length of the perimeter fence on a quarterly basis. They have limited O&M funds; therefore, it is not always possible to make all fence repairs as soon as they are noted in inspection forms. Additionally, the installation status is such that the type of fence that is in place is not even required. The ESD for this site changed the LUCs so that the Camp Ravenna perimeter fence will no longer be one of the LUCs. However, this change will not be effective until the RA is complete and the RA report is accepted. At that time, a revised PMP will be submitted for Ohio EPA review and approval. Then, the perimeter fence will no longer be an engineering control for any of the AOCs that do not meet UU/UE.
42. Is the remedy functioning as intended?
    Yes
43. Has any other information come to light that could call into question the protectiveness of the remedy?
    No
44. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    No

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INTERVIEW RECORD

Site Name: *Camp Ravenna*		**EPA ID No.:** *OH5210020736*	
Subject: *Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*		**Time:** *1300 - 1400*	**Date:** *Oct 19, 2016*
Type: ☐ Telephone ☒ Visit ☒ Other (completed via email) **Location of Visit:** *US Army Corps of Engineers, Louisville District Office*		☐ Incoming ☐ Outgoing	

Contact Made By

Name: *Karen Keil*	**Title:** *Environmental Toxicologist*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted

Name: *Angela Schmidt*	**Title:** *Risk Assessor*	**Organization:** *CELRL*
Telephone No: *(502) 315-6313* **Fax No:** **E-Mail Address:** *Angela.L.Schmidt@usace.army.mil*	**Street Address:** *600 Dr. Martin Luther King Pl.* **City, State, Zip:** *Louisville, KY 40402*	

Summary Of Conversation

Load Lines 1, 2, 3, and 4 (RVAAP-08, -09, -10, & -10)

1. What is your involvement with the project?
   I have been the USACE project risk assessor and technical reviewer since 2008/2009.
2. Have any problems been encountered that required or will require changes to the remedial design or Record of Decision (ROD)?
   Yes, the sites cannot be used as intended. We have difficulty using the site for military training land use as intended and have to basically clean it up again for residential or industrial land use. The depth of exposure/cleanup will be the actual depth of contamination, although Ohio EPA typically assumes a depth down to 13 feet (ft) below ground surface (bgs), which applies to residential exposure and not the depth for military training land use (for 0 to 4 ft bgs and 4 to 7 ft bgs) or with the expected surface soil exposure for commercial/industrial land use using the USEPA's composite worker receptor.
3. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
   There was a technical memorandum from OHARNG to Ohio EPA, signed February 2014. It stipulates that commercial/industrial land use and associated USEPA regional risk-based screening levels (RSLs) are protective of military training that would occur at RVAAP. However, it's not completely clear. The new POC at OHARNG (arrived after the memo was signed) recognized that the Risk Assessment Land Use Tech Memo confused some of the issues in the consideration of exposure as well as media and risk assessment. However, Ohio EPA continues to approve recent site documents, so it may not be necessary to revise the Tech Memo in order to obtain Ohio EPA concurrence on site decision-making documents. (Angela noted that the USEPA RSLs for industrial use doesn't really fit exposure assessment for a National Guard Trainee. A site specific exposure assessment was originally used to develop site-wide cleanup goals, as documented in 2009 and revised in 2012. She clarified how to update facility-wide cleanup goals (with equations, etc.) based on USESPA updates to recommended exposure factor values and toxicity criteria, and how to address sediment (vs. soil) contamination, which could raise the FWCUGs and relieve the Army of cleaning up sites unnecessarily.)

INTERVIEW RECORD

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4. What is the status of additional characterization sampling and the Feasibility Study (FS) addendum for these sites?
   Sampling and analysis is incorporated into a FS Addendum. The pre-draft is currently under USACE review and the draft version will be available in early November. The Buffalo District Corps of Engineers can get a copy at that time.
5. What is the intended future use of the sites?
   Military training with exposure to 7 ft bgs. The industrial/commercial cleanup standard will be applied to 13 ft bgs. Cleanup goals were set in the facility-wide cleanup goal document from 2010 but are not fully recognized by some Ohio EPA personnel.
6. Has environmental data been evaluated to determine if additional sampling and/or remediation is needed at Load Line 3 to address the presence of benzo(a)pyrene, Aroclor-1254, and manganese above the cleanup levels identified in the Interim ROD? (First Five-Year Review report recommendation #2)
   Unsure, it seems it would be to the Army's benefit to look at these numbers and potential changes to ensure they are still protective and that the LUCS are still needed.
7. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
   Maybe the fence is maintained?
8. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
   There may be some smaller pockets needing LUCs and other areas that could be released. We had been taking samples across the AOC and averaging across the entire AOC to develop the exposure point concentrations (EPCs) for risk determination as referenced in Facility-Wide Human Health Risk Assessment Manual (FW HHRAM). We had a process in place to remove hot spots and then re-calculate exposure, but Ohio EPA did not agree with the approach. Ohio EPA wants EPCs developed across hot spots only. Removing outlying areas of the AOC from EPC development should allow many areas to meet residential use and eliminate the need for LUCs. Also, Ohio EPA does not recognize the bias in the sampling approach that we have used since imitating the IRP at Ravenna.
9. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
   Yes, because OHARNG is not able to use the site due to monitoring requirements.
10. Is the remedy functioning as intended?
    Yes, the remedy is functioning but the site it not being used as needed.
11. Has any other information come to light that could call into question the protectiveness of the remedy?
    The commercial/industrial USEPA regional RSLs may not be protective of a military trainee exposure at the site and it is not site-specific.
12. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    Changes in the Tech Memo (for site-wide risk-based cleanup goal development) have made management of the site difficult and are not considerate for the Army.

Load Line 12 (RVAAP-12)

13. What is your involvement with the project?
    I have been the USACE project risk assessor and technical reviewer since 2008/09.

INTERVIEW RECORD

Site Name:	*Camp Ravenna*	**EPA ID No.:** *OH5210020736*	
Subject:	*Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*	**Time:** *1300 - 1400*	**Date:** *Oct 19, 2016*

14. Have any problems been encountered that required or will require changes to the remedial design or ROD?
Yes, the site cannot be used as intended. We have difficulty using the site for military training as intended and have to basically clean it up again for residential or industrial land use. The depth of exposure/ cleanup will be the actual depth of contamination, although Ohio EPA typically assumes a depth down to 13 feet (ft) below ground surface (bgs), which applies to residential exposure and not the depth for military training land use (for 0 to 4 ft bgs and 4 to 7 ft bgs) or with the expected surface soil exposure for commercial/industrial land use using the USEPA's composite worker receptor.

15. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
There was a technical memorandum from OHARNG to Ohio EPA, signed February 2014. It stipulates that commercial/industrial land use and associated USEPA regional risk-based screening levels (RSLs) are protective of military training that would occur at RVAAP. However, it's not completely clear. The new POC at OHARNG (arrived after that memo was signed) recognized that the Risk Assessment Land Use Tech Memo confused some of the issues in the consideration of exposure as well as media and risk assessment. However, Ohio EPA continues to approve recent site documents, so it may not be necessary to revise the Tech Memo in order to obtain Ohio EPA concurrence on site decision-making documents. (Angela noted that the USEPA RSLs for industrial use doesn't really fit exposure assessment for a National Guard Trainee. A site specific exposure assessment was originally used to develop site-wide cleanup goals, as documented in 2009 and revised in 2012. She clarified how to update facility-wide cleanup goals (with equations, etc.) based on USESPA updates to recommended exposure factor values and toxicity criteria, and how to address sediment (vs. soil) contamination, which could raise the FWCUGs and relieve the Army of cleaning up sites unnecessarily.)

16. What is the intended future use of the site?
Military training with exposure to 7 ft bgs. The industrial/commercial cleanup standard will be applied to 13 ft bgs. Cleanup goals were set in the facility-wide cleanup goal document from 2010 but are not fully recognized by some Ohio EPA personnel.

17. What is the status of additional characterization sampling and the FS addendum for this site?
Sampling and analyses are incorporated into a draft FS Addendum. The pre-draft is currently under USACE review and the draft version will be available in early November. The Buffalo District Corps of Engineers can get a copy at that time.

18. Has the Property Management Plan (PMP) been updated to include the land use control requirements identified in the ROD and remedial design?
Unknown, I believe it needs to be.

19. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
Unsure, but I assume it is being completed as directed.

20. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
Yes, because OHARNG is not able to use the site because of the monitoring requirements.

INTERVIEW RECORD

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21. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
There may be some smaller pockets needing LUCs and other areas that could be released. We had been taking samples across the AOC and averaging across the entire AOC to develop the exposure point concentrations (EPCs) for risk determination as referenced in Facility-Wide Human Health Risk Assessment Manual (FW HHRAM). We had a process in place to remove hot spots and then re-calculate exposure, but Ohio EPA did not agree with the approach. Ohio EPA wants EPCs developed across hot spots only. Removing outlying areas of the AOC from EPC development should allow many areas to meet residential use and eliminate the need for LUCs. Also, Ohio EPA does not recognize the bias in the sampling approach that we have used since imitating the IRP at Ravenna.
22. Is the remedy functioning as intended?
Yes, but the AOC is not being used.
23. Has any other information come to light that could call into question the protectiveness of the remedy?
The commercial/industrial USEPA regional RSLs may not be protective of a military trainee exposure at the site and it is not site-specific.
24. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
Changes in the Tech Memo (for site-wide risk-based cleanup goal development) have made management of the site difficult and are not considerate for the Army.

Ramsdell Quarry Landfill (RVAAP-01)

25. What is your involvement with the project?
I have been the USACE project risk assessor and technical reviewer since 2008/09.
26. Have any problems been encountered that required or will require changes to the remedial design or ROD?
A ROD amendment was prepared in 2013 to address the presence of friable asbestos.
27. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
None
28. Has the PMP been updated to include the land use control requirements identified in the ROD, ROD amendment, and remedial designs?
Unknown, I believe it needs to be.
29. What is the intended future use of the site?
Landfill, restricted access.
30. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
Routine LUC monitoring is being performed since the ROD amendment remedial action was implemented.
31. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
None
32. Has any other information come to light that could call into question the protectiveness of the remedy?
None
33. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
None

INTERVIEW RECORD

Site Name: *Camp Ravenna*		**EPA ID No.:** *OH5210020736*	
Subject:	*Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*	**Time:** *1300 - 1400*	**Date:** *Oct 19, 2016*

Winklepeck Burning Grounds (RVAAP-05)

34. What is your involvement with the project?
I have been the USACE project risk assessor and technical reviewer since 2008/09.

35. Have any problems been encountered that required or will require changes to the remedial design or ROD?
There have been many issues with the site. The Army identified small areas that needed to be remediated to meet unrestricted (residential) land use at the Site. The Ohio EPA did not agree with this approach. The Army prepared a RAAD that was approved but afterwards it was determined that a full time receptor needed to be added and the screening had to be redone in areas where there were elevated concentrations not necessarily related to the overall distribution from a site-wide basis.

36. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
None

37. What is the status of the remedial action for post-ROD changes?
Unsure

38. What is the intended future use of the site?
Restricted access (closed landfill).

39. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
The intended future use of this site has changed and additional areas will be remediated.

40. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
The majority of monitoring is either done for safety from UXO or for OSHA standards.

41. Has any other information come to light that could call into question the protectiveness of the remedy?
The commercial/industrial USEPA regional RSLs may not be protective of a military trainee exposure at the site and is not site-specific.

42. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
Redo the analysis and do not consider the composite receptor as a full time occupational exposure potential.

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INTERVIEW RECORD

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Subject:	*Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*	**Time:** *11:30 am*	**Date:** *Nov. 08, 2016*
Type:	☐ Telephone ☐ Visit ☒ Other (completed via email)	☐ Incoming ☐ Outgoing	
Location of Visit:	*Not applicable*		

Contact Made By

Name: *James R Stachowski, PE*	**Title:** *Environmental Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted

Name: *Allan Brillinger*	**Title:** *Program Manager*	**Organization:** *Vista Environmental Services*
Telephone No: *(330) 872-8009* **Fax No:** **E-Mail Address:** *allan.brillinger@vistasciences.com*	**Street Address:** *1438 State Route 534 SW* **City, State, Zip:** *Newton Falls, OH 44444*	

Summary Of Conversation

Load Lines 1, 2, 3, and 4 (RVAAP-08, -09, -10, & -11)

1. What is your involvement with the project?
   None

Load Line 12 (RVAAP-12)

2. What is your involvement with the project?
   None

Ramsdell Quarry Landfill (RVAAP-01)

3. What is your involvement with the project?
   Vista Sciences Corporation (VSC) has been under contract with USACE for over 10 years to provide maintenance and inspection services for the Ramsdell Quarry Landfill (RQL). These services have historically included annual mowing, soil repairs (as needed), and weekly inspections.
4. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
   No
5. Has the PMP been updated to include the land use control requirements identified in the ROD, ROD amendment, and remedial designs?
   Yes, VSC's PMP has been updated to include inspections of the Land Use Controls (LUCs) that were initiated in December 2014.
6. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
   Yes, on behalf of OHARNG, VSC as of September 2016 will be conducting quarterly inspections and submitting the quarterly Closed Municipal Solid Waste (MSW) Landfill Inspection checklist to the Ohio EPA. VSC will also be submitting an annual report to the Ohio EPA to comply with the regulations for closed MSW landfills in Ohio. Fulfilling these reporting requirements will improve the record-keeping for the facility and will ensure the continued effectiveness of the LUCs and cap system in place.

INTERVIEW RECORD

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7. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
   The addition of the quarterly and annual report have not significantly increased the costs for VSC's involvement.
8. Is the remedy functioning as intended?
   Yes
9. Has any other information come to light that could call into question the protectiveness of the remedy?
   No
10. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    None

Winklepeck Burning Grounds (RVAAP-05)

11. What is your involvement with the project?
    VSC provides quarterly inspections and reporting for the Winklepeck Burning Grounds (WBG) LUCs.
12. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
    No
13. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
    VSC conducts and submits quarterly LUC inspection reports to the Ohio EPA. The LUC inspection involves inspecting the Camp Ravenna perimeter fence (which is a LUC for WBG) and documenting any damage to the fence, and conducting interviews with appropriate personnel to ensure the LUCs are in place and operating effectively. The quarterly and annual reports are all up to date.
14. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up? If so, do they affect the remedy?
    No
15. Have there been unexpected monitoring/maintenance difficulties or increased costs at the site since start-up? If so, please give details.
    No
16. Has any other information come to light that could call into question the protectiveness of the remedy?
    No
17. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    None

INTERVIEW RECORD
Ohio EPA (Nov. 23, 2016)

General Comments

Rodney Beals:

The current copy of the Property Management Plan in the Ohio EPA file does not include LUCs for Ramsdell Quarry or Load Line 12. This was identified as an issue in the first five-year review (August 2012).

The 2007 Interim ROD for Load Lines 1 - 4 did not include LUCs, but should have since waste was left in place. Ohio EPA recognizes that OHARNG has not used this AOC and that additional work is on-going that will support a less restrictive future use.

Load Lines 1, 2, 3, and 4

1. What is your role and responsibility with this project?

   Response: Sue Watkins is project lead reviewer for the Winklepeck Burning Grounds revised ROD activities and lead reviewer for the additional remedial investigation activities at Load Lines 1 – 4 and 12.

2. What is your overall impression of the project (general sentiment)?

   Response: The purpose of sampling at these AOCs is to address questions regarding potential contamination dragged out from areas that had undergone removal activities after other areas had been cleaned up. Changes in the land use receptors has also resulted in re-evaluation of these AOCs. There are some challenges regarding the interpretation of previous sample collection activities through incremental sampling and ensuring exposure areas are adequately characterized.

3. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

   Response: Ohio EPA participates in monthly calls with the USACE and Ohio National Guard. We receive updates through this venue. We usually conduct site visits to these AOCs annually. There has not been actual changes to the use of these AOCs.

4. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

   Response: None

5. Do you feel well informed about the site’s activities and progress?

   Response: I don’t have a great sense when sampling activities are being conducted. Results are provided to us when they have been compiled into a report. Ohio EPA provided comments on the RI in February 2016.

6. Is the remedy functioning as intended?

   Response: Soil removal activities have been conducted at these load lines in the past. The planned additional RI activities are intended to determine if additional removal actions are needed. I’m not sure of the status of the sampling activities.

7. Has any other information come to light that could call into question the protectiveness of the remedy?

   Response: No

8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

   Response: The monthly calls could include more details regarding status of activities at these AOCs. Generally the monthly calls focus only on deliverable reports and the timing of getting these reports to each other.

Load Line 12

9. What is your overall impression of the project (general sentiment)?

   Response: Focus of the additional sampling is on the surface water and sediments at this AOC. Ohio EPA provided comments on October 24, 2016 on the Draft Phase III Remedial Investigation. Ensuring that detections of COCs on this AOC are evaluated and considered

10. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

    Response: Ohio EPA participates in monthly calls with the US ACE and Ohio National Guard. We receive updates through this venue. We usually conduct site visits to the AOCs annually. There has not been changes to the use of this AOC.

11. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

    Response: None

12. Do you feel well informed about the site's activities and progress?

    Response: We have conversations with the US ACE regarding RI development to reach consensus. I don't have a great sense when sampling activities are being conducted. Results are provided to us when they have been compiled into a report for our review.

13. Is the remedy functioning as intended?

    Response: Yes, however the evaluation of sediments and surface water as well as sampling the ground water in the area of this AOC will help evaluate the success of prior soil removal activities in this AOC. Other investigations (site wide sewers, site wide ground water and Atlas Scrap) may show that these other AOC may be impacting Load Line 12 or that there may be sources of COCs remaining on LL 12. These other AOC evaluations underway as well as Ohio EPA's recommendation to further evaluate surface water/sediments on Load Line 12 will help evaluate these questions.

14. Has any other information come to light that could call into question the protectiveness of the remedy?

    Response: Not at this **time**.

15. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

    Response: The monthly calls could include more details regarding status of activities at the AOCs. Generally the monthly calls focus only on deliverable reports and the timing of getting these reports.

Winklepeck Burning Grounds

16. What is your overall impression of the project (general sentiment)?

    Response: The cleanups conducted on this AOC appear to have addressed direct contact exposures to COCs. The AOC still has a Land Use Control in place (fence), but this will no longer be needed after the current remedial activities outlined in the Sept 2015 ESD changes are completed. The fence will remain around the entire RVAAP to keep trespassers from entering the facility, but it will not be needed for environmental remedial measures at Winklepeck. Ground water in this area will continue to be monitored through site wide ground water monitoring activities. Winklepeck Burning Grounds continues to be used actively by the Ohio National Guard for military training. MEC items were found during the recent post ROD remedy activities. It is likely the MEC will continue to be discovered at Winklepeck over time.

17. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

    Response: In September 2015 Ohio EPA approved the ESD for Winklepeck. The land use changes at this AOC required additional removal actions at several former burn pad locations on the AOC. Ohio EPA recently visited Winklepeck to view the remedy underway.

18. Have there been any complaints, violations, or other incidents related to the site requiring a response by our office? If so, please give details of the events and results of the responses.

    Response: I am not aware of any complaints, violations or incidents that required a response by our office.

19. Do you feel well informed about the site's activities and progress?

    Response: Yes, I received notice both via e-mail and letter that activities were going to start at this AOC. The activities began on October 31, 2016.

20. Is the remedy functioning as intended?

    Response: On-going activities at Winklepeck are designed to address use changes. Existing LUCs are in place until the remedy is complete.

21. Has any other information come to light that could call into question the protectiveness of the remedy?

    Response: No

22. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Response: Ohio EPA visited the AOC on November 10th. All parties involved with the current remedial actions were conducting the remedy in a manner that seems consistent with the post – ROD changes.

Ramsdell Quarry Landfill

Nicholas Roope is the Ohio EPA Site Coordinator for Ramsdell Quarry Landfill AOC.

23. What is your overall impression of the project (general sentiment)?

    Response: My overall impression of the site is that it remains protective to human health with restricted access to the area, and a fence that is being maintained to deter entrance to the area. There is still work remaining to maintain protection of the environment under different programs (MMRP, surface water and sediment, etc.).

24. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

    Response: Routine communications have been made. Multiple site visits have occurred in the last year (2016). The site visits were prompted by the surface water and sediment investigation at the site. During that investigation the integrity of the cap, signs, and fence as part of the LUC were completed and noted to be in excellent condition. The results of the previous site visit at low water level revealed some solid wastes, and Asbestos Containing Material (ACM). Other than that training has occurred to inform guard staff why the site is restricted, and the requirement of signing in to access the site is completed routinely.

25. Have there been any complaints, violations, or other incidents related to the site requiring a response by our office? If so, please give details of the events and results of the responses.

    Response: To the best of my knowledge, I am unaware of any complaints, violations, or incidents requiring response from our agency.

26. Do you feel well informed about the site's activities and progress?

    Response: Yes, I feel well informed about the site's activities and progress, and have been in contact with Kathryn Tait for every inspection to date.

27. Is the remedy functioning as intended?

    Response: The fence to prevent human exposure and access to the site appears to be in good shape, and acts as an effective barrier with signs evenly spaced and restricting access and digging of any kind. The cap on the surface appears to be well vegetated to prevent runoff and the gradual weathering of the cap. However, after viewing the water at low levels in the wetland it was evident that some material is uncapped, and at times of drought allows for complete access to ACM and other wastes. However, the area is restricted, no digging has occurred, and the exposed items normally are not exposed due to the contact with a wetland. Further discussion may be warranted.

28. Has any other information come to light that could call into question the protectiveness of the remedy?

    Response: After viewing the water at low levels in the wetland it was evident that some material is uncapped, and at times of drought ACM and other wastes are exposed. However, the area is restricted.

29. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

    Response: I believe the site is being properly managed to maintain safety and provides protection to human health. However, I have concerns for the remaining material that is below the surface of the water in the wetland area may have the potential to cause an environmental impact and human exposure at low water levels (i.e. during a drought).

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INTERVIEW RECORD

Site Name: *Camp Ravenna*		**EPA ID No.:** *OH5210020736*	
Subject: *Second Five-Year Review of Remedial Actions for Load Lines 1 – 4, Load Line 12, Ramsdell Quarry Landfill, and Winklepeck Burning Grounds*		**Time:** *1447 hrs.*	**Date:** *Nov. 5, 2016*
Type: ☐ Telephone ☐ Visit ☒ Other (completed via email) **Location of Visit:** *Not applicable*		☐ Incoming ☐ Outgoing	

Contact Made By

Name: *James R Stachowski, PE*	**Title:** *Environmental Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted

Name: *Tom Tadsen*	**Title:** *RAB Co-Chair*	**Organization:** *RVAAP RAB*
Telephone No: *330-256-0921* **Fax No:** *N/A* **E-Mail Address:** *ttadsen@neo.rr.com*	**Street Address:** *7657 W Lake Blvd* **City, State, Zip:** *Kent OH 44240*	

Summary Of Conversation

General

1. How does the community use Camp Ravenna in general?
   Community members train there as military personnel. Contractors work there and contribute to the local economy. The Ohio Army National Guard provides occasional facility tours for area civic and other organizations. Hunters apply to hunt the unrestricted portions of the facility during controlled deer hunts each fall. Vendors provide support services, such as fuel and prepared foods for troops in training.

Load Lines 1, 2, 3, and 4 (RVAAP-08, -09, -10, & -11)

2. What is your overall impression of the project (general sentiment)?
   The project has been going well and progressing as planned, subject to budgetary limitations. During the project, some procedures and specific goals have changed as a result of unexpected findings onsite. The army has honored its pledge to follow the evidence in its deliberate search for contaminants and has spent extra care in ensuring that any known contaminated areas were remediated to the required standard, and any contaminants in surface and groundwater were tracked accurately, whether the contaminants were limited to the area within the installation boundary, or outside.

3. What effects have site operations had on the surrounding community?
   The surrounding community has always been very suspicious that the Army has been hiding something inside the fence. Suspicions have led to development of many rumors over the years about what goes on inside the fence. The surrounding communities are more concerned about potential contamination leaving the facility and potential long term effects of the contamination. When Load Line 9 was burned, local opposition was at its highest ever. It was a good idea for the Army to finish remediating and demolishing buildings by means other than fire.

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4. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
The community is quite concerned about hexavalent chromium leaving the facility in the groundwater, it's eventual resting place and potential impacts on flora and fauna – mostly on humans, though. The community is also concerned that the explosive and SVOC contamination in groundwater leaving the installation is followed to its eventual resting place and properly treated and/or disposed of. A lingering rumor has been the suspected occurrence of cancer clusters in the Minyoung Road area historically. The Director of the Portage County Health Department made a RAB presentation years ago, and disproved the existence of cancer clusters related to RVAAP, but the suspicion still lingers and infrequently rears its ugly head. There's also concern about groundwater contamination from Ramsdell Quarry Landfill, based on fairly unique potentiometric results there, based on ground water flow. The community is always concerned about development of live-fire weapons ranges, especially when they are overlaid on contaminated ground. Winklepeck Burning Ground is one such area. The public would like to see it remediated to an unrestricted use category and all unexploded ordnance and contaminants removed.

5. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
There have been very infrequent cases of trespassing and vandalism inside the fence over the years, and only a few times law enforcement agencies were called to apprehend and expel trespassers. In the fairly recent past, a number of police agencies chased two suspected felons into the installation through the Charlestown gate, then had to apprehend and arrest them. Over many years (since the end of WWII), poachers from outside the Northern boundary have cut the fence and poached deer and other wildlife. The Portage County (ODOW) Wildlife Enforcement Officer responded to many of these calls and removed a number of poachers. A car drove through the fence on State Route 5 at the George Road Sewage Plant sometime in the last ten years.

6. Do you feel well informed about the site's activities and progress?
Yes

7. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
Follow the contamination emanating from load lines 3 and 12 to its conclusion and initiate appropriate remedial actions.

Load Line 12 (RVAAP-12)

8. What is your overall impression of the project (general sentiment)?
Progressing as scheduled.

9. What effects have site operations had on the surrounding community?
Very little, if any, except causing anxiety over unknowns.

10. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
Yes – specifically, establishment, memorialization and enforcement of land use controls – as in the Landfill North of WBG.

11. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
Load Line 12 was the site of a fatal building collapse during the building demolition process.

12. Do you feel well informed about the site's activities and progress?
Yes

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13. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
 Follow the contamination emanating from Load Line 12 to its conclusion and initiate appropriate remedial actions.

Ramsdell Quarry Landfill (RVAAP-01)

1. What is your overall impression of the project (general sentiment)?
 Good – somewhat concerned. Want to ensure that there's no residual contamination from dumping, VOC's, SVOC's and explosives migrating outward in the ground water.

14. What effects have site operations had on the surrounding community?
 Not much

15. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
 No

16. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
 No

17. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
 No

18. Do you feel well informed about the site's activities and progress?
 Yes

19. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
 No

Winklepeck Burning Grounds (RVAAP-05)

20. What is your overall impression of the project (general sentiment)?
 The project has progressed in starts and stops since the beginning, due to found UXO and contamination not memorialized clearly in historical records. Halts in re-development projects resulted, delaying re-use.

21. What effects have site operations had on the surrounding community?
 Very little. Occasionally, neighbors comment on hearing weapons firing when the winds carry the noise in their direction. All ranges comply with required federal and state noise and noise control requirements, so this is really a non-issue.

22. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
 The community is concerned anytime the military weaponry to be used is superseded by more modern or newer systems with different range/targetry requirements. The Army (OHARNG) responds to Army requirements and makes changes IAW directives from DA, when funding supports required modifications.

23. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
 No

24. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
 No

INTERVIEW RECORD

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25. Do you feel well informed about the site's activities and progress?
Generally, it might be good to have an update from the OHARNG on intended range modifications, environmental considerations and potential problem areas resulting from modifications.

26. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
No

ATTACHMENT 7

ARAR Evaluation

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ARAR EVALUATION

BACKGROUND

Section 121 (d)(2)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) specifies that remedial actions must meet federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). ARARs are those standards, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. To-be-considered (TBC) criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary level of cleanup for protection of human health or the environment.

The final remedy selected for a site should be designed to meet all chemical-specific, action-specific, and location-specific ARARs and consider all TBCs. Chemical-specific ARARs are health- or risk-based numerical values for individually listed contaminants in specific media. Action-specific ARARs are technology- or activity-based limitations or requirements that are selected to accomplish a remedy. Location-specific ARARs are restrictions placed on the concentration of chemicals or conduct of operations based on the location of a site.

OBJECTIVE

Camp Ravenna, formerly known as the Ravenna Army Ammunition Plant (RVAAP), is located in northeastern Ohio within Portage and Trumbull counties. The facility was constructed in 1940 and 1941 and used for ammunition assembly, loading, and demilitarization activities. It encompassed 21,683 acres. Administrative accountability for all of the acreage was transferred to the U.S. Property and Fiscal Officer in September 2013 and licensed to the Ohio Army National Guard as a military training site known as Camp Ravenna Joint Military Training Center (Camp Ravenna).

This is the second five-year review of the following Camp Ravenna sites:

- Load Line 1
- Load Line 2
- Load Line 3
- Load Line 4
- Load Line 12
- Winklepeck Burning Grounds
- Ramsdell Quarry Landfill

This evaluation was prepared to address Question B of the CERCLA five-year review, *"Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?"*

EVALUATION

Load Lines 1 Through 4

Industrial operations at RVAAP primarily consisted of 12 munitions assembly facilities referred to as load lines (LLs). LL 1-4 were used between 1941 and 1971 to melt and load trinitrotoluene

(TNT) and Composition B (a mixture of TNT and cyclotrimethylenetrinitramine [RDX]) into large-caliber shells. In 1951, soils contaminated with accumulated explosives were removed from LL 1 and replaced with clean fill.

Chemical contaminants detected in soil and dry sediment at LLs 1-4 above risk-based cleanup goals consisted of inorganics, explosives, polychlorinated biphenyls (PCBs) and semivolatile organic compounds (SVOCs). The soil and sediment contamination detected at LLs 1-4 was generally surficial in nature, between 0 and 4 feet (ft) below ground surface (bgs). In isolated areas, the contamination may have extended to 6 ft bgs.

The remedy selected in the Interim Record of Decision (ROD) [USACE 2007] to address contaminated surface and subsurface soils and dry sediment at LLs 1-4 consisted of the following:

- Excavation of discrete areas of contaminated surface and subsurface soils and dry sediment with concentrations of contaminants exceeding risk-based clean-up goals
- Temporary on-site storage via stockpiling for characterization
- Off-site disposal of soils at a permitted landfill and, as needed, disposal at a TSCA and/or RCRA permitted landfill
- Replacement of excavated material with clean compacted backfill
- Groundwater monitoring to ensure the remedy did not impact groundwater
- Maintenance of building slabs and foundations
- Five year reviews in accordance with CERCLA 121(c) and 300.430(f)(4)(ii)

No chemical-specific ARARs were identified in the Interim ROD [USACE 2007]. The location- and action-specific ARARs, listed in Attachment 1 of the Interim ROD and included in Appendix A of this ARAR evaluation, were potential ARARs for the conduct of the remediation, and therefore are no longer relevant and appropriate.

The U.S. Army issued a change memorandum to the Interim ROD [Army 2008] which committed to sampling soil underneath concrete slabs and building foundations to determine the need to perform a removal action of contaminated soil.

Between August and November of 2007, 1,752 tons of PCB soils and 9,489 tons of non-hazardous soils were excavated from LLs 1-4 [USACE 2008]. Following remedial action, sub-slab soil sampling was conducted to determine if the removal of contaminated sub-slab soil was necessary. The sub-slab soil remedial completion report [URS 2010] documents the removal of contaminated sub-slab soil at building footprints within Load Lines 2 and 3. It also documents the removal and disposal of soil piles stored within three buildings at Load Line 4 (i.e., G-1, G-1A and G-3). This material was removed so that these three buildings could be demolished, the slabs removed, and the underlying soil subsequently sampled. The subsurface characterization performed after the floor slabs were removed extended to a depth of 4 ft bgs and the resulting subsurface samples were field screened only.

In December 2009 and August 2010, subsurface soil beneath former building slabs was sampled using a subsurface soil incremental sampling methodology (ISM) to determine if there was residual soil contamination above risk-based project cleanup goals over the depth range of 1 to 7 ft bgs [Prudent 2011].

Additional ISM sampling was conducted at LLs 1-4 and other areas of concern in June and July 2011 to bound areas requiring further soil remediation and documented in a characterization sampling report [Prudent 2013]. Table 7-2 of the characterization report [Prudent 2013] identifies characterization samples exceeding risk-based child resident, adult resident, and National Guard trainee cleanup goals.

The sample and analysis plan addendum for surface water and sediment at LLs 1-4 [Leidos 2016] provides recommendations, procedures, and locations for conducting surface water and sediment sampling at LLs 1-4 to define the nature and extent of contamination for incorporation into a feasibility study addendum for soil, sediment, and surface water at LLs 1-4 and LL 12.

There are no new standards or performance requirements affecting the protectiveness of the remedy at LLs 1-4. A review of the risk assessment methods and toxicity criteria that prompted remedial action at LLs 1-4 is located in Attachment 8.

CONCLUSION

There are no changes to the ARARs or newly promulgated or modified requirements of federal or state environmental laws that would change the protectiveness of the remedy implemented at LLs 1 - 4.

RVAAP-12 (Load Line 12)

From 1946 to 1949, LL 12 was used to produce ammonium nitrate for explosives and fertilizers prior to its use as a weapons demilitarization facility [SAIC 2006b].

Arsenic was detected in dry sediment in a main ditch at LL 12 above the risk-based cleanup goals of 31 milligrams per kilogram (mg/kg) for a National Guard trainee (mounted training with no digging).

The remedy selected in the ROD for LL 12 [SAIC 2009b] to address arsenic in dry sediment in the main ditch consisted of excavation and off-site disposal of contaminated soil and dry sediment above National Guard Trainee clean-up goals. Components of the selected remedy included:

- Remedial design plan
- Excavation
- Handling of waste materials
- Off-site disposal
- Confirmatory sampling
- Restoration
- Land use controls
- Five-year reviews

No chemical- or location-specific ARARs were identified in the ROD [SAIC 2009b]. The action-specific ARARs, listed in Attachment A of the ROD and included in Appendix A of this ARAR evaluation, were potential ARARs for the conduct of the remediation, and therefore are no longer relevant and appropriate.

In June 2010, approximately 1.212 tons of non-hazardous material was transported off-site for disposal. Table 7-2 of the Remedial Action Report [SAIC 2010] shows that the confirmation sample results below the risk-based cleanup goal.

There are no new standards or performance requirements affecting the protectiveness of the remedy at LL 12. A review of the risk assessment methods and toxicity criteria that prompted remedial action at LL 12 is located in Attachment 8.

CONCLUSION

There are no changes to the ARARs or newly promulgated or modified requirements of federal or state environmental laws that would change the protectiveness of the remedy implemented at LL 12.

RVAAP-05 Winklepeck Burning Grounds

The Winklepeck Burning Grounds (WBG) is a 200-acre site located in the central part of Camp Ravenna. Historical activities at WBG included destruction of explosives in munitions, bulk explosives, propellants, and explosives-contaminated combustible material using open burning. Approximately 180 acres of WBG has been used for a Mark 19 (MK19) Grenade Machinegun Range, a target practice range for use in firing non-explosive practice rounds. In advance of site transfer and range construction, the U.S. Army Joint Munitions Command removed munitions and explosives of concern (MEC) in August 2005.

Chemical contaminants detected in soil and dry sediment at WBG above risk-based cleanup goals consisted of the explosive RDX and polycyclic aromatic hydrocarbons (benzo(a)pyrene, dibenz(a,h)anthracene, benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd) pyrene).

A ROD was signed on 19 August 2008 [SAIC 2008] that established a selected remedy with the following components for COCs in soil and dry sediment:

- clearing of vegetation
- geophysical surveys and visual inspections for identifying metal debris
- removal of transite and friable asbestos from the surface and subsurface within the footprint of Pad 70
- excavation of contaminated soil by layers to a depth of 0.3 to 1.2 meters (1 to 4 ft)
- screening (sifting) of the excavated soil for metal debris (potential MEC)
- confirmation sampling of the chemical characteristics of the remaining soil and for the absence of visible asbestos within the sides and bottom of the excavation
- multi-increment sampling and testing of sifted soil to determine disposal requirements
- disposal of contaminated soil (above remedial goals) at an approved off-site facility
- backfill of the excavations using fill material from a source approved by the U. S. Army and Ohio EPA
- site restoration
- implementation of LUCs for the site
- conducting 5-year reviews of the performance of the selected remedy

No chemical-specific ARARs were identified in the ROD [SAIC 2008]. Location- and action-specific ARARs, listed in Table 4 of the ROD and included in Appendix A of this ARAR evaluation, were potential ARARs for the conduct of the remediation, and therefore are no longer relevant and appropriate.

A total of 7,294 cubic yards of soils contaminated with transite ACM, friable asbestos, and/or MEC was excavated from WBG Pads 61/61A, 67, and 70 to protect future range maintenance soldiers from exposure to contaminants in soil exceeding risk-based cleanup goals listed in the

WBG ROD [SAIC 2008]. Although ACM (transite) was present in the soil at pads 61/61A and 70, the Ohio Department of Health did not consider soil excavation and processing operations an abatement operation. Therefore, the excavations were not required to be performed in accordance with State of Ohio (Ohio Administrative Code [OAC] 3745-20) asbestos emission control regulations. However, the loadout of asbestos-contaminated soil for off-site disposal was considered an asbestos abatement operation and was conducted in accordance with 40 CFR Part 61, Subpart M and State of Ohio (OAC 3745-20) asbestos emission control regulations [MKM 2009].

The remedial action was conducted on the basis of a limited site characterization to accelerate the timeframe in which the AOC could be developed and used as a MK19 Range. Although remedial actions were completed for WBG, the associated LUCs/restrictions placed on the AOC limited the use and future development of the AOC. Additional development of the AOC as a Multi-Purpose Machine Gun range was planned and therefore the AOC was reassessed to fully define the nature and extent of remaining contamination (if any) and LUCs/restrictions were re-evaluated to facilitate range construction and future use and management of the AOC as an operational range.

A 2015 Explanation of Significant Differences [USACE 2015] documents additional areas of soil excavation required to meet the commercial/industrial land use and associated changes to the LUCs. The only LUCs for the WBG AOC are:

- The AOC cannot be used for unrestricted (residential) land use unless or until additional evaluation shows that risk levels resulting from residual contamination have been reduced to levels acceptable for residential land use and any residual MEC hazards have been removed
- Groundwater use or extraction of groundwater located at or underlying WBG or any portion thereof is prohibited, except for the following:
    - The installation, development, purging, and sampling of new or existing monitoring wells in accordance with the most recent Facility-Wide Sampling and Analysis Plan as part of the Area of Concern (AOC)-specific Installation Restoration Program, the Facility-Wide Ground Water Monitoring Program Plan (FWGWMPP), or the Facility-Wide Groundwater Remedial Investigation
    - The modification of existing monitoring wells, if necessary, to allow for construction on the range
    - The abandonment and replacement of monitoring wells damaged by activities or removed for construction, and abandonment of wells no longer utilized as part of IRP or FGWMPP activities, in accordance with Ohio EPA guidance, the most recent Facility-Wide Sampling and Analysis Plan, and applicable OAC requirements

The Explanation of Significant Differences did not identify any changes to the ARARs listed in the ROD.

There are no new standards or performance requirements affecting the protectiveness of the remedy at the WBG. A review of the risk assessment methods and toxicity criteria that prompted remedial action at WBG is located in Attachment 8.

CONCLUSION

There are no changes to the ARARs or newly promulgated or modified requirements of federal or state environmental laws that would change the protectiveness of the remedy implemented at WBG.

RVAAP-01 Ramsdell Quarry Landfill

The Ramsdell Quarry landfill (RQL) is a 14-acre abandoned quarry with a 10-acre unlined landfill that was used for domestic, commercial, industrial, and solid wastes that included explosives (TNT and Composition B), napalm, gasoline, acid-dip liquor, annealing residue, aluminum chloride, and inert material. Land surface burning was also performed to destroy waste explosives from Load Line 1 and napalm bombs. A four-acre portion of the landfill was operated as a state of Ohio permitted sanitary landfill in 1978 and was closed under state of Ohio solid waste regulations in 1990.

Chemical contaminants detected in soil and dry sediment at RQL above risk-based cleanup goals consisted of polycyclic aromatic hydrocarbons (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd) pyrene).

A ROD was signed on 20 August 2009 [SAIC 2009a] that established a selected remedy for excavation and off-site disposal of chemically-contaminated soil and dry sediment. Other components of the remedy included LUCs and five-year reviews to assess performance of the remedial action. Remediation started in 2010 and was not completed because asbestos-containing material (ACM) was encountered in the subsurface. The presence of ACM in the landfill was not known prior to discovery, and the ROD did not account for this material. The excavation was stopped once ACM was no longer visible, and the excavated ACM was disposed off-site. Not all of the chemically-contaminated areas were remediated. Because of the discovery of friable ACM, new remedial alternatives were evaluated and the selected remedy was established in a ROD Amendment [SAIC 2013].

The remedy selected in the ROD amendment consisted of the following:

- Installation of a fence at the perimeter of RQL to encompass the closed landfill, quarry bottom, and wetlands
- Implementing a best management practice to remove surficial ACM through non-intrusive/no-digging methods

Part V of the ROD amendment refers to the RQL feasibility study [SAIC 2006a], the original ROD [SAIC 2009a], and OAC 3745-20-07 for ARARs.

Many of the action-specific ARARs, listed in Table 4-1 of the RQL feasibility study and Attachment A of the original ROD and included in Appendix A of this ARAR evaluation, were potential ARARs for RCRA hazardous waste that would be disposed of on-site, and therefore are no longer relevant and appropriate.

Part III of the ROD amendment states that the discovery of ACM in RQL during the implementation of 2010 remedial action, under the original ROD invoked the following relevant and appropriate requirements stated in OAC, Asbestos Emissions Control ~ OAC 3745-20 and Standard of Inactive Asbestos Waste Disposal Sites ~ OAC 3745-20-07:

1. Discharge no visible emissions to the outside air

2. Cover ACM with at least 6 inches of compacted non-ACM, and establish and maintain a cover of vegetation on the area adequate to prevent exposure to the ACM
3. Cover ACM with at least 2 ft compacted non-ACM and maintain the cover to prevent exposure to the ACM

Section 7.0 of the remedial design report [Leidos 2014] stated, *"After the perimeter fence is installed, there is no additional requirement for ACM removal, as access and land use restrictions at RQL will ensure no visible emissions will be released to the outside air in accordance with Ohio Administrative Code (OAC) 3745-20-01."* Section 10.0 of the remedial design report presented asbestos-related regulations that were to be conformed to during the conduct of the remedy implementation.

According to the remedial action report [Leidos 2015], security fences were installed around the perimeter of RQL in 2014 and eleven signs were installed around RQL to warn of the ACM hazard in the quarry bottom in compliance with OAC 3745-20-07(B)(1)(b). After installing the perimeter fence, ACM exposed at the ground surface was removed using non-intrusive, no digging methods (e.g., removal by hand) and dust control measures were implemented as needed to ensure no visible emissions. In total, an estimated 200 pounds of ACM was removed from the RQL.

The U.S. Army will manage future land use at RQL as restricted access due to residual, non-exposed asbestos in soil, residual PAH contamination above residential facility-wide cleanup goals, and the closed landfill. No soil disturbing activities are allowed within the quarry bottom and any personnel entering the quarry bottom will be briefed of the asbestos hazards. The Army will implement LUCs and conduct CERCLA five-year reviews. Other media (i.e., surface water, wet sediment, and groundwater) and MEC at RQL will be addressed as part of future actions.

There are no new standards or performance requirements affecting the protectiveness of the remedy at the RQL. A review of the risk assessment methods and toxicity criteria that prompted remedial action at RQL is located in Attachment 8.

<u>CONCLUSION</u>

There are no changes to the ARARs or newly promulgated or modified requirements of federal or state environmental laws that would change the protectiveness of the remedy implemented at RQL.

REFERENCES

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SAIC 2009b. *Final Record of Decision for Soil and Dry Sediment for the RVAAP-12 Load Line 12, Ravenna Army Ammunition Plant, Ravenna, Ohio*, March.

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Grounds, Former Ravenna Army Ammunition Plant/Camp Ravenna, Portage and Trumbull Counties, Ohio, March.

USACE 2008. Final Remedial Action Completion Report for the *Remediation of Soils and Dry Sediments at RVAAP 08-11 (Load Lines 1-4), Ravenna Army Ammunition Plant*, June.

USACE 2007. *Interim Record of Decision for the Remediation of Soils at Load Lines 1 through 4 at the Ravenna Army Ammunition Plant*, January.

Appendix A

1. Attachment 1 of the Interim ROD for LLs 1-4 (USACE 2007)
2. Attachment A of the ROD for LL 12 (SAIC 2009b)
3. Table 4 of the ROD for WBG (SAIC 2008)
4. Table 4-1 of the Feasibility Study for RQL (SAIC 2006a)
5. Attachment A of the original ROD for RQL (SAIC 2009a)

Attachment 1. Description of ARARs

	Containers holding hazardous wastes must be kept closed except to add or remove wastes and must not be managed in a manner that would cause them to leak.	Applicable to 90-day accumulation of debris from excavation and screening if such debris contains listed wastes or exhibits a characteristic.	40 CFR 264.171 40 CFR 264.172 40 CFR 264.173 40 CFR 264.176 40 CFR 264.17 OAC 3745-52-34(A)(1)
	Containers of hazardous waste must be maintained in good condition and comparable with the waste stored therein. Containers holding ignitable or reactive wastes must be separated from potential ignition sources and located 50 feet from the property boundary.		
Placement of hazardous contaminated soil in a staging pile	In 1998, USEPA created a new unit for the temporary management of remediation wastes known as the staging pile. The staging pile is an accumulation of solid, non-flowing remediation wastes that may be used for storage of those wastes for two years. The requirements for staging piles include the performance criteria of 40 CFR 264.554(d). These standards require that: the staging pile must be designed to prevent or minimize releases of hazardous waste or hazardous constituents into the environment, the staging pile must be designed to minimize cross-media transfer as necessary to protect human health and the environment (by using liners, run-off/run-on controls as appropriate) The staging pile requirements also contain closure requirements (separate provisions for staging piles located in previously contaminated areas and those located in previously uncontaminated areas)	Applicable to storage of hazardous-contaminated soils in staging piles. Potentially relevant and appropriate if excavated soils are determined to not contain listed wastes or exhibit the TC soils.	40 CFR 264.554 OAC 3745-57-74

Attachment 1. Description of ARARs

	The generator must determine each EPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 CFR 268.40, Subpart D.	Applicable to the generation and characterization of hazardous-contaminated soil and hazardous debris resulting from excavation. Applicable to generation of decontamination wastewater.	40 CFR 268.9(a) OAC 3745-270-07 OAC 3745-270-09
	The generator must determine the underlying hazardous constituents [as defined in 40 CFR 268.2(i)] in the waste.	Applicable to the generation and characterization of RCRA characteristic hazardous waste (except D00I non-wastewaters treated by combustion, recovery of organics, or polymerization. See 268.42, Table I) and to hazardous-contaminated soils for their subsequent storage, treatment, or disposal.	40 CFR 268.9(a) OAC 3745-270-09
Accumulation of Hazardous Debris from Excavation and Screening. It is Assumed that any Debris Resulting from Excavation and Screening will be Accumulated for < 90 Days	A generator may accumulate for up to 90 days or conduct treatment of hazardous wastes in containers without an Ohio EPA permit. Generators that accumulate for 90 days or conduct on-site treatment of hazardous waste in containers must comply with the personnel training, preparedness and prevention requirements, and contingency plan requirements of 40 *CFR* 265.16; 40 *CFR* 265, Subpart C; and 40 *CFR* 265, Subpart D, respectively. Personal training and contingency plan requirements would appear to be administrative in nature. Arguably some of the components/goals of the contingency plan such as: (1) to minimize the hazards to human health or environment from fire, explosion or sudden release of hazardous waste or hazardous constituents, or (2) presence of an emergency coordinator on site, could be viewed as substantive. If determined to be substantive, these provisions should be cited as ARAR; however, the plans, details or implementation steps should be included in the CERCLA documentation for the site (i.e., remedial design documents).	Applicable to 90-day accumulation of debris from excavation and screening if such debris contains listed wastes or exhibits a characteristic.	40 CFR 262.34(a)(4) OAC 3745-52-34(A)(4) OAC 3745-66-70 to 66-77
	Containers must be marked with the date upon which period of accumulation began and with the words "Hazardous Waste."	Applicable to 90-day accumulation of debris from excavation and screening if such debris contains listed wastes or exhibits a characteristic.	40 CFR 262.34 (a)(2)(3) OAC 3745-52-34 (A)(2)(3)

Construction Activities Causing Storm Water Runoff (e.g., clearing, grading, and excavation)	Construction activities disturbing more than 1 acre must develop and implement a storm water pollution prevention plan incorporating best management practices (including sediment and erosion controls, vegetative controls, and structural controls) in accordance with the requirements of the Ohio EPA General Permit for Construction Activities (Permit ORC 000002).	Applicable to stormwater discharges from land disturbances from a construction activity involving more than 1 acre.	40 CFR 122.26 OAC 3745-38-06
REMOVAL OF CONTAMINATED SOILS			
Waste Generation, Characterization, Segregation, and Storage-Excavated Soils and Buried Wastes, Sludge, Surface Features, Debris, and Secondary Wastes			
Generation and Characterization of Solid Waste *(all primary and secondary wastes)*	The generator must determine if the material is a solid waste, as defined in 40 *CFR* 261.2 and 40 *CFR* 261.4(a). if the material is a solid waste, the generator must determine if the solid waste is a hazardous waste by:	Applicable to generation of a solid waste as defined in 40 *CFR* 261.2 and that is not excluded under 40 *CFR* 261.4(a).	40 CFR 262.11(a)(b)(c) OAC 3745-52-11(A)(B)(C)(D)
	• determining if the waste is listed under 40 *CFR* Part 261; or • determining if the waste exhibits characteristics by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used; and • determining if the waste is excluded under 40 *CFR* Parts 261, 262, 266, 268, and 273	Applicable to the generation and characterization of hazardous-contaminated soil and hazardous debris resulting from excavation. Process history indicates that soils were contaminated with K047 pink/red water from TNT operations. Applicable to the generation and characterization of hazardous-contaminated soil and hazardous debris resulting from excavation. Site data indicate that soils contain metals at concentrations that exceed 20 times the TC limit and may exhibit the characteristics D008. Applicable to generation of decontamination wastewater.	40 CFR 262.11(a)(b)(c) OAC 3745-52-11(A)(B)(C)(D) 40 CFR 262.II(a)(b)(c) OAC 3745-52-11(A)(B)(C)(D)
	The generator must determine if the waste is restricted from land disposal under 40 *CFR* 268 *et seq.* by testing in accordance with prescribed methods or use of generator knowledge of waste.	Applicable to the generation and characterization of hazardous-contaminated soil and hazardous debris resulting from excavation. Applicable to generation of decontamination wastewater.	40 CFR 268.7 OAC 3745-270-07

Attachment 1. Description of ARARs

Action	Requirements	Prerequisite	Citation(s)
Surface Waters and Wetlands	All waters of the state shall be free of suspended solids, floating debris, oil, scum, or toxic substances from human activity that create a nuisance, cause degradation, or adversely affect aquatic life. There may be no degradation of water quality that results in violation of the applicable water quality criteria or the impairment of existing uses. Wetlands-designated uses shall be maintained and protected such that degradation through direct, indirect, or cumulative impacts do not result in wetland use or function.	Applicable to activities at LLs 1-4 that may impact waters of the state (connected drainageways) or wetlands, including isolated wetlands.	OAC 3745-1-04 OAC 3745-1-51 OAC 3745-1-54(B)(1)
General Construction Standards-Site Preparation and Excavation			
Activities Resulting in the Emission of Particulate Matter, Dusts, Fumes, Gas, Mists, Smoke, etc. From a Hazardous Waste Facility	No owner/operator of a hazardous waste facility shall cause or allow the emission of any particulate matter, dusts, gas, fumes, mists, smoke, vapor, or odorous substances that interferes with the enjoyment of life or property by persons living or working in the vicinity of the facility. Any such action is considered a public nuisance.	Applicable to soil excavation activities at LLs 1-4	ORC 3734.02(I) OAC 3745-15-07(A)
Activities Causing Fugitive Dust Emissions	Persons engaged in construction activities shall take reasonable precautions to prevent particulate matter from becoming airborne; reasonable precautions include, but are not limited to, the following: • the use of water or chemicals for control of dust during construction operations or clearing of land; and • the application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stockpiles, and other surfaces, which can create airborne dusts. No person shall cause, or allow, fugitive dust to be emitted in such a manner that visible emissions are produced beyond the property line.	Applicable to fugitive emissions from demolition of existing buildings or structures, construction operations, grading of roads, or the clearing of land. Applicable to pre-construction clearing activities and excavation activities.	OAC 3745-17-08(B)

Attachment 1. Description of ARARs

Abbreviations:

CFR	Code of Federal Regulations
ORC	Ohio Revised Code
TC	toxicity characteristic

ATTACHMENT A

DESCRIPTION OF ARARs

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Potential Action ARARs for Disposal of RCRA Hazardous Waste

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Soil Contaminated with RCRA Hazardous Waste OAC § 3745-400-49 OAC § 3745-400-48 UTS	These rules prohibit land disposal of RCRA hazardous wastes subject to them, unless the waste is treated to meet certain standards that are protective of human health and the environment. Standards for treatment of hazardous contaminated soil prior to disposal are set forth in the two cited rules. Use of the greater of either technology-based standards or UTS is prescribed.	LDRs apply only to RCRA hazardous waste. This rule is considered for ARAR status only upon generation of a RCRA hazardous waste. If any soils are determined to be RCRA hazardous, and if they will be disposed of onsite, then this rule is potentially applicable to disposal of the soils.	All soils subject to treatment must be treated as follows: 1) For non-metals, treatment must achieve 90% reduction in total constituent concentration (primary constituent for which the waste is characteristically hazardous as well as for any organic or metal UHC), subject to 3) below 2) For metals and carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90% reduction in constituent concentrations as measured in leachate from the treated media (tested according to the TCLP or 90% reduction in total constituent concentrations when a metal removal treatment technology is used), subject to 3) below. 3) When treatment of any constituent subject to treatment to a 90% reduction standard would result in a concentration less than 10 times the UTS for that constituent, treatment to achieve constituent concentrations less than 10 times the UTS is not required. This is commonly referred to as "90% capped by 10xUTS."
Debris Contaminated with RCRA Hazardous Waste OAC § 3745-400-49 OAC § 3745-400-47	These rules prescribe conditions and standards for land disposal of debris contaminated with RCRA hazardous waste. Debris subject to this requirement for characteristic RCRA contamination that no longer exhibits the hazardous characteristic after treatment does not need to be disposed of as a hazardous waste. Debris contaminated with listed RCRA contamination remains subject to hazardous waste disposal requirements.	If RCRA hazardous debris is disposed of onsite, then these rules are potentially applicable to disposal of the debris.	Standards are extraction or destruction methods prescribed in OAC § 3745-400-47. Treatment residues continue to be subject to RCRA hazardous waste requirements.
Soils/Debris Contaminated with RCRA Hazardous Waste – Variance OAC § 3745-400-44	The Director will recognize a variance approved by the EPA from the alternative treatment standards for hazardous contaminated soil or for hazardous debris.	Potentially applicable to RCRA hazardous soil or debris that is generated and placed back into a unit and that will be land disposed of onsite.	A site-specific variance from the soil treatment standards can be used when treatment to concentrations of hazardous constituents greater (i.e., higher) than those specified in the soil treatment standards minimizes short- and long-term threats to human health and the environment. In this way, on a case-by-case basis, risk-based LDR treatment standards approved through a variance process could supersede the soil treatment standards.

Potential Action ARARs for Disposal of RCRA Hazardous Waste (continued)

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Soils Disposed of in a CAMU OAC § 3745-57-53	Only CAMU-eligible waste can be disposed of in a CAMU. CAMU-eligible waste includes hazardous and non-hazardous waste that are managed for implementing clean-up, depending on the Director's approval or prohibition of specific wastes or waste streams. Use of a CAMU for disposal does not trigger LDRs or MTRs as long as the standards specified in the rule are observed. The Director will incorporate design and treatment standards into a permit or order.	Potentially applicable to RCRA hazardous waste that is disposed of in a CAMU.	Design standards include a composite liner and a leachate collection system that is designed and constructed to maintain less than a 30 cm depth of leachate over the liner. A composite liner means a system consisting of two components; each of which has detailed specifications and installation requirements. The Director may approve alternate requirements if he can make the findings specified in the rule. Treatment standards are similar to LDR standards for contaminated soil, although alternative and adjusted standards may be approved or required by the Director, as long as the adjusted standard is protective of human health and the environment. Treatment standards are de facto clean-up standards for wastes disposed of in a CAMU.
Clean Water Act 33 USC § 1344 Sections 401, 404	Section 404 of the Clean Water Act of 1977 governs the discharge of dredged and fill material into waters of the U.S., including adjacent wetlands.	Potentially applicable if the main ditch at Load Line 12 is categorized as a jurisdictional wetland by the USACE Pittsburgh District. Section 401 water quality certification would apply regardless of jurisdictional status under Section 404. Ohio EPA addresses Section 401 certification through their Wetland Antidegradation Policy (See below).	The wetland in question is currently considered jurisdictional. However, USACE would have to make a jurisdictional determination regarding the wetland's status under Section 404 of the CWA. Both EPA and USACE have jurisdiction over wetlands. EPA's Section 404 guidelines are promulgated in 40 CFR § 230; USACE guidelines are promulgated in 33 CFR § 320.
Executive Order 11990 Protection of Wetlands	EO 11990 requires that federal agencies minimize the destruction, loss, or degradation of wetlands; preserve and enhance the natural and beneficial value of wetlands,; and avoid support of new construction in wetlands if a practicable alternative exists.	Potentially applicable. Requires federal agencies to consider all alternatives to avoid or minimize activities with adverse impacts to wetlands.	EO 11990 requirements were addressed through the CERCLA evaluation of alternative actions for remediation.

Potential Action ARARs for Disposal of RCRA Hazardous Waste (continued)

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Wetland Antidegradation OAC Section 3745-1-54	These rules prescribe the steps to categorize the existing wetland and outline the procedures for the antidegradation of wetlands.	Potentially applicable unless the main ditch is categorized as a jurisdictional wetland by the USACE Pittsburgh district. In which case the wetland would fall under requirement in the Clean Water Act for CERCLA wetlands.	The impact as a result of excavation in the main ditch would not result in significant degradation to the aquatic ecosystem - as determined consistent with 40 CFR part 230.10(2). The results of the action would result in better water quality. Ohio EPA could require mitigation for loss of wetland habitat.

ARAR = Applicable and Relevant or Appropriate Requirements.
CAMU = Corrective action management unit.
LDR = Land disposal restrictions.
MTR = Minimum Technical Requirements.
OAC = Ohio Administrative Code.
RCRA = Resource Conservation and Recovery Act.
TCLP = Toxicity Characteristic Leaching Procedure.
UHC = Underlying hazardous constituent.
UTS = Universal Treatment Standard.

Table 4. ARARs for the Selected Alternative for Contaminated Soil and Dry Sediment at Winklepeck Burning Grounds

Type of ARAR	Requirements	Prerequisite	Citation(s)
Location-Specific			
Surface Waters and Wetlands	All waters of the state shall be free of suspended solids, floating debris, oil, scum, or toxic substances from human activity that create a nuisance, cause degradation, or adversely affect aquatic life. There may be no degradation of water quality that results in violation of the applicable water quality criteria or the impairment of existing uses. Wetlands-designated uses shall be maintained and protected such that degradation through direct, indirect, or cumulative impacts do not result in wetland loss or function.	Applicable to activities at WBG that may impact waters of the state (connected drainageways) or wetlands, including isolated wetlands.	OAC 3745-1-04 OAC 3745-1-51 OAC 3745-1-54(B)(1)
Action- Specific			
Activities Causing Fugitive Dust Emissions	Persons engaged in construction activities shall take reasonable precautions to prevent particulate matter from becoming airborne; reasonable precautions include, but are not limited to, the following: – the use of water or chemicals for control of dust during construction operations or clearing of land; and – the application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stockpiles, and other surfaces, which can create airborne dusts. No person shall cause, or allow, fugitive dust to be emitted in such a manner that visible emissions are produced beyond the property line. Monitoring may be employed to determine the effectiveness of dust emission controls.	Applicable to fugitive emissions from demolition of existing buildings or structures, construction operations, grading of roads, or the clearing of land. Applicable to pre-construction clearing activities and soil excavation activities.	OAC 3745-17-08(B)

Table 4. ARARs for the Selected Alternative for Contaminated Soil and Dry Sediment at for Winklepeck Burning Grounds (continued)

Type of ARAR	Requirements	Prerequisite	Citation(s)
Construction Activities Causing Storm Water Run-off (e.g., clearing, grading, and excavation)	Construction activities disturbing more than 1 acre must develop and implement a stormwater pollution prevention plan incorporating best management practices (including sediment and erosion controls, vegetative controls, and structural controls) in accordance with the requirements of the Ohio EPA General Permit for Construction Activities (Permit ORC 000002).	Applicable to stormwater discharges from land disturbances from a construction activity involving more than 1 acre.	40 *CFR* 122.26 OAC 3745-38-06
Generation and Characterization of Solid Waste (all primary and secondary wastes)	The generator must determine if the material is a solid waste, as defined in 40 *CFR* 261.2 and 40 *CFR* 261.4(a). If the material is a solid waste, the generator must determine if the solid waste is a hazardous waste by: • determining if the waste is listed under 40 *CFR* Part 261; or • determining if the waste exhibits characteristics by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used; and • determining if the waste is excluded under 40 *CFR* Parts 261, 262, 266, 268, and 273.	Applicable to generation of a solid waste as defined in 40 *CFR* 261.2 and that is not excluded under 40 *CFR* 261.4(a).	40 *CFR* 262.11(a)(b)(c) OAC 3745-52-11(A)(B)(C)(D)
		Applicable to the generation and characterization of hazardous-contaminated soil and hazardous debris resulting from excavation. Process history indicates that soil may have been contaminated with K047 (pink/red water) from RVAAP operations. Applicable to the generation and characterization of hazardous-contaminated soil and hazardous debris resulting from excavation. Site data indicate that soil contains metals at concentrations that exceed 20 times the toxicity characteristic limit and may exhibit the characteristics D008. Applicable to generation of decontamination wastewater.	40 *CFR* 262.11(a)(b)(c) OAC 3745-52-11(A)(B)(C)(D)
	The generator must determine if the waste is restricted from land disposal under 40 *CFR* 268 *et seq.* by testing in accordance with prescribed methods or use of generator knowledge of waste.	Applicable to the generation and characterization of hazardous-contaminated soil and hazardous debris resulting from excavation. Applicable to generation of decontamination wastewater.	40 *CFR* 268.7 OAC 3745-270-07

Table 4. ARARs for the Selected Alternative for Contaminated Soil and Dry Sediment at for Winklepeck Burning Grounds (continued)

Type of ARAR	Requirements	Prerequisite	Citation(s)
	The generator must determine each EPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 *CFR* 268.40, Subpart D.	Applicable to the generation and characterization of hazardous-contaminated soil and hazardous debris resulting from excavation. Applicable to generation of decontamination wastewater.	40 *CFR* 268.9(a) OAC 3745-270-07 OAC 3745-270-09
	The generator must determine the underlying hazardous constituents [as defined in 40 *CFR* 268.2(i)] in the waste.	Applicable to the generation and characterization of RCRA characteristic hazardous waste (except D001 non-wastewaters treated by combustion, recovery of organics, or polymerization. see 268.42, Table I) and to hazardous-contaminated soil for their subsequent storage, treatment, or disposal.	40 *CFR* 268.9(a) OAC 3745-270-09
Accumulation of Hazardous Debris from Excavation and Screening (it is assumed that any debris resulting from excavation and screening will be accumulated for less than 90 days)	A generator may accumulate for up to 90 days or conduct treatment of hazardous wastes in containers without an Ohio EPA permit. Generators that accumulate for 90 days or conduct on-site treatment of hazardous waste in containers must comply with the personnel training, preparedness and prevention requirements, and contingency plan requirements of 40 *CFR* 265.16; 40 *CFR* 265, Subpart C; and 40 *CFR* 265, Subpart D, respectively. Personal training and contingency plan requirements would appear to be administrative in nature. Arguably, some of the components/goals of the contingency plan such as: (1) to minimize the hazards to human health or environment from fire, explosion, or sudden release of hazardous waste or hazardous constituents; or (2) presence of an emergency coordinator on-site, could be viewed as substantive. If determined to be substantive, these provisions should be	Applicable to 90-day accumulation of debris from excavation and screening if such debris contains listed wastes or exhibits a characteristic.	40 *CFR* 262.34(a)(4) OAC 3745-52-34(A)(4) OAC 3745-66-70 to 66-77

Table 4. ARARs for the Selected Alternative for Contaminated Soil and Dry Sediment at for Winklepeck Burning Grounds (continued)

Type of ARAR	Requirements	Prerequisite	Citation(s)
	cited as ARAR; however, the plans, details, or implementation steps should be included in the CERCLA documentation for the site (i.e., remedial design documents).		
	Containers must be marked with the date upon which period of accumulation began and with the words "Hazardous Waste."	Applicable to 90-day accumulation of debris from excavation and screening if such debris contains listed wastes or exhibits a characteristic.	40 *CFR* 262.34 (a)(2)(3) OAC 3745-52-34 (A)(2)(3)
	Containers holding hazardous wastes must be kept closed except to add or remove wastes and must not be managed in a manner that would cause them to leak. Containers of hazardous waste must be maintained in good condition and comparable with the waste stored therein. Containers holding ignitable or reactive wastes must be separated from potential ignition sources and located 50 ft from the property boundary.	Applicable to 90-day accumulation of debris from excavation and screening if such debris contains listed wastes or exhibits a characteristic.	40 *CFR* 264.171 40 *CFR* 264.172 40 *CFR* 264.173 40 *CFR* 264.176 40 *CFR* 264.17 OAC 3745-52-34(A)(1)
Placement of Hazardous-contaminated Soil in a Staging Pile	In 1988, EPA created a new unit for the temporary management of remediation waste known as a staging pile. The staging pile is an accumulation of solid, non-flowing remediation wastes that may be used for storage of those wastes for 2 years.	Applicable to storage of hazardous-contaminated soil in staging piles. Potentially relevant and appropriate if excavated soil are determined to not contain listed wastes or exhibit the toxicity characteristics of soil.	40 CFR 264.554 OAC 3745-57-74

Table 4. ARARs for the Selected Alternative for Contaminated Soil and Dry Sediment at for Winklepeck Burning Grounds (continued)

Type of ARAR	Requirements	Prerequisite	Citation(s)
	The requirements for staging piles include the performance criteria of 40 *CFR* 264.554(d). These standards require that: – the staging pile must be designed to prevent or minimize releases of hazardous waste or hazardous constituents into the environment, and – the staging pile must be designed to minimize cross-media transfer as necessary to protect human health and the environment (by using liners, run-off/run-on controls as appropriate). The staging pile requirements also contain closure requirements (separate provisions for staging piles located in previously contaminated areas and those located in previously uncontaminated areas).		
Generation and Storage of Wastewater from Equipment Decontamination (wastewater may contain listed wastes or exhibit a hazardous waste characteristic)	The generator must determine if the wastewater contains listed wastes or exhibits a characteristic, and must characterize the pollutants sufficiently to meet the waste acceptance criteria of the receiving facility. See previous requirements concerning the generation/characteristic of solid wastes.	Applicable to generation of wastewater from equipment decontamination.	40 *CFR* 262.11 OAC 3745-52-11 (A)(B)(C)(D)
Asbestos-Containing Materials at Pad 70 (worker training, material handling, containerization, transport and disposal)	The management of Asbestos Containing Materials (ACM) is subject to the technical requirements found at 40 CFR 61.145 and OAC 3745-20. These standards require: • That prior to the management of any asbestos material at least one trained person be present at all times that is trained in accordance with OAC3745-20-5.	Applicable for asbestos-containing material generated from remedial actions at Pad 70.	40 *CFR* 61.145 OAC 3745-20

Table 4. ARARs for the Selected Alternative for Contaminated Soil and Dry Sediment at for Winklepeck Burning Grounds (continued)

Type of ARAR	Requirements	Prerequisite	Citation(s)
	• That no visible dust emissions occur during activities and that sufficient asbestos control measures (e.g., wetting, fixing, etc.) be included within the activities to prevent fugitive emissions of asbestos particles. • That asbestos wastes be controlled at all times (e.g., adequately wetted/fixed, work controls preclude the potential of rendering non-friable asbestos airborne, etc.). • The emission control measures be included within the planned actions and be approved prior to implementation. • Wastes be properly marked and disposed of at an approved facility. The technical or substantive requirements will govern the manner in which ACM are removed, managed, packaged, and shipped for final disposal.		

Table 4. ARARs for the Selected Alternative for Contaminated Soil and Dry Sediment at for Winklepeck Burning Grounds (continued)

ARAR = Applicable or relevant and appropriate requirement.
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act.
CFR = Code of Federal Regulations.
COC = Chemical of concern.
EPA = U. S. Environmental Protection Agency.
OAC = Ohio Administrative Code.
Ohio EPA = Ohio Environmental Protection Agency.
ORC = Ohio Revised Code.
PCB = Polychlorinated biphenyl.
RCRA = Resource Conservation and Recovery Act.
RVAAP = Ravenna Army Ammunition Plant.
TSCA = Toxic Substances Control Act.
WBG = Winklepeck Burning Grounds.

liner. A composite liner entails a system consisting of two components; each component has detailed specifications and installation requirements. The Director may approve alternate requirements if he can make the findings specified in the rule. Treatment standards are similar to LDR standards for contaminated soil, although alternative and adjusted standards may be approved or required by the Director, as long as the adjusted standard is protective of human health and the environment.

Table 4-1. Potential Action ARARs for Disposal of RCRA Hazardous Waste

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Soil Contaminated with RCRA Hazardous Waste OAC Section 3745-400-49 OAC Section 3745-400-48 UTS	These rules prohibit land disposal of RCRA hazardous wastes subject to them, unless the waste is treated to meet certain standards that are protective of human health and the environment. Standards for treatment of hazardous contaminated soil prior to disposal are set forth in the two cited rules. Use of the greater of either technology-based standards or UTS is prescribed.	LDRs apply only to RCRA hazardous waste. This rule is considered for ARAR status only upon generation of a RCRA hazardous waste. If any soils are determined to be RCRA hazardous, and if they will be disposed of onsite, then this rule is potentially Applicable to disposal of the soils.	All soils subject to treatment must be treated as follows: 1) For non-metals, treatment must achieve 90% reduction in total constituent concentration (primary constituent for which the waste is characteristically hazardous as well as for any organic or metal UHC), subject to 3) below; 2) For metals and carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90% reduction in constituent concentrations as measured in leachate from the treated media (tested according to the TCLP or 90% reduction in total constituent concentrations (when a metal removal treatment technology is used), subject to 3) below: 3) When treatment of any constituent subject to treatment to a 90% reduction standard would result in a concentration less than 10 times the UTS for that constituent, treatment to achieve constituent concentrations less than 10 times the UTS is not required. This is commonly referred to as "90% capped by 10xUTS."

Table 4-1. Potential Action ARARs for Disposal of RCRA Hazardous Waste (continued)

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Debris Contaminated with RCRA Hazardous Waste OAC Section 3745-400-49 OAC Section 3745-400-47	These rules prescribe conditions and standards for land disposal of debris contaminated with RCRA hazardous waste. Debris subject to this requirement for characteristic RCRA contamination that no longer exhibits the hazardous characteristic after treatment does not need to be disposed of as a hazardous waste. Debris contaminated with listed RCRA contamination remains subject to hazardous waste disposal requirements.	If RCRA hazardous debris is disposed of onsite, then these rules are potentially applicable to disposal of the debris.	Standards are extraction or destruction methods prescribed in OAC Section 3745-400-47. Treatment residues continue to be subject to RCRA hazardous waste requirements.
Soils/Debris Contaminated with RCRA Hazardous Waste – Variance OAC Section 3745-400-44	The Director will recognize a variance approved by the USEPA from the alternative treatment standards for hazardous contaminated soil or for hazardous debris.	Potentially applicable to RCRA hazardous soil or debris that is generated and placed back into a unit and that will be land disposed of onsite.	A site-specific variance from the soil treatment standards can be used when treatment to concentrations of hazardous constituents greater (i.e., higher) than those specified in the soil treatment standards minimizes short- and long-term threats to human health and the environment. In this way, on a case-by-case basis, risk-based LDR treatment standards approved through a variance process could supersede the soil treatment standards.
Soils Disposed of in a CAMU OAC Section 3745-57-53	Only CAMU-eligible waste can be disposed of in a CAMU. CAMU-eligible waste includes hazardous and non-hazardous waste that are managed for implementing cleanup, depending on the Director's approval or prohibition of specific wastes or waste streams. Use of a CAMU for disposal does not trigger LDRs or MTRs as long as the standards specified in the rule are observed. The Director will incorporate design and treatment standards into a permit or order.	Potentially applicable to RCRA hazardous waste that is disposed of in a CAMU.	Design standards include a composite liner and a leachate collection system that is designed and constructed to maintain less than a thirty centimeter depth of leachate over the liner. A composite liner means a system consisting of two components; each of which has detailed specifications and installation requirements. The Director may approve alternate requirements if he can make the findings specified in the rule. Treatment standards are similar to LDR standards for contaminated soil, although alternative and adjusted standards may be approved or required by the Director, as long as the adjusted standard is protective of human health and the environment. Treatment standards are de facto cleanup standards for wastes disposed of in a CAMU.

ARAR = Applicable and relevant or appropriate requirements.
CAMU = Corrective Action Management Unit.
LDR = Land Disposal Restrictions.
MTR = Minimum technical requirements.
OAC = Ohio Administrative Code.
RCRA = Resource Conservation and Recovery Act.
TCLP = Toxicity characteristic leaching procedure.
UHC = Underlying Hazardous Constituent.
UTS = Universal Treatment Standard.

ATTACHMENT A

DESCRIPTION OF ARARS

Potential Action ARARs for Disposal of RCRA Hazardous Waste

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Soil Contaminated with RCRA Hazardous Waste OAC Section 3745-400-49 OAC Section 3745-400-48 UTS	These rules prohibit land disposal of RCRA hazardous wastes subject to them, unless the waste is treated to meet certain standards that are protective of human health and the environment. Standards for treatment of hazardous contaminated soil prior to disposal are set forth in the two cited rules. Use of the greater of either technology-based standards or UTS is prescribed.	LDRs apply only to RCRA hazardous waste. This rule is considered for ARAR status only upon generation of a RCRA hazardous waste. If any soils are determined to be RCRA hazardous, and if they will be disposed of onsite, then this rule is potentially Applicable to disposal of the soils.	All soils subject to treatment must be treated as follows: 1) For non-metals, treatment must achieve 90% reduction in total constituent concentration (primary constituent for which the waste is characteristically hazardous as well as for any organic or metal UHC), subject to 3) below; 2) For metals and carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90% reduction in constituent concentrations as measured in leachate from the treated media (tested according to the TCLP or 90% reduction in total constituent concentrations (when a metal removal treatment technology is used), subject to 3) below; 3) When treatment of any constituent subject to treatment to a 90% reduction standard would result in a concentration less than 10 times the UTS for that constituent, treatment to achieve constituent concentrations less than 10 times the UTS is not required. This is commonly referred to as "90% capped by 10xUTS."
Debris Contaminated with RCRA Hazardous Waste OAC Section 3745-400-49 OAC Section 3745-400-47	These rules prescribe conditions and standards for land disposal of debris contaminated with RCRA hazardous waste. Debris subject to this requirement for characteristic RCRA contamination that no longer exhibits the hazardous characteristic after treatment does not need to be disposed of as a hazardous waste. Debris contaminated with listed RCRA contamination remains subject to hazardous waste disposal requirements.	If RCRA hazardous debris is disposed of onsite, then these rules are potentially applicable to disposal of the debris.	Standards are extraction or destruction methods prescribed in OAC Section 3745-400-47. Treatment residues continue to be subject to RCRA hazardous waste requirements.

Potential Action ARARs for Disposal of RCRA Hazardous Waste (continued)

Media and Citation	Description of Requirement	Potential ARAR Status	Standard
Soils/Debris Contaminated with RCRA Hazardous Waste – Variance OAC Section 3745-400-44	The Director will recognize a variance approved by the USEPA from the alternative treatment standards for hazardous contaminated soil or for hazardous debris.	Potentially applicable to RCRA hazardous soil or debris that is generated and placed back into a unit and that will be land disposed of onsite.	A site-specific variance from the soil treatment standards can be used when treatment to concentrations of hazardous constituents greater (i.e., higher) than those specified in the soil treatment standards minimizes short- and long-term threats to human health and the environment. In this way, on a case-by-case basis, risk-based LDR treatment standards approved through a variance process could supersede the soil treatment standards.
Soils Disposed of in a CAMU OAC Section 3745-57-53	Only CAMU-eligible waste can be disposed of in a CAMU. CAMU-eligible waste includes hazardous and non-hazardous waste that are managed for implementing clean-up, depending on the Director's approval or prohibition of specific wastes or waste streams. Use of a CAMU for disposal does not trigger LDRs or MTRs as long as the standards specified in the rule are observed. The Director will incorporate design and treatment standards into a permit or order.	Potentially applicable to RCRA hazardous waste that is disposed of in a CAMU.	Design standards include a composite liner and a leachate collection system that is designed and constructed to maintain less than a thirty centimeter depth of leachate over the liner. A composite liner means a system consisting of two components; each of which has detailed specifications and installation requirements. The Director may approve alternate requirements if he can make the findings specified in the rule. Treatment standards are similar to LDR standards for contaminated soil, although alternative and adjusted standards may be approved or required by the Director, as long as the adjusted standard is protective of human health and the environment. Treatment standards are de facto clean-up standards for wastes disposed of in a CAMU.

Clean Water Act 33 USC § 1344 Sections 401, 404	Section 404 of the Clean Water Act of 1977 governs the discharge of dredged and fill material into waters of the U.S., including adjacent wetlands.	Potentially applicable if the Ramsdell Quarry wetland is categorized as a jurisdictional wetland by the USACE Pittsburgh District. Section 401 water quality certification would apply regardless of jurisdictional status under Section 404. Ohio EPA addresses Section 401 certification through their Wetland Antidegradation Policy (See below).	The wetland in question is hydrologically isolated and incidentally created. It has no direct surface water connections to any waters of the U. S. The USACE would have to make a jurisdictional determination regarding the wetland's status under Section 404 of the CWA. Both EPA and USACE have jurisdiction over wetlands. EPA's Section 404 guidelines are promulgated in 40 CFR § 230; USACE guidelines are promulgated in 33 CFR § 320.
Executive Order 11990 Protection of Wetlands	EO 11990 requires that federal agencies minimize the destruction, loss, or degradation of wetlands; preserve and enhance the natural and beneficial value of wetlands,; and avoid support of new construction in wetlands if a practicable alternative exists.	Potentially applicable. Requires federal agencies to consider all alternatives to avoid or minimize activities with adverse impacts to wetlands.	EO 11990 requirements were addressed through the CERCLA evaluation of alternative actions for remediation.
Wetland Antidegradation OAC Section 3745-1-54	These rules prescribe the steps to categorize the existing wetland and outline the procedures for the antidegradation of wetlands.	Potentially applicable unless other wise categorized as a jurisdictional wetland by the USACE Pittsburgh district. In which case the wetland would fall under requirement in the Clean Water Act for CERCLA wetlands.	The wetland in question was rated as a Category 1 through the ORAM as prescribed by Ohio EPA. A category 1 wetland generally supports minimal wildlife habitat, hydrologic, and recreational functions. The impact as a result of excavation would not result in significant degradation to the aquatic ecosystem - as determined consistent with 40 CFR part 230.10(2). The results of the action would result in better water quality. Ohio EPA could require mitigation for loss of wetland habitat.

ARAR = Applicable and relevant or appropriate requirements.
CAMU = Corrective Action Management Unit.
LDR = Land Disposal Restrictions.
MTR = Minimum technical requirements.
OAC = Ohio Administrative Code.
RCRA = Resource Conservation and Recovery Act.
TCLP = Toxicity characteristic leaching procedure.
UHC = Underlying Hazardous Constituent.
UTS = Universal Treatment Standard.

ATTACHMENT 8

Risk Assessment and Toxicology Evaluation

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Risk Assessment and Toxicology Evaluation

This evaluation was prepared to address Question B of the statement of service, *"Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?"*

This is the second five-year review for Camp Ravenna. The following areas of concern (AOCs) are being evaluated.

- Load Line 1
- Load Line 2
- Load Line 3
- Load Line 4
- Load Line 12
- Winklepeck Burning Grounds (WBG)
- Ramsdell Quarry Landfill (RQL)

Since many of these areas have the same constituents of concern (COCs) and a review of toxicity criteria changes was performed altogether. Table A.8-1 indicates that toxicity criteria changes may have occurred for some COCs since their original records of decision (RODs) were signed (e.g., for Load Lines 1 – 4, Load Line 12, and RQL), however, no new toxicity criteria changes have occurred since the last five-year review was completed in 2012 (USACE-LRB 2012). Therefore, the conclusions from the previous five-year review regarding continued protectiveness of existing toxicity criteria used at the time of the remedy remain valid for this report. Since that time, an updated risk assessment was performed for WBG in 2014 as part of a remedial investigation/feasibility study (RI/FS) supplement (USACE-LRL 2014). This supported a 2015 Explanation of Significant Differences (ESD) for WBG (USACE-LRL 2015).

In 2010, facility-wide risk-based cleanup goals were developed (SAIC 2010) to assist in streamlining the site-specific human health risk assessment process following investigation of potentially contaminated site media. In 2012, USACE issued a position paper outlining the application and use of these facility-wide cleanup goals, which indicated that site-specific cleanup goals for residential or military training should be used in the streamlined risk evaluation process (USACE-LRL 2012). In 2014 the Army National Guard (ARNG) issued a final technical memorandum regarding land uses and revised risk assessment process for the Ravenna Army Ammunition Plant (ARNG 2014), which indicated that in addition to the site-specific exposure assessments described in the 2012 position paper, the USEPA's regional risk-based screening levels (RSLs) for industrial use should also be used in the risk evaluations (currently USEPA 2016a). The three land uses and representative receptors identified in that technical memorandum are (a) unrestricted (residential) land use, represented by a resident receptor (adult and child), (b) military training land use, represented by a National Guard Trainee, and (c) commercial/industrial use, represented by an industrial receptor as used in the development of USEPA regional generic risk-based screening levels for the composite worker. Note that a comparison between the current USEPA industrial use RSLs and the previously developed site-specific cleanup goals (for the areas covered by this review, or the facility-wide cleanup goals) indicates that the USEPA industrial RSLs may not be protective of the assumed site-specific exposures (the National Guard Trainee) for certain constituents of concern. This is shown in Table A.8-2; site-specific cleanup goals developed to protect a National Guard Trainee in the

Load Lines 1 – 4 Interim ROD for aluminum, barium, hexavalent chromium, manganese are lower than the current USEPA industrial use RSLs, as are cleanup goals developed in the RQL for manganese and polycyclic aromatic hydrocarbons (semi-volatiles). The 2010 facility-wide cleanup goal for Aroclor-1254 is lower than the current USEPA industrial use risk-based screening level. This issue does not currently affect protectiveness, since the cleanup goals established in the decision documents and the ESD remain protective of current exposure and the USEPA industrial use risk-based cleanup goals are not being implemented as site-specific cleanup goals at Load Lines 1 – 4 or RQL at this time.

Area-specific considerations for risk assessment are provided for each area below.

Load Lines 1 - 4

Human Health

Site-specific risk-based cleanup goals were developed for load lines 1 – 4 based on protection of the current and reasonably anticipated future use of these areas of the site as a National Guard training site. These are presented in Table 3 of the 2007 Interim Record of Decision (ROD) for load lines 1 – 4. A National Guard Trainee was identified as the reasonable maximum exposed individual for load lines 1 – 4, following the same basic exposure assessment. This receptor was assumed to train at the site 24 hours per day for 24 days per year for inactive duty training and 24 hours per day for 15 days per year for annual training for their 25 year enlistment period. Conservative estimates were made of how much contaminated soil and sediment this person would encounter via incidental ingestion, inhalation of dust particles, and skin contact. The USEPA's currently recommended default exposure factor values (USEPA 2014) are generally less conservative than what was used in the site-specific risk assessment and the exposure assessments used at the time of the risk assessments for these areas remains valid. The cleanup goals were designed to be fully protective of all trainee activities with the sites, assuming that the trainee would be exposed to surface soil, which was defined as the top four feet. Remediation was limited to the top four feet of soil. The intention of the original exposure assessment supporting development of these cleanup goals was to allow the trainee to move about the site on foot or in a vehicle with unlimited exposure to surface soil. The only restrictions would be to exposure to soils deeper than four feet. This was intended to be consistent with anticipated military uses of the site.

Although the reasonable future land use remains the same the Ohio Army National Guard (OHARNG) must adhere to the digging and vehicle cleaning restrictions implied by the exposure assessment defined in the Interim ROD for load lines 1 - 4. Specifically, all site visitors and site users should be monitored to ensure that their actual exposure time does not exceed the exposure time assumed for development of cleanup goals. In addition, vehicles traversing from one load line area to another should be cleaned between areas, to ensure that dirt is not being dug up and dragged across sites. This can be cumbersome and interferes with OHARNG planned training activities at the site.

Load lines 1 – 4 are not currently being used for OHARNG training, although that is their intended land use. The site inspection did not identify evidence of trespass or OHARNG training in these areas.

Subsequent to the remedy implementation (removal of all soils containing contamination above cleanup goals established in the ROD), additional characterization (sampling and analysis) was performed to evaluate the presence and extent of contamination in the surface and subsurface soils and surface water and sediment at Load Lines 1 - 4 (Leidos 2015, Leidos 2016). The objective of this characterization was to determine if the areas may meet unrestricted (residential) land use requirements, or, if additional remediation may be appropriate in order for the areas to meet those requirements. The sediment and surface water sampling data will also be evaluated for potential effects on ecological receptors which may be exposed to those media. A FS addendum is currently being drafted to determine whether additional soil cleanup may be warranted in order to remove restrictions on use of the sites by OHARNG.

As indicated earlier (Table A.8-1), no additional toxicity changes have occurred for any of the COCs in the ROD since the last five-year review was conducted. As no actual exposures are occurring at the sites, the cleanup goals specified in the Interim ROD remain protective.

Environmental Health

The conclusions from evaluating the ecological risk assessment and current conditions of the site for media covered by the 2007 Interim ROD (soil and dry sediment) at the time of the previous five-year review are still valid and are repeated here. (Note: the draft report evaluating potential ecological effects from exposure to any site contaminants in surface water and sediment was not available at the time this review was prepared).

Because the majority of constituents of ecological concern are co-located with human health COCs, remedial activities implemented to address human health COCs will serve to reduce the concentrations and number of constituents of ecological concern in soil to which ecological receptors are exposed, resulting in lowered ecological risk. Based on the expected impact to site conditions at load lines 1-4 from remediation associated with achieving human health cleanup goals and proposed vehicular training activities (e.g., soil compaction, vegetation damage, etc.), ecologically based cleanup goals have been determined to be unnecessary (USACE 2007). Since the load lines 1-4 and Load Line 12 will not be managed for ecological purposes but instead will have intensive use by the OHARNG, protection of human health will drive the RAOs and the remedy would adequately protect the environment. The Integrated Natural Resource Management Plan for the site (OHARNG 2007) stipulates that the site will be managed to provide for sustainable, healthy ecosystems and comply with applicable environmental laws and regulations. As such, the remedy allowing for OHARNG use of the site would continue to provide adequate protection for the environment.

<u>Significant Finding</u>

The exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection are still valid. The USEPA's current recommended default exposure factor values are generally less conservative than what was used to initially assess risk and develop site-specific cleanup goals, so the basis of the exposure assessment remains protective. No exposures are currently occurring at the site. No new toxicity criteria changes have occurred in the past five years that would affect the protectiveness of the cleanup goals.

<u>RVAAP-12, Load Line 12</u>

Human Health

A site-specific risk-based cleanup goal for arsenic in soil and dry sediment was developed for Load Line 12 based on protection of the current and reasonably anticipated future use of this area of the site as a National Guard Training site. This is presented in Table 1 of the 2009 ROD. A

National Guard Trainee was identified as the reasonable maximum exposed individual for Load Line 12, following the same basic exposure assessment described above for load lines 1 - 4. This receptor was assumed to train at the site 24 hours per day for 24 days per year for inactive duty training and 24 hours per day for 15 days per year for annual training for their 25 year enlistment period. Conservative estimates were made of how much contaminated soil and sediment this person would encounter via incidental ingestion, inhalation of dust particles, and skin contact. The USEPA's currently recommended default exposure factor values (USEPA 2014) are generally less conservative than what was used in the site-specific risk assessment, therefore, the exposure assessments used at the time of the risk assessments for this area remains valid. The cleanup goals were designed to be fully protective of all trainee activities with the site, assuming that the trainee would be exposed to surface soil, which was defined as the top four feet of soil. Remediation was limited to the top four feet of soil. The intention of the original exposure assessment supporting development of these cleanup goals was to allow the trainee to move about the site on foot or in a vehicle with unlimited exposure to surface soil. The only restrictions would be to exposure to soils deeper than four feet. This was intended to be consistent with anticipated military uses of the site.

Although the reasonable future land use remains the same (it is intended to be used by the OHARNG), the OHARNG must adhere to the digging and vehicle cleaning restrictions implied by the exposure assessment defined in the 2009 ROD for Load Line 12. Specifically, all site visitors and site users should be monitored to ensure that their actual exposure time does not exceed the exposure time assumed for development of cleanup goals. In addition, vehicles traversing from one load line area to another should be cleaned between areas, to ensure that dirt is not being dug up and dragged across sites. This can be cumbersome and interferes with OHARNG planned training activities at the site.

Load Line 12 is not currently being used for OHARNG training, although that is its intended land use. The site inspection did not identify evidence of trespass or OHARNG training in these areas. Subsequent to the remedy implementation (removal of all soils containing contamination above cleanup goals established in the ROD), additional characterization (sampling and analysis) was performed to evaluate the presence and extent of contamination in the surface and subsurface soils (Leidos 2015) and in wet sediment and surface water at the site (SAIC 2012). A FS addendum is currently being drafted to determine whether additional cleanup may be warranted in order to remove restrictions on use of the site by OHARNG.

As indicated earlier (Table A.8-1), no additional toxicity changes have occurred for any of the COCs in the ROD since the last five-year review was conducted. As no actual exposures are occurring at the sites, the cleanup goals specified in the ROD remain protective.

In 2012, a Phase III RI report was drafted, which characterized the nature and extent of constituents of potential concern in wet sediment and surface water at Load Line 12 (SAIC 2012). That report concluded that there are no COCs that pose unacceptable risk in these media at this site. Groundwater is being evaluated separately as an area of concern for the entire facility under RVAAP-66.

Environmental Health

The conclusions from evaluating the ecological risk assessment and current conditions of the site at the time of the previous five-year review are still valid.

Because the majority of constituents of ecological concern are co-located with human health COCs, remedial activities implemented to address human health COCs will serve to reduce the concentrations and number of constituents of ecological concern in soil to which ecological receptors are exposed, resulting in lowered ecological risk. Based on the expected impact to site conditions at Load Line 12 from remediation associated with achieving human health cleanup goals and proposed vehicular training activities (e.g., soil compaction, vegetation damage, etc.), ecologically based cleanup goals have been determined to be unnecessary (USACE 2007). Since Load Line 12 will not be managed for ecological purposes but instead will have intensive use by the OHARNG, protection of human health will drive the RAOs and the remedy would provide adequate protection of the environment. The Integrated Natural Resource Management Plan for the site (OHARNG 2007) stipulates that the site will be managed to provide for sustainable, healthy ecosystems and comply with applicable environmental laws and regulations. As such, the remedy allowing for OHARNG use of the site would continue to provide adequate protection for the environment. Furthermore, the Phase III RI of wet sediment and surface water considered the presence of wetlands and perennial surface water in channelized ditches/streams and ponds at the site as important and significant ecological resources near potential contamination being investigated in the area of concern. The Phase III RI also concluded that no further action was warranted to protect ecological receptors in this area.

Significant Finding

The exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection for dry soil and sediment are still valid. No exposures are currently occurring at the site. The USEPA's current recommended default exposure factor values are generally less conservative than what was used to initially assess risk and develop site-specific cleanup goals, so the basis of the exposure assessment used to develop cleanup goals for the site remains protective. No new toxicity criteria changes have occurred in the past five years that would affect the protectiveness of the cleanup goals. Additional characterization of wet sediment and surface water indicated that there are no COCs that pose unacceptable risk to human health and the environment in these media at this site, therefore, there is no new evidence of any contamination which would call into question the protectiveness of the remedy.

Ramsdell Quarry Landfill

Human Health

In 2009, a ROD was signed indicating that soil excavation was needed to protect security guard and maintenance worker receptors who might be exposed to site media. The previous five year review indicated that those cleanup goals remained valid and protective, however, unanticipated conditions (presence of asbestos) were encountered during implementation of the remedy, which prevented full implementation of the remedy. In 2013, a ROD amendment was signed which selected a new remedy that consisted of installing a security fence with signage around the perimeter of RQL and removal of asbestos containing material at the ground surface within the quarry bottom (SAIC 2015). RQL would be closed to all standard training activities and the fence would help enforce those restrictions. As stated in the ROD amendment:

> *"Surveying; sampling; and essential security, safety, periodic maintenance, natural resources management, and other directed activities may be conducted at RQL only after personnel have been properly briefed on potential hazards. A portion of RQL is also considered an MRS, designated RVAAP-0001-R-01.*

> *Investigation and decisions regarding the need for remediation of munitions and explosives of concern (MEC) and munitions debris (MD) will be conducted as part of the Military Munitions Response Program (MMRP). Individuals will be granted access to the AOC after being properly briefed on the hazards/restrictions. Once the fence is complete and LUCs are in place, this alternative will result in reduced potential for exposure to contaminated soil by National Guard receptors. This alternative will also protect the MRS and landfill cap on the closed, sanitary landfill within RQL."*

According to the *2015 Annual Land Use Control Monitoring Report* (Vista 2016), the fence and signage has been installed and are in good shape.

<u>Significant Finding</u>

The remedial action objectives identified in the 2013 ROD amendment were established to eliminate exposure to site contaminants. Fencing was installed and training activities are not allowed on this area of the site. The RAOs used at the time of remedy selection are still valid and functioning to eliminate the exposure that could lead to unacceptable risks.

<u>Winklepeck Burning Grounds</u>

Human Health

A ROD was initially signed in 2008 indicating cleanup was to be performed to allow use of the site as a Mark 19 Grenade Machine Gun range by a National Guard Maintenance Soldier. It is currently being used for this purpose.

In 2015, an ESD was developed for WBG (USACE-LRL 2015) following a draft RI/FS supplement that was conducted after the initial ROD remedial action. These actions were taken to remove restrictions associated with the previous remedial action. The site is planned to be further developed as a Multi-Purpose Machine Gun range, which will require intrusive activities at various depths over the entire AOC. Additionally, the U.S. Army determined that future use of the site may involve full-time employees, thereby requiring that it meet the applicable standards for commercial/industrial land use. The draft RI/FS supplement indicates that the AOC has three COCs related to commercial/industrial land use (USACE-LRL 2014). Although the ESD does not list the three COCs or their associated commercial/industrial cleanup goals, a review of the RI/FS Supplement indicates that TNT, RDX, and benzo(a)pyrene were identified as exceeding the commercial/industrial RSLs. Table A.8-2 includes the USEPA commercial/industrial RSLs for these constituents that were identified at the time of the supplemental RI/FS. The USEPA RSLs are updated every six months; it appears that values from the May 2013 version of the USEPA RSL table were used, consistent with the date of the Final Risk Assessment Assumptions Document (USACE-LRL 2013). Tables A.8-1 and A.8-2, indicate that although no recent changes in toxicity criteria have occurred for these three COCs, the current USEPA RSLs for industrial use are now greater than (less conservative than) the industrial USEPA RSLs used at the time of the RI/FS supplement. This is due to slight updates to various exposure factor values that USEPA uses to develop the RSLs, which are generally less conservative than previous default exposure factor values (USEPA 2014). In addition, chemical and physical parameter values may have been slightly updated, and those will affect the dermal and inhalation exposure pathways. However, none of these newer exposure assessment recommendations from the USEPA affect the protectiveness of the remedy.

Environmental Health

As stated in the first five-year review (2012), the determination of ecological risk was made by using field biological measurements at the site. This provides a significant advantage over a screening level ecological risk assessment, which tends to rely on laboratory-based toxicity evaluations and the use of laboratory test subjects rather than wildlife. As such, the site-specific observations and measurements made during the field studies would take precedence over any changes in toxicity criteria developed in the laboratory. Since the WBG will not be managed for ecological purposes and instead will have intensive use by the OHARNG, protection of human health drives the remedial action objectives (RAOs) and the remedy would provide adequate protection of the environment.

The Integrated Natural Resource Management Plan for the site (OHARNG 2007) stipulates that the site will be managed to provide for sustainable, healthy ecosystems and comply with applicable environmental laws and regulations. As such, the remedy allowing for OHARNG use of the site would continue to provide adequate protection for the environment.

Significant Finding

The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection (2009 ROD) are still valid. The additional cleanup identified in the 2015 ESD remains valid as there have been no changes in recommended exposure factor values or toxicity values that would affect the protectiveness of using the USEPA commercial/industrial RSLs in place at that time (circa 2013) as cleanup goals.

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Table A.8-1 Summary of Toxicity Criteria Changes for RVAAP Human Health Constituents of Concern

Constituent of Concern	Area	Media	Cleanup Goal Basis	Date of Risk Assessment / ROD / ESD	Toxicity Criteria Last Reviewed in IRIS	Current Toxicity Criteria Source (and date if not IRIS)	Change in Toxicity Criteria since ROD/Risk Assessment?
Inorganics							
Aluminum	LL1 - 4	soil and dry sediment	Risk	2004 / 2007	1987	PPRTV (2006)	No, derivation of risk-based concentrations used current toxicity criteria
Antimony	LL1 - 4	soil and dry sediment	Risk	2004 / 2007	1987	IRIS	No, derivation of risk-based concentrations used current toxicity criteria
Arsenic	LL1 - 4, LL 12	soil and dry sediment	Risk	2004 / 2007, 2009	1991 (oral reference dose), 1994 (carcinogencity)	IRIS (cancer criteria and oral reference dose), CalEPA (inhalation reference dose, 2008)	No change in primary toxicity criteria for ingestion; new Tier III toxicity source (CalEPA) for inhalation reference concentration.
Barium	LL1 - 4	soil and dry sediment	Risk	2004 / 2007	2005 (oral reference dose), 1994 (inhalation reference concentration and carcinogencity)	IRIS (oral reference dose), HEAST (inhalation reference concentration)	Yes, updated toxicity criteria indicates barium is less toxic now than at time of derivation of risk-based cleanup goal
Cadmium	LL1 - 4	soil and dry sediment	Risk	2004 / 2007	1989 (oral reference dose), 1987 (carcinogencity)	IRIS (inhalation unit cancer risk and oral reference dose), ATSDR 2012 (inhalation reference concentration)	No change in primary toxicity criteria for ingestion; new Tier III toxicity source (ATSDR) for inhalation.
Chromium, hexavalent	LL1 - 4	soil and dry sediment	Risk	2004 / 2007	1998	IRIS (oral reference dose, inhalation reference concentration, and inhalation unit cancer risk), New Jersey 2008 (oral cancer slope factor)	Yes, updated toxicity criteria for carcinogenicity via oral exposure could increase toxicity, as evaluated in 2012 Five Year Review.
Lead	LL1 - 4	soil and dry sediment	Risk	2004 / 2007	2004 (oral reference dose), 1988 (carcinogencity)	USEPA Adult lead model (2009 update)	Yes, the Adult Lead Model was updated in 2009. This was assessed in the 2012 Five Year Review; this update does not affect protectiveness
Manganese	LL1 - 4	soil and dry sediment	Risk	2004 / 2007	1995 (oral reference dose), 1993 (inhalation reference concentration), 1988(carcinogencity)	IRIS	No, derivation of risk-based concentrations used current toxicity criteria
Explosives							
2,4,6-TNT	LL1 - 4	soil and dry sediment	Risk	2004 / 2007	1988 (oral reference dose), 1989 (carcinogencity)	IRIS	No, derivation of risk-based concentrations used current toxicity criteria
RDX	LL1 - 4, WBG	soil and dry sediment	Risk	2004 / 2007, 2008/2013/2015	1988 (oral reference dose), 1990 (carcinogencity)	IRIS	No, derivation of risk-based concentrations used current toxicity criteria
PCBs							
Aroclor-1254	LL1 - 4	soil and dry sediment	Risk	2004 / 2007	1994	IRIS	No, derivation of risk-based concentrations used current toxicity criteria
SVOCs							
Benz(a)anthracene	LL1 - 4, RQL, WBG	soil and dry sediment	Risk	2004 / 2007, 2006/2009, 2008/2013/2015	1994	IRIS (oral cancer slope factor), CalEPA 2011 (inhalation unit cancer risk)	No, derivation of risk-based concentrations used current toxicity criteria
Benzo(a)pyrene	LL1 - 4, RQL, WBG	soil and dry sediment	Risk	2004 / 2007, 2006/2009, 2008/2013/2015	1994	IRIS (oral cancer slope factor), CalEPA 2011 (inhalation unit cancer risk)	No, derivation of risk-based concentrations used current toxicity criteria
Benzo(b)fluoranthene	LL1 - 4, RQL, WBG	soil and dry sediment	Risk	2004 / 2007, 2006/2009, 2008/2013/2015	1994	IRIS (oral cancer slope factor), CalEPA 2011 (inhalation unit cancer risk)	No, derivation of risk-based concentrations used current toxicity criteria
Dibenz(a,h)anthracene	LL1 - 4, RQL, WBG	soil and dry sediment	Risk	2004 / 2007, 2006/2009, 2008/2013/2015	1990	IRIS (oral cancer slope factor), CalEPA 2011 (inhalation unit cancer risk)	No, derivation of risk-based concentrations used current toxicity criteria
Indeno(1,2,3-cd)pyrene	RQL, WBG	soil and dry sediment	Risk	2006/2009, 2008/2013/2015	1990	IRIS (oral cancer slope factor), CalEPA 2011 (inhalation unit cancer risk)	No, derivation of risk-based concentrations used current toxicity criteria

Current toxicity criteria source identified in the May 2016 USEPA regional risk-based screening levels
IRIS is the USEPA Integrated Risk Information System, the primary source of toxicity criteria for CERCLA.
PPRTV are the USEPA's provisional peer reviewed toxicity criteria, the secondary source of toxicity criteria for CERCLA, when IRIS toxicity criteria are absent.
CalEPA is the California Environmental Protection Agency, a tertiary source of toxicity criteria for CERCLA, when IRIS toxicity criteria are absent.
HEAST is the USEPA's health effects summary assessment table, a tertiary source of toxicity criteria for CERCLA, when IRIS toxicity criteria are absent.

Table A.8-2 Comparison of Decision Document-Based CUG with Facility Wide Cleanup Goals and Current USEPA Risk-Based Screening Levels for Industrial Use for COCs Covered by this Five Year Review

	Decision Document based CUG				2010 FWCUG	National Guard Trainee Surface Soil FWCUG		Surface Soil Background	Subsurface soil Background	Resident Farmer Adult FWCUG		2013 Residential RSL for Chemicals w/No FWCUG 10^{-5} or HI =1	Current (2016) EPA RSL Industrial Use 10^{-5} or HI=1
Constiuent of Concern	LL 1-4, 12 (2007/2009)	RQL (2009)	WBG (2008)	WBG (2015)		Non- Cancer HI = 1	Cancer Risk = 10^{-5}			Non- Cancer HI = 1	Cancer Risk = 10^{-5}		
Inorganics													
Aluminum	34,942				34,960	34,960	*	17,700	19,500	529,229	*		1,100,000
Antimony	2,458				136	1,753	*	0.96	0.96	136	*		470
Arsenic	31				19.8	1,140	27.8	15.4	19.8	82.1	4.25		30
Barium	3,483				3,506	3,506	*	88.4	124	89,656	*		220,000
Cadmium	109				109	3,292	109	0	0	223	12,491		980
Chromium (hexavalent)	16				16.4	56.1	16.4	*	*	904	1,874		63
Lead	1,995				4,000			26.1	19.1			4,000	800
Manganese	1,800 (surface) / 3,030 (subsurface)	1,800			3,030	351	*	1,450	3,030	14,817	*		26,000
Explosives - Propellants													
2,4,6 Trinitrotoluene	1,646			420	211	2,488	4,643	*		211	328		510
RDX	838		617	240	1,452	17,113	1,452	*		1,632	*		280
Semi-Volatiles													
Benzo(a) anthracene	105	13			2.21	*	47.7			*		2.21	29
Benzo(a) pyrene	10	1.3	7.5	2.1	0.221	*	4.77			*		0.221	2.9
Benzo(b) fluoranthene	105	13	75		2.21	*	4.77			*		2.21	29
Dibenz(a,h) anthracene	10	1.3			0.221	*	4.77			*		0.221	2.9
Indeno(1,2,3-cd) pyrene		13			2.21	*	47.7			*		2.21	29
PESTICIDES & PCBs													
PCB-1254	35				**2**	54.9	34.6			3.48		2.03	9.7

All units are mg/kg

This table is adopted from Table 7-1 of the Characterization Sampling Report of Load Lines 1,2,3,4 and 12 (Prudent 2013)

Current EPA RSL are the May 2016 USEPA regional risk-based screening levels

ATTACHMENT 9

Public Notices

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PUBLIC NOTICE

Camp Ravenna Joint Military Training Center
Army National Guard Begins Second Five-Year Review

The Army National Guard has begun a second five-year review of environmental remedies undertaken as part of the Ravenna Army Ammunition Plant Restoration Program at the Camp Ravenna Joint Military Training Center in Portage and Trumbull Counties, Ohio. The focus of the five-year review will be the following sites: Ramsdell Quarry Landfill, Winklepeck Burning Grounds, Load Line 1, Load Line 2, Load Line 3, Load Line 4, and Load Line 12.

Ramsdell Quarry Landfill is located in the eastern section of Camp Ravenna. It was an abandoned quarry that was used as a landfill for domestic, commercial, industrial, and solid wastes. Soil and sediment were contaminated by polycyclic aromatic hydrocarbons (PAHs) from these activities. A Record of Decision (ROD) was signed in 2009 that established excavation and off-site disposal of contaminated soil and sediment. Miscellaneous debris containing asbestos was discovered during implementation of the remedy in 2010. The remedy was subsequently revised to include installation of a security fence around the landfill and best management practices to remove surficial asbestos-containing material (ACM) through non-intrusive methods.

Winklepeck Burning Grounds is located in the center of Camp Ravenna. It was used for open burning activities in unlined pits, pads, on roads and roadside ditches, and in refractory-lined trays. Soil and dry sediment were contaminated by explosives, PAHs, and ACM from these activities. A ROD was signed in 2008 that established excavation and off-site disposal of chemically contaminated soil and dry sediment. An Explanation of Significant Differences was issued in 2015 that required removal of contaminated soil and sediment from additional areas to meet industrial use requirements and facilitate use of a future multi-purpose machine gun range.

Load Lines 1 through 4 are located in the southern section of Camp Ravenna. They were used to melt and load explosives into large caliber shells, for munitions rehabilitation activities, and for demilitarization of projectiles. These operations, together with maintenance, power generation, and wastewater treatment activities, resulted in the contamination of soil and dry sediment by metals, hexavalent chromium, explosives, polychlorinated biphenyls, and PAHs. An interim ROD was signed in 2007 that established excavation and off-site disposal of contaminated soil and dry sediment, groundwater monitoring, and maintenance of former building slabs to prevent leaching of potentially contaminated soil and dry sediment.

Load Line 12 is located in the southeast portion of Camp Ravenna. It was used for the production of ammonium nitrate and ammonium chloride and for demilitarization activities to recover explosives from bombs. A wastewater treatment plant was also operated on the site. Soil and dry sediment were contaminated by arsenic from these activities. A ROD was signed in 2010 that required excavation and off-site disposal of contaminated soil and dry sediment and land use controls.

The five-year review will be conducted to determine whether the remedies remain protective of human health and the environment and function as intended by the RODs. The five-year review will also assess factors to determine if the remedies will continue to be protective in the future. The report is scheduled for completion by August 31, 2017.

If you have any concerns about these sites, please contact:

Mr. Mark Leeper
Environmental Cleanup Program Manager
Army National Guard Directorate
Environmental Programs Division
ARNG-IED
111 South George Mason Drive
Arlington, VA 22204-1382
(703) 607-7955
Mark.s.leeper.civ@mail.mil

A copy of the final report will be available at the following locations:

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ATTACHMENT 10

Groundwater Information and Data

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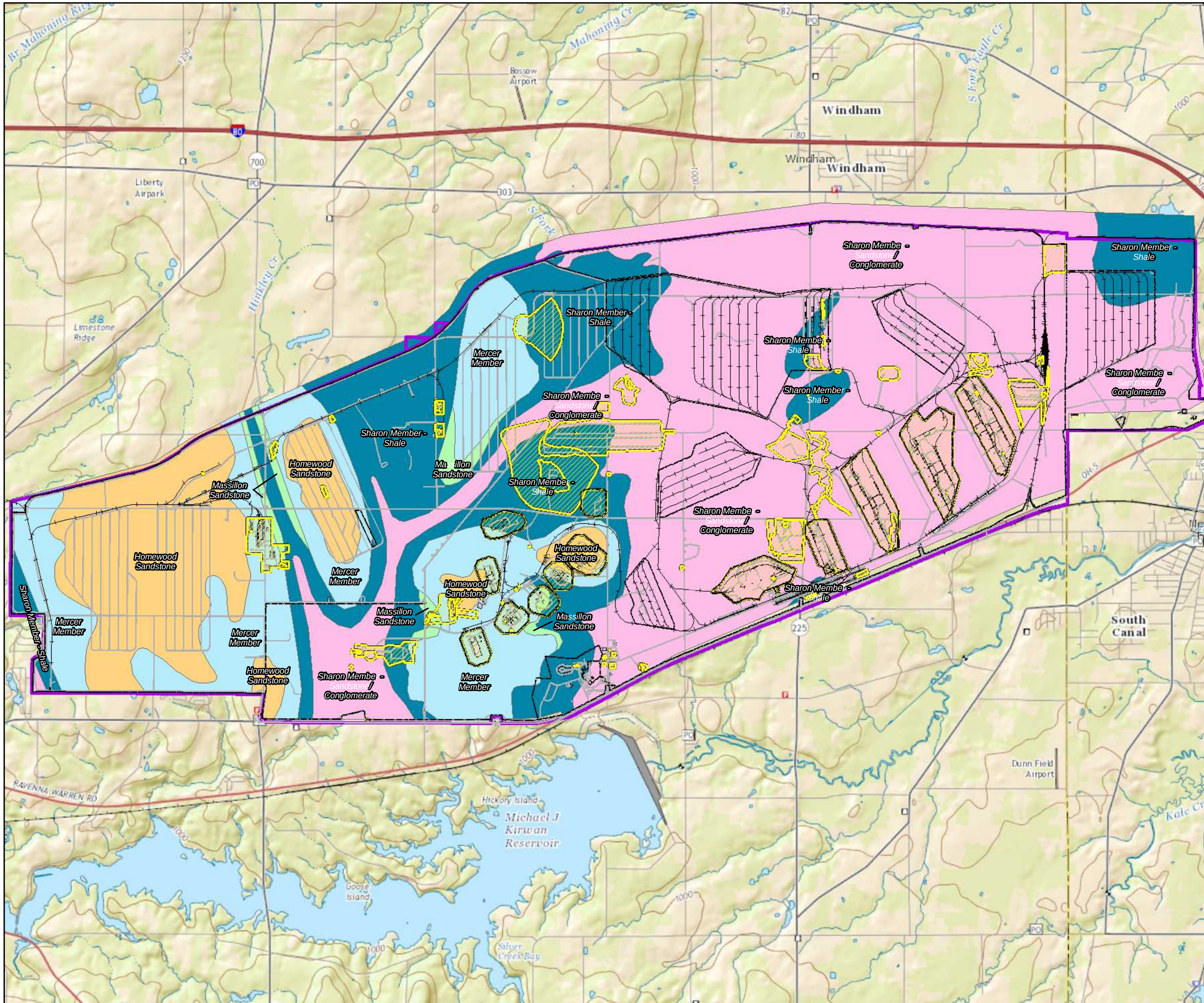

Legend

Geology Formation

- Homewood Sandstone
- Mercer Member
- Massillon Sandstone
- Sharon Member - Shale
- Sharon Member - Sandstone/Conglomerate
- Fenceline
- Roads
- Railroad
- Buildings
- AOCs
- Camp Ravenna Property Line

Notes:
- Basemap Source: ESRI Map Sservice - USGSTopo

N

0 2,500 5,000 7,500 10,000 Feet

1:60,000
NAD83 UTM Zone 17N

TEC-Weston Joint Venture

SURFACE GEOLOGY MAP

Groundwater and Environmental Investigation Services for RVAAP-66 Facility-wide Groundwater
Former Ravenna Army Ammunition Plant
Ravenna, Ohio

Figure: 1-2

DRAFT

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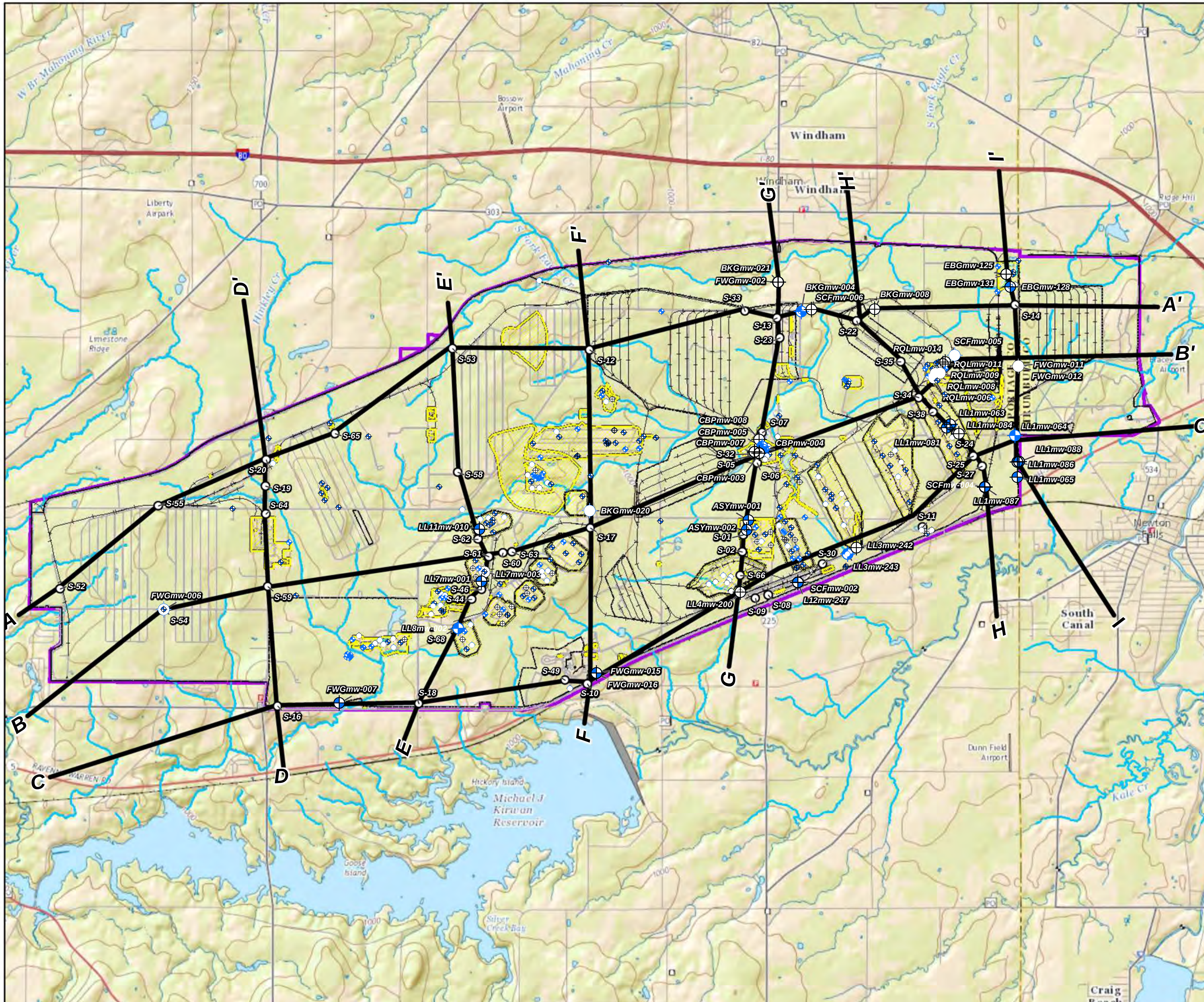

Legend

- Line of Section
- Monitor Well Location Used in Cross-Section
- Other Input Used for Cross Section
- Other Monitor Well Location
- AOCs
- Camp Ravenna Property Line
- Fenceline
- Roads
- Railroad
- Streams

Notes:
- Basemap Source: ESRI Map Sservice - USGSTopo

N

0 2,500 5,000 7,500 10,000 Feet

1:64,000
NAD83 UTM Zone 17N

TEC-Weston Joint Venture

LINE OF SECTION MAP

Groundwater and Environmental Investigation Services for RVAAP-66 Facility-wide Groundwater
Former Ravenna Army Ammunition Plant
Ravenna, Ohio

Figure: 1-3

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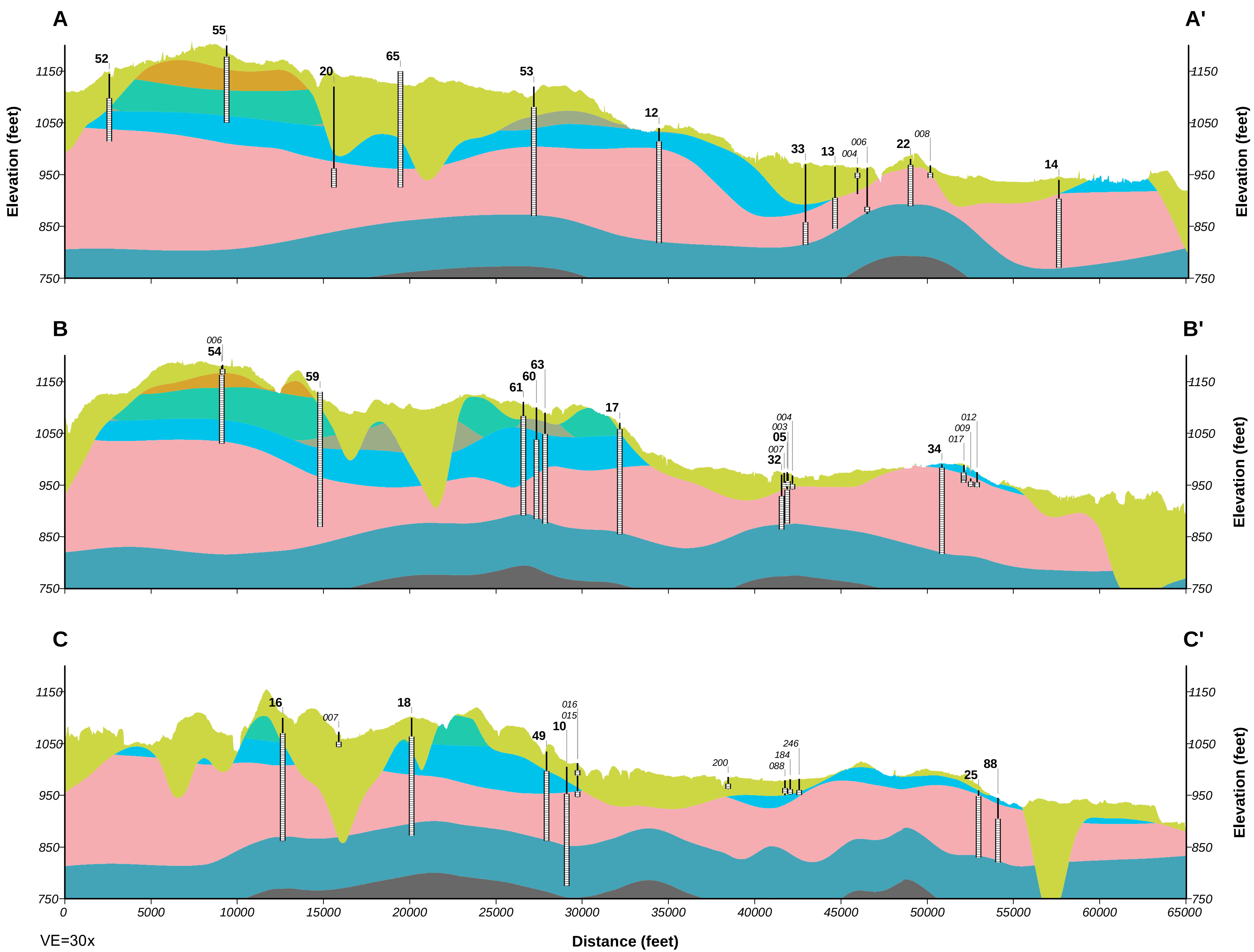

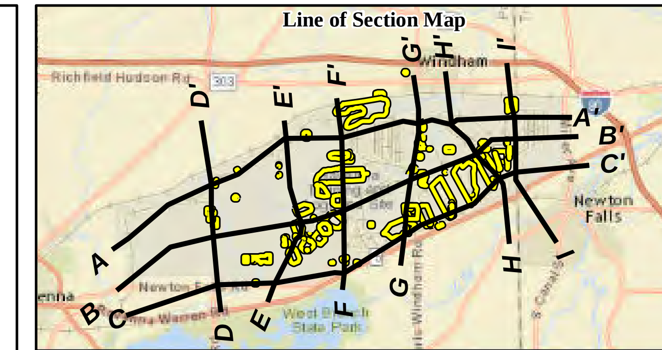

Legend

AOC boundary

Lines of Section

Site Wells

Leader

Casing

Screen

Geology

Undifferentiated

Homewood Sandstone Member

Mercer Member

Massillon Sandstone Member

Sharon Member, Shale Unit

Sharon Member, Conglomerate Unit

Cuyahoga Group

Berea Sandstone

Pottsville Formation

Notes:
- Former production well IDs are **bold**
- Site wells are *italicized* and have had the AOC prefix removed for clarity

TEC-Weston Joint Venture

EAST-WEST CROSS SECTIONS (A-C)

Groundwater and Environmental Investigation Services for RVAAP-66 Facility-wide Groundwater
Former Ravenna Army Ammunition Plant
Ravenna, Ohio

Figure: 1-4

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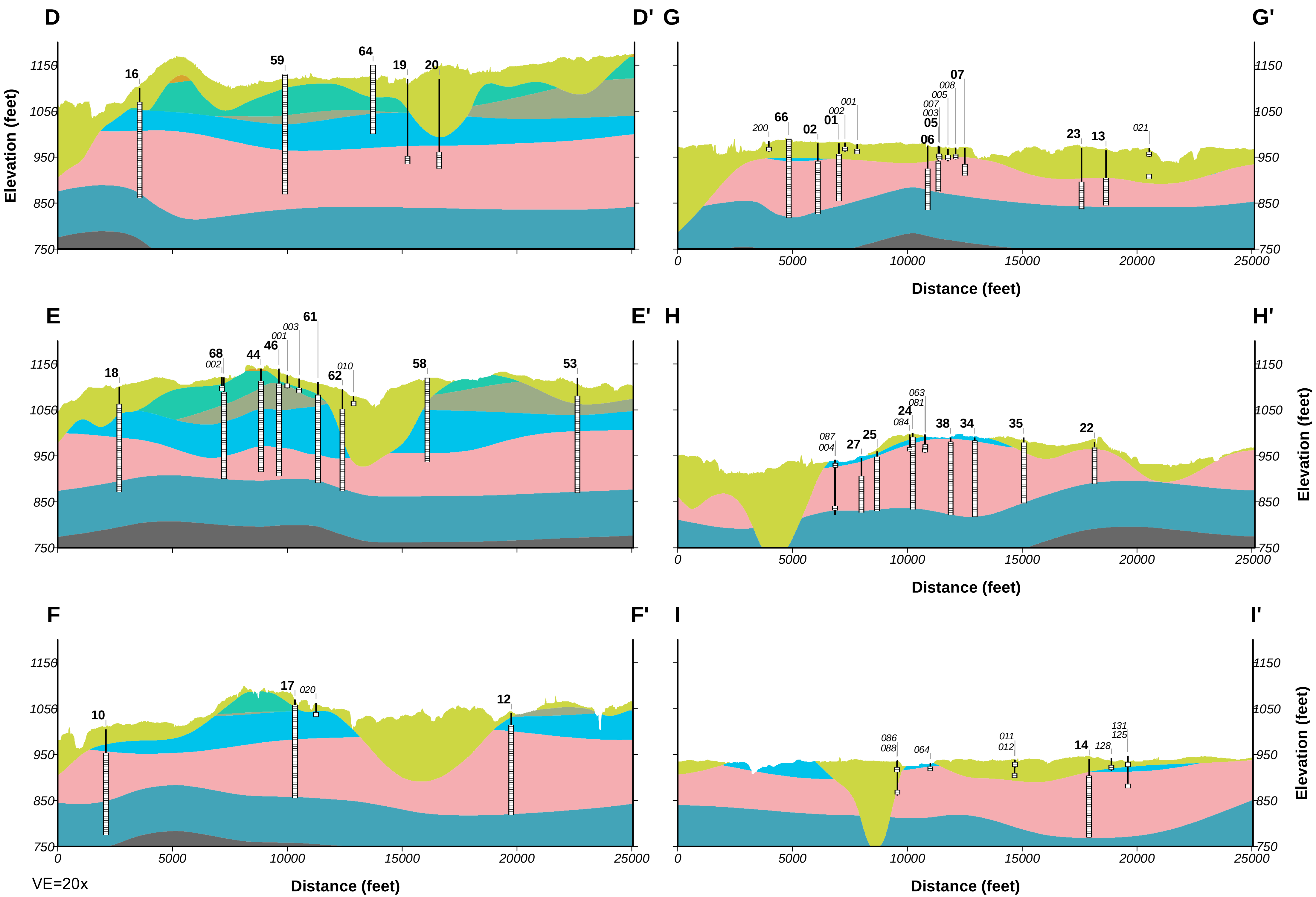

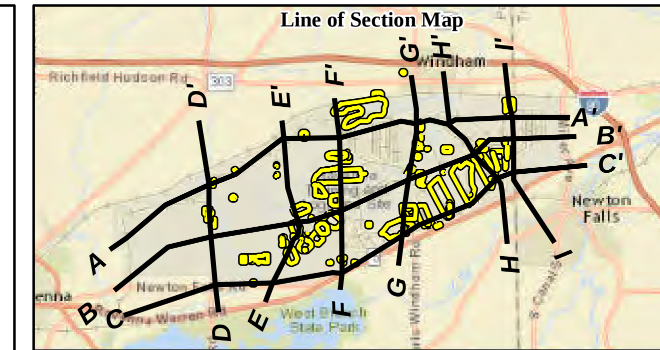

Legend

- AOC boundary
- Lines of Section

Site Wells

- Leader
- Casing
- Screen

Geology

- Undifferentiated
- Homewood Sandstone Member
- Mercer Member
- Massillon Sandstone Member
- Sharon Member, Shale Unit
- Sharon Member, Conglomerate Unit
- Cuyahoga Group
- Berea Sandstone

Pottsville Formation

Notes:
- Former production well IDs are **bold**
- Site wells are *italicized* and have had the AOC prefix removed for clarity

TEC-Weston Joint Venture

NORTH-SOUTH CROSS SECTIONS (D-I)

Groundwater and Environmental Investigation Services for RVAAP-66 Facility-wide Groundwater
Former Ravenna Army Ammunition Plant
Ravenna, Ohio

Figure: 1-5

DRAFT

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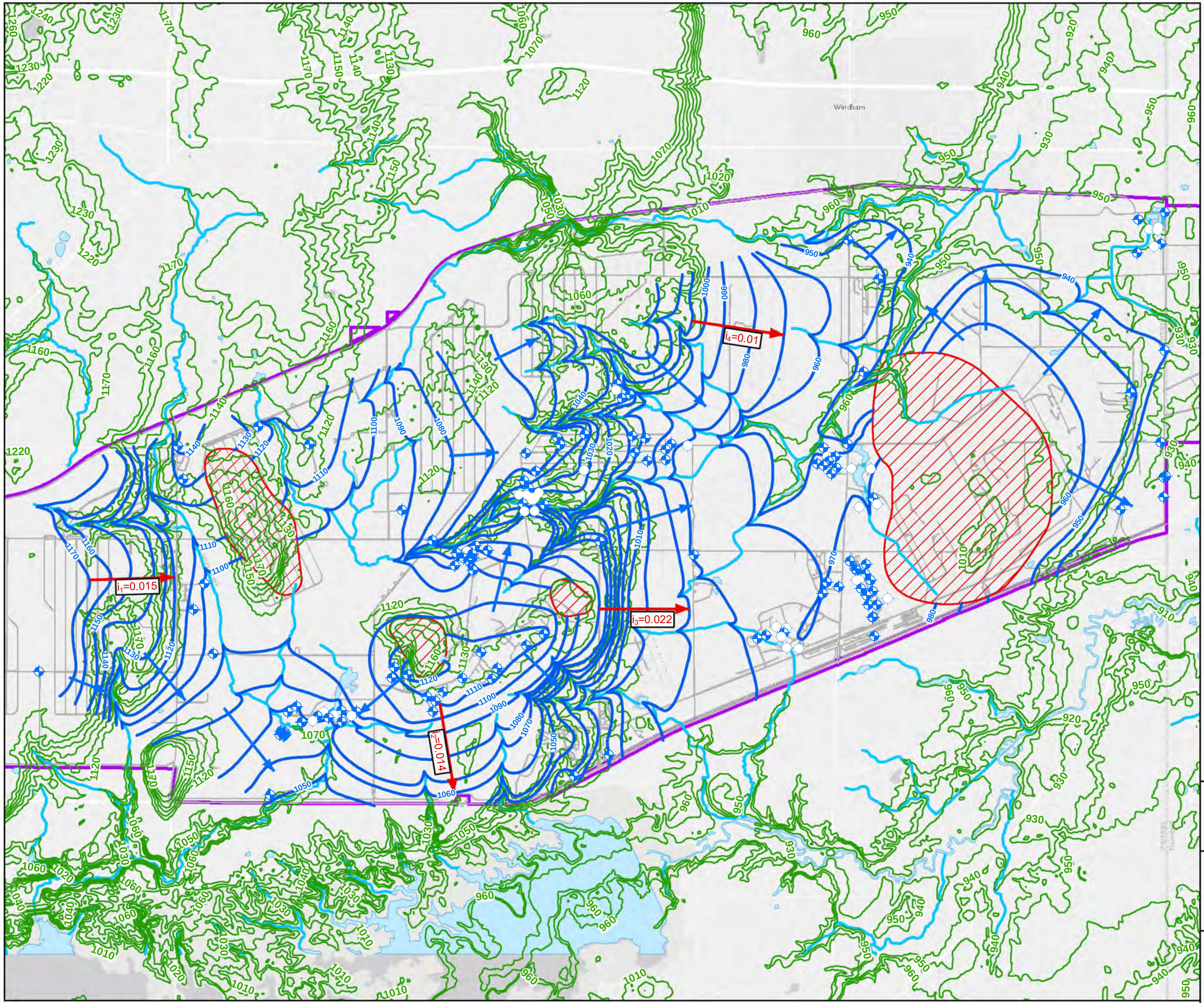


Legend

- Unconsolidated Well Location
- Unconsolidated Contours - 10ft Interval
- Direction Of Flow
- i1 = Hydraulic Gradient (ft/ft)
- Roads
- Creeks and Streams
- Elevation Contours (Feet)
- Unconsolidated Aquifer Missing (See Notes Below)
- Camp Ravenna Property Line

Notes:
- Potentiometric Surfaces based on data collected in July 2015
- Basemap Sources: ESRI Map Services - Canvas/World_Light_Gray_Base and World_Street_Map
- Unconsolidated Aquifer indicated to not be present, based on the most recent Facility Wide Groundwater Monitoring Program Report on the January 2014 Sampling Event

N

0 4,000 8,000 Feet

1:48,000

NAD83 UTM Zone 17N

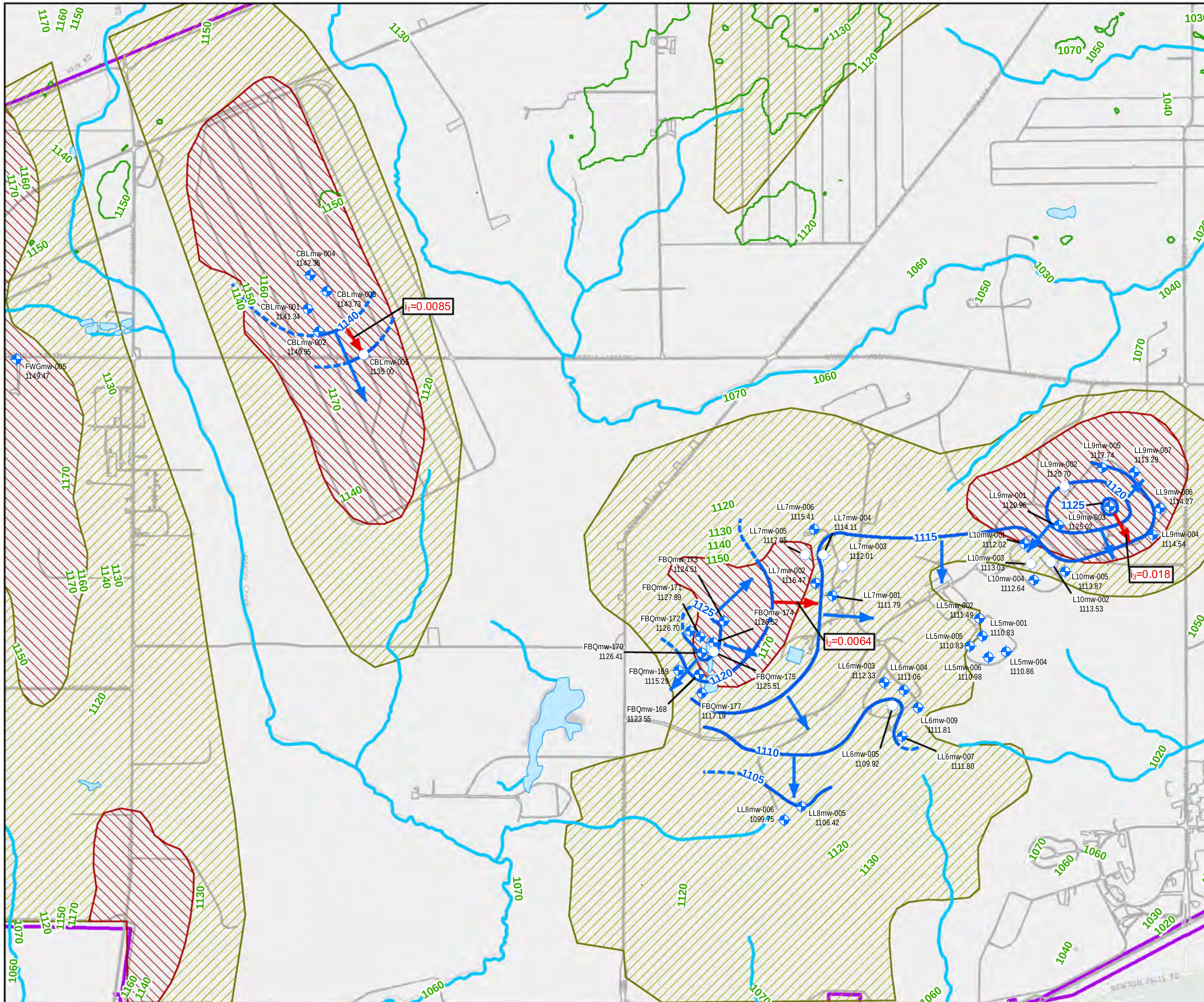
TEC-Weston Joint Venture

POTENTIOMETRIC SURFACE MAP
UNCONSOLIDATED AQUIFER
Groundwater and Environmental Investigation Services for RVAAP-66 Facility-wide Groundwater
Former Ravenna Army Ammunition Plant
Ravenna, Ohio

Figure: 3-1

DRAFT

Path: L:\15363_Ravenna_Army_Ammunition_Plant\GIS\Figure 3-1 Potentiometric Surface Map - Unconsolidated Aquifer.mxd, 2/11/2016 8:24:23 AM, bondp



Legend

- Homewood or Mercer Well Locations
- Homewood and Mercer Contour Intervals
- Inferred Homewood and Mercer Contour Intervals
- Direction Of Flow
- i1 = Hydraulic Gradient (ft/ft)
- Roads
- Creeks and Streams
- Elevation Contours (Feet)
- Camp Ravenna Property Line
- Homewood Sandstone Member
- Mercer Member

Notes:
- Potentiometric Surfaces based on data collected in July 2015
- Basemap Sources: ESRI Map Services - Canvas/World_Light_Gray_Base and World_Street_Map
- Surface Elevation Contours - USDA

N

0 1,625 3,250 Feet

1:19,500

NAD83 UTM Zone 17N

TEC-Weston Joint Venture

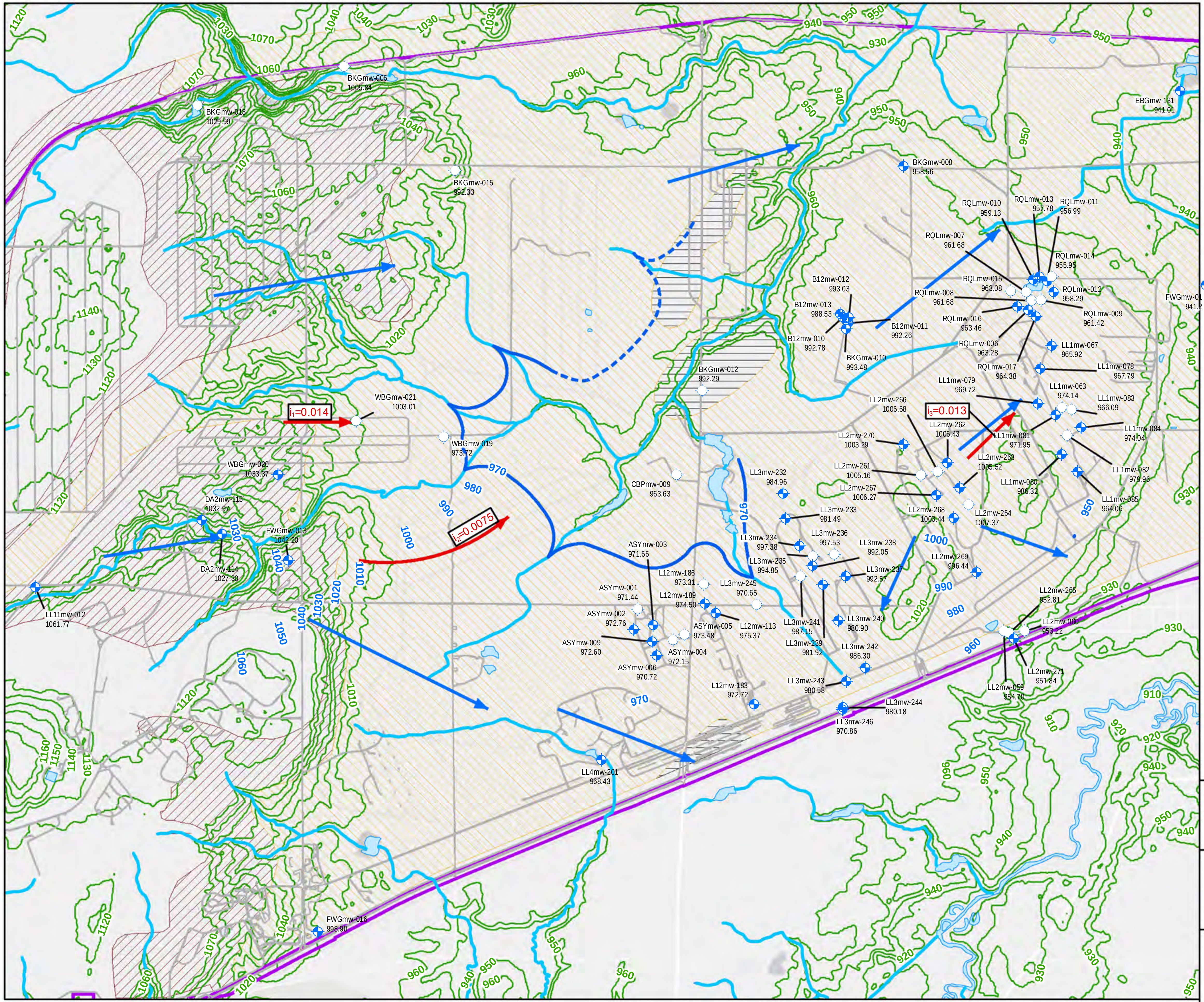
POTENTIOMETRIC SURFACE MAP
HOMEWOOD SANDSTONE AQUIFER

Groundwater and Environmental Investigation Services for RVAAP-66 Facility-wide Groundwater
Former Ravenna Army Ammunition Plant
Ravenna, Ohio

Figure: 3-2

DRAFT

Path: L:\15363_Ravenna_Army_Ammunition_Plant\GIS\Figure 3-2 Potentiometric Surface Map - Homewood Sandstone Aquifer.mxd, 1/4/2016 2:43:20 PM, bondp



Legend

- Upper Sharon Well Location
- Upper Sharon Contour Intervals
- Upper Sharon Inferred Contour Intervals
- Direction Of Flow
- i1 = Hydraulic Gradient (ft/ft)
- Creeks and Streams
- Roads
- Camp Ravenna Property Line
- Sharon Conglomerate Shale Lens
- Sharon Member
- Sharon Sandstone - Conglomerate Unit

Notes:
- Potentiometric Surfaces based on data collected July 14-20, 2015
- Basemap Sources: ESRI Map Services - Canvas/World_Light_Gray_Base and World_Street_Map
- Surface Elevation Contours - USDA

N

0 2,500 5,000 Feet

1:30,000

NAD83 UTM Zone 17N

Cardno TEC WESTON

TEC-Weston Joint Venture

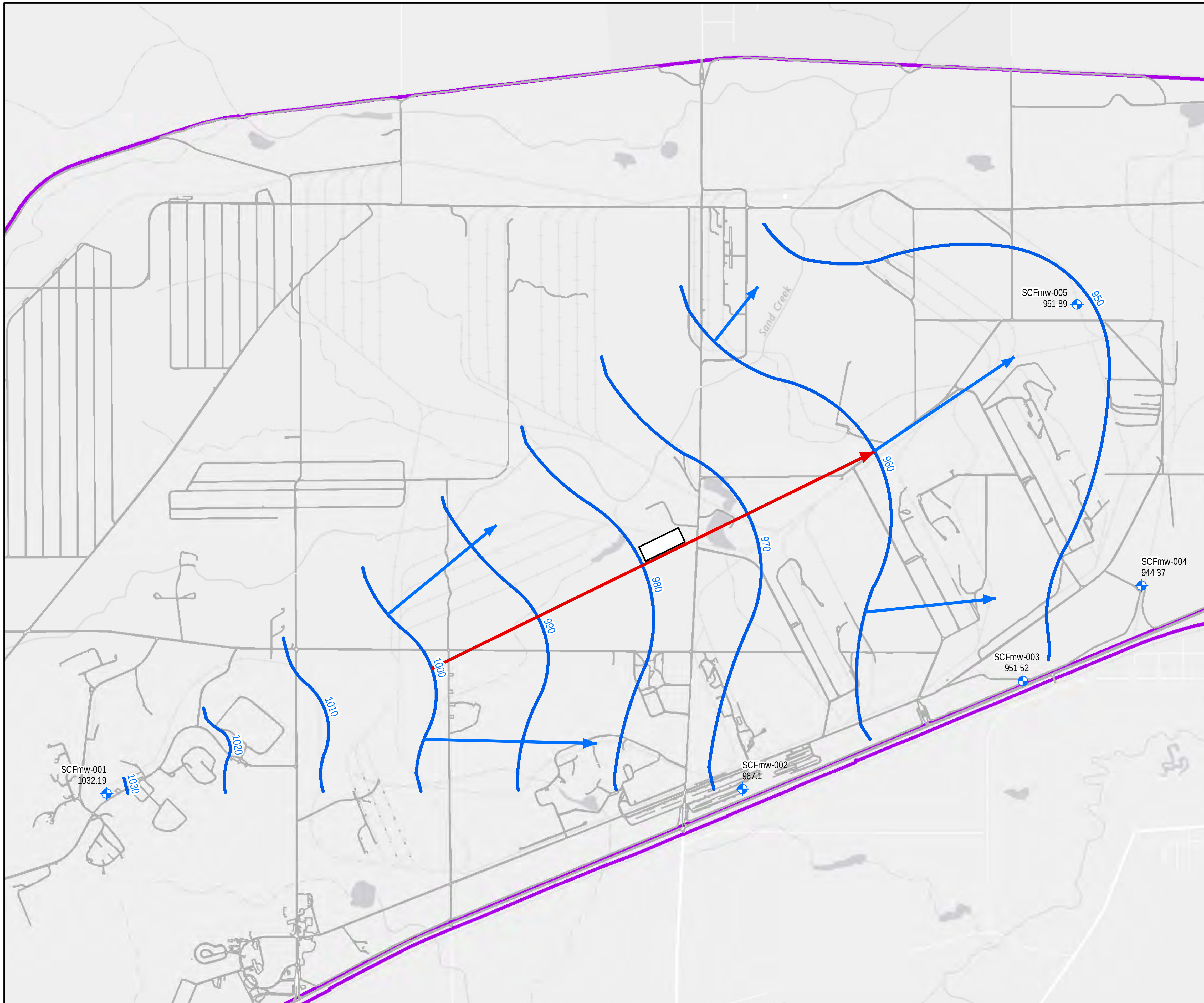
POTENTIOMETRIC SURFACE MAP
UPPER SHARON AQUIFER

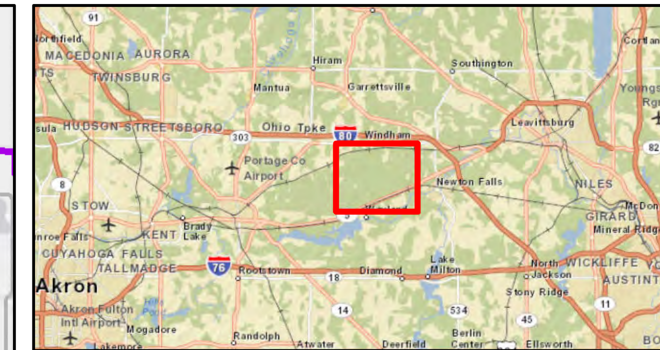
Groundwater and Environmental Investigation Services for RVAAP-66 Facility-wide Groundwater
Former Ravenna Army Ammunition Plant
Ravenna, Ohio

Figure: 3-3

DRAFT

Path: L:\15363_Ravenna_Army_Ammunition_Plant\GIS\Figure 3-3 Potentiometric Surface Map - Upper Sharon Aquifer.mxd, 2/9/2016 3:36:15 PM, bondp





Legend

- Sharon Conglomerate Well Location
- Sharon Conglomerate Contours - 10ft Interval
- Direction Of Flow
- i1 = Hydraulic Gradient (ft/ft)
- Roads
- Camp Ravenna Property Line

Notes:
- Potentiometric Surfaces based on data collected in July 2015
- Basemap Sources: ESRI Map Services - Canvas/World_Light_Gray_Base and World_Street_Map
- Surface Elevation Contours - USDA

N

0 3,000 6,000 Feet

1:30,000
NAD83 UTM Zone 17N

Cardno TEC WESTON
TEC-Weston Joint Venture

POTENTIOMETRIC SURFACE MAP
LOWER SHARON (CONGLOMERATE) AQUIFER
Groundwater and Environmental Investigation Services for RVAAP-66 Facility-wide Groundwater
Former Ravenna Army Ammunition Plant
Ravenna, Ohio

Figure: 3-4

DRAFT

Path: L:\15363_Ravenna_Army_Ammunition_Plant\GIS\Figure 3-4 Potentiometric Surface Map - Lower Sharon (Conglomerate) Aquifer.mxd, 2/9/2016 3:36:26 PM, bondp

Table 2-1
Well Construction Details, Groundwater Elevations, and Depth to Bottom Measurements

RVAAP Area	Well ID	Ohio State Plane Easting	Ohio State Plane Northing	Ground Elevation (ft, AMSL)	Total Drilled Depth (ft, BGS)	TOC Elevation (ft, AMSL)	Well Head Type[1]	Monitored Zone	Top of Screen (ft, BGS)	Bottom of Screen (ft, BGS)	Bottom of Inner Casing Plug or End Cap (ft, BGS)	Stickup height (ft, AGS)	Reported Bottom of Inner Casing (ft, BTOC)	Depth to Water - March 2015 (ft, BTOC)	Groundwater Elevation - March 2015 (ft, AMSL)	Depth to Water - July 2015 (ft, BTOC)	Groundwater Elevation - July 2015 (ft, AMSL)	July 2015 Measured Bottom of Inner Casing (ft, BTOC)	Sediment Accumulation (ft)[2]	Description of Bottom
Atlas Scrap Yard	ASYmw-001	2366260.85	558404.04	978.40	22.0	981.13	A	Sharon	11.0	21.0	21.0	2.73	23.7	nm	N/A	9.69	971.44	23.25	0.45	hard
	ASYmw-002	2366170.86	557887.86	982.00	20.0	985.24	A	Sharon	10.0	19.5	19.5	3.24	22.7	nm	N/A	12.48	972.76	23.11	0.00	hard
	ASYmw-003	2366651.49	558015.94	979.70	21.5	982.21	A	Sharon	11.0	21.0	21.0	2.51	23.5	nm	N/A	10.55	971.66	23.78	0.00	hard
	ASYmw-004	2367166.04	557640.81	977.10	27.8	979.66	A	Sharon	17.0	27.0	27.0	2.56	29.6	nm	N/A	7.51	972.15	29.95	0.00	hard
	ASYmw-005	2367448.16	557783.01	977.60	25.0	979.80	A	Sharon	14.0	24.0	24.0	2.20	26.2	nm	N/A	6.32	973.48	27.54	0.00	soft
	ASYmw-006	2366746.73	557257.72	980.20	27.0	983.01	A	Sharon	16.0	26.0	26.0	2.81	28.8	nm	N/A	12.29	970.72	29.10	0.00	hard
	ASYmw-007	2366834.49	556818.08	981.40	28.0	984.16	A	Unconsolidated	16.0	26.0	26.0	2.76	28.8	nm	N/A	13.80	970.36	29.21	0.00	
	ASYmw-008	2367475.07	557087.66	976.20	26.0	978.85	A	Unconsolidated	15.0	25.0	25.0	2.65	27.7	nm	N/A	4.02	974.83	27.58	0.12	hard
	ASYmw-009	2366631.94	557603.68	979.90	22.0	982.70	A	Sharon	11.5	21.5	21.5	2.80	24.3	nm	N/A	10.10	972.60	24.41	0.00	soft
	ASYmw-010	2366985.37	557270.61	978.20	28.0	981.05	A	Unconsolidated	17.0	27.0	27.0	2.85	29.8	nm	N/A	10.54	970.51	31.42	0.00	hard
Building 1200-Dilution/Settling Pond	B12mw-010	2371292.81	565827.43	1,002.72	21.0	1,005.92	A	Sharon	10.0	20.0	20.0	3.20	23.2	nm	N/A	13.14	992.78	22.84	0.36	hard
	B12mw-011	2371416.15	565687.82	1,003.76	24.7	1,006.70	A	Sharon	14.0	24.0	24.0	2.94	26.9	nm	N/A	14.44	992.26	26.70	0.20	hard
	B12mw-012	2371430.41	565828.01	1,003.43	22.3	1,006.32	A	Sharon	12.0	22.0	22.0	2.89	24.9	nm	N/A	13.29	993.03	24.80	0.10	hard
	B12mw-013	2371221.00	565904.00	1,001.80	22	1,004.48	A	Sharon	11.5	21.5	21.8	2.68	24.25	nm	N/A	15.95	988.53	24.20	0.05	hard
Background	BKGmw-004	2368852.97	569464.76	965.16	19.5	967.66	A	Unconsolidated	9.2	19.2	19.5	2.50	22.0	nm	N/A	13.04	954.62	22.29	0.00	hard
	BKGmw-005	2340835.86	562288.45	1,149.44	19.0	1,151.94	A	Unconsolidated	8.2	18.2	18.5	2.50	21.0	nm	N/A	11.09	1140.85	20.88	0.12	hard
	BKGmw-006	2358643.96	571910.47	1,026.38	35.1	1,028.88	A	Sharon	24.7	34.7	35.1	2.50	37.6	nm	N/A	23.04	1005.84	37.70	0.00	soft
	BKGmw-008	2372741.08	569654.23	970.40	25.0	972.90	A	Sharon	14.7	24.7	25.0	2.50	27.5	nm	N/A	14.34	958.56	27.44	0.06	hard
	BKGmw-010	2371372.86	565540.54	1,003.80	22.0	1,006.18	A	Sharon	8.9	18.9	19.2	2.38	21.6	nm	N/A	12.70	993.48	21.96	0.00	hard
	BKGmw-012	2367795.23	563918.86	997.57	59.8	1,000.07	A	Sharon	38.6	59.6	59.8	2.50	62.3	nm	N/A	7.78	992.29	62.05	0.25	hard
	BKGmw-013	2361627.39	558269.16	986.59	25.5	989.09	A	Unconsolidated	15.2	25.2	25.5	2.50	28.0	nm	N/A	11.52	977.57	28.08	0.00	hard
	BKGmw-015	2361482.22	569339.87	1,037.90	51.0	1,040.40	A	Sharon	30.1	50.1	50.4	2.50	52.9	nm	N/A	48.07	992.33	53.05	0.00	hard
	BKGmw-016	2342407.08	553983.50	1,098.42	19.0	1,100.92	A	Unconsolidated	8.4	18.5	18.6	2.50	21.1	nm	N/A	5.34	1095.58	21.15	0.00	hard
	BKGmw-017	2346115.35	562452.04	1,132.80	34.8	1,135.30	A	Unconsolidated	23.2	33.3	33.6	2.50	36.1	nm	N/A	17.35	1117.95	35.90	0.20	hard
	BKGmw-018	2354993.91	570873.35	1,043.06	24.7	1,045.56	A	Sharon	14.5	24.5	24.7	2.50	27.2	nm	N/A	15.57	1029.99	27.65	0.00	hard
	BKGmw-019	2349882.14	559864.55	1,108.24	34.0	1,110.74	A	Unconsolidated	23.0	33.0	33.2	2.50	35.7	nm	N/A	18.42	1092.32	35.61	0.09	hard
	BKGmw-020	2357856.24	558756.24	1,065.00	30.7	1,067.50	A	Unconsolidated	20.5	30.5	30.7	2.50	33.2	nm	N/A	7.95	1059.55	33.19	0.01	hard
	BKGmw-021	2367622.95	571016.75	972.16	19.0	974.66	A	Unconsolidated	7.7	17.8	18.1	2.50	20.6	nm	N/A	13.66	961.00	21.46	0.00	hard
C-Block Quarry	CBLmw-001	2343657.08	559403.12	1,178.50	50.0	1,181.08	A	Homewood	39.0	49.0	49.0	2.58	51.6	nm	N/A	39.74	1141.34	50.41	1.19	hard
	CBLmw-002	2343845.22	559044.48	1,172.50	45.3	1,175.24	A	Homewood	34.5	44.5	44.5	2.74	47.2	nm	N/A	34.29	1140.95	47.33	0.00	hard
	CBLmw-003	2343970.00	559695.52	1,172.22	44.0	1,175.06	A	Homewood	33.0	43.0	43.0	2.84	45.8	nm	N/A	31.33	1143.73	44.70	1.10	hard
	CBLmw-004	2343688.76	559951.58	1,172.08	45.0	1,174.84	A	Homewood	34.0	44.0	44.0	2.76	46.8	nm	N/A	32.48	1142.36	46.96	0.00	hard
	CBLmw-005	2344572.00	558686.00	1,155.60	31.0	1,158.10	A	Homewood	22.0	30.0	30.3	2.50	32.42	nm	N/A	23.10	1135.00	32.41	0.01	hard
Central Burn Pits	CBPmw-001	2367095.37	561616.01	972.71	32.3	975.84	A	Unconsolidated	21.8	31.8	31.8	3.13	34.9	nm	N/A	11.51	964.33	34.20	**0.70**	soft
	CBPmw-002	2367295.66	561865.83	967.33	30.0	970.04	A	Unconsolidated	19.5	29.5	29.5	2.71	32.2	nm	N/A	6.56	963.48	31.61	0.59	hard
	CBPmw-003	2366768.68	561944.14	972.04	25.0	974.67	A	Unconsolidated	14.5	24.5	24.5	2.63	27.1	nm	N/A	10.75	963.92	30.19	0.00	medium
	CBPmw-004	2366978.80	562123.80	968.58	27.5	971.13	A	Unconsolidated	17.0	27.0	27.0	2.55	29.5	nm	N/A	9.55	961.58	29.67	0.00	medium
	CBPmw-005	2366919.66	562311.88	968.83	25.0	971.59	A	Unconsolidated	14.5	24.5	24.5	2.76	27.3	nm	N/A	10.93	960.66	27.40	0.00	medium
	CBPmw-006	2367243.68	562311.87	965.01	23.0	967.64	A	Unconsolidated	12.5	22.5	22.5	2.63	25.1	nm	N/A	6.55	961.09	25.20	0.00	medium
	CBPmw-007	2366512.62	562006.41	973.47	30.0	976.37	A	Unconsolidated	19.5	29.5	29.5	2.90	32.4	nm	N/A	14.14	962.23	31.89	0.51	hard
	CBPmw-008	2366757.21	562668.84	970.57	25.5	973.19	A	Unconsolidated	15.0	25.0	25.0	2.62	27.6	nm	N/A	14.80	958.39	28.00	0.00	hard
	CBPmw-009	2367174.00	561797.00	969.90	65	972.48	A	Sharon	54.0	64.0	64.3	2.58	66.55	nm	N/A	8.85	963.63	66.62	0.00	medium
Upper and Lower Cobbs Ponds	CPmw-001	2368948.81	560440.91	975.46	16.0	975.26	F	Unconsolidated	5.5	15.5	15.5	-0.20	15.3	nm	N/A	1.05	974.21	14.75	0.55	hard
	CPmw-002	2368239.23	560311.26	972.72	16.0	972.31	F	Unconsolidated	5.5	15.5	15.5	-0.41	15.1	nm	N/A	-0.20	972.51	15.03	0.07	hard
	CPmw-003	2368796.49	560676.30	973.27	18.5	972.92	F	Unconsolidated	8.0	18.0	18.0	-0.35	17.6	nm	N/A	0.93	971.99	17.77	0.00	hard
	CPmw-004	2368674.31	561843.46	978.51	20.0	981.20	A	Unconsolidated	9.5	19.5	19.5	2.69	22.2	nm	N/A	9.76	971.44	22.60	0.00	hard
	CPmw-005	2367900.41	561846.78	970.71	40.0	973.58	A	Unconsolidated	29.5	39.5	39.5	2.87	42.4	nm	N/A	9.40	964.18	43.23	0.00	hard
	CPmw-006	2367727.13	562830.13	962.97	18.5	965.13	A	Unconsolidated	8.0	18.0	18.0	2.16	20.2	nm	N/A	7.29	957.84	20.68	0.00	hard
Open Demolition Area #2	DA2mw-104	2354773.79	561129.59	1,070.82	27.0	1,073.89	A	Unconsolidated	16.3	26.3	26.5	3.07	29.6	nm	N/A	19.41	1054.48	29.59	0.01	hard
	DA2mw-105	2354557.62	560572.58	1,042.66	14.0	1,045.34	A	Unconsolidated	8.3	13.3	13.5	2.68	16.2	nm	N/A	2.95	1042.39	16.22	0.00	hard
	DA2mw-106	2354848.85	560560.49	1,041.19	16.0	1,043.79	A	Unconsolidated	8.3	15.3	15.5	2.60	18.1	nm	N/A	3.80	1039.99	16.90	1.20	hard
	DA2mw-107	2354924.29	560480.05	1,039.18	15.0	1,041.63	A	Unconsolidated	8.8	13.8	14.0	2.45	16.5	nm	N/A	6.46	1035.17	16.91	0.00	hard
	DA2mw-108	2355604.43	560181.78	1,029.92	15.0	1,032.36	A	Unconsolidated	9.3	14.3	14.5	2.44	16.9	nm	N/A	5.91	1026.45	17.24	0.00	hard
	DA2mw-109	2354793.14	559897.89	1,068.66	24.0	1,071.29	A	Unconsolidated	11.3	21.3	21.5	2.63	24.1	nm	N/A	12.21	1059.08	24.50	0.00	soft
	DA2mw-110	2355195.91	559927.02	1,061.39	20.0	1,063.78	A	Unconsolidated	9.3	19.3	19.5	2.39	21.9	nm	N/A	6.83	1056.95	22.49	0.00	hard
	DA2mw-111	2354728.33	560222.94	1,039.63	12.6	1,042.12	A	Unconsolidated	7.1	12.1	12.3	2.49	14.8	nm	N/A	6.11	1036.01	15.00	0.00	hard
	DA2mw-112	2355018.98	560378.36	1,034.87	15.0	1,037.44	A	Unconsolidated	8.8	13.8	14.0	2.57	16.6	nm	N/A	5.86	1031.58	17.15	0.00	hard
	DA2mw-113	2355153.13	560394.81	1,034.51	14.0	1,037.11	A	Unconsolidated	8.3	13.3	13.5	2.60	16.1	nm	N/A	6.91	1030.20	16.39	0.00	hard
	DA2mw-114	2355785.00	560109.00	1,029.50	19.5	1,031.90	A	Sharon Shale	9.16	19.16	19.46	2.40	21.8	nm	N/A	4.60	1027.30	21.93	0.00	hard
	DA2mw-115	2355269.00	560459.00	1,035.40	44.0	1,038.08	A	Sharon	33.75	43.75	44.05	2.68	46.8	5.52	1032.56	5.11	1032.97	47.30	0.00	medium
	DETmw-001B	2354959.47	560820.03	1,064.35	39.0	1,065.85	A	Unconsolidated	34.0	39.0	39.0	1.50	40.5	nm	N/A	21.18	1044.67	39.09	**1.41**	medium
	DETmw-002	2355360.33	560664.71	1,060.24	39.0	1,061.24	A	Unconsolidated	34.0	39.0	39.0	1.00	40.0	nm	N/A	31.49	1029.75	42.50	0.00	medium
	DETmw-003	2355204.94	560456.10	1,035.81	15.0	1,036.81	A	Unconsolidated	7.0	12.0	12.0	1.00	13.0	8.94	1027.87	8.36	1028.45	16.11	0.00	hard
	DETmw-004	2355072.36	560454.22	1,037.68	11.0	1,038.68	A	Unconsolidated	6.0	11.0	11.0	1.00	12.0	10.02	1028.66	8.95	1029.73	13.89	0.00	hard

Table 2-1
Well Construction Details, Groundwater Elevations, and Depth to Bottom Measurements

RVAAP Area	Well ID	Ohio State Plane Easting	Ohio State Plane Northing	Ground Elevation (ft, AMSL)	Total Drilled Depth (ft, BGS)	TOC Elevation (ft, AMSL)	Well Head Type[1]	Monitored Zone	Top of Screen (ft, BGS)	Bottom of Screen (ft, BGS)	Bottom of Inner Casing Plug or End Cap (ft, BGS)	Stickup height (ft, AGS)	Reported Bottom of Inner Casing (ft, BTOC)	Depth to Water - March 2015 (ft, BTOC)	Groundwater Elevation - March 2015 (ft, AMSL)	Depth to Water - July 2015 (ft, BTOC)	Groundwater Elevation - July 2015 (ft, AMSL)	July 2015 Measured Bottom of Inner Casing (ft, BTOC)	Sediment Accumulation (ft)[2]	Description of Bottom
Erie Burning Grounds	EBGmw-123	2380049.21	571747.04	945.59	32.0	947.82	A	Unconsolidated	21.0	31.0	31.5	2.23	33.7	nm	N/A	10.50	937.32	34.78	0.00	hard
	EBGmw-124	2380030.24	571618.07	939.02	32.0	941.39	A	Unconsolidated	20.0	30.0	30.5	2.37	32.9	nm	N/A	4.29	937.10	32.63	**0.27**	medium
	EBGmw-125	2379679.20	571655.63	947.55	25.0	949.89	A	Unconsolidated	14.0	24.0	24.5	2.34	26.8	nm	N/A	13.15	936.74	27.41	0.00	hard
	EBGmw-126	2380307.31	572348.81	938.20	28.0	940.61	A	Unconsolidated	15.2	25.2	25.5	2.41	27.9	nm	N/A	2.39	938.22	27.70	0.20	medium
	EBGmw-127	2380172.16	571083.61	940.21	30.0	943.07	A	Unconsolidated	19.0	29.0	29.5	2.86	32.4	nm	N/A	4.64	938.43	32.83	0.00	hard
	EBGmw-128	2379892.79	570970.32	942.47	28.0	945.13	A	Unconsolidated	15.0	25.0	25.3	2.66	28.0	nm	N/A	7.02	938.11	28.21	0.00	hard
	EBGmw-129	2379240.52	572035.68	941.97	29.0	944.36	A	Unconsolidated	16.0	26.0	26.0	2.39	28.4	nm	N/A	5.84	938.52	30.96	0.00	medium
	EBGmw-130	2379220.69	570695.61	941.18	26.0	944.00	A	Unconsolidated	15.2	25.2	25.5	2.82	28.3	nm	N/A	6.78	937.22	28.39	0.00	hard
	EBGmw-131	2379666.00	571655.00	947.50	71.0	950.08	A	Sharon	60.5	70.5	70.8	2.58	73.10	nm	N/A	9.07	941.01	23.41	49.69	hard
Fuze and Booster Quarry Landfill/Ponds	FBQmw-166	2349584.33	553123.86	1,104.87	16.0	1,108.86	A	Unconsolidated	5.5	15.5	15.5	3.99	19.5	nm	N/A	4.32	1104.54	19.86	0.00	hard
	FBQmw-167	2349675.45	553556.12	1,112.05	18.0	1,115.90	A	Unconsolidated	5.0	15.0	15.0	3.85	18.9	nm	N/A	3.66	1112.24	19.09	0.00	hard
	FBQmw-168	2350066.87	553620.85	1,131.27	19.5	1,133.91	A	Homewood	9.0	19.0	19.0	2.64	21.6	nm	N/A	10.36	1123.55	21.26	**0.34**	medium
	FBQmw-169	2349730.90	553681.21	1,117.36	16.0	1,120.58	A	Homewood	5.0	15.0	15.0	3.22	18.2	nm	N/A	5.29	1115.29	18.91	0.00	hard
	FBQmw-170	2350102.41	553975.40	1,139.67	30.5	1,142.26	A	Homewood	20.0	30.0	30.0	2.59	32.6	nm	N/A	15.85	1126.41	32.75	0.00	hard
	FBQmw-171	2350072.44	554230.93	1,140.49	30.0	1,143.55	A	Homewood	18.0	28.0	28.0	3.06	31.1	nm	N/A	15.66	1127.89	31.46	0.00	hard
	FBQmw-172	2349907.37	554322.17	1,145.71	33.0	1,150.09	A	Homewood	20.0	30.0	30.0	4.38	34.4	nm	N/A	23.39	1126.70	20.03	**14.37**	medium
	FBQmw-173	2350449.01	554491.35	1,162.43	50.0	1,165.94	A	Homewood	29.5	49.5	49.5	3.51	53.0	nm	N/A	41.43	1124.51	53.03	0.00	hard
	FBQmw-174	2350289.81	554142.44	1,135.78	22.5	1,139.97	A	Homewood	12.0	22.0	22.0	4.19	26.2	16.02	1123.95	13.45	1126.52	23.08	**3.12**	medium
	FBQmw-175	2350297.98	553989.24	1,137.16	22.5	1,140.73	A	Homewood	12.0	22.0	22.0	3.57	25.6	nm	N/A	15.22	1125.51	25.81	0.00	medium
	FBQmw-176	2350219.45	553273.33	1,129.57	21.5	1,131.91	A	Unconsolidated	11.0	21.0	21.0	2.34	23.3	nm	N/A	7.63	1124.28	23.65	0.00	soft
	FBQmw-177	2350112.18	553321.94	1,125.73	22.5	1,128.57	A	Homewood	12.0	22.0	22.0	2.84	24.8	nm	N/A	11.38	1117.19	24.74	0.06	soft
Facility-Wide Groundwater	FWGmw-001	2368321.00	565739.00	953.60	17.5	956.62	A	Unconsolidated	7	17	17.3	3.02	20.05	nm	N/A	8.05	948.57	20.03	0.02	medium
	FWGmw-002	2367606.00	571015.00	970.60	71.0	973.10	A	Unconsolidated	57	67	67.3	2.50	70.05	23.09	950.01	22.75	950.35	69.61	**0.44**	soft
	FWGmw-003	2344042.00	563118.00	1,129.40	19.0	1,131.96	A	Unconsolidated	8.5	18.5	18.8	2.56	21.1	nm	N/A	4.68	1127.28	21.01	0.09	hard
	FWGmw-004	2356970.00	549319.00	1,034.50	20.0	1,037.15	A	Unconsolidated	9.5	19.5	19.8	2.65	22.6	11.36	1025.79	11.13	1026.02	22.54	0.06	soft
	FWGmw-005	2338973.00	558510.00	1,167.50	29.5	1,170.10	A	Homewood	19.25	29.25	29.55	2.60	31.9	nm	N/A	20.63	1149.47	31.65	**0.25**	soft
	FWGmw-006	2335421.00	553142.00	1,181.90	18.0	1,184.33	A	Unconsolidated	7.5	17.5	17.8	2.43	19.25	nm	N/A	4.03	1180.30	19.20	0.05	hard
	FWGmw-007	2344785.00	548356.00	1,072.80	30.0	1,075.41	A	Unconsolidated	19.5	29.5	29.8	2.61	32.35	22.72	1052.69	22.22	1053.19	32.18	0.17	hard
	FWGmw-008	2341569.00	555735.00	1,109.00	21.0	1,111.61	A	Unconsolidated	10	20	20.3	2.61	22.1	nm	N/A	4.94	1106.67	21.72	**0.38**	soft
	FWGmw-009	2341998.00	556784.00	1,099.50	18.5	1,102.14	A	Unconsolidated	8	18	18.3	2.64	20.4	nm	N/A	2.19	1099.95	20.31	0.09	hard
	FWGmw-010	2379060.00	565077.00	959.50	17.3	962.15	A	Unconsolidated	6	16	16.3	2.65	19.1	nm	N/A	9.21	952.94	19.12	0.00	hard
	FWGmw-011	2380390.00	566801.00	939.00	17.5	941.61	A	Unconsolidated	6	16	16.3	2.61	17.8	1.63	939.98	1.58	940.03	17.58	0.22	hard
	FWGmw-012	2380389.00	566790.00	938.90	40.0	941.39	A	Sharon Shale	29.5	39.5	39.8	2.49	42.45	0.00	941.39	0.15	941.24	42.41	0.04	hard
	FWGmw-013	2357460.00	559483.00	1,057.10	34.5	1,059.51	A	Sharon	24	34	34.3	2.41	36.7	nm	N/A	17.31	1042.20	37.24	0.00	hard
	FWGmw-014	2341064.00	560957.00	1,135.00	18.5	1,137.57	A	Unconsolidated	8.25	18.25	18.55	2.57	21.15	nm	N/A	3.18	1134.39	21.08	0.07	hard
	FWGmw-015	2358353.00	550179.00	1,012.10	26.0	1,014.51	A	Unconsolidated	13.5	23.5	23.8	2.41	26.35	4.28	1010.23	3.98	1010.53	26.26	0.09	medium
	FWGmw-016	2358364.00	550171.00	1,011.90	65.0	1,014.39	A	Sharon	54.5	64.5	64.8	2.49	67.5	16.54	997.85	15.49	998.90	67.50	0.00	hard
Load Line 1	LL1mw-063	2376841.36	563650.53	992.20	27.4	994.84	A	Sharon	17.1	27.1	27.4	2.64	30.0	nm	N/A	20.70	974.14	30.25	0.00	hard
	LL1mw-064	2380286.97	563118.74	932.32	18.4	935.10	A	Unconsolidated	8.0	18.0	18.4	2.78	21.1	1.42	933.68	0.50	934.60	21.21	0.00	soft
	LL1mw-065	2380452.00	560916.92	941.53	20.5	944.41	A	Unconsolidated	10.2	20.2	20.5	2.88	23.4	11.40	933.01	9.91	934.50	23.21	0.19	hard
	LL1mw-067	2376545.30	565201.14	977.55	22.8	980.36	A	Sharon	12.8	22.5	22.8	2.81	25.6	nm	N/A	14.44	965.92	26.10	0.00	hard
	LL1mw-078	2376275.85	564623.87	993.40	38.7	995.84	A	Sharon	28.7	38.2	38.7	2.44	41.1	nm	N/A	28.05	967.79	41.48	0.00	soft
	LL1mw-079	2376228.31	563739.63	995.30	29.5	997.87	A	Sharon	29.5	38.9	39.5	2.57	42.0	nm	N/A	28.15	969.72	42.62	0.00	hard
	LL1mw-080	2376845.07	562479.73	993.70	19.5	996.27	A	Sharon	9.5	19.0	19.5	2.57	22.0	nm	N/A	9.95	986.32	22.54	0.00	hard
	LL1mw-081	2376672.66	563462.73	996.40	39.4	998.92	A	Sharon	29.4	38.9	39.4	2.52	41.9	nm	N/A	26.97	971.95	42.09	0.00	hard
	LL1mw-082	2376977.38	562956.86	1,003.70	39.0	1,006.45	A	Sharon	28.9	38.5	39.0	2.75	41.8	nm	N/A	26.49	979.96	41.70	0.10	hard
	LL1mw-083	2377074.80	563612.75	992.80	39.3	995.20	A	Sharon	29.1	38.6	39.3	2.40	41.7	33.90	961.30	29.11	966.09	41.41	0.29	hard
	LL1mw-084	2377316.02	563160.44	996.40	37.0	998.73	A	Sharon	26.7	36.3	37.0	2.33	39.3	30.52	968.21	24.69	974.04	39.55	0.00	hard
	LL1mw-085	2377246.94	562046.25	994.30	42.1	996.84	A	Sharon	32.2	41.6	42.1	2.54	44.7	nm	N/A	32.78	964.06	45.95	0.00	hard
	LL1mw-086	2380437.00	561714.00	938.00	75.0	940.63	A	Unconsolidated	64.5	74.5	74.8	2.63	77.38	7.82	932.81	6.24	934.39	77.80	0.00	hard
	LL1mw-087	2378732.00	560375.00	941.80	17.5	944.32	A	Unconsolidated	7	17	17.3	2.52	18.55	4.25	940.07	5.10	939.22	18.09	**0.46**	medium
	LL1mw-088	2380525.00	561746.00	936.30	24	938.63	A	Unconsolidated	13.9	23.9	24.51	3.00	27.54	4.39	934.24	4.24	934.39	27.46	0.08	soft
Load Line 2	LL2mw-059	2375453.00	558020.00	964.33	19.5	966.67	A	Sharon	9.3	19.1	19.5	2.34	21.8	13.15	953.52	11.97	954.70	21.85	0.00	hard
	LL2mw-060	2375978.00	558022.00	958.93	18.3	961.57	A	Sharon	8.1	17.9	18.3	2.64	20.9	9.48	952.09	8.35	953.22	20.90	0.00	hard
	LL2mw-261	2373317.81	561898.25	1,009.55	22.5	1,011.40	A	Sharon	9.8	19.8	20.0	1.85	21.9	nm	N/A	6.24	1005.16	22.49	0.00	hard
	LL2mw-262	2373970.79	562219.87	1,011.12	21.2	1,012.62	A	Sharon	10.6	20.6	20.8	1.50	22.3	nm	N/A	6.19	1006.43	22.68	0.00	hard
	LL2mw-263	2374289.51	561591.19	1,009.42	22.2	1,011.47	A	Sharon	10.8	20.8	21.0	2.05	23.0	nm	N/A	5.95	1005.52	23.60	0.00	hard
	LL2mw-264	2374532.00	561173.60	1,010.10	20.5	1,011.88	A	Sharon	9.8	19.8	20.0	1.78	21.7	nm	N/A	4.51	1007.37	22.51	0.00	hard
	LL2mw-265	2375594.06	557972.91	959.47	22.5	961.24	A	Sharon	11.8	21.8	22.0	1.77	23.8	nm	N/A	8.43	952.81	24.50	0.00	hard
	LL2mw-266	2373744.03	561981.86	1,014.09	20.5	1,016.28	A	Sharon	9.8	19.8	20.0	2.19	22.2	nm	N/A	9.60	1006.68	22.75	0.00	hard
	LL2mw-267	2373715.04	561393.22	1,012.81	20.5	1,014.81	A	Sharon	9.8	19.8	20.0	2.00	22.0	8.64	1006.17	8.54	1006.27	22.08	0.00	soft
	LL2mw-268	2374157.30	560831.04	1,015.47	28.8	1,017.28	A	Sharon	17.3	27.3	27.5	1.81	29.3	nm	N/A	13.84	1003.44	29.90	0.00	soft
	LL2mw-269	2374756.07	559484.12	1,009.49	28.0	1,011.62	A	Sharon	17.1	27.1	27.3	2.13	29.4	nm	N/A	15.18	996.44	30.55	0.00	soft
	LL2mw-270	2372858.41	562655.93	1,009.93	20.5	1,010.18	A	Sharon	9.8	19.8	20.0	0.25	20.3	nm	N/A	6.89	1003.29	22.44	0.00	hard
	LL2mw-271	2375714.00	557827.00	958.70	24	961.19	A	Sharon	14.6	24.6	24.8	3	27.8	10.28	950.91	9.35	951.84	27.74	0.06	hard

Table 2-1
Well Construction Details, Groundwater Elevations, and Depth to Bottom Measurements

RVAAP Area	Well ID	Ohio State Plane Easting	Ohio State Plane Northing	Ground Elevation (ft, AMSL)	Total Drilled Depth (ft, BGS)	TOC Elevation (ft, AMSL)	Well Head Type[1]	Monitored Zone	Top of Screen (ft, BGS)	Bottom of Screen (ft, BGS)	Bottom of Inner Casing Plug or End Cap (ft, BGS)	Stickup height (ft, AGS)	Reported Bottom of Inner Casing (ft, BTOC)	Depth to Water - March 2015 (ft, BTOC)	Groundwater Elevation - March 2015 (ft, AMSL)	Depth to Water - July 2015 (ft, BTOC)	Groundwater Elevation - July 2015 (ft, AMSL)	July 2015 Measured Bottom of Inner Casing (ft, BTOC)	Sediment Accumulation (ft) [2]	Description of Bottom
Load Line 3	LL3mw-232	2369862.96	561365.91	998.59	37.8	1,000.41	A	Sharon	26.8	36.8	37.0	1.82	38.8	nm	N/A	15.45	984.96	39.80	0.00	medium
	LL3mw-233	2369934.52	560750.41	1,002.47	31.1	1,004.36	A	Sharon	20.1	30.1	30.3	1.89	32.2	nm	N/A	22.87	981.49	31.69	**0.51**	soft
	LL3mw-234	2370297.47	560058.89	1,004.47	20.5	1,006.56	A	Sharon	9.8	19.8	20.0	2.09	22.1	nm	N/A	9.18	997.38	22.67	0.00	hard
	LL3mw-235	2370642.47	559812.63	1,008.05	21.2	1,009.94	A	Sharon	10.1	20.1	20.3	1.89	22.2	nm	N/A	15.09	994.85	22.99	0.00	hard
	LL3mw-236	2371178.58	559866.75	1,008.94	25.5	1,011.17	A	Sharon	13.8	23.8	24.0	2.23	26.2	nm	N/A	13.64	997.53	26.61	0.00	hard
	LL3mw-237	2371475.00	559328.09	1,003.57	23.9	1,005.57	A	Sharon	12.7	22.7	22.9	2.00	24.9	nm	N/A	13.00	992.57	25.57	0.00	hard
	LL3mw-238	2370625.34	559569.06	1,004.75	20.7	1,006.91	A	Sharon	10.5	20.5	20.7	2.16	22.9	14.84	992.07	14.86	992.05	23.39	0.00	hard
	LL3mw-239	2370895.01	559101.39	1,001.70	35.7	1,003.50	A	Sharon	24.9	34.9	35.0	1.80	36.8	nm	N/A	21.58	981.92	36.92	0.00	soft
	LL3mw-240	2371309.57	558204.34	1,005.60	35.5	1,007.52	A	Sharon	24.4	34.4	34.6	1.92	36.5	nm	N/A	26.62	980.90	36.68	0.00	medium
	LL3mw-241	2370332.80	559298.09	992.41	23.8	994.65	A	Sharon	12.7	22.7	22.9	2.24	25.1	9.90	984.75	7.50	987.15	25.59	0.00	hard
	LL3mw-242	2371993.30	557034.21	997.39	20.5	999.32	A	Sharon	9.8	19.8	20.0	1.93	21.9	nm	N/A	13.02	986.30	22.56	0.00	hard
	LL3mw-243	2371532.61	556688.92	989.36	24.5	991.16	A	Sharon	13.8	23.8	24.0	1.80	25.8	nm	N/A	10.58	980.58	26.39	0.00	hard
	LL3mw-244	2371456.00	556033.00	986.20	45	988.78	A	Sharon	34.5	44.5	44.8	2.58	47.25	7.29	981.49	8.60	980.18	46.88	0.37	hard
	LL3mw-245	2369249.00	558573.00	978.70	47	981.24	A	Sharon	36.5	46.5	46.8	2.54	48.9	nm	N/A	10.59	970.65	48.80	0.10	hard
	LL3mw-246	2371441.00	555969.00	986.50	43	988.84	A	Sharon	32.8	42.8	43.0	2.75	45.75	18.39	970.45	17.98	970.86	45.69	0.06	hard
Load Line 4	LL4mw-193	2364237.44	554959.74	980.88	21.9	982.92	A	Unconsolidated	11.3	21.3	21.5	2.04	23.5	nm	N/A	5.36	977.56	24.13	0.00	hard
	LL4mw-194	2364584.76	555088.18	981.87	22.0	983.76	A	Unconsolidated	11.3	21.3	21.5	1.89	23.4	nm	N/A	5.36	978.40	23.43	0.00	hard
	LL4mw-195	2365198.84	555045.69	980.83	21.0	982.59	A	Unconsolidated	10.3	20.3	20.5	1.76	22.3	nm	N/A	9.26	973.33	22.74	0.00	medium
	LL4mw-196	2365297.28	552212.59	982.56	20.0	984.55	A	Unconsolidated	9.2	19.2	19.4	1.99	21.4	nm	N/A	12.24	972.31	21.68	0.00	hard
	LL4mw-197	2365385.95	555396.55	983.79	21.7	985.46	A	Unconsolidated	10.8	20.8	21.0	1.67	22.7	nm	N/A	13.04	972.42	23.53	0.00	hard
	LL4mw-198	2364991.12	555440.99	981.61	22.0	983.42	A	Unconsolidated	10.3	20.3	20.5	1.81	22.3	nm	N/A	6.02	977.40	21.69	0.61	hard
	LL4mw-199	2365421.66	554621.06	975.20	22.0	977.28	A	Unconsolidated	10.3	20.3	20.5	2.08	22.6	nm	N/A	6.15	971.13	23.06	0.00	hard
	LL4mw-200	2365904.12	554579.72	985.97	23.5	987.93	A	Unconsolidated	12.6	22.6	23.0	1.96	25.0	nm	N/A	16.89	971.04	25.10	0.00	hard
	LL4mw-201	2365417.00	554607.00	975.90	67	978.02	A	Sharon	56.5	66.5	66.8		70.15	nm	N/A	9.59	968.43	69.89	0.26	hard
Load Line 5	LL5mw-001	2354625.07	554319.25	1,125.00	24.0	1,127.92	A	Homewood	14.0	24.0	24.0	2.92	26.9	nm	N/A	17.09	1110.83	27.03	0.00	hard
	LL5mw-002	2354571.52	554604.01	1,125.80	25.0	1,128.68	A	Homewood	15.0	25.0	25.0	2.88	27.9	nm	N/A	17.19	1111.49	27.53	0.37	hard
	LL5mw-003	2354964.47	554535.41	1,124.70	21.0	1,127.70	A	Unconsolidated	11.0	21.0	21.0	3.00	24.0	nm	N/A	15.55	1112.15	23.96	0.04	hard
	LL5mw-004	2355006.44	554073.73	1,122.90	22.4	1,125.81	A	Homewood	12.0	22.0	22.0	2.91	24.9	nm	N/A	14.95	1110.86	25.35	0.00	medium
	LL5mw-005	2354422.02	554152.73	1,126.50	27.8	1,129.42	A	Homewood	17.0	27.0	27.0	2.92	29.9	nm	N/A	18.59	1110.83	29.65	**0.25**	soft
	LL5mw-006	2354730.78	553984.82	1,125.10	24.5	1,128.00	A	Homewood	14.0	24.0	24.0	2.90	26.9	nm	N/A	17.02	1110.98	27.08	0.00	medium
Load Line 6	LL6mw-001	2353153.23	554214.84	NA	18.0	1,124.16	F	Unconsolidated	7.0	17.0	17.0	0.00	17.0	nm	N/A	9.46	1114.70	17.63	0.00	hard
	LL6mw-002	2353820.09	553589.88	NA	23.0	1,129.36	F	Unconsolidated	12.5	22.5	22.5	0.00	22.5	nm	N/A	17.65	1111.71	24.51	0.00	hard
	LL6mw-003	2353048.68	553544.34	NA	23.4	1,125.38	A	Homewood	12.5	22.5	22.5	3.35	25.9	nm	N/A	13.05	1112.33	25.66	**0.24**	soft
	LL6mw-004	2353368.79	553431.82	NA	23.0	1,125.39	A	Homewood	12.5	22.5	22.5	2.58	25.1	nm	N/A	14.33	1111.06	24.57	0.53	hard
	LL6mw-005	2353194.52	553170.76	NA	19.9	1,120.47	A	Homewood	9.5	19.5	19.5	2.96	22.5	nm	N/A	10.55	1109.92	22.05	**0.45**	soft
	LL6mw-006	2352419.15	553165.28	NA	20.0	1,124.37	A	Unconsolidated	7.0	17.0	17.0	0.00	17.0	nm	N/A	11.85	1112.52	nm	N/A	N/A
	LL6mw-007	2353354.89	552677.17	NA	20.0	1,115.62	F	Homewood	9.5	19.5	19.5	0.00	19.5	nm	N/A	3.82	1111.80	19.32	0.18	hard
	LL6mw-008	2353616.00	553154.00	1,121.30	17.8	1,124.15	A	Unconsolidated	7.2	17.2	17.5	2.85	20.20	nm	N/A	12.28	1111.87	20.15	0.05	hard
	LL6mw-009	2353604.00	553149.00	1,121.40	39.5	1,123.75	A	Homewood	29	39	39.3	2.35	41.40	nm	N/A	11.94	1111.81	41.39	0.01	hard
Load Line 7 Pink Waste Water Treatment	LL7mw-001	2352192.91	554925.77	1,126.90	30.0	1,129.64	A	Homewood	19.5	29.5	29.5	2.74	32.2	20.18	1109.46	17.85	1111.79	33.51	0.00	hard
	LL7mw-002	2351918.23	555126.55	1,126.70	26.5	1,129.55	A	Homewood	15.0	25.0	25.0	2.85	27.8	nm	N/A	13.08	1116.47	27.51	0.29	hard
	LL7mw-003	2352351.04	555417.04	1,118.23	31.5	1,120.84	A	Homewood	21.0	31.0	31.0	2.61	33.6	nm	N/A	8.83	1112.01	33.92	0.00	hard
	LL7mw-004	2352035.20	555581.14	1,123.30	29.5	1,126.32	A	Homewood	19.5	29.5	29.5	3.02	32.5	nm	N/A	12.21	1114.11	32.69	0.00	hard
	LL7mw-005	2351741.47	555581.80	1,133.30	28.2	1,135.87	A	Homewood	18.0	28.0	28.0	2.57	30.6	nm	N/A	18.82	1117.05	30.78	0.00	hard
	LL7mw-006	2351879.92	555990.59	1,120.70	28.0	1,123.56	A	Homewood	17.5	27.5	27.5	2.86	30.4	nm	N/A	8.15	1115.41	30.66	0.00	hard
Load Line 8	LL8mw-001	2351666.10	552607.06	1,118.69	24.0	1,121.46	A	Unconsolidated	14.0	24.0	24.0	2.77	26.8	nm	N/A	7.90	1113.56	27.71	0.00	hard
	LL8mw-002	2351010.33	552408.18	1,121.67	30.4	1,124.51	A	Unconsolidated	20.0	30.0	30.0	2.84	32.8	nm	N/A	14.40	1110.11	33.01	0.00	hard
	LL8mw-003	2351359.25	552231.14	1,116.30	21.0	1,119.05	A	Unconsolidated	10.5	20.5	20.5	2.75	23.3	nm	N/A	9.05	1110.00	23.21	0.09	medium
	LL8mw-004	2351261.83	551807.58	1,112.73	20.5	1,115.75	A	Unconsolidated	10.0	20.0	20.0	3.02	23.0	nm	N/A	7.60	1108.15	22.92	0.08	hard
	LL8mw-005	2351748.32	551522.48	1,112.51	24.0	1,115.73	A	Homewood	14.0	24.0	24.0	3.22	27.2	nm	N/A	9.31	1106.42	17.06	**10.14**	medium
	LL8mw-006	2351483.58	551296.77	1,114.33	24.2	1,117.17	A	Homewood	14.0	24.0	24.0	2.84	26.8	nm	N/A	17.42	1099.75	27.40	0.00	hard
Load Line 9	LL9mw-001	2355817.04	556125.81	NA	21.6	1,134.62	A	Homewood	10.5	20.5	20.5	2.78	23.3	nm	N/A	13.66	1120.96	23.35	0.00	hard
	LL9mw-002	2355907.76	556755.11	NA	21.0	1,127.30	A	Homewood	10.0	20.0	20.0	2.42	22.4	nm	N/A	6.60	1120.70	22.75	0.00	hard
	LL9mw-003	2356635.21	556445.31	NA	22.0	1,135.76	A	Homewood	11.5	21.5	21.5	2.30	23.8	nm	N/A	10.74	1125.02	24.23	0.00	hard
	LL9mw-004	2357338.76	556002.00	NA	33.0	1,131.83	A	Homewood	22.0	32.0	32.0	2.91	34.9	nm	N/A	17.29	1114.54	34.68	0.22	hard
	LL9mw-005	2356505.95	557063.36	NA	20.6	1,130.93	A	Homewood	10.0	20.0	20.0	3.30	23.3	nm	N/A	13.19	1117.74	23.51	0.00	hard
	LL9mw-006	2357446.67	556434.79	NA	26.8	1,129.88	A	Homewood	16.0	26.0	26.0	2.90	28.9	nm	N/A	15.61	1114.27	25.86	3.04	hard
	LL9mw-007	2357024.34	557000.56	NA	19.0	1,119.99	F	Homewood	8.5	18.5	18.5	0.00	18.5	nm	N/A	6.70	1113.29	18.19	0.31	hard
Load Line 10	LL10mw-001	2355272.22	555816.25	1,130.00	28.0	1,132.77	A	Homewood	17.0	27.0	27.0	2.77	29.8	nm	N/A	20.75	1112.02	29.59	0.21	hard
	LL10mw-002	2355710.51	555523.36	1,124.40	28.0	1,127.13	A	Homewood	17.0	27.0	27.0	2.73	29.7	nm	N/A	13.60	1113.53	29.81	0.00	hard
	LL10mw-003	2355389.92	555494.71	1,127.40	26.4	1,130.28	A	Homewood	16.0	26.0	26.0	2.88	28.9	21.06	1109.22	17.25	1113.03	28.52	0.38	hard
	LL10mw-004	2355438.20	555236.59	1,119.60	31.2	1,122.39	A	Homewood	21.0	31.0	31.0	2.79	33.8	nm	N/A	9.75	1112.64	33.55	0.25	hard
	LL10mw-005	2355943.55	555380.53	1,122.90	27.0	1,125.67	A	Homewood	16.5	26.5	26.5	2.77	29.3	nm	N/A	11.80	1113.87	29.26	0.04	hard
	LL10mw-006	2355654.80	554995.25	1,121.20	24.0	1,123.83	A	Unconsolidated	13.5	23.5	23.5	2.63	26.1	nm	N/A	9.53	1114.30	26.50	0.00	hard

Table 2-1
Well Construction Details, Groundwater Elevations, and Depth to Bottom Measurements

RVAAP Area	Well ID	Ohio State Plane Easting	Ohio State Plane Northing	Ground Elevation (ft, AMSL)	Total Drilled Depth (ft, BGS)	TOC Elevation (ft, AMSL)	Well Head Type[1]	Monitored Zone	Top of Screen (ft, BGS)	Bottom of Screen (ft, BGS)	Bottom of Inner Casing Plug or End Cap (ft, BGS)	Stickup height (ft, AGS)	Reported Bottom of Inner Casing (ft, BTOC)	Depth to Water - March 2015 (ft, BTOC)	Groundwater Elevation - March 2015 (ft, AMSL)	Depth to Water - July 2015 (ft, BTOC)	Groundwater Elevation - July 2015 (ft, AMSL)	July 2015 Measured Bottom of Inner Casing (ft, BTOC)	Sediment Accumulation (ft) [2]	Description of Bottom
Load Line 11	LL11mw-001	2352778.89	557505.03	1,097.46	23.0	1,100.16	A	Unconsolidated	11.4	21.4	21.4	2.70	24.1	nm	N/A	7.96	1092.20	23.69	0.41	hard
	LL11mw-002	2353354.28	558310.52	1,080.29	20.0	1,080.00	F	Unconsolidated	6.3	16.3	16.3	-0.29	16.0	nm	N/A	1.42	1078.58	16.49	0.00	hard
	LL11mw-003	2352737.87	557999.62	1,088.45	17.0	1,088.48	F	Unconsolidated	5.9	15.9	15.9	0.03	15.9	nm	N/A	0.25	1088.23	16.11	0.00	medium
	LL11mw-004	2352737.24	558164.36	1,084.60	17.0	1,084.72	F	Unconsolidated	6.1	16.1	16.1	0.12	16.2	nm	N/A	-0.08	1084.80	16.25	0.00	hard
	LL11mw-005	2352847.56	558501.02	1,079.60	17.0	1,079.40	F	Unconsolidated	6.2	16.2	16.2	-0.20	16.0	nm	N/A	5.12	1074.28	16.44	0.00	hard
	LL11mw-006	2352521.36	558263.28	1,086.61	17.0	1,086.50	F	Unconsolidated	5.6	15.6	15.6	-0.11	15.5	nm	N/A	2.74	1083.76	15.71	0.00	hard
	LL11mw-007	2352094.81	558189.71	1,079.22	23.0	1,082.00	A	Unconsolidated	12.4	22.4	22.4	2.78	25.2	nm	N/A	14.45	1067.55	25.64	0.00	medium
	LL11mw-008	2352388.60	557981.17	1,087.90	17.0	1,087.74	F	Unconsolidated	5.6	15.6	15.6	-0.16	15.4	nm	N/A	0.08	1087.66	15.74	0.00	hard
	LL11mw-009	2352577.18	557901.18	1,088.38	17.0	1,091.54	F	Unconsolidated	6.7	16.7	16.7	-0.10	16.6	nm	N/A	1.71	1089.83	19.55	0.00	hard
	LL11mw-010	2352039.00	557675.43	1,080.22	22.0	1,082.68	A	Unconsolidated	10.9	20.9	20.9	2.46	23.4	nm	N/A	3.34	1079.34	23.54	0.00	hard
	LL11mw-011	2351119.00	558680.00	1,077.40	18.5	1,080.20	A	Unconsolidated	7.8	17.8	18.1	2.80	20.45	nm	N/A	7.06	1073.14	20.43	0.02	hard
	LL11mw-012	2351125.00	558691.00	1,077.90	115.0	1,080.36	A	Sharon Shale	104.5	114.5	114.8	2.46	119.45	nm	N/A	18.59	1061.77	119.31	0.14	medium
Load Line 12	LL12mw-088	2368667.75	556393.79	978.94	29.0	981.06	A	Unconsolidated	14.8	24.8	25.0	2.12	27.1	nm	N/A	5.11	975.95	27.38	0.00	hard
	LL12mw-107	2368595.67	556759.02	978.03	33.0	980.15	A	Unconsolidated	20.7	30.7	31.0	2.12	33.1	nm	N/A	6.79	973.36	33.66	0.00	hard
	LL12mw-113	2368223.73	558345.37	977.67	23.0	980.18	A	Sharon Shale	12.3	22.3	22.5	2.51	25.0	nm	N/A	4.81	975.37	20.70	4.30	hard
	LL12mw-128	2368293.20	557371.54	976.21	34.0	978.24	A	Unconsolidated	21.1	31.1	31.3	2.03	33.3	nm	N/A	7.60	970.64	33.93	0.00	hard
	LL12mw-153	2368138.87	557823.23	975.34	26.0	977.85	A	Unconsolidated	12.3	22.3	22.5	2.51	25.0	nm	N/A	4.69	973.16	25.03	0.00	hard
	LL12mw-154	2368183.88	557754.56	977.00	29.0	979.06	A	Unconsolidated	16.4	26.4	26.6	2.06	28.7	nm	N/A	6.78	972.28	28.81	0.00	hard
	LL12mw-182	2368853.20	555890.35	982.20	36.1	984.42	A	Unconsolidated	25.2	35.2	35.5	2.22	37.7	nm	N/A	7.88	976.54	38.04	0.00	hard
	LL12mw-182ss	2368867.00	555897.00	982.30	36	985.02	A	Unconsolidated	25.25	35.25	35.55	2.72	38.5	nm	N/A	8.00	977.02	37.40	1.10	hard
	LL12mw-183	2369224.36	556068.15	980.59	36.0	982.98	A	Sharon Shale	23.3	33.3	33.6	2.39	36.0	nm	N/A	10.26	972.72	36.30	0.00	hard
	LL12mw-184	2368997.48	556399.46	980.96	29.5	983.16	A	Unconsolidated	18.8	28.8	29.0	2.20	31.2	nm	N/A	10.51	972.65	31.38	0.00	hard
	LL12mw-185	2368829.86	556946.75	979.09	24.0	981.31	A	Unconsolidated	10.8	20.8	21.0	2.22	23.2	7.33	973.98	5.50	975.81	23.23	0.00	hard
	LL12mw-186	2367912.39	559065.95	976.34	23.0	978.31	A	Sharon Shale	8.8	18.8	19.0	1.97	21.0	nm	N/A	5.00	973.31	21.00	0.00	hard
	LL12mw-187	2368524.14	557633.10	977.90	29.0	979.94	A	Unconsolidated	17.2	27.2	27.4	2.04	29.4	8.96	970.98	7.29	972.65	29.89	0.00	hard
	LL12mw-188	2367908.82	558132.59	978.46	20.5	980.63	A	Unconsolidated	9.8	19.8	20.0	2.17	22.2	nm	N/A	3.91	976.72	22.01	0.19	hard
	LL12mw-189	2367945.92	558569.27	976.17	18.5	978.04	A	Sharon Shale	7.5	17.5	17.7	1.87	19.6	nm	N/A	3.54	974.50	19.51	0.09	hard
	LL12mw-242	2368545.29	558020.51	978.40	26.3	981.20	A	Unconsolidated	15.5	25.5	25.5	2.80	28.3	7.89	973.31	6.94	974.26	28.54	0.00	hard
	LL12mw-243	2368190.04	557376.32	978.10	24.0	980.79	A	Unconsolidated	13.0	23.0	23.0	2.69	25.7	nm	N/A	7.29	973.50	24.28	1.42	hard
	LL12mw-244	2368751.42	557377.17	978.10	30.0	980.65	A	Unconsolidated	19.5	29.5	29.5	2.55	32.1	nm	N/A	9.69	970.96	30.59	1.51	hard
	LL12mw-245	2368370.74	557044.55	977.50	29.0	980.04	A	Unconsolidated	18.0	28.0	28.0	2.54	30.5	7.33	972.71	6.07	973.97	29.75	0.75	hard
	LL12mw-246	2369432.17	556658.89	982.00	32.0	984.83	A	Unconsolidated	21.5	31.5	31.5	2.83	34.3	nm	N/A	14.08	970.75	35.00	0.00	hard
	LL12mw-247	2368932.00	555141.00	981.30	20.5	984.25	A	Unconsolidated	10	20	20.3	2.95	22.6	4.44	979.81	4.08	980.17	22.58	0.02	medium
Landfill North of Winklepeck Burning Grounds	LNWmw-024	2358403.21	564825.89	1,035.30	24.0	1,038.00	A	Unconsolidated	10.0	20.0	20.0	2.70	22.7	nm	N/A	10.44	1027.56	22.49	0.21	hard
	LNWmw-025	2358417.06	565071.92	1,027.20	19.0	1,029.13	A	Unconsolidated	8.0	18.0	18.0	1.93	19.9	nm	N/A	3.33	1025.80	20.29	0.00	hard
	LNWmw-026	2358952.24	564658.16	1,025.00	24.0	1,027.80	A	Unconsolidated	13.0	23.0	23.0	2.80	25.8	nm	N/A	3.85	1023.95	25.95	0.00	hard
	LNWmw-027	2358628.75	564517.41	1,024.40	25.0	1,027.13	A	Unconsolidated	14.0	24.0	24.0	2.73	26.7	nm	N/A	5.49	1021.64	26.85	0.00	hard
Suspected Mustard Agent Burial Site	MBS-001	2345323.00	550759.50	1,079.68	30.0	1,082.20	A	Unconsolidated	19	28.7	29	2.52	31.5	nm	N/A	16.60	1065.60	30.98	0.52	hard
	MBS-002	2345322.30	550886.20	1,080.50	30.0	1,083.22	A	Unconsolidated	18	27.3	28	2.72	30.7	nm	N/A	17.11	1066.11	31.10	0.00	hard
	MBS-003	2345172.40	550922.80	1,082.45	30.0	1,084.45	A	Unconsolidated	18.5	28.2	28.5	2.00	30.5	nm	N/A	16.79	1067.66	30.69	0.00	hard
	MBS-004	2345134.20	550767.90	1,079.55	26.0	1,081.80	A	Unconsolidated	14.7	24.4	24.7	2.25	27.0	nm	N/A	15.01	1066.79	27.16	0.00	hard
	MBS-005	2345354.10	550800.70	1,080.50	30.0	1,082.42	A	Unconsolidated	18	28	28.08	1.92	30.2	nm	N/A	16.84	1065.58	30.01	0.19	soft
	MBS-006	2345282.30	550726.10	1,080.29	28.0	1,081.83	A	Unconsolidated	16.5	26.5	26.56	1.54	28.2	nm	N/A	16.32	1065.51	28.09	0.11	soft
NACA Test Area	NTAmw-107	2345433.40	551697.29	1,077.65	23.0	1,080.30	A	Unconsolidated	12.0	22.0	22.0	2.65	24.6	nm	N/A	11.40	1068.90	24.39	**0.21**	soft
	NTAmw-108	2345781.60	551916.22	1,083.22	23.0	1,085.62	A	Unconsolidated	12.0	22.0	22.0	2.40	24.4	nm	N/A	16.52	1069.10	24.72	0.00	medium
	NTAmw-109	2345997.72	551293.25	1,076.89	19.0	1,079.84	A	Unconsolidated	8.0	18.0	18.0	2.95	20.9	nm	N/A	10.57	1069.27	20.60	**0.30**	soft
	NTAmw-110	2346438.94	551351.46	1,080.03	28.0	1,082.62	A	Unconsolidated	17.0	27.0	27.0	2.59	29.6	nm	N/A	12.81	1069.81	30.28	0.00	hard
	NTAmw-111	2346638.01	551538.60	1,078.07	20.0	1,080.94	A	Unconsolidated	9.5	19.5	19.5	2.87	22.4	nm	N/A	3.40	1077.54	22.19	0.21	hard
	NTAmw-112	2346889.48	551712.14	1,075.36	23.9	1,078.33	A	Unconsolidated	13.9	23.9	23.9	2.97	26.9	nm	N/A	7.51	1070.82	26.96	0.00	soft
	NTAmw-113	2347082.83	551488.52	1,072.61	27.5	1,075.68	A	Unconsolidated	17.0	27.0	27.5	3.07	30.6	nm	N/A	5.62	1070.06	29.95	0.65	hard
	NTAmw-114	2347301.57	551592.94	1,075.61	20.0	1,078.71	A	Unconsolidated	9.5	19.5	19.5	3.10	22.6	nm	N/A	4.92	1073.79	22.95	0.00	hard
	NTAmw-115	2347581.16	551791.78	1,086.91	24.0	1,089.65	A	Unconsolidated	12.5	22.5	22.5	2.74	25.2	nm	N/A	10.93	1078.72	25.65	0.00	hard
	NTAmw-116	2348196.39	551748.00	1,091.68	22.0	1,094.33	A	Unconsolidated	10.0	20.0	20.0	2.65	22.6	nm	N/A	4.31	1090.02	22.68	0.00	hard
	NTAmw-117	2347994.83	551584.57	1,091.67	25.0	1,094.54	A	Unconsolidated	14.5	24.5	24.5	2.87	27.4	nm	N/A	12.29	1082.25	27.89	0.00	hard
	NTAmw-118	2347609.41	551335.04	1,078.86	22.5	1,081.44	A	Unconsolidated	12.0	22.0	22.0	2.58	24.6	nm	N/A	7.34	1074.10	25.03	0.00	hard
	NTAmw-119	2346013.00	551286.00	1,077.40	130	1,080.07	A	Unconsolidated	90.0	100.0	100.3	2.67	104.6	11.48	1068.59	11.24	1068.83	104.49	0.11	hard
Ramsdell Quarry Landfill	RQLmw-006	2375927.71	566091.26	993.52	42.1	995.39	A	Sharon	19.4	39.4	39.6	1.87	41.4	nm	N/A	32.11	963.28	42.03	0.00	hard
	RQLmw-007	2375872.56	566544.36	963.86	18.7	965.91	A	Sharon	6.0	16.0	16.2	2.05	18.2	6.30	959.61	4.23	961.68	18.63	0.00	hard
	RQLmw-008	2376011.08	566327.94	963.82	18.7	966.08	A	Sharon	6.0	16.0	16.2	2.26	18.5	6.55	959.53	4.40	961.68	18.65	0.00	hard
	RQLmw-009	2376253.65	566351.20	962.60	18.8	964.58	A	Sharon	5.9	15.9	16.4	1.98	18.4	5.44	959.14	3.16	961.42	18.78	0.00	hard
	RQLmw-010	2376048.58	566857.39	980.04	35.4	982.14	A	Sharon	12.5	32.5	33.0	2.10	35.1	nm	N/A	23.01	959.13	35.34	0.00	hard
	RQLmw-011	2376398.19	566819.66	974.60	35.4	976.57	A	Sharon	12.4	32.4	32.6	1.97	34.6	22.18	954.39	19.58	956.99	35.35	0.00	hard
	RQLmw-012	2376558.19	566551.95	975.12	30.5	977.65	A	Sharon	19.8	29.8	30.0	2.53	32.5	22.55	955.10	19.36	958.29	32.68	0.00	hard
	RQLmw-013	2376204.93	566928.09	978.04	34.4	980.71	A	Sharon	23.7	33.7	33.9	2.67	36.6	25.66	955.05	22.93	957.78	36.44	0.16	soft
	RQLmw-014	2376519.38	566941.29	970.83	29.4	973.49	A	Sharon	18.6	28.6	28.9	2.66	31.6	nm	N/A	17.54	955.95	31.52	0.08	hard
	RQLmw-015	2375490.96	566560.90	989.19	40.1	991.26	A	Sharon	29.2	39.2	39.5	2.07	41.6	nm	N/A	28.18	963.08	42.03	0.00	hard
	RQLmw-016	2375649.55	566177.68	994.02	39.5	996.60	A	Sharon	28.5	38.5	39.0	2.58	41.6	nm	N/A	33.14	963.46	41.68	0.00	hard
	RQLmw-017	2376124.18	565931.38	988.69	30.5	991.23	A	Sharon	19.8	29.8	30.0	2.54	32.5	nm	N/A	26.85	964.38	32.72	0.00	hard

Table 2-1
Well Construction Details, Groundwater Elevations, and Depth to Bottom Measurements

RVAAP Area	Well ID	Ohio State Plane Easting	Ohio State Plane Northing	Ground Elevation (ft, AMSL)	Total Drilled Depth (ft, BGS)	TOC Elevation (ft, AMSL)	Well Head Type[1]	Monitored Zone	Top of Screen (ft, BGS)	Bottom of Screen (ft, BGS)	Bottom of Inner Casing Plug or End Cap (ft, BGS)	Stickup height (ft, AGS)	Reported Bottom of Inner Casing (ft, BTOC)	Depth to Water - March 2015 (ft, BTOC)	Groundwater Elevation - March 2015 (ft, AMSL)	Depth to Water - July 2015 (ft, BTOC)	Groundwater Elevation - July 2015 (ft, AMSL)	July 2015 Measured Bottom of Inner Casing (ft, BTOC)	Sediment Accumulation (ft)[2]	Description of Bottom
Sharon Conglomerate	SCFmw-001	2353178.98	554768.62	1,118.53	230	1,120.71	A	Sharon Cong.	201	211	NA	2.18	213.61	nm	N/A	88.52	1032.19	214.30	0.00	hard
	SCFmw-002	2368927.36	555152.38	982.28	153	984.56	A	Sharon Cong.	137	147	NA	2.28	149.65	18.84	965.72	17.46	967.10	150.05	0.00	medium
	SCFmw-003	2375843.20	557957.67	956.14	140	958.47	A	Sharon Cong.	125.5	135.5	NA	2.33	139.65	nm	N/A	6.95	951.52	140.00	0.00	hard
	SCFmw-004	2378730.23	560361.03	941.87	120	944.17	A	Sharon Cong.	100	110	NA	2.30	112.47	-0.20	944.37	-0.20	944.37	112.50	0.00	medium
	SCFmw-005	2377014.05	567302.35	958.43	160	960.80	A	Sharon Cong.	139	154	NA	2.37	156.41	nm	N/A	8.91	951.89	156.35	0.06	hard
	SCFmw-006	2369394.54	569583.41	963.69	90	965.92	A	Sharon Cong.	76	86	NA	2.23	88.32	nm	N/A	17.25	948.67	88.34	0.00	medium
Winklepeck Burning Grounds	WBGmw-005	2357163.55	563037.18	1,052.20	19.0	1,054.70	A	Unconsolidated	8.3	18.3	18.6	2.50	21.1	nm	N/A	4.56	1050.14	21.41	0.00	hard
	WBGmw-006	2359087.79	563008.87	1,012.16	19.0	1,014.66	A	Unconsolidated	7.6	17.6	17.9	2.50	20.4	5.69	1008.97	5.64	1009.02	20.24	0.16	hard
	WBGmw-007	2360420.44	562479.87	998.09	24.0	1,000.59	A	Unconsolidated	13.5	23.5	23.8	2.50	26.3	nm	N/A	16.33	984.26	26.69	0.00	hard
	WBGmw-008	2359700.57	562010.35	1,005.71	18.5	1,008.21	A	Unconsolidated	8.1	18.2	18.5	2.50	21.0	nm	N/A	13.91	994.30	21.09	0.00	hard
	WBGmw-009	2357159.20	561603.54	1,045.03	24.0	1,047.53	A	Unconsolidated	11.4	21.4	21.5	2.50	24.0	11.51	1036.02	10.80	1036.73	24.55	0.00	medium
	WBGmw-010	2356051.96	562893.20	1,067.10	21.0	1,069.85	A	Unconsolidated	10.5	20.5	20.8	2.75	23.6	nm	N/A	6.76	1063.09	23.65	0.00	hard
	WBGmw-011	2356187.29	562609.18	1,069.70	22.0	1,072.38	A	Unconsolidated	11.0	21.0	21.3	2.68	24.0	nm	N/A	9.52	1062.86	24.23	0.00	medium
	WBGmw-012	2354810.65	562240.90	1,076.50	30.0	1,079.11	A	Unconsolidated	19.0	29.0	29.4	2.61	32.0	nm	N/A	15.19	1063.92	31.82	0.18	hard
	WBGmw-013	2355223.25	561518.27	1,069.10	22.0	1,071.70	A	Unconsolidated	11.0	21.0	21.3	2.60	23.9	nm	N/A	9.62	1062.08	24.32	0.00	
	WBGmw-014	2360439.22	562061.26	994.10	23.0	996.78	A	Unconsolidated	12.0	22.0	22.3	2.68	25.0	nm	N/A	15.40	981.38	25.14	0.00	
	WBGmw-015	2359182.41	562340.12	1,009.10	22.0	1,011.60	A	Unconsolidated	11.0	21.0	21.3	2.50	23.8	nm	N/A	11.24	1000.36	23.75	0.05	hard
	WBGmw-016	2360645.88	562709.13	994.90	24.0	997.03	A	Unconsolidated	13.0	23.0	23.3	2.13	25.4	nm	N/A	16.04	980.99	25.32	0.08	hard
	WBGmw-017	2359603.84	562913.24	1,004.00	22.0	1,006.62	A	Unconsolidated	11.0	21.0	21.3	2.62	23.9	nm	N/A	7.28	999.34	23.59	0.31	hard
	WBGmw-018	2361302.00	562659.00	990.50	24.0	991.45	A	Unconsolidated	13.5	23.5	23.8	0.95	24.8	nm	N/A	14.53	976.92	25.21	0.00	hard
	WBGmw-019	2361304.00	562645.00	989.30	50.0	990.25	A	Sharon	39.55	49.55	49.85	0.95	50.5	nm	N/A	16.53	973.72	51.36	0.00	medium
	WBGmw-020	2357161.00	561623.00	1,043.40	43.3	1,044.31	A	Sharon	32.9	42.9	43.2	0.91	43.8	11.25	1033.06	10.94	1033.37	44.27	0.00	medium
	WBGmw-021	2359106.00	563009.00	1,010.00	42.5	1,010.92	A	Sharon	32	42	42.3	0.92	43.1	8.28	1002.64	7.91	1003.01	43.66	0.00	hard

Notes and Abbreviations:

[1] A = above grade completion; F = flush-mount completion

[2] Sediment accumulation is based on historical construction depths that may not be accurate; only positive sediment accumulation is presented.

Sediment accumulation values with gray-shading and bold font identify a calculated sediment thickness greater than 0.20 feet, with a "soft" or "medium" bottom description.

AGS = above ground surface

ASML - above mean sea level

BGS = below ground surface

BTOC - below top of casing

ft - feet

N/A - not applicable

nm - not measured

TOC - top of casing

Table 3-3
Screening Criteria

Sum Category	CAS Number	Parameter Name	FWCUG	MCL	RSL	Screening Criteria
Common Anions	16887-00-6	Chloride				---
Common Anions	14797-55-8	Nitrate	10000	**10000**	3200	10000
Common Anions	N599	Nitrate/Nitrite (NO3/NO2-N)				---
Common Anions	14808-79-8	Sulfate				---
Common Anions	18496-25-8	Sulfide				---
Common Anions	14265-45-3	Sulfite				---
Explosives	99-35-4	1,3,5-Trinitrobenzene (Explosive)			**59**	59
Explosives	99-65-0	1,3-Dinitrobenzene (Explosive)	**0.104**		0.2	0.104
Explosives	118-96-7	2,4,6-Trinitrotoluene (Explosive)	**0.521**		0.98	0.521
Explosives	121-14-2	2,4-Dinitrotoluene (Explosive)	**0.12**		0.24	0.12
Explosives	606-20-2	2,6-Dinitrotoluene (Explosive)	**0.122**		0.049	0.122
Explosives	35572-78-2	2-Amino-4,6-Dinitrotoluene (Explosive)	**0.209**		3.9	0.209
Explosives	88-72-2	2-Nitrotoluene (Explosive)	**0.37**		0.31	0.37
Explosives	99-08-1	3-Nitrotoluene (Explosive)			**0.17**	0.17
Explosives	19406-51-0	4-Amino-2,6-Dinitrotoluene (Explosive)	**0.209**		3.9	0.209
Explosives	99-99-0	4-Nitrotoluene (Explosive)	**5.01**		4.3	5.01
Explosives	80251-29-2	DNX (Explosive)				---
Explosives	2691-41-0	HMX (Explosive)			100	100
Explosives	5755-27-1	MNX (Explosive)				---
Explosives	98-95-3	Nitrobenzene (Explosive)	**0.521**		0.14	0.521
Explosives	9004-70-0	Nitrocellulose (Explosive)			6000000	6000000
Explosives	55-63-0	Nitroglycerin (Explosive)	**5.01**		0.2	5.01
Explosives	556-88-7	Nitroguanidine (Explosive)			**200**	200
Explosives	78-11-5	PETN (Explosive)			**3.9**	3.9
Explosives	121-82-4	RDX (Explosive)	**0.774**		0.7	0.774
Explosives	479-45-8	Tetryl (Explosive)			**3.9**	3.9
Explosives	13980-04-6	TNX (Explosive)				---
Herbicides	93-76-5	2,4,5-T			**16**	16
Herbicides	94-75-7	2,4-D		70	**17**	17
Herbicides	88-85-7	Dinoseb		7	**1.5**	1.5
Herbicides	93-72-1	Silvex		50	**11**	11
Metals	7429-90-5	Aluminum			**2000**	2000
Metals	7440-36-0	Antimony		6	**0.78**	0.78
Metals	7440-38-2	Arsenic		10	**0.052**	0.052
Metals	7440-39-3	Barium		2000	**380**	380
Metals	7440-41-7	Beryllium		4	**2.5**	2.5
Metals	7440-43-9	Cadmium		5	**0.92**	0.92
Metals	7440-70-2	Calcium				---
Metals	7440-47-3	Chromium		100		---
Metals	7440-48-4	Cobalt			**0.6**	0.6
Metals	7440-50-8	Copper		1300	**80**	80
Metals	7439-89-6	Iron			**1400**	1400
Metals	7439-92-1	Lead		15	**15**	15
Metals	7439-95-4	Magnesium				---
Metals	7439-96-5	Manganese			**43**	43
Metals	7439-97-6	Mercury		2	**0.063**	0.063
Metals	7440-02-0	Nickel			**39**	39
Metals	7440-09-7	Potassium				---
Metals	7782-49-2	Selenium		50	**10**	10

Table 3-3
Screening Criteria

Sum Category	CAS Number	Parameter Name	FWCUG	MCL	RSL	Screening Criteria
Metals	7440-22-4	Silver			**9.4**	9.4
Metals	7440-23-5	Sodium				---
Metals	7440-28-0	Thallium		2	**0.02**	0.02
Metals	7440-29-1	Thorium				---
Metals	7440-31-5	Tin			**1200**	1200
Metals	7440-61-1	Uranium (inorg)				---
Metals	7440-62-2	Vanadium			**8.6**	8.6
Metals	7440-66-6	Zinc			**600**	600
Miscellaneous	57-14-7	1,1-Dimethylhydrazine (UDMH)			**0.00042**	0.00042
Miscellaneous	505-29-3	1,4-Dithiane			**20**	20
Miscellaneous	15980-15-1	1,4-Oxathiane				---
Miscellaneous	N33	Alkalinity				---
Miscellaneous	7664-41-7	Ammonia				---
Miscellaneous	N179	Chemical Oxygen Demand				---
Miscellaneous	18540-29-9	Chromium, hexavalent			**0.035**	0.035
Miscellaneous	124-38-9	CO2				---
Miscellaneous	N237	Conductivity				---
Miscellaneous	57-12-5	Cyanide		200	**0.15**	0.15
Miscellaneous	302-01-2	Hydrazine			**0.0011**	0.0011
Miscellaneous	N522	Kjeldahl Nitrogen				---
Miscellaneous	74-82-8	Methane				---
Miscellaneous	67-56-1	Methanol			**2000**	2000
Miscellaneous	14797-73-0	Perchlorate			**1.4**	1.4
Miscellaneous	N704	pH				---
Miscellaneous	64743-03-9	Phenols (misc)				---
Miscellaneous	111-48-8	Thiodiglycol			**140**	140
Miscellaneous	N340	Total Dissolved Solids				---
Miscellaneous	N997	Total Organic Carbon				---
Miscellaneous	7723-14-0	Total Phosphorus as P			**0.04**	0.04
Miscellaneous	NS791	TPH - Diesel Range Organics (misc)				---
Miscellaneous	NS834	TPH - Gasoline Range Organics (misc)				---
PCBs	12674-11-2	PCB-1016			**0.14**	0.14
PCBs	11104-28-2	PCB-1221			**0.0047**	0.0047
PCBs	11141-16-5	PCB-1232			**0.0047**	0.0047
PCBs	53469-21-9	PCB-1242	**0.213**		0.0078	0.213
PCBs	12672-29-6	PCB-1248			**0.0078**	0.0078
PCBs	11097-69-1	PCB-1254	**0.021**		0.0078	0.021
PCBs	11096-82-5	PCB-1260	**0.213**		0.0078	0.213
Pesticides	72-54-8	4,4'-DDD	**0.059**		0.032	0.059
Pesticides	72-55-9	4,4'-DDE	**0.047**		0.046	0.047
Pesticides	50-29-3	4,4'-DDT	**0.027**		0.23	0.027
Pesticides	309-00-2	Aldrin	**0.005**		0.00092	0.005
Pesticides	319-84-6	alpha-BHC	**0.014**		0.0072	0.014
Pesticides	5103-71-9	alpha-Chlordane				---
Pesticides	319-85-7	beta-BHC	**0.047**		0.025	0.047
Pesticides	57-74-9	Chlordane		2	**0.045**	0.045
Pesticides	319-86-8	delta-BHC				---
Pesticides	60-57-1	Dieldrin	**0.004**		0.0018	0.004
Pesticides	959-98-8	Endosulfan I				---
Pesticides	33213-65-9	Endosulfan II				---
Pesticides	1031-07-8	Endosulfan sulfate				---

Table 3-3
Screening Criteria

Sum Category	CAS Number	Parameter Name	FWCUG	MCL	RSL	Screening Criteria
Pesticides	72-20-8	Endrin		2	**0.23**	0.23
Pesticides	7421-93-4	Endrin aldehyde				---
Pesticides	53494-70-5	Endrin ketone				---
Pesticides	5103-74-2	gamma-Chlordane				---
Pesticides	76-44-8	Heptachlor	**0.4**	0.4	0.0014	0.4
Pesticides	1024-57-3	Heptachlor epoxide	**0.2**	0.2	0.0014	0.2
Pesticides	465-73-6	Isodrin				---
Pesticides	143-50-0	Kepone			**0.0035**	0.0035
Pesticides	58-89-9	Lindane	**0.2**	0.2	0.042	0.2
Pesticides	72-43-5	Methoxychlor		40	**3.7**	3.7
Pesticides	298-00-0	Methyl parathion			**0.45**	0.45
Pesticides	56-38-2	Parathion			**8.6**	8.6
Pesticides	8001-35-2	Toxaphene	**3**	3	0.071	3
Radiological	14952-40-0	Actinium-227				---
Radiological	14331-83-0	Actinium-228				---
Radiological	12587-46-1	Alpha activity				---
Radiological	12587-47-2	Beta activity				---
Radiological	14913-49-6	Bismuth-212				---
Radiological	14733-03-0	Bismuth-214				---
Radiological	10045-97-3	Cesium-137				---
Radiological	14255-04-0	Lead-210				---
Radiological	15092-94-1	Lead-212				---
Radiological	15067-28-4	Lead-214				---
Radiological	13966-00-2	Potassium-40				---
Radiological	14331-85-2	Protactinium-231				---
Radiological	7440-14-4	Radium				---
Radiological	13982-63-3	Radium-226				---
Radiological	15262-20-1	Radium-228				---
Radiological	14913-50-9	Thallium-208				---
Radiological	15065-10-8	Thorium-234				---
Radiological	7440-61-1	Uranium				---
Radiological	15117-96-1	Uranium-235				---
Radiological	24678-82-8	Uranium-238				---
SVOCs	92-52-4	1,1-Biphenyl			**0.083**	0.083
SVOCs	95-94-3	1,2,4,5-Tetrachlorobenzene			**0.17**	0.17
SVOCs	120-82-1	1,2,4-Trichlorobenzene (SVOC)		70	**0.4**	0.4
SVOCs	95-50-1	1,2-Dichlorobenzene (SVOC)		600	**30**	30
SVOCs	99-35-4	1,3,5-Trinitrobenzene (SVOC)			**59**	59
SVOCs	541-73-1	1,3-Dichlorobenzene (SVOC)				---
SVOCs	99-65-0	1,3-Dinitrobenzene	**0.104**		0.2	0.104
SVOCs	106-46-7	1,4-Dichlorobenzene (SVOC)		75	**0.48**	0.48
SVOCs	130-15-4	1,4-Naphthoquinone				---
SVOCs	134-32-7	1-Naphthalenamine				---
SVOCs	58-90-2	2,3,4,6-Tetrachlorophenol			**24**	24
SVOCs	95-95-4	2,4,5-Trichlorophenol			**120**	120
SVOCs	88-06-2	2,4,6-Trichlorophenol			**1.2**	1.2
SVOCs	120-83-2	2,4-Dichlorophenol			**4.6**	4.6
SVOCs	105-67-9	2,4-Dimethylphenol			**36**	36
SVOCs	51-28-5	2,4-Dinitrophenol			**3.9**	3.9
SVOCs	121-14-2	2,4-Dinitrotoluene	**0.12**		0.24	0.12
SVOCs	87-65-0	2,6-Dichlorophenol				---

Table 3-3
Screening Criteria

Sum Category	CAS Number	Parameter Name	FWCUG	MCL	RSL	Screening Criteria
SVOCs	606-20-2	2,6-Dinitrotoluene	**0.122**		0.049	0.122
SVOCs	53-96-3	2-Acetylaminofluorene			**0.016**	0.016
SVOCs	91-58-7	2-Chloronaphthalene			**75**	75
SVOCs	95-57-8	2-Chlorophenol			**9.1**	9.1
SVOCs	534-52-1	2-Methyl-4,6-dinitrophenol			**0.15**	0.15
SVOCs	91-57-6	2-Methylnaphthalene			**3.6**	3.6
SVOCs	95-48-7	2-Methylphenol			**93**	93
SVOCs	91-59-8	2-Naphthalenamine			**0.039**	0.039
SVOCs	88-74-4	2-Nitrobenzenamine			**19**	19
SVOCs	88-75-5	2-Nitrophenol				---
SVOCs	91-94-1	3,3'-Dichlorobenzidine			**0.13**	0.13
SVOCs	119-93-7	3,3'-Dimethylbenzidine			**0.0065**	0.0065
SVOCs	15831-10-4	3+4-Methylphenol				---
SVOCs	56-49-5	3-Methylcholanthrene			**0.0011**	0.0011
SVOCs	108-39-4	3-Methylphenol			**93**	93
SVOCs	99-09-2	3-Nitrobenzenamine				---
SVOCs	92-67-1	4-Aminobiphenyl			**0.003**	0.003
SVOCs	101-55-3	4-Bromophenyl phenyl ether				---
SVOCs	59-50-7	4-Chloro-3-methylphenol			**140**	140
SVOCs	106-47-8	4-Chlorobenzenamine			**0.37**	0.37
SVOCs	7005-72-3	4-Chlorophenyl phenyl ether				---
SVOCs	106-44-5	4-Methylphenol			**190**	190
SVOCs	100-01-6	4-Nitrobenzenamine	**3.13**		3.8	3.13
SVOCs	100-02-7	4-Nitrophenol				---
SVOCs	94-59-7	(Safrole)			**0.096**	0.096
SVOCs	99-55-8	5-Nitro-o-toluidine			**8.2**	8.2
SVOCs	57-97-6	7,12-Dimethylbenz(a)anthracene			**0.0001**	0.0001
SVOCs	83-32-9	Acenaphthene			**53**	53
SVOCs	208-96-8	Acenaphthylene				---
SVOCs	98-86-2	Acetophenone			**190**	190
SVOCs	120-12-7	Anthracene			**180**	180
SVOCs	1912-24-9	Atrazine		3	**0.3**	0.3
SVOCs	56-55-3	Benz(a)anthracene	**0.004**		0.012	0.004
SVOCs	100-52-7	Benzaldehyde			**190**	190
SVOCs	100-51-6	Benzenemethanol			**200**	200
SVOCs	50-32-8	Benzo(a)pyrene	**0.2**	0.2	0.0034	0.2
SVOCs	205-99-2	Benzo(b)fluoranthene	**0.002**		0.034	0.002
SVOCs	191-24-2	Benzo(ghi)perylene				---
SVOCs	207-08-9	Benzo(k)fluoranthene			**0.34**	0.34
SVOCs	65-85-0	Benzoic acid			**7500**	7500
SVOCs	111-91-1	bis(2-Chloroethoxy)methane			**5.9**	5.9
SVOCs	111-44-4	bis(2-Chloroethyl) ether			**0.014**	0.014
SVOCs	108-60-1	Bis(2-chloroisopropyl) ether			**71**	71
SVOCs	117-81-7	Bis(2-ethylhexyl)phthalate	**6**	6	5.6	6
SVOCs	85-68-7	Butyl benzyl phthalate			**16**	16
SVOCs	105-60-2	Caprolactam			**990**	990
SVOCs	86-74-8	Carbazole				---
SVOCs	510-15-6	Chlorobenzilate			**0.31**	0.31
SVOCs	218-01-9	Chrysene			**3.4**	3.4
SVOCs	2303-16-4	Diallate			**0.54**	0.54
SVOCs	53-70-3	Dibenz(a,h)anthracene	**0.002**		0.0034	0.002

Table 3-3
Screening Criteria

Sum Category	CAS Number	Parameter Name	FWCUG	MCL	RSL	Screening Criteria
SVOCs	132-64-9	Dibenzofuran			**0.79**	0.79
SVOCs	84-66-2	Diethyl phthalate			**1500**	1500
SVOCs	60-51-5	Dimethoate			**0.4**	0.4
SVOCs	131-11-3	Dimethyl phthalate				---
SVOCs	84-74-2	Di-n-butyl phthalate			**90**	90
SVOCs	117-84-0	Di-n-octylphthalate			**20**	20
SVOCs	122-39-4	Diphenylamine			**31**	31
SVOCs	298-04-4	Disulfoton			**0.05**	0.05
SVOCs	62-50-0	Ethyl methanesulfonate				---
SVOCs	52-85-7	Famphur				---
SVOCs	206-44-0	Fluoranthene			**80**	80
SVOCs	86-73-7	Fluorene			**29**	29
SVOCs	1888-71-7	Hexachloro-1-propene				---
SVOCs	118-74-1	Hexachlorobenzene		1	**0.0098**	0.0098
SVOCs	87-68-3	Hexachlorobutadiene (SVOC)			**0.14**	0.14
SVOCs	77-47-4	Hexachlorocyclopentadiene		50	**0.041**	0.041
SVOCs	67-72-1	Hexachloroethane			**0.33**	0.33
SVOCs	193-39-5	Indeno(1,2,3-cd)pyrene	**0.002**		0.034	0.002
SVOCs	78-59-1	Isophorone			**78**	78
SVOCs	120-58-1	Isosafrole				---
SVOCs	91-80-5	Methapyrilene				---
SVOCs	66-27-3	Methyl methanesulfonate			**0.79**	0.79
SVOCs	91-20-3	Naphthalene (SVOC)			**0.17**	0.17
SVOCs	98-95-3	Nitrobenzene	**0.521**		0.14	0.521
SVOCs	55-18-5	N-Nitrosodiethylamine			**0.00017**	0.00017
SVOCs	62-75-9	N-Nitrosodimethylamine			**0.00011**	0.00011
SVOCs	924-16-3	N-Nitroso-di-n-butylamine			**0.0027**	0.0027
SVOCs	621-64-7	N-Nitroso-di-n-propylamine			**0.011**	0.011
SVOCs	86-30-6	N-Nitrosodiphenylamine			**12**	12
SVOCs	10595-95-6	N-Nitrosomethylethylamine			**0.00071**	0.00071
SVOCs	100-75-4	N-Nitrosopiperidine			**0.0082**	0.0082
SVOCs	930-55-2	N-Nitrosopyrrolidine			**0.037**	0.037
SVOCs	126-68-1	O,O,O-Triethylphosphorothioate				---
SVOCs	95-53-4	o-Toluidine				---
SVOCs	60-11-7	p-Dimethylaminoazobenzene			**0.005**	0.005
SVOCs	608-93-5	Pentachlorobenzene			**0.32**	0.32
SVOCs	82-68-8	Pentachloronitrobenzene			**0.12**	0.12
SVOCs	87-86-5	Pentachlorophenol	**1**	1	0.041	1
SVOCs	62-44-2	Phenacetin			**34**	34
SVOCs	85-01-8	Phenanthrene				---
SVOCs	108-95-2	Phenol			**580**	580
SVOCs	64743-03-9	Phenols				---
SVOCs	298-02-2	Phorate			**0.3**	0.3
SVOCs	106-50-3	p-Phenylenediamine			**380**	380
SVOCs	23950-58-5	Pronamide			**120**	120
SVOCs	129-00-0	Pyrene			**12**	12
SVOCs	297-97-2	Thionazin				---
VOCs	630-20-6	1,1,1,2-Tetrachloroethane			**0.57**	0.57
VOCs	71-55-6	1,1,1-Trichloroethane		200	**800**	800
VOCs	79-34-5	1,1,2,2-Tetrachloroethane	**0.069**		0.076	0.069
VOCs	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane			**5500**	5500

Table 3-3
Screening Criteria

Sum Category	CAS Number	Parameter Name	FWCUG	MCL	RSL	Screening Criteria
VOCs	79-00-5	1,1,2-Trichloroethane		5	**0.041**	0.041
VOCs	75-34-3	1,1-Dichloroethane			**2.8**	2.8
VOCs	75-35-4	1,1-Dichloroethene		7	**28**	28
VOCs	563-58-6	1,1-Dichloropropene				---
VOCs	96-18-4	1,2,3-Trichloropropane			**0.00075**	0.00075
VOCs	120-82-1	1,2,4-Trichlorobenzene (VOC)		70	**0.4**	0.4
VOCs	96-12-8	1,2-Dibromo-3-chloropropane		0.2	**0.00033**	0.00033
VOCs	106-93-4	1,2-Dibromoethane		0.05	**0.0075**	0.0075
VOCs	95-50-1	1,2-Dichlorobenzene (VOC)		600	**30**	30
VOCs	107-06-2	1,2-Dichloroethane	**5**	5	0.17	5
VOCs	540-59-0	1,2-Dichloroethene				---
VOCs	78-87-5	1,2-Dichloropropane		5	**0.44**	0.44
VOCs	541-73-1	1,3-Dichlorobenzene (VOC)				---
VOCs	142-28-9	1,3-Dichloropropane			**37**	37
VOCs	106-46-7	1,4-Dichlorobenzene (VOC)		75	**0.48**	0.48
VOCs	594-20-7	2,2-Dichloropropane				---
VOCs	78-93-3	2-Butanone			**560**	560
VOCs	126-99-8	2-Chloro-1,3-butadiene			**0.019**	0.019
VOCs	110-75-8	2-Chloroethyl vinyl ether				---
VOCs	591-78-6	2-Hexanone			**3.8**	3.8
VOCs	1634-04-4	2-Methoxy-2-methylpropane			**14**	14
VOCs	108-10-1	4-Methyl-2-pentanone			**630**	630
VOCs	67-64-1	Acetone			**1400**	1400
VOCs	75-05-8	Acetonitrile			**13**	13
VOCs	107-02-8	Acrolein			**0.0042**	0.0042
VOCs	107-13-1	Acrylonitrile			**0.052**	0.052
VOCs	107-05-1	Allyl chloride			**0.21**	0.21
VOCs	71-43-2	Benzene	**5**	5	0.46	5
VOCs	74-97-5	Bromochloromethane			**8.3**	8.3
VOCs	75-27-4	Bromodichloromethane			**0.13**	0.13
VOCs	75-25-2	Bromoform			**3.3**	3.3
VOCs	74-83-9	Bromomethane			**0.75**	0.75
VOCs	75-15-0	Carbon disulfide			**81**	81
VOCs	56-23-5	Carbon tetrachloride	**5**	5	0.46	5
VOCs	108-90-7	Chlorobenzene		100	**7.8**	7.8
VOCs	75-00-3	Chloroethane			**2100**	2100
VOCs	67-66-3	Chloroform	**0.207**		0.22	0.207
VOCs	74-87-3	Chloromethane			**19**	19
VOCs	156-59-2	cis-1,2-Dichloroethene		70	**3.6**	3.6
VOCs	10061-01-5	cis-1,3-Dichloropropene				---
VOCs	98-82-8	Cumene			**45**	45
VOCs	110-82-7	Cyclohexane			**1300**	1300
VOCs	124-48-1	Dibromochloromethane			**0.87**	0.87
VOCs	74-95-3	Dibromomethane			**0.83**	0.83
VOCs	75-71-8	Dichlorodifluoromethane			**20**	20
VOCs	107-12-0	Ethyl cyanide				---
VOCs	97-63-2	Ethyl methacrylate			**63**	63
VOCs	100-41-4	Ethylbenzene		700	**1.5**	1.5
VOCs	74-88-4	Iodomethane				---
VOCs	78-83-1	Isobutanol			**590**	590
VOCs	126-98-7	Methacrylonitrile			**0.19**	0.19

Table 3-3
Screening Criteria

Sum Category	CAS Number	Parameter Name	FWCUG	MCL	RSL	Screening Criteria
VOCs	79-20-9	Methyl acetate			**2000**	2000
VOCs	80-62-6	Methyl methacrylate			**140**	140
VOCs	108-87-2	Methylcyclohexane				---
VOCs	75-09-2	Methylene chloride	**5.34**	5	11	5.34
VOCs	100-42-5	Styrene		100	**120**	120
VOCs	127-18-4	Tetrachloroethene	**5**	5	4.1	5
VOCs	108-88-3	Toluene		1000	**110**	110
VOCs	156-60-5	trans-1,2-Dichloroethene		100	**36**	36
VOCs	10061-02-6	trans-1,3-Dichloropropene				---
VOCs	110-57-6	trans-1,4-Dichloro-2-butene			**0.0013**	0.0013
VOCs	79-01-6	Trichloroethene	**5**	5	0.28	5
VOCs	75-69-4	Trichlorofluoromethane			**520**	520
VOCs	108-05-4	Vinyl acetate			**41**	41
VOCs	75-01-4	Vinyl chloride		2	**0.019**	0.019
VOCs	179601-23-1	Xylene, m+p				---
VOCs	95-47-6	Xylene, ortho			**19**	19
VOCs	1330-20-7	Xylenes, total		10000	**19**	19

Notes and Abbreviations:

FWCUG - Facility Wide Cleanup Goal, from the Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army ammunition Plant, Ravenna, Ohio, dated March 23, 2010, prepared by EQM.

MCL - U.S. EPA Maximum Contaminant Level

PCBs - Polychlorinated biphenyls

RSL - Regional Screening Level, from November 2015 (using a THQ=0.1, and HQ=10e-6).

SVOCs - Semivolatile Organic Compounds

VOCs - Volatile Organic Compounds

Highlighted and Bold values identify the screening value.

Note that the FWCUG for metals are not included in this table; these will be revised during the pending Remedial Investigation.

Load Line 1

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Table A10-1
Load Line 1 Groundwater Data Summary

Well	Zone Monitored	COC	Discussion
LL1mw-067	Sandstone bedrock	Aluminum	5 samples collected after the remedial action, all results < RSL, 4 results ND
		Antimony	5 samples collected after the remedial action, all results ND
		Arsenic	5 samples collected after the remedial action, 4 results ND
		Barium	5 samples collected after the remedial action, all results < RSL, no apparent trend
		Cadmium	5 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	5 samples collected after the remedial action, all results > RSL, no apparent trend
		Lead	5 samples collected after the remedial action, 4 results ND
		2,4,6-TNT	4 samples collected after the remedial action, all results ND
		RDX	4 samples collected after the remedial action, all results ND
		Aroclor-1254	4 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND
LL1mw-078	Sandstone bedrock	Aluminum	3 samples collected after the remedial action, all results < RSL
		Antimony	3 samples collected after the remedial action, 2 results ND, all results < RSL
		Arsenic	3 samples collected after the remedial action, 2 results ND
		Barium	3 samples collected after the remedial action, all results < RSL, no apparent trend
		Cadmium	3 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	3 samples collected after the remedial action, all results > RSL, no apparent trend
		Lead	3 samples collected after the remedial action, 2 results ND, all results < RSL
		2,4,6-TNT	2 samples collected after the remedial action, all results ND
		RDX	2 samples collected after the remedial action, 1 result ND, 1 result < FWCUG
		Aroclor-1254	2 samples collected after the remedial action, all results ND
		Benz(a)anthracene	2 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	2 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	2 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	2 samples collected after the remedial action, all results ND
LL1mw-081	Sandstone bedrock	Aluminum	6 samples collected after the remedial action, 5 results ND & 1 result estimated (< detection limit)
		Antimony	6 samples collected after the remedial action, all results ND
		Arsenic	6 samples collected after the remedial action, 5 results ND & 2 results estimated (< detection limit)
		Barium	6 samples collected after the remedial action, all results < RSL, no apparent trend
		Cadmium	6 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	1 sample collected since the remedial action, ND result
		Manganese	6 samples collected after the remedial action, all results > RSL, no apparent trend
		Lead	6 samples collected after the remedial action, all results ND
		2,4,6-TNT	5 samples collected after the remedial action, 3 results ND & 2 results estimated (< detection limit)
		RDX	5 samples collected after the remedial action, 3 results estimated (< detection limit), all results < FWCUG
		Aroclor-1254	4 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND
LL1mw-082	Sandstone bedrock	Aluminum	6 samples collected after the remedial action, 5 results ND
		Antimony	6 samples collected after the remedial action, all results ND
		Arsenic	6 samples collected after the remedial action, 3 results ND, 2 results estimated (< detection limit)
		Barium	6 samples collected after the remedial action, all results < RSL, no apparent trend
		Cadmium	6 samples collected after the remedial action, 1 result ND, 5 results estimated (< detection limit), all results < RSL
		Chromium (hexavalent)	1 sample collected since the remedial action, ND result
		Manganese	6 samples collected after the remedial action, all results > RSL, upward trend
		Lead	6 samples collected after the remedial action, 5 results ND
		2,4,6-TNT	5 samples collected after the remedial action, all results ND
		RDX	5 samples collected after the remedial action, 4 results ND
		Aroclor-1254	4 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND
LL1mw-084	Sandstone bedrock	Aluminum	11 samples collected after the remedial action, 10 results < RSL, downward trend
		Antimony	11 samples collected after the remedial action, all results ND
		Arsenic	11 samples collected after the remedial action, 9 results ND & 1 result estimated (< detection limit)
		Barium	11 samples collected after the remedial action, all results < RSL, no trend
		Cadmium	11 samples collected after the remedial action, all results > RSL, no trend
		Chromium (hexavalent)	1 sample collected since the remedial action, ND result
		Manganese	11 samples collected after the remedial action, all results > RSL, decreasing trend
		Lead	11 samples collected after the remedial action, 9 results ND
		2,4,6-TNT	10 samples collected after the remedial action, 9 results estimated (< detection limit), all results > FWCUG, no trend
		RDX	10 samples collected after the remedial action, 9 results estimated (< detection limit), 5 results > FWCUG, no trend
		Aroclor-1254	4 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND

Table A10-1
Load Line 1 Groundwater Data Summary

Well	Zone Monitored	COC	Discussion
LL1mw-085	Sandstone bedrock	Aluminum	6 samples collected after the remedial action, 5 results ND
		Antimony	6 samples collected after the remedial action, all results ND
		Arsenic	6 samples collected after the remedial action, all results < RSL
		Barium	6 samples collected after the remedial action, all results < RSL
		Cadmium	6 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	1 sample collected since the remedial action, ND result
		Manganese	6 samples collected after the remedial action, all results > RSL, upward trend
		Lead	6 samples collected after the remedial action, all results ND
		2,4,6-TNT	5 samples collected after the remedial action, all results ND
		RDX	5 samples collected after the remedial action, all results ND
		Aroclor-1254	4 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND

Notes:

FWCUG = Facility Wide Cleanup Goal from EQM, 2010, *Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant, Ravenna, Ohio.* March 23

ND = not detected

RSL = USEPA Regional Screeing Level from Table 3-3 Screening Criteria, *Draft Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Annual Report for 2015*. February 2016

Table A10-2
Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-067	LL1MW067-080107	8/1/2007	2,4,6-Trinitrotoluene	0.001	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	2,4,6-Trinitrotoluene	0.000099	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Aluminum	0.1	mg/L	
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Aluminum	0.05	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Aluminum	1.71	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Aluminum	0.05	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Aluminum	0.05	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Aluminum	0.05	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Aluminum	0.05	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Antimony	0.00088	mg/L	
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Antimony	0.002	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Antimony	0.00015	mg/L	UJ
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Antimony	0.002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Antimony	0.002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Antimony	0.002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Antimony	0.002	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Arsenic	0.001	mg/L	
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Arsenic	0.005	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Arsenic	0.0084	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Arsenic	0.005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Arsenic	0.005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Arsenic	0.005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Arsenic	0.005	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Barium	0.0203	mg/L	
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Barium	0.0195	mg/L	
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Barium	0.0277	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Barium	0.0112	mg/L	
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Barium	0.015	mg/L	
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Barium	0.0341	mg/L	
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Barium	0.0274	mg/L	
LL1mw-067	LL1MW067-080107	8/1/2007	Benz(a)anthracene	0.00549	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Benz(a)anthracene	0.00025	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Benzo(a)pyrene	0.00549	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Benzo(a)pyrene	0.00025	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Benzo(b)fluoranthene	0.00549	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Benzo(b)fluoranthene	0.00025	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Cadmium	0.01	mg/L	
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Cadmium	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Cadmium	0.0005	mg/L	U

Table A10-2
Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Cadmium	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Cadmium	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Cadmium	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Cadmium	0.0005	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Dibenz(a,h)anthracene	0.00549	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Dibenz(a,h)anthracene	0.00025	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Lead	0.001	mg/L	
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Lead	0.003	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Lead	0.0049	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Lead	0.003	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Lead	0.003	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Lead	0.003	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Lead	0.003	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Manganese	0.0454	mg/L	
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Manganese	0.0132	mg/L	
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Manganese	0.104	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Manganese	0.0131	mg/L	
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Manganese	0.0119	mg/L	
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Manganese	0.0677	mg/L	
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Manganese	0.085	mg/L	
LL1mw-067	LL1MW067-080107	8/1/2007	PCB-1254	0.00051	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	PCB-1254	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	PCB-1254	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	PCB-1254	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	PCB-1254	0.0005	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	RDX	0.001	mg/L	
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	RDX	0.0001	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	RDX	0.00011	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	RDX	0.000099	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	RDX	0.00011	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	2,4,6-Trinitrotoluene	0.00102	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Aluminum	0.1	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Aluminum	0.0698	mg/L	J
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Aluminum	0.253	mg/L	
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Aluminum	3.12	mg/L	
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Aluminum	0.11	mg/L	
LL1mw-078	LL1MW078-080207	8/2/2007	Antimony	0.000385	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Antimony	0.00024	mg/L	J
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Antimony	0.002	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Antimony	0.002	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Antimony	0.002	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Arsenic	0.001	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Arsenic	0.005	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Arsenic	0.005	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Arsenic	0.0071	mg/L	
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Arsenic	0.005	mg/L	U

Table A10-2
Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-078	LL1MW078-080207	8/2/2007	Barium	0.0115	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Barium	0.0163	mg/L	
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Barium	0.0093	mg/L	J
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Barium	0.0272	mg/L	
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Barium	0.0162	mg/L	
LL1mw-078	LL1MW078-080207	8/2/2007	Benz(a)anthracene	0.0051	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Benzo(a)pyrene	0.0051	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Benzo(b)fluoranthene	0.0051	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Cadmium	0.01	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Cadmium	0.0005	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Cadmium	0.0005	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Cadmium	0.0005	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Cadmium	0.0005	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Dibenz(a,h)anthracene	0.0051	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Lead	0.001	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Lead	0.003	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Lead	0.003	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Lead	0.0061	mg/L	
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Lead	0.003	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Manganese	0.0559	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Manganese	0.12	mg/L	
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Manganese	0.0338	mg/L	
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Manganese	0.159	mg/L	
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Manganese	0.071	mg/L	
LL1mw-078	LL1MW078-080207	8/2/2007	PCB-1254	0.0005	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	PCB-1254	0.0005	mg/L	UJ
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	PCB-1254	0.0005	mg/L	UJ
LL1mw-078	LL1MW078-080207	8/2/2007	RDX	0.00102	mg/L	
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	RDX	0.0001	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	RDX	0.000095	mg/L	J
LL1mw-081	LL1MW081-080207	8/2/2007	2,4,6-Trinitrotoluene	0.00102	mg/L	
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	2,4,6-Trinitrotoluene	0.000097	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	2,4,6-Trinitrotoluene	0.000057	mg/L	J
LL1mw-081	FWGLL1mw-081C-1765-GW	8/1/2011	2,4,6-Trinitrotoluene	0.00005	mg/L	J
LL1mw-081	LL1MW081-080207	8/2/2007	Aluminum	0.1	mg/L	
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Aluminum	0.05	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Aluminum	0.0262	mg/L	UJB
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Aluminum	0.05	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Aluminum	0.05	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Aluminum	0.05	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Aluminum	0.05	mg/L	U

Table A10-2
Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Aluminum	0.025	mg/L	J
LL1mw-081	LL1MW081-080207	8/2/2007	Antimony	0.001	mg/L	
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Antimony	0.00018	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Arsenic	0.00102	mg/L	
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Arsenic	0.005	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Arsenic	0.0044	mg/L	J
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Arsenic	0.005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Arsenic	0.005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Arsenic	0.005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Arsenic	0.005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Arsenic	0.0032	mg/L	J
LL1mw-081	LL1MW081-080207	8/2/2007	Barium	0.0236	mg/L	
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Barium	0.0168	mg/L	
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Barium	0.0188	mg/L	
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Barium	0.0182	mg/L	
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Barium	0.0195	mg/L	
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Barium	0.0206	mg/L	
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Barium	0.0214	mg/L	
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Barium	0.018	mg/L	
LL1mw-081	LL1MW081-080207	8/2/2007	Benz(a)anthracene	0.0051	mg/L	
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Benzo(a)pyrene	0.0051	mg/L	
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Benzo(b)fluoranthene	0.0051	mg/L	
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Cadmium	0.01	mg/L	
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Chromium, hexavalent	0.02	mg/L	UJ
LL1mw-081	LL1MW081-080207	8/2/2007	Dibenz(a,h)anthracene	0.0051	mg/L	
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U

Table A10-2
Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Lead	0.001	mg/L	
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Lead	0.003	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Lead	0.003	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Lead	0.003	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Lead	0.003	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Lead	0.003	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Lead	0.003	mg/L	U
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Lead	0.003	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Manganese	2.09	mg/L	
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Manganese	1.9	mg/L	
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Manganese	1.85	mg/L	
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Manganese	1.83	mg/L	
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Manganese	1.95	mg/L	
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Manganese	2.03	mg/L	
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Manganese	2.17	mg/L	
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Manganese	2	mg/L	
LL1mw-081	LL1MW081-080207	8/2/2007	PCB-1254	0.0005	mg/L	
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	PCB-1254	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	PCB-1254	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	PCB-1254	0.0005	mg/L	UJ
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	PCB-1254	0.0005	mg/L	UJ
LL1mw-081	LL1MW081-080207	8/2/2007	RDX	0.00102	mg/L	
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	RDX	0.001	mg/L	
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	RDX	0.00035	mg/L	J
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	RDX	0.0011	mg/L	J
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	RDX	0.0016	mg/L	
LL1mw-081	FWGLL1mw-081C-1765-GW	8/1/2011	RDX	0.0016	mg/L	J
LL1mw-082	LL1MW082-080207	8/2/2007	2,4,6-Trinitrotoluene	0.001	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	2,4,6-Trinitrotoluene	0.000098	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-082	FWGLL1mw-082C-1766-GW	8/1/2011	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Aluminum	0.1	mg/L	
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Aluminum	0.05	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Aluminum	5.2	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Aluminum	0.05	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Aluminum	0.05	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Aluminum	0.05	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Aluminum	0.05	mg/L	U
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Aluminum	0.05	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Antimony	0.001	mg/L	
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Antimony	0.002	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Antimony	0.00014	mg/L	UJ
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Antimony	0.002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Antimony	0.002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Antimony	0.002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Antimony	0.002	mg/L	U

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Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Antimony	0.002	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Arsenic	0.00191	mg/L	
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Arsenic	0.005	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Arsenic	0.018	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Arsenic	0.005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Arsenic	0.005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Arsenic	0.005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Arsenic	0.0036	mg/L	J
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Arsenic	0.0049	mg/L	J
LL1mw-082	LL1MW082-080207	8/2/2007	Barium	0.0103	mg/L	
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Barium	0.0118	mg/L	
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Barium	0.045	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Barium	0.0099	mg/L	J
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Barium	0.0096	mg/L	J
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Barium	0.0111	mg/L	
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Barium	0.0109	mg/L	
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Barium	0.01	mg/L	
LL1mw-082	LL1MW082-080207	8/2/2007	Benz(a)anthracene	0.0051	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Benzo(a)pyrene	0.0051	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Benzo(b)fluoranthene	0.0051	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Cadmium	0.01	mg/L	
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Cadmium	0.0005	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Cadmium	0.00032	mg/L	J
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Cadmium	0.00018	mg/L	J
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Cadmium	0.00019	mg/L	J
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Cadmium	0.0002	mg/L	J
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Cadmium	0.00017	mg/L	J
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Cadmium	0.0005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Chromium, hexavalent	0.02	mg/L	UJ
LL1mw-082	LL1MW082-080207	8/2/2007	Dibenz(a,h)anthracene	0.0051	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Lead	0.001	mg/L	
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Lead	0.003	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Lead	0.0237	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Lead	0.003	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Lead	0.003	mg/L	U

Table A10-2
Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Lead	0.003	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Lead	0.003	mg/L	U
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Lead	0.003	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Manganese	0.693	mg/L	
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Manganese	0.945	mg/L	
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Manganese	1	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Manganese	1.08	mg/L	
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Manganese	0.456	mg/L	
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Manganese	2.66	mg/L	
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Manganese	1.64	mg/L	
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Manganese	1.2	mg/L	
LL1mw-082	LL1MW082-080207	8/2/2007	PCB-1254	0.0005	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	PCB-1254	0.0005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	PCB-1254	0.0005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	PCB-1254	0.0005	mg/L	UJ
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	PCB-1254	0.0005	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	RDX	0.001	mg/L	
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	RDX	0.000098	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	RDX	0.0001	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	RDX	0.0001	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	RDX	0.00042	mg/L	
LL1mw-082	FWGLL1mw-082C-1766-GW	8/1/2011	RDX	0.0001	mg/L	UJ
LL1mw-084	LL1MW084-080207	8/2/2007	2,4,6-Trinitrotoluene	0.00918	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	2,4,6-Trinitrotoluene	0.0092	mg/L	J
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	2,4,6-Trinitrotoluene	0.01	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	2,4,6-Trinitrotoluene	0.009	mg/L	J
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	2,4,6-Trinitrotoluene	0.013	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	2,4,6-Trinitrotoluene	0.012	mg/L	J
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	2,4,6-Trinitrotoluene	0.0084	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	2,4,6-Trinitrotoluene	0.0098	mg/L	J
LL1mw-084	FWGLL1mw-084C-1768-GW	8/1/2011	2,4,6-Trinitrotoluene	0.0073	mg/L	
LL1mw-084	FWGLL1mw-084C-0355-GW	8/21/2013	2,4,6-Trinitrotoluene	0.012	mg/L	J
LL1mw-084	FWGLL1mw-084C-0392-GW	1/21/2014	2,4,6-Trinitrotoluene	0.012	mg/L	J
LL1mw-084	FWGLL1mw-084C-0465-GW	7/21/2014	2,4,6-Trinitrotoluene	0.01	mg/L	J
LL1mw-084	FWGLL1mw-084C-0522-GW	3/10/2015	2,4,6-Trinitrotoluene	0.012	mg/L	J
LL1mw-084	FWGLL1mw-084C-0584-GW	7/20/2015	2,4,6-Trinitrotoluene	0.0058	mg/L	J
LL1mw-084	LL1MW084-080207	8/2/2007	Aluminum	1.59	mg/L	
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Aluminum	0.53	mg/L	
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Aluminum	14.1	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Aluminum	0.335	mg/L	
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Aluminum	0.515	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Aluminum	0.465	mg/L	
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Aluminum	0.337	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Aluminum	0.357	mg/L	
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Aluminum	0.246	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Aluminum	0.244	mg/L	
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Aluminum	0.59	mg/L	
LL1mw-084	FWGLL1mw-084C-0355-GF	8/21/2013	Aluminum	1.3	mg/L	
LL1mw-084	FWGLL1mw-084C-0392-GF	1/21/2014	Aluminum	0.21	mg/L	
LL1mw-084	FWGLL1mw-084C-0465-GF	7/21/2014	Aluminum	0.22	mg/L	
LL1mw-084	FWGLL1mw-084C-0522-GF	3/10/2015	Aluminum	0.24	mg/L	

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Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-084	FWGLL1mw-084C-0584-GF	7/20/2015	Aluminum	0.44	mg/L	
LL1mw-084	LL1MW084-080207	8/2/2007	Antimony	0.000322	mg/L	
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Antimony	0.00029	mg/L	UJ
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-084C-0355-GF	8/21/2013	Antimony	0.001	mg/L	U
LL1mw-084	FWGLL1mw-084C-0392-GF	1/21/2014	Antimony	0.001	mg/L	U
LL1mw-084	FWGLL1mw-084C-0465-GF	7/21/2014	Antimony	0.001	mg/L	U
LL1mw-084	FWGLL1mw-084C-0522-GF	3/10/2015	Antimony	0.001	mg/L	U
LL1mw-084	FWGLL1mw-084C-0584-GF	7/20/2015	Antimony	0.001	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Arsenic	0.001	mg/L	
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Arsenic	0.0125	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Arsenic	0.0044	mg/L	J
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-0355-GF	8/21/2013	Arsenic	0.01	mg/L	U
LL1mw-084	FWGLL1mw-084C-0392-GF	1/21/2014	Arsenic	0.01	mg/L	U
LL1mw-084	FWGLL1mw-084C-0465-GF	7/21/2014	Arsenic	0.01	mg/L	U
LL1mw-084	FWGLL1mw-084C-0522-GF	3/10/2015	Arsenic	0.01	mg/L	U
LL1mw-084	FWGLL1mw-084C-0584-GF	7/20/2015	Arsenic	0.01	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Barium	0.0166	mg/L	
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Barium	0.0142	mg/L	
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Barium	0.0368	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Barium	0.014	mg/L	
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Barium	0.0161	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Barium	0.0155	mg/L	
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Barium	0.0178	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Barium	0.0188	mg/L	
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Barium	0.0167	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Barium	0.0171	mg/L	
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Barium	0.015	mg/L	
LL1mw-084	FWGLL1mw-084C-0355-GF	8/21/2013	Barium	0.018	mg/L	
LL1mw-084	FWGLL1mw-084C-0392-GF	1/21/2014	Barium	0.017	mg/L	
LL1mw-084	FWGLL1mw-084C-0465-GF	7/21/2014	Barium	0.016	mg/L	
LL1mw-084	FWGLL1mw-084C-0522-GF	3/10/2015	Barium	0.015	mg/L	J
LL1mw-084	FWGLL1mw-084C-0584-GF	7/20/2015	Barium	0.015	mg/L	B
LL1mw-084	LL1MW084-080207	8/2/2007	Benz(a)anthracene	0.0051	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Benz(a)anthracene	0.0002	mg/L	U

Table A10-2
Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Benzo(a)pyrene	0.0051	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Benzo(b)fluoranthene	0.0051	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Cadmium	0.01	mg/L	
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Cadmium	0.0019	mg/L	
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Cadmium	0.0019	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Cadmium	0.0016	mg/L	
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Cadmium	0.002	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Cadmium	0.002	mg/L	
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Cadmium	0.0018	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Cadmium	0.0019	mg/L	
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Cadmium	0.0015	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Cadmium	0.0015	mg/L	
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Cadmium	0.0015	mg/L	
LL1mw-084	FWGLL1mw-084C-0355-GF	8/21/2013	Cadmium	0.0014	mg/L	
LL1mw-084	FWGLL1mw-084C-0392-GF	1/21/2014	Cadmium	0.0012	mg/L	
LL1mw-084	FWGLL1mw-084C-0465-GF	7/21/2014	Cadmium	0.0017	mg/L	
LL1mw-084	FWGLL1mw-084C-0522-GF	3/10/2015	Cadmium	0.0017	mg/L	J
LL1mw-084	FWGLL1mw-084C-0584-GF	7/20/2015	Cadmium	0.0023	mg/L	
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Chromium, hexavalent	0.02	mg/L	UJ
LL1mw-084	LL1MW084-080207	8/2/2007	Dibenz(a,h)anthracene	0.0051	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Lead	0.00281	mg/L	
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Lead	0.003	mg/L	U
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Lead	0.0177	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Lead	0.003	mg/L	U

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Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Lead	0.003	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Lead	0.003	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Lead	0.0027	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Lead	0.003	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Lead	0.003	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Lead	0.003	mg/L	U
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Lead	0.003	mg/L	U
LL1mw-084	FWGLL1mw-084C-0355-GF	8/21/2013	Lead	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-0392-GF	1/21/2014	Lead	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-0465-GF	7/21/2014	Lead	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-0522-GF	3/10/2015	Lead	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-0584-GF	7/20/2015	Lead	0.0025	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Manganese	0.306	mg/L	
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Manganese	0.153	mg/L	
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Manganese	0.184	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Manganese	0.196	mg/L	
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Manganese	0.164	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Manganese	0.157	mg/L	
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Manganese	0.222	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Manganese	0.237	mg/L	
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Manganese	0.192	mg/L	
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Manganese	0.196	mg/L	
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Manganese	0.17	mg/L	
LL1mw-084	FWGLL1mw-084C-0355-GF	8/21/2013	Manganese	0.067	mg/L	
LL1mw-084	FWGLL1mw-084C-0392-GF	1/21/2014	Manganese	0.1	mg/L	J
LL1mw-084	FWGLL1mw-084C-0465-GF	7/21/2014	Manganese	0.15	mg/L	
LL1mw-084	FWGLL1mw-084C-0522-GF	3/10/2015	Manganese	0.14	mg/L	
LL1mw-084	FWGLL1mw-084C-0584-GF	7/20/2015	Manganese	0.1	mg/L	
LL1mw-084	LL1MW084-080207	8/2/2007	PCB-1254	0.000538	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	PCB-1254	0.0005	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	PCB-1254	0.0005	mg/L	UJ
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	PCB-1254	0.0005	mg/L	UJ
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	PCB-1254	0.0005	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	PCB-1254	0.0005	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	PCB-1254	0.0005	mg/L	UJ
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	PCB-1254	0.0005	mg/L	UJ
LL1mw-084	LL1MW084-080207	8/2/2007	RDX	0.00242	mg/L	
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	RDX	0.00076	mg/L	J
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	RDX	0.0001	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	RDX	0.000097	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	RDX	0.00069	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	RDX	0.00066	mg/L	J
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	RDX	0.00042	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	RDX	0.00049	mg/L	J
LL1mw-084	FWGLL1mw-084C-1768-GW	8/1/2011	RDX	0.00069	mg/L	J
LL1mw-084	FWGLL1mw-084C-0355-GW	8/21/2013	RDX	0.0021	mg/L	J
LL1mw-084	FWGLL1mw-084C-0392-GW	1/21/2014	RDX	0.0018	mg/L	J
LL1mw-084	FWGLL1mw-084C-0465-GW	7/21/2014	RDX	0.0015	mg/L	J
LL1mw-084	FWGLL1mw-084C-0522-GW	3/10/2015	RDX	0.00092	mg/L	J
LL1mw-084	FWGLL1mw-084C-0584-GW	7/20/2015	RDX	0.0013	mg/L	J
LL1mw-085	LL1MW085-080207	8/2/2007	2,4,6-Trinitrotoluene	0.00105	mg/L	

Table A10-2
Load Line 1 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GW	8/1/2011	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Aluminum	0.1	mg/L	
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Aluminum	0.05	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Aluminum	0.0322	mg/L	J
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Aluminum	0.05	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Aluminum	0.05	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Aluminum	0.05	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Aluminum	0.05	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Aluminum	0.05	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Antimony	0.000432	mg/L	
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Antimony	0.002	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Arsenic	0.00427	mg/L	
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Arsenic	0.005	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Arsenic	0.0137	mg/L	
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Arsenic	0.005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Arsenic	0.0057	mg/L	
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Arsenic	0.005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Arsenic	0.0057	mg/L	
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Arsenic	0.0048	mg/L	J
LL1mw-085	LL1MW085-080207	8/2/2007	Barium	0.016	mg/L	
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Barium	0.0161	mg/L	
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Barium	0.0232	mg/L	
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Barium	0.0134	mg/L	
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Barium	0.0176	mg/L	
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Barium	0.0163	mg/L	
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Barium	0.022	mg/L	
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Barium	0.016	mg/L	
LL1mw-085	LL1MW085-080207	8/2/2007	Benz(a)anthracene	0.005	mg/L	
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Benzo(a)pyrene	0.005	mg/L	
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Benzo(b)fluoranthene	0.005	mg/L	
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Benzo(b)fluoranthene	0.0002	mg/L	U

Table A10-2
Load Line 1 Groundwater Data

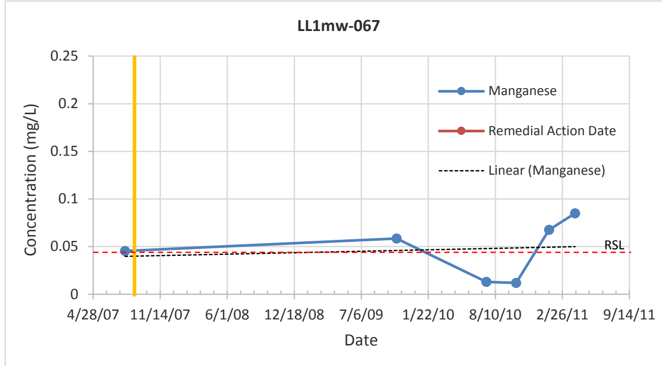
Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Cadmium	0.01	mg/L	
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Chromium, hexavalent	0.02	mg/L	UJ
LL1mw-085	LL1MW085-080207	8/2/2007	Dibenz(a,h)anthracene	0.005	mg/L	
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Lead	0.001	mg/L	
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Lead	0.003	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Lead	0.003	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Lead	0.003	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Lead	0.003	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Lead	0.003	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Lead	0.003	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Lead	0.003	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Manganese	0.613	mg/L	
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Manganese	0.546	mg/L	
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Manganese	0.575	mg/L	
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Manganese	0.564	mg/L	
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Manganese	0.638	mg/L	
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Manganese	0.179	mg/L	
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Manganese	1.18	mg/L	
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Manganese	0.84	mg/L	
LL1mw-085	LL1MW085-080207	8/2/2007	PCB-1254	0.00051	mg/L	
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	PCB-1254	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	PCB-1254	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	PCB-1254	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	PCB-1254	0.0005	mg/L	UJ
LL1mw-085	LL1MW085-080207	8/2/2007	RDX	0.00105	mg/L	
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	RDX	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	RDX	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	RDX	0.00011	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	RDX	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GW	8/1/2011	RDX	0.0001	mg/L	UJ

Table A10-3
Load Line 1 Groundwater Trend Plots

LL4mw-067
Manganese (mg/L)

Date	Result	
8/1/2007	0.0454	
10/19/2009	0.0586	mean of 2 results
7/14/2010	0.0131	
10/11/2010	0.0119	
1/17/2011	0.0677	
4/5/2011	0.085	

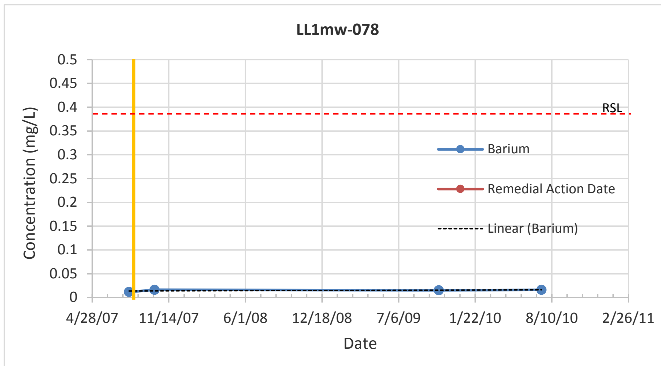
RSL = 0.043 mg/L



LL4mw-078
Barium (mg/L)

Date	Result	
8/2/2007	0.0115	
10/8/2007	0.0163	
10/19/2009	0.01525	mean of 2 results
7/14/2010	0.0162	

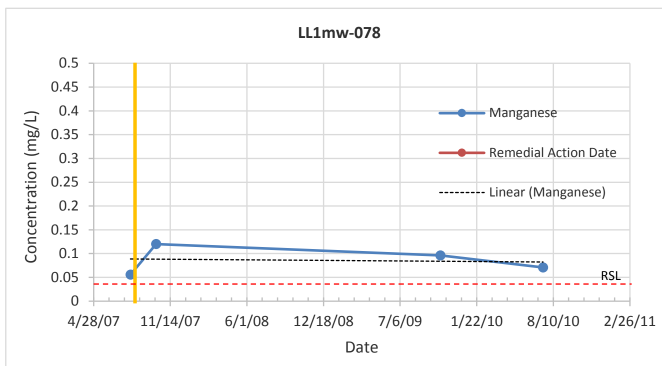
RSL = 0.38 mg/L



LL4mw-078
Manganese (mg/L)

Date	Result	
8/2/2007	0.0559	
10/8/2007	0.12	
10/19/2009	0.0964	mean of 2 results
7/14/2010	0.071	

RSL = 0.043 mg/L



LL4mw-078
Aluminum (mg/L)

Date	Result	
8/2/2007	0.1	
10/8/2007	0.0698	
10/19/2009	1.6865	mean of 2 results
7/14/2010	0.11	

RSL = 2 mg/L

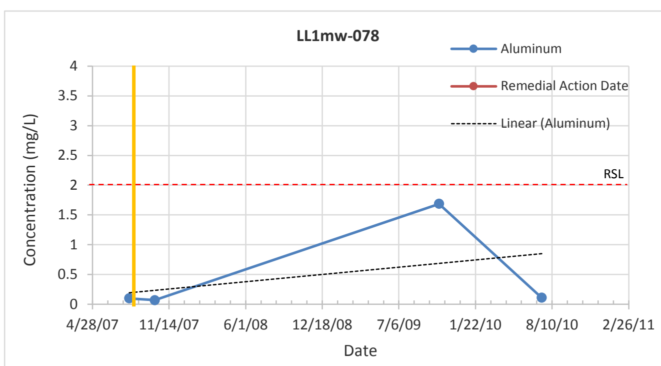
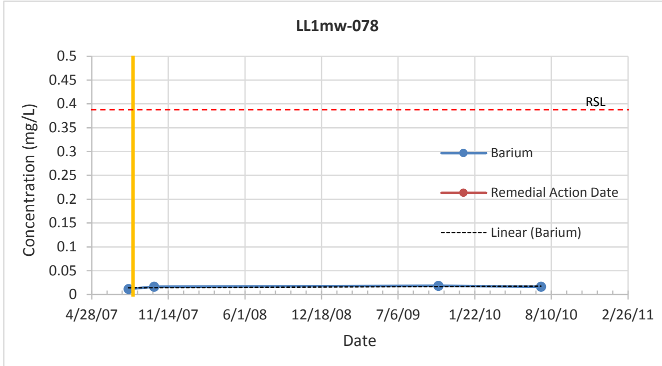


Table A10-3
Load Line 1 Groundwater Trend Plots

LL4mw-078
Barium (mg/L)

Date	Result	
8/2/2007	0.0115	
10/8/2007	0.0163	
10/19/2009	0.01825	mean of 2 results
7/14/2010	0.0162	

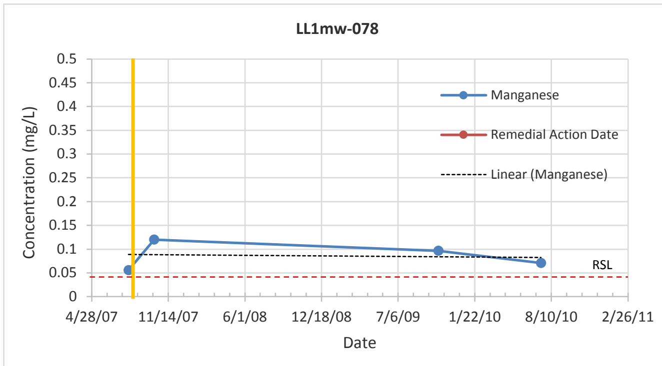
RSL = 0.38 mg/L



LL4mw-078
Manganese (mg/L)

Date	Result	
8/2/2007	0.0559	
10/8/2007	0.12	
10/19/2009	0.0964	mean of 2 results
7/14/2010	0.071	

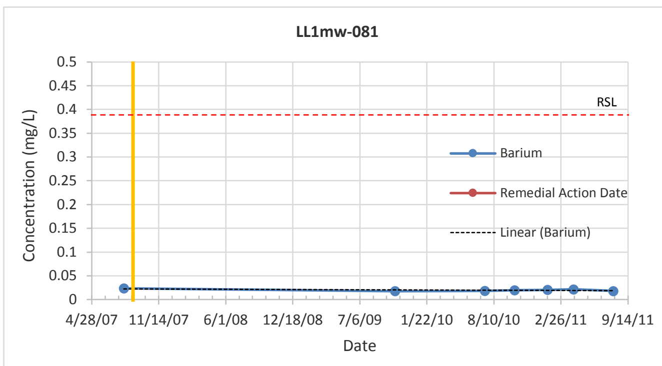
RSL = 0.043 mg/L



LL4mw-081
Barium (mg/L)

Date	Result	
8/2/2007	0.0236	
10/19/2009	0.0178	mean of 2 results
7/14/2010	0.0182	
10/11/2010	0.0195	
1/17/2011	0.0206	
4/5/2011	0.0214	
8/1/2011	0.018	

RSL = 0.38 mg/L



LL4mw-081
Manganese (mg/L)

Date	Result	
8/2/2007	2.09	
10/19/2009	1.875	mean of 2 results
7/14/2010	1.83	
10/11/2010	1.95	
1/17/2011	2.03	
4/5/2011	2.17	
8/1/2011	2	

RSL = 0.043 mg/L

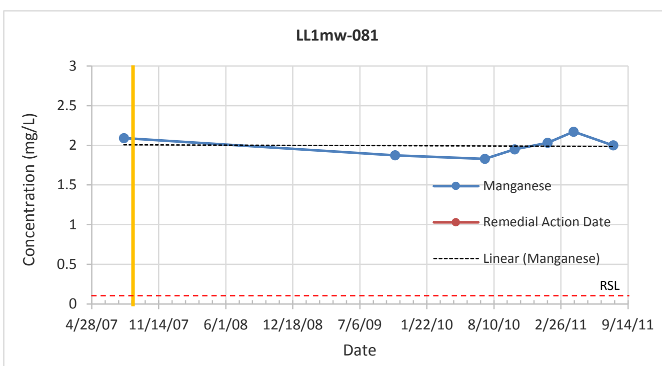
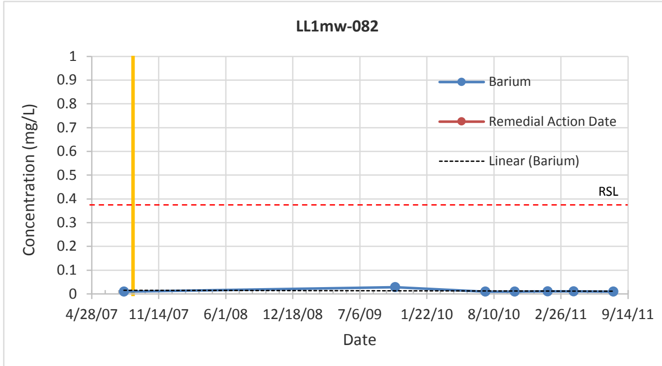


Table A10-3
Load Line 1 Groundwater Trend Plots

LL4mw-082
Barium (mg/L)

Date	Result	
8/2/2007	0.0103	
10/19/2009	0.0284	mean of 2 results
7/15/2010	0.0099	
10/11/2010	0.0096	
1/17/2011	0.0111	
4/5/2011	0.0109	
8/1/2011	0.01	

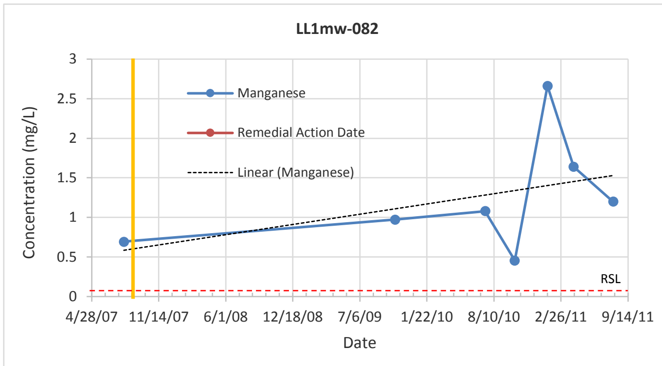
RSL = 0.38 mg/L



LL4mw-082
Manganese (mg/L)

Date	Result	
8/2/2007	0.693	
10/19/2009	0.9725	mean of 2 results
7/15/2010	1.08	
10/11/2010	0.456	
1/17/2011	2.66	
4/5/2011	1.64	
8/1/2011	1.2	

RSL = 0.043 mg/L



Mann-Kendall Test Using Normal Approximation for Small Sample Size

n	7	
S	9	
p	0.115	
α	0.1	
Ho:	No trend	
Ha:	Upward trend	
	p>α	Ho rejected at 90% level of confidence; upward trend

LL4mw-084
2,4,6-TNT (mg/L)

Date	Result	
8/2/2007	0.00918	
7/14/2010	0.0092	
10/11/2010	0.0095	mean of 2 results
1/17/2011	0.0125	mean of 2 results
4/5/2011	0.0091	mean of 2 results
8/1/2011	0.0073	
8/21/2013	0.012	
1/21/2014	0.012	
7/21/2014	0.01	
3/10/2015	0.012	
7/20/2015	0.0058	

FWCUG = 0.000521 mg/L

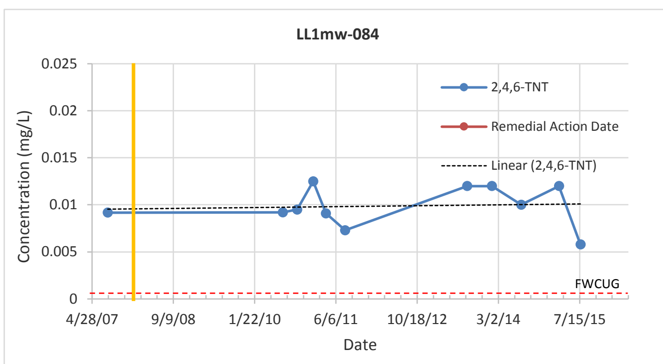
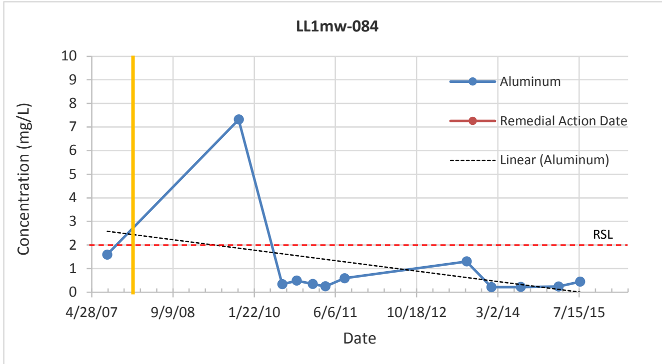


Table A10-3
Load Line 1 Groundwater Trend Plots

LL4mw-084
Aluminum (mg/L)

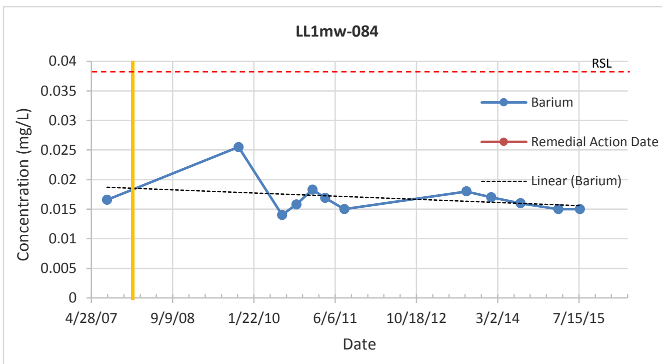
Date	Result	
8/2/2007	1.59	
10/19/2009	7.315	mean of 2 results
7/14/2010	0.335	
10/11/2010	0.49	mean of 2 results
1/17/2011	0.347	mean of 2 results
4/5/2011	0.245	
8/1/2011	0.59	
8/21/2013	1.3	
1/21/2014	0.21	
7/21/2014	0.22	
3/10/2015	0.24	
7/20/2015	0.44	



RSL =	2	mg/L
Mann-Kendall Test Using Normal Approximation for Larger Sample Size		
n	12	
s	-24	
g	0	No. tied groups
	2	No. data points in each tied group
v(s)	212.667	
z	-1.577	
Z(0.9)	-1.28	(Table B-15, EM 200-1-16)
Ho: No trend		
Ha: Downward trend		
Reject Ho if z < Z(0.9)		Ho rejected at 90% level of confidence, downward trend

LL4mw-084
Barium (mg/L)

Date	Result	
8/2/2007	0.0166	
10/19/2009	0.0255	mean of 2 results
7/14/2010	0.014	
10/11/2010	0.0158	mean of 2 results
1/17/2011	0.0183	mean of 2 results
4/5/2011	0.0169	mean of 2 results
8/1/2011	0.015	
8/21/2013	0.018	
1/21/2014	0.017	
7/21/2014	0.016	
3/10/2015	0.015	
7/20/2015	0.015	

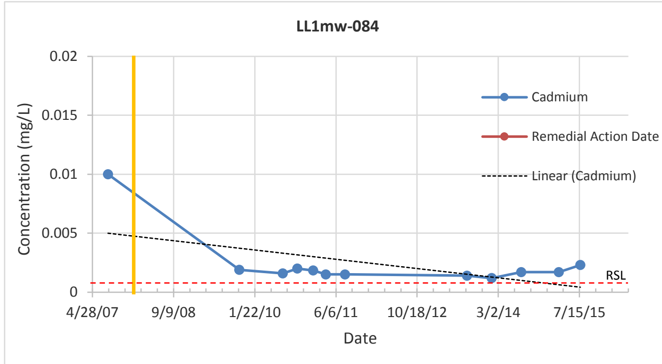


RSL =	0.38	mg/L
Mann-Kendall Test Using Normal Approximation for Larger Sample Size		
n	12	
s	-15	
g	3	No. tied groups
	2	No. data points in each tied group
v(s)	158.667	
z	-1.111	
Z(0.9)	-1.28	(Table B-15, EM 200-1-16)
Ho: No trend		
Ha: Downward trend		
Reject Ho if z < Z(0.9)		Ho accepted at 90% level of confidence, no trend

Table A10-3
Load Line 1 Groundwater Trend Plots

LL4mw-084
Cadmium (mg/L)

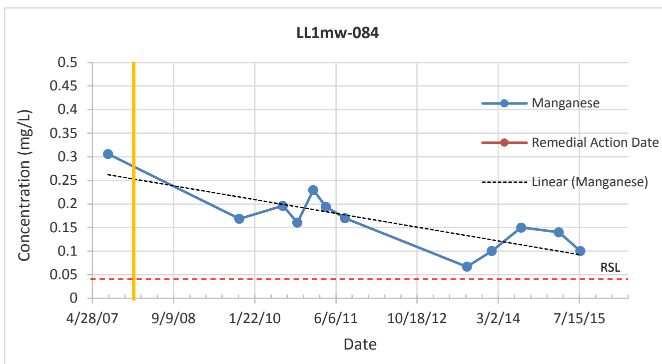
Date	Result	
8/2/2007	0.01	
10/19/2009	0.0019	mean of 2 results
7/14/2010	0.0016	
10/11/2010	0.002	mean of 2 results
1/17/2011	0.00185	mean of 2 results
4/5/2011	0.0015	mean of 2 results
8/1/2011	0.0015	
8/21/2013	0.0014	
1/21/2014	0.0012	
7/21/2014	0.0017	
3/10/2015	0.0017	
7/20/2015	0.0023	



RSL =	0.00092	mg/L
Mann-Kendall Test Using Normal Approximation for Larger Sample Size		
n	12	
s	-18	
g	2	No. tied groups
	2	No. data points in each tied group
v(s)	176.667	
z	-1.279	
Z(0.9)	-1.28	(Table B-15, EM 200-1-16)
Ho: No trend		
Ha: Downward trend		
Reject Ho if z < Z(0.9)		Ho accepted at 90% level of confidence, no trend

LL4mw-084
Manganese (mg/L)

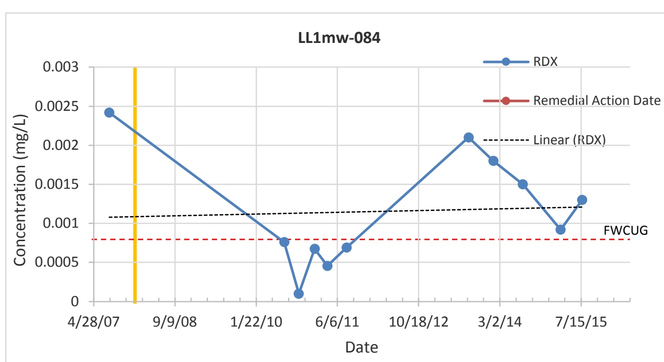
Date	Result	
8/2/2007	0.306	
10/19/2009	0.1685	mean of 2 results
7/14/2010	0.196	
10/11/2010	0.1605	mean of 2 results
1/17/2011	0.2295	mean of 2 results
4/5/2011	0.194	mean of 2 results
8/1/2011	0.17	
8/21/2013	0.067	
1/21/2014	0.1	
7/21/2014	0.15	
3/10/2015	0.14	
7/20/2015	0.1	



RSL =	0.043	mg/L
Mann-Kendall Test Using Normal Approximation for Larger Sample Size		
n	12	
s	-37	
v(s)	212.667	
z	-2.46861	
Z(0.9)	-1.28	(Table B-15, EM 200-1-16)
Ho: No trend		
Ha: Downward trend		
Reject Ho if z < Z(0.9)		Ho rejected at 90% level of confidence, downward trend

LL4mw-084
RDX (mg/L)

Date	Result	
8/2/2007	0.00242	
7/14/2010	0.00076	
10/11/2010	0.0000985	mean of 2 results
1/17/2011	0.000675	mean of 2 results
4/5/2011	0.000455	mean of 2 results
8/1/2011	0.00069	
8/21/2013	0.0021	
1/21/2014	0.0018	
7/21/2014	0.0015	
3/10/2015	0.00092	
7/20/2015	0.0013	



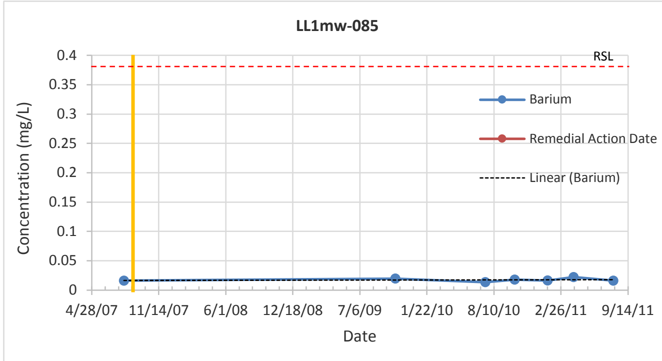
FWCUG = 0.000774 mg/L

Table A10-3
Load Line 1 Groundwater Trend Plots

LL4mw-085
Barium (mg/L)

Date	Result	
8/2/2007	0.016	
10/20/2009	0.01965	mean of 2 results
7/15/2010	0.0134	
10/11/2010	0.0176	
1/17/2011	0.0163	
4/5/2011	0.022	
8/1/2011	0.016	

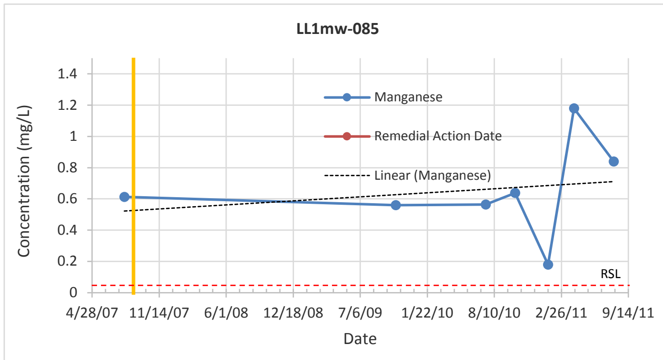
RSL = 0.38 mg/L



LL4mw-085
Manganese (mg/L)

Date	Result	
8/2/2007	0.613	
10/20/2009	0.5605	mean of 2 results
7/15/2010	0.564	
10/11/2010	0.638	
1/17/2011	0.179	
4/5/2011	1.18	
8/1/2011	0.84	

RSL = 0.043 mg/L



Mann-Kendall Test Using Normal Approximation for Small Sample Size

n	7	
S	7	
p	0.191	
α	0.1	
Ho:	No trend	
Ha:	Upward trend	
	p>α	Ho rejected at 90% level of confidence; upward trend

Notes:

FWCUG = Facility Wide Cleanup Goal from EQM, 2010, *Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant, Ravenna, Ohio.* March 23

RSL = USEPA Regional Screeing Level from Table 3-3 Screening Criteria, Draft Facility-Wide Groundwater Monitoring Program *RVAAP-66 Facility-Wide Groundwater Annual Report for 2015*. February 2016

(yellow) exceeds FWCUG or RSL

Load Line 2

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Table A10-4
Load Line 2 Groundwater Data Summary

Well	Zone Monitored	COC	Discussion
LL2mw-262	Sandstone bedrock	Aluminum	3 samples collected after the remedial action, 1 result ND, all results < RSL
		Antimony	3 samples collected after the remedial action, all results ND
		Arsenic	3 samples collected after the remedial action, 2 results ND
		Barium	3 samples collected after the remedial action, all results < RSL
		Cadmium	3 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	3 samples collected after the remedial action, all results > RSL
		Lead	3 samples collected after the remedial action, 2 results ND, all results < RSL
		2,4,6-TNT	2 samples collected after the remedial action, all results ND
		RDX	2 samples collected after the remedial action, all results ND
		Aroclor-1254	2 samples collected after the remedial action, all results ND
		Benz(a)anthracene	2 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	2 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	2 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	2 samples collected after the remedial action, all results ND
LL2mw-263		Aluminum	3 samples collected after the remedial action, 2 results ND, all results < RSL
		Antimony	3 samples collected after the remedial action, all results ND
		Arsenic	3 samples collected after the remedial action, all results > RSL
		Barium	3 samples collected after the remedial action, all results < RSL
		Cadmium	3 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	3 samples collected after the remedial action, all results > RSL
		Lead	3 samples collected after the remedial action, 2 results ND, 1 result estimated (< detection limit)
		2,4,6-TNT	2 samples collected after the remedial action, all results ND
		RDX	2 samples collected after the remedial action, all results ND
		Aroclor-1254	2 samples collected after the remedial action, all results ND
		Benz(a)anthracene	2 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	2 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	2 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	2 samples collected after the remedial action, all results ND
LL2mw-266		Aluminum	5 samples collected after the remedial action, 2 results ND, all results < RSL
		Antimony	5 samples collected after the remedial action, all results ND
		Arsenic	5 samples collected after the remedial action, 2 results ND, all results > RSL
		Barium	5 samples collected since the remedial action, all results < RSL
		Cadmium	5 samples collected after the remedial action, 2 results ND, all results < RSL
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	3 samples collected after the remedial action, all results > RSL
		Lead	5 samples collected after the remedial action, 4 results ND, all results < RSL
		2,4,6-TNT	4 samples collected after the remedial action, all results ND
		RDX	4 samples collected after the remedial action, all results ND
		Aroclor-1254	4 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND
LL2mw-267		Aluminum	10 samples collected after the remedial action, 6 results ND, 9 results < RSL
		Antimony	10 samples collected after the remedial action, 9 results ND, 1 result estimated (< detection limit)
		Arsenic	10 samples collected after the remedial action, 8 results ND
		Barium	10 samples collected after the remedial action, all results < RSL, downward trend
		Cadmium	10 samples collected after the remedial action, 9 results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	10 samples collected after the remedial action, all results > RSL, downward trend
		Lead	10 samples collected after the remedial action, 9 results ND, 1 result estimated (< detection limit)
		2,4,6-TNT	9 samples collected since the remedial action, 2 results > FWCUG, no trend
		RDX	9 samples collected since the remedial action, all results > FWCUG, no trend
		Aroclor-1254	4 samples collected since the remedial action, all results ND
		Benz(a)anthracene	4 samples collected since the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected since the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected since the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected since the remedial action, all results ND
LL2mw-269		Aluminum	5 samples collected after the remedial action, 4 results ND
		Antimony	5 samples collected after the remedial action, all results ND
		Arsenic	5 samples collected after the remedial action, all results ND
		Barium	5 samples collected after the remedial action, all results < RSL, downward trend
		Cadmium	5 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	10 samples collected after the remedial action, all results > RSL, downward trend
		Lead	5 samples collected after the remedial action, all results ND
		2,4,6-TNT	4 samples collected since the remedial action, all results ND
		RDX	4 samples collected since the remedial action, all results ND
		Aroclor-1254	4 samples collected since the remedial action, all results ND
		Benz(a)anthracene	4 samples collected since the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected since the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected since the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected since the remedial action, all results ND

Table A10-4
Load Line 2 Groundwater Data Summary

Notes:

FWCUG = Facility Wide Cleanup Goal from EQM, 2010, *Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant, Ravenna, Ohio.* March 23

ND = not detected

RSL = USEPA Regional Screeing Level from Table 3-3 Screening Criteria, Draft Facility-Wide Groundwater Monitoring Program *RVAAP-66 Facility-Wide Groundwater Annual Report for 2015*. February 2016

Table A10-5
Load Line 2 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL2mw-262	LL2MW262-080107	8/1/2007	2,4,6-Trinitrotoluene	0.00105	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	2,4,6-Trinitrotoluene	0.00106	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	2,4,6-Trinitrotoluene	0.000098	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Aluminum	0.1	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Aluminum	0.1	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Aluminum	0.05	mg/L	UJ
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Aluminum	0.05	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Aluminum	0.639	mg/L	
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Aluminum	0.0249	mg/L	J
LL2mw-262	LL2MW262-080107	8/1/2007	Antimony	0.000315	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Antimony	0.000422	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Antimony	0.002	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Antimony	0.002	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Antimony	0.00014	mg/L	UJ
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Antimony	0.002	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Arsenic	0.000312	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Arsenic	0.000268	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Arsenic	0.005	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Arsenic	0.005	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Arsenic	0.0375	mg/L	
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Arsenic	0.005	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Barium	0.0151	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Barium	0.0156	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Barium	0.0194	mg/L	
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Barium	0.0148	mg/L	
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Barium	0.0471	mg/L	
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Barium	0.0162	mg/L	
LL2mw-262	LL2MW262-080107	8/1/2007	Benz(a)anthracene	0.00538	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Benz(a)anthracene	0.00543	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Benzo(a)pyrene	0.00538	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Benzo(a)pyrene	0.00543	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Benzo(b)fluoranthene	0.00538	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Benzo(b)fluoranthene	0.00543	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Cadmium	0.01	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Cadmium	0.01	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Cadmium	0.0005	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Cadmium	0.0005	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Cadmium	0.00013	mg/L	UJ
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Cadmium	0.0005	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Dibenz(a,h)anthracene	0.00538	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Dibenz(a,h)anthracene	0.00543	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Lead	0.001	mg/L	

Table A10-5
Load Line 2 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Lead	0.001	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Lead	0.003	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Lead	0.003	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Lead	0.0018	mg/L	J
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Lead	0.003	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Manganese	0.291	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Manganese	0.263	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Manganese	0.922	mg/L	
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Manganese	1.12	mg/L	
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Manganese	6.24	mg/L	
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Manganese	0.0774	mg/L	
LL2mw-262	LL2MW262-080107	8/1/2007	PCB-1254	0.000526	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	PCB-1254	0.000532	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	PCB-1254	0.0005	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	PCB-1254	0.0005	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	RDX	0.00105	mg/L	
LL2mw-262	LL2MW262DUP-080107	8/1/2007	RDX	0.00106	mg/L	
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	RDX	0.00011	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	RDX	0.000098	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	2,4,6-Trinitrotoluene	0.00102	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	2,4,6-Trinitrotoluene	0.000098	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Aluminum	0.1	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Aluminum	0.05	mg/L	UJ
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Aluminum	0.0572	mg/L	B
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Aluminum	2.32	mg/L	
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Aluminum	0.05	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Antimony	0.001	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Antimony	0.002	mg/L	U
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Antimony	0.002	mg/L	U
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Antimony	0.00017	mg/L	UJ
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Antimony	0.002	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Arsenic	0.0104	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Arsenic	0.0168	mg/L	
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Arsenic	0.0172	mg/L	
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Arsenic	0.0227	mg/L	
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Arsenic	0.0154	mg/L	
LL2mw-263	LL2MW263-080107	8/1/2007	Barium	0.0311	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Barium	0.027	mg/L	
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Barium	0.0261	mg/L	
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Barium	0.0368	mg/L	
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Barium	0.0215	mg/L	
LL2mw-263	LL2MW263-080107	8/1/2007	Benz(a)anthracene	0.00538	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Benzo(a)pyrene	0.00538	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Benzo(b)fluoranthene	0.00538	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Benzo(b)fluoranthene	0.0002	mg/L	U

Table A10-5
Load Line 2 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL2mw-263	LL2MW263-080107	8/1/2007	Cadmium	0.01	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Cadmium	0.0005	mg/L	U
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Cadmium	0.0005	mg/L	U
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Cadmium	0.0005	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Cadmium	0.0005	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Dibenz(a,h)anthracene	0.00538	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Lead	0.001	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Lead	0.003	mg/L	U
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Lead	0.003	mg/L	U
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Lead	0.0017	mg/L	J
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Lead	0.003	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Manganese	0.837	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Manganese	1.59	mg/L	
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Manganese	2.14	mg/L	
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Manganese	2.1	mg/L	
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Manganese	1.45	mg/L	
LL2mw-263	LL2MW263-080107	8/1/2007	PCB-1254	0.000521	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	PCB-1254	0.0005	mg/L	UJ
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	PCB-1254	0.0005	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	RDX	0.00102	mg/L	
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	RDX	0.00011	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	RDX	0.000098	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	2,4,6-Trinitrotoluene	0.00103	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	2,4,6-Trinitrotoluene	0.00106	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	2,4,6-Trinitrotoluene	0.000099	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Aluminum	0.1	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Aluminum	0.1	mg/L	
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Aluminum	0.05	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Aluminum	5	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Aluminum	1.06	mg/L	
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Aluminum	0.0567	mg/L	
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Aluminum	0.05	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Aluminum	0.05	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Antimony	0.000452	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Antimony	0.001	mg/L	
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Antimony	0.002	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Antimony	0.00021	mg/L	UJB
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Antimony	0.002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Antimony	0.002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Antimony	0.002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Antimony	0.002	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Arsenic	0.00488	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Arsenic	0.00554	mg/L	
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Arsenic	0.005	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Arsenic	0.0177	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Arsenic	0.0056	mg/L	

Table A10-5
Load Line 2 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Arsenic	0.0042	mg/L	J
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Arsenic	0.005	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Arsenic	0.005	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Barium	0.0215	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Barium	0.0266	mg/L	
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Barium	0.01	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Barium	0.0352	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Barium	0.0191	mg/L	
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Barium	0.0155	mg/L	
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Barium	0.021	mg/L	
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Barium	0.0139	mg/L	
LL2mw-266	LL2MW266-080107	8/1/2007	Benz(a)anthracene	0.00532	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Benz(a)anthracene	0.00532	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Benzo(a)pyrene	0.00532	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Benzo(a)pyrene	0.00532	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Benzo(b)fluoranthene	0.00532	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Benzo(b)fluoranthene	0.00532	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Cadmium	0.01	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Cadmium	0.01	mg/L	
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Cadmium	0.00019	mg/L	J
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Cadmium	0.00079	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Cadmium	0.00024	mg/L	J
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Cadmium	0.00014	mg/L	J
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Cadmium	0.0005	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Cadmium	0.0005	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Dibenz(a,h)anthracene	0.00532	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Dibenz(a,h)anthracene	0.00532	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Lead	0.001	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Lead	0.001	mg/L	
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Lead	0.003	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Lead	0.006	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Lead	0.003	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Lead	0.003	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Lead	0.003	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Lead	0.003	mg/L	U

Table A10-5
Load Line 2 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL2mw-266	LL2MW266-080107	8/1/2007	Manganese	1.12	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Manganese	0.982	mg/L	
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Manganese	0.856	mg/L	
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Manganese	4.37	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Manganese	1.39	mg/L	
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Manganese	1.25	mg/L	
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Manganese	0.936	mg/L	
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Manganese	0.761	mg/L	J
LL2mw-266	LL2MW266-080107	8/1/2007	PCB-1254	0.000549	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	PCB-1254	0.000556	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	PCB-1254	0.0005	mg/L	UJ
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	PCB-1254	0.0005	mg/L	UJ
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	PCB-1254	0.0005	mg/L	UJ
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	PCB-1254	0.0005	mg/L	UJ
LL2mw-266	LL2MW266-080107	8/1/2007	RDX	0.00103	mg/L	
LL2mw-266	LL2MW266DUP-080107	8/1/2007	RDX	0.00106	mg/L	
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	RDX	0.0001	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	RDX	0.000099	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	RDX	0.00011	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	RDX	0.00011	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	2,4,6-Trinitrotoluene	0.00104	mg/L	
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	2,4,6-Trinitrotoluene	0.00027	mg/L	
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	2,4,6-Trinitrotoluene	0.00016	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	2,4,6-Trinitrotoluene	0.00012	mg/L	
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	2,4,6-Trinitrotoluene	0.00067	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	2,4,6-Trinitrotoluene	0.00056	mg/L	
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	2,4,6-Trinitrotoluene	0.00049	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	2,4,6-Trinitrotoluene	0.00047	mg/L	
LL2mw-267	FWGLL2mw-267C-0358-GW	8/21/2013	2,4,6-Trinitrotoluene	0.00054	mg/L	
LL2mw-267	FWGLL2mw-267c-0398-GW	1/21/2014	2,4,6-Trinitrotoluene	0.00044	mg/L	
LL2mw-267	FWGLL2mw-267C-0472-GW	7/23/2014	2,4,6-Trinitrotoluene	0.00049	mg/L	
LL2mw-267	FWGLL2mw-267C-0528-GW	3/11/2015	2,4,6-Trinitrotoluene	0.00038	mg/L	
LL2mw-267	FWGLL2mw-267C-0590-GW	7/23/2015	2,4,6-Trinitrotoluene	0.00035	mg/L	
LL2mw-267	LL2MW267-080107	8/1/2007	Aluminum	0.1	mg/L	
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Aluminum	0.0589	mg/L	B
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Aluminum	0.577	mg/L	
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Aluminum	0.05	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Aluminum	51.3	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Aluminum	43.9	mg/L	
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Aluminum	0.318	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Aluminum	0.367	mg/L	
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Aluminum	0.033	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Aluminum	0.0357	mg/L	J
LL2mw-267	FWGLL2mw-267C-0358-GF	8/21/2013	Aluminum	0.06	mg/L	U
LL2mw-267	FWGLL2mw-267c-0398-GF	1/21/2014	Aluminum	0.06	mg/L	U
LL2mw-267	FWGLL2mw-267C-0472-GF	7/23/2014	Aluminum	0.06	mg/L	U
LL2mw-267	FWGLL2mw-267C-0528-GF	3/11/2015	Aluminum	0.06	mg/L	U
LL2mw-267	FWGLL2mw-267C-0590-GF	7/23/2015	Aluminum	0.06	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Antimony	0.000525	mg/L	
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Antimony	0.00016	mg/L	UJ
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Antimony	0.002	mg/L	U

Table A10-5
Load Line 2 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Antimony	0.002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Antimony	0.0006	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Antimony	0.00056	mg/L	J
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Antimony	0.002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Antimony	0.002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Antimony	0.002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Antimony	0.002	mg/L	U
LL2mw-267	FWGLL2mw-267C-0358-GF	8/21/2013	Antimony	0.001	mg/L	U
LL2mw-267	FWGLL2mw-267c-0398-GF	1/21/2014	Antimony	0.001	mg/L	U
LL2mw-267	FWGLL2mw-267C-0472-GF	7/23/2014	Antimony	0.001	mg/L	U
LL2mw-267	FWGLL2mw-267C-0528-GF	3/11/2015	Antimony	0.00059	mg/L	U
LL2mw-267	FWGLL2mw-267C-0590-GF	7/23/2015	Antimony	0.001	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Arsenic	0.00438	mg/L	
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Arsenic	0.0081	mg/L	
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Arsenic	0.137	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Arsenic	0.102	mg/L	
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-0358-GF	8/21/2013	Arsenic	0.01	mg/L	U
LL2mw-267	FWGLL2mw-267c-0398-GF	1/21/2014	Arsenic	0.01	mg/L	U
LL2mw-267	FWGLL2mw-267C-0472-GF	7/23/2014	Arsenic	0.01	mg/L	U
LL2mw-267	FWGLL2mw-267C-0528-GF	3/11/2015	Arsenic	0.01	mg/L	U
LL2mw-267	FWGLL2mw-267C-0590-GF	7/23/2015	Arsenic	0.01	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Barium	0.0241	mg/L	
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Barium	0.0196	mg/L	
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Barium	0.0241	mg/L	
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Barium	0.0149	mg/L	
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Barium	0.274	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Barium	0.248	mg/L	
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Barium	0.0149	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Barium	0.0151	mg/L	
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Barium	0.0117	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Barium	0.0117	mg/L	
LL2mw-267	FWGLL2mw-267C-0358-GF	8/21/2013	Barium	0.011	mg/L	
LL2mw-267	FWGLL2mw-267c-0398-GF	1/21/2014	Barium	0.01	mg/L	
LL2mw-267	FWGLL2mw-267C-0472-GF	7/23/2014	Barium	0.0091	mg/L	
LL2mw-267	FWGLL2mw-267C-0528-GF	3/11/2015	Barium	0.0078	mg/L	
LL2mw-267	FWGLL2mw-267C-0590-GF	7/23/2015	Barium	0.0079	mg/L	
LL2mw-267	LL2MW267-080107	8/1/2007	Benz(a)anthracene	0.005	mg/L	
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Benzo(a)pyrene	0.005	mg/L	

Table A10-5
Load Line 2 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Benzo(b)fluoranthene	0.005	mg/L	
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Cadmium	0.01	mg/L	
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Cadmium	0.00097	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Cadmium	0.00075	mg/L	
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-0358-GF	8/21/2013	Cadmium	0.001	mg/L	U
LL2mw-267	FWGLL2mw-267c-0398-GF	1/21/2014	Cadmium	0.001	mg/L	U
LL2mw-267	FWGLL2mw-267C-0472-GF	7/23/2014	Cadmium	0.001	mg/L	U
LL2mw-267	FWGLL2mw-267C-0528-GF	3/11/2015	Cadmium	0.001	mg/L	U
LL2mw-267	FWGLL2mw-267C-0590-GF	7/23/2015	Cadmium	0.001	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Dibenz(a,h)anthracene	0.005	mg/L	
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Lead	0.001	mg/L	
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Lead	0.003	mg/L	U
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Lead	0.003	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Lead	0.003	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Lead	0.069	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Lead	0.048	mg/L	J
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Lead	0.003	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Lead	0.003	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Lead	0.003	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Lead	0.003	mg/L	U
LL2mw-267	FWGLL2mw-267C-0358-GF	8/21/2013	Lead	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267c-0398-GF	1/21/2014	Lead	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-0472-GF	7/23/2014	Lead	0.005	mg/L	U

Table A10-5
Load Line 2 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL2mw-267	FWGLL2mw-267C-0528-GF	3/11/2015	Lead	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-0590-GF	7/23/2015	Lead	0.005	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Manganese	0.594	mg/L	
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Manganese	0.652	mg/L	
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Manganese	0.673	mg/L	
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Manganese	0.622	mg/L	
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Manganese	2.85	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Manganese	2.24	mg/L	
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Manganese	0.547	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Manganese	0.551	mg/L	
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Manganese	0.564	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Manganese	0.568	mg/L	J
LL2mw-267	FWGLL2mw-267C-0358-GF	8/21/2013	Manganese	0.49	mg/L	
LL2mw-267	FWGLL2mw-267c-0398-GF	1/21/2014	Manganese	0.45	mg/L	J
LL2mw-267	FWGLL2mw-267C-0472-GF	7/23/2014	Manganese	0.49	mg/L	
LL2mw-267	FWGLL2mw-267C-0528-GF	3/11/2015	Manganese	0.49	mg/L	
LL2mw-267	FWGLL2mw-267C-0590-GF	7/23/2015	Manganese	0.46	mg/L	
LL2mw-267	LL2MW267-080107	8/1/2007	PCB-1254	0.000532	mg/L	
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	PCB-1254	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	LL2MW267-080107	8/1/2007	RDX	0.00104	mg/L	
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	RDX	0.0011	mg/L	
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	RDX	0.00093	mg/L	
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	RDX	0.00086	mg/L	J
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	RDX	0.0017	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	RDX	0.0015	mg/L	J
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	RDX	0.0013	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	RDX	0.0014	mg/L	
LL2mw-267	FWGLL2mw-267C-0358-GW	8/21/2013	RDX	0.0015	mg/L	
LL2mw-267	FWGLL2mw-267c-0398-GW	1/21/2014	RDX	0.0013	mg/L	
LL2mw-267	FWGLL2mw-267C-0472-GW	7/23/2014	RDX	0.0014	mg/L	
LL2mw-267	FWGLL2mw-267C-0528-GW	3/11/2015	RDX	0.0011	mg/L	
LL2mw-267	FWGLL2mw-267C-0590-GW	7/23/2015	RDX	0.0013	mg/L	
LL2mw-269	LL2MW269-073107	7/31/2007	2,4,6-Trinitrotoluene	0.00104	mg/L	
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	2,4,6-Trinitrotoluene	0.000098	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	2,4,6-Trinitrotoluene	0.000096	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Aluminum	0.1	mg/L	
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Aluminum	0.05	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Aluminum	0.448	mg/L	
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Aluminum	0.05	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Aluminum	0.05	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Aluminum	0.05	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Aluminum	0.05	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Antimony	0.001	mg/L	

Table A10-5
Load Line 2 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Antimony	0.002	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Antimony	0.002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Antimony	0.002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Antimony	0.002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Antimony	0.002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Antimony	0.002	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Arsenic	0.000623	mg/L	
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Arsenic	0.005	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Arsenic	0.0041	mg/L	J
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Arsenic	0.005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Arsenic	0.005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Arsenic	0.005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Arsenic	0.005	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Barium	0.263	mg/L	
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Barium	0.23	mg/L	
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Barium	0.289	mg/L	
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Barium	0.215	mg/L	
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Barium	0.216	mg/L	
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Barium	0.232	mg/L	
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Barium	0.218	mg/L	
LL2mw-269	LL2MW269-073107	7/31/2007	Benz(a)anthracene	0.00521	mg/L	
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Benz(a)anthracene	0.0002	mg/L	UJ
LL2mw-269	LL2MW269-073107	7/31/2007	Benzo(a)pyrene	0.00521	mg/L	
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Benzo(a)pyrene	0.0002	mg/L	UJ
LL2mw-269	LL2MW269-073107	7/31/2007	Benzo(b)fluoranthene	0.00521	mg/L	
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Benzo(b)fluoranthene	0.0002	mg/L	UJ
LL2mw-269	LL2MW269-073107	7/31/2007	Cadmium	0.01	mg/L	
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Cadmium	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Cadmium	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Cadmium	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Cadmium	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Cadmium	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Cadmium	0.0005	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Dibenz(a,h)anthracene	0.00521	mg/L	
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Dibenz(a,h)anthracene	0.0002	mg/L	UJ
LL2mw-269	LL2MW269-073107	7/31/2007	Lead	0.000423	mg/L	
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Lead	0.003	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Lead	0.003	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Lead	0.003	mg/L	U

Table A10-5
Load Line 2 Groundwater Data

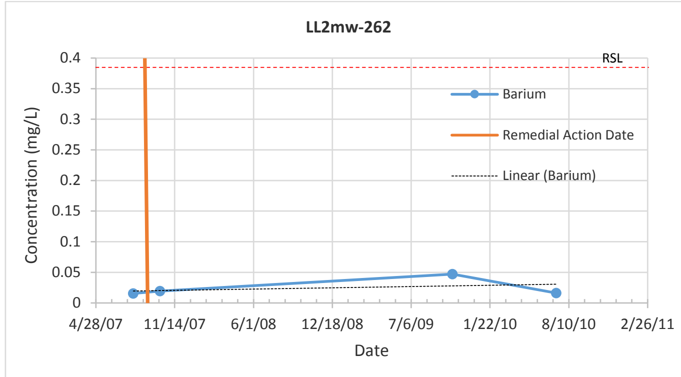
Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Lead	0.003	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Lead	0.003	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Lead	0.003	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Manganese	1.78	mg/L	
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Manganese	1.77	mg/L	
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Manganese	1.75	mg/L	
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Manganese	1.54	mg/L	
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Manganese	1.52	mg/L	
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Manganese	1.57	mg/L	
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Manganese	1.59	mg/L	J
LL2mw-269	LL2MW269-073107	7/31/2007	PCB-1254	0.00051	mg/L	
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	PCB-1254	0.0005	mg/L	UJ
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	PCB-1254	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	PCB-1254	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	PCB-1254	0.0005	mg/L	UJ
LL2mw-269	LL2MW269-073107	7/31/2007	RDX	0.00104	mg/L	
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	RDX	0.000098	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	RDX	0.000096	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	RDX	0.0001	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	RDX	0.0001	mg/L	U

Table A10-6
Load Line 2 Groundwater Trend Plots

LL2mw-262
Barium (mg/L)

Date	Result	
8/1/2007	0.0156	mean of 2 results
10/8/2007	0.0194	
10/19/2009	0.0471	mean of 2 results
7/9/2010	0.0162	

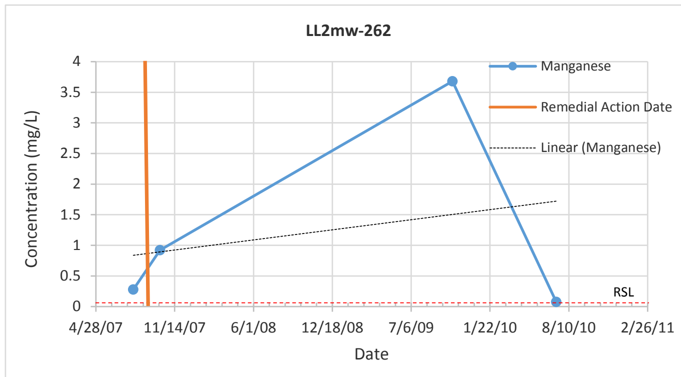
RSL = 0.38



LL2mw-262
Manganese (mg/L)

Date	Result	
8/1/2007		mean of 2 results
10/8/2007		
10/19/2009		mean of 2 results
7/9/2010		

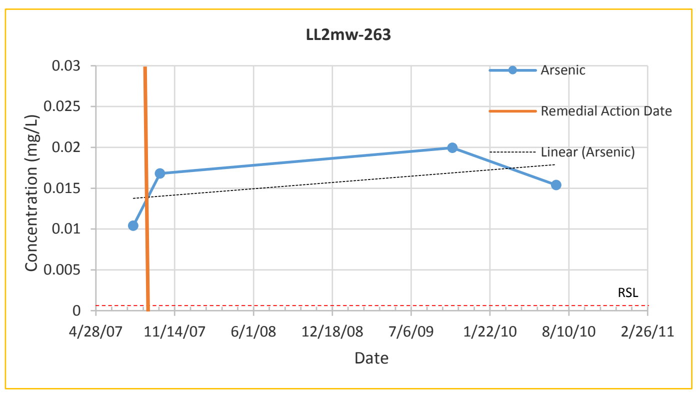
RSL = 0.043



LL2mw-263
Arsenic (mg/L)

Date	Result	
8/1/2007	0.0104	
10/8/2007	0.0168	
10/19/2009	0.01995	mean of 2 results
7/9/2010	0.0154	

RSL = 0.000521



LL2mw-263
Barium (mg/L)

Date	Result	
8/1/2007	0.0311	
10/8/2007	0.027	
10/19/2009	0.0261	mean of 2 results
7/9/2010	0.0215	

RSL = 0.38

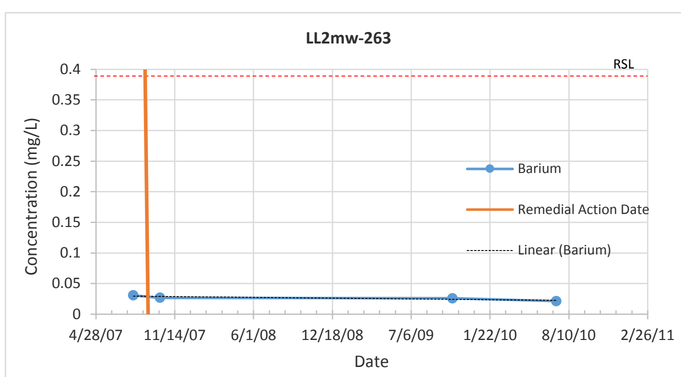
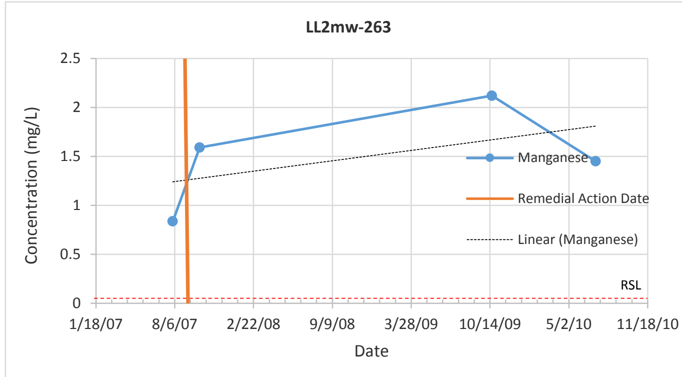


Table A10-6
Load Line 2 Groundwater Trend Plots

LL2mw-263
Manganese (mg/L)

Date	Result	
8/1/2007	0.837	
10/8/2007	1.59	
10/19/2009	2.12	mean of 2 results
7/9/2010	1.45	

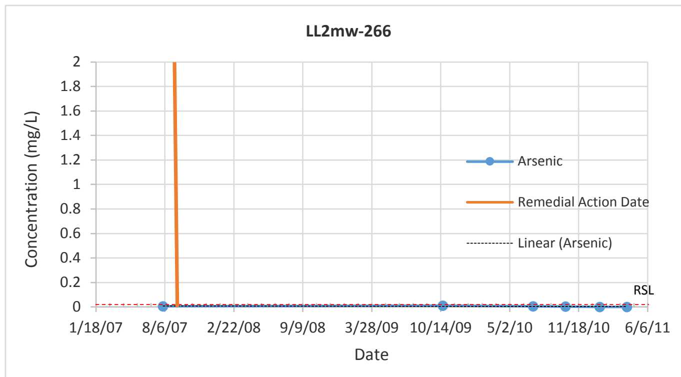
RSL = 0.043



LL2mw-266
Arsenic (mg/L)

Date	Result	
8/1/2007	0.00521	mean of 2 results
10/20/2009	0.01135	mean of 2 results
7/9/2010	0.0056	
10/11/2010	0.0042	
1/18/2011	0	ND
4/7/2011	0	ND

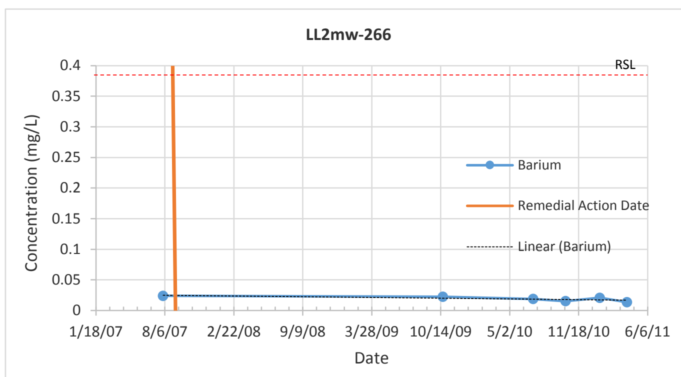
RSL = 0.000521



LL2mw-266
Barium (mg/L)

Date	Result	
8/1/2007	0.02405	mean of 2 results
10/20/2009	0.0226	mean of 2 results
7/9/2010	0.0191	
10/11/2010	0.0155	
1/18/2011	0.021	
4/7/2011	0.0139	

RSL = 0.38



LL2mw-266
Manganese (mg/L)

Date	Result	
8/1/2007	1.051	mean of 2 results
10/20/2009	2.613	mean of 2 results
7/9/2010	1.39	
10/11/2010	1.25	
1/18/2011	0.936	
4/7/2011	0.761	

RSL = 0.043

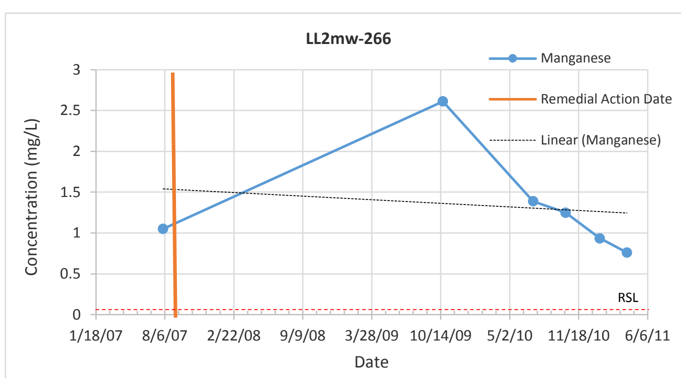
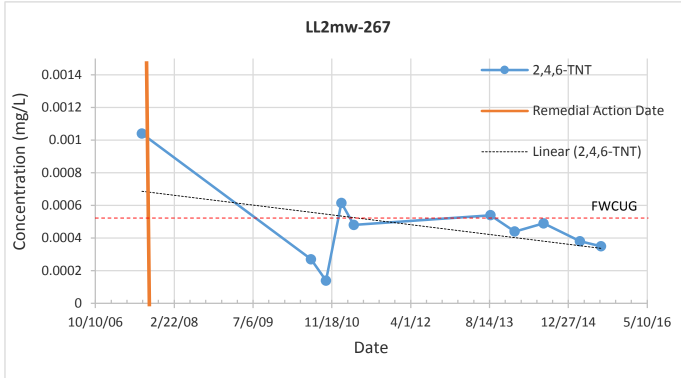


Table A10-6
Load Line 2 Groundwater Trend Plots

LL2mw-267
2,4,6-TNT (mg/L)

Date	Result	
8/1/2007	0.00104	
7/9/2010	0.00027	
10/12/2010	0.00014	mean of 2 results
1/18/2011	0.000615	mean of 2 results
4/7/2011	0.00048	mean of 2 results
8/21/2013	0.00054	
1/21/2014	0.00044	
7/23/2014	0.00049	
3/11/2015	0.00038	
7/23/2015	0.00035	

FWCUG = 0.000521



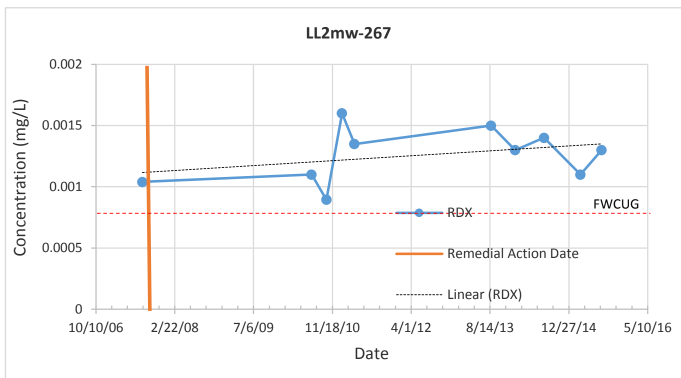
Mann-Kendall Test Using Normal Approximation for Larger Sample Size

n	10	
s	-11	
g	0	No. tied groups
	2	No. data points in each tied group
v(s)	125.0	
z	-0.894	
Z(0.9)	-1.28	(Table B-15, EM 200-1-16)
Ho:	No trend	
Ha:	Downward trend	
Reject Ho if z < Z(0.9)		Ho accepted at 90% level of confidence, no trend

LL2mw-267
RDX (mg/L)

Date	Result	
8/1/2007	0.00104	
7/9/2010	0.0011	
10/12/2010	0.000895	mean of 2 results
1/18/2011	0.0016	mean of 2 results
4/7/2011	0.00135	mean of 2 results
8/21/2013	0.0015	
1/21/2014	0.0013	
7/23/2014	0.0014	
3/11/2015	0.0011	
7/23/2015	0.0013	

FWCUG = 0.000774



Mann-Kendall Test Using Normal Approximation for Larger Sample Size

n	10	
s	7	
g	2	No. tied groups
	2	No. data points in each tied group
v(s)	89.0	
z	0.848	
Z(0.9)	1.28	(Table B-15, EM 200-1-16)
Ho:	No trend	
Ha:	Upward trend	
Reject Ho if z > Z(0.9)		Ho accepted at 90% level of confidence, no trend

LL2mw-267
Aluminum (mg/L)

Date	Result	
8/1/2007	0.1	
10/19/2009	0.31795	mean of 2 results
7/9/2010	0	ND
10/12/2010	47.6	mean of 2 results
1/18/2011	0.3425	mean of 2 results
4/7/2011	0.03435	mean of 2 results
8/21/2013	0	ND
1/21/2014	0	ND
7/23/2014	0	ND
3/11/2015	0	ND
7/23/2015	0	ND

RSL = 2 mg/L

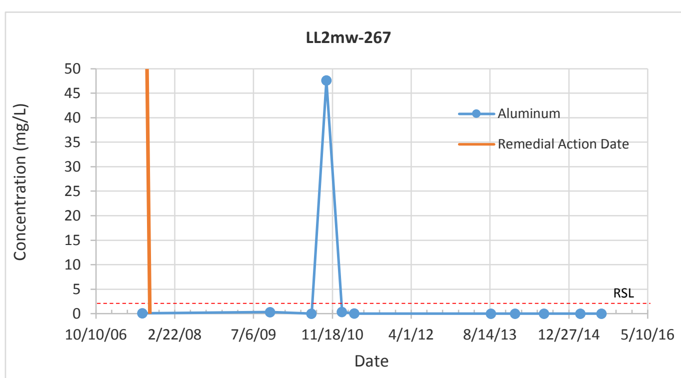
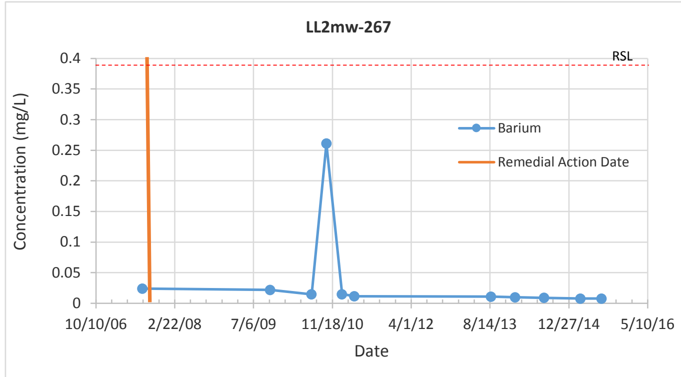


Table A10-6
Load Line 2 Groundwater Trend Plots

LL2mw-267
Barium (mg/L)

Date	Result	
8/1/2007	0.0241	
10/19/2009	0.02185	mean of 2 results
7/9/2010	0.0149	
10/12/2010	0.261	mean of 2 results
1/18/2011	0.015	mean of 2 results
4/7/2011	0.0117	mean of 2 results
8/21/2013	0.011	
1/21/2014	0.01	
7/23/2014	0.0091	
3/11/2015	0.0078	
7/23/2015	0.0079	

RSL = 0.38 mg/L



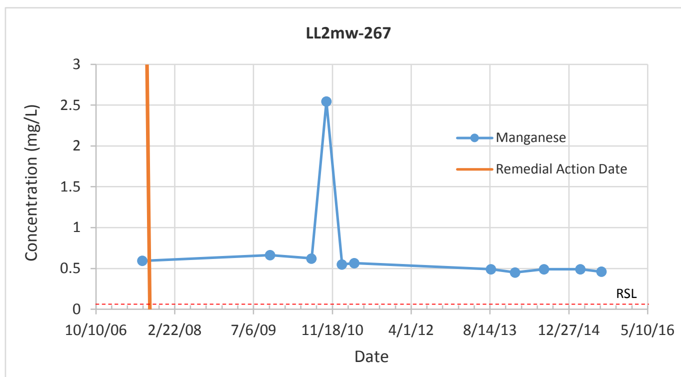
Mann-Kendall Test Using Normal Approximation for Larger Sample Size

n	11	
s	-45	
g	0	No. tied groups
	2	No. data points in each tied group
v(s)	165.0	
z	-3.425	
Z(0.9)	-1.28	(Table B-15, EM 200-1-16)
Ho:	No trend	
Ha:	Downward trend	
Reject Ho if z < Z(0.9)		Ho rejected at 90% level of confidence, downward trend

LL2mw-267
Manganese (mg/L)

Date	Result	
8/1/2007	0.594	
10/19/2009	0.6625	mean of 2 results
7/9/2010	0.622	
10/12/2010	2.545	mean of 2 results
1/18/2011	0.549	mean of 2 results
4/7/2011	0.566	mean of 2 results
8/21/2013	0.49	
1/21/2014	0.45	
7/23/2014	0.49	
3/11/2015	0.49	
7/23/2015	0.46	

RSL = 0.043 mg/L



Mann-Kendall Test Using Normal Approximation for Larger Sample Size

n	11	
s	-34	
g	3	No. tied groups
	2	No. data points in each tied group
v(s)	111.0	
z	-3.132	
Z(0.9)	-1.28	(Table B-15, EM 200-1-16)
Ho:	No trend	
Ha:	Downward trend	
Reject Ho if z < Z(0.9)		Ho rejected at 90% level of confidence, downward trend

LL2mw-269
Barium (mg/L)

Date	Result	
7/31/2007	0.263	
10/20/2009	0.2595	mean of 2 results
7/15/2010	0.215	
10/12/2010	0.216	
1/18/2011	0.232	
4/7/2011	0.218	

RSL = 0.38 mg/L

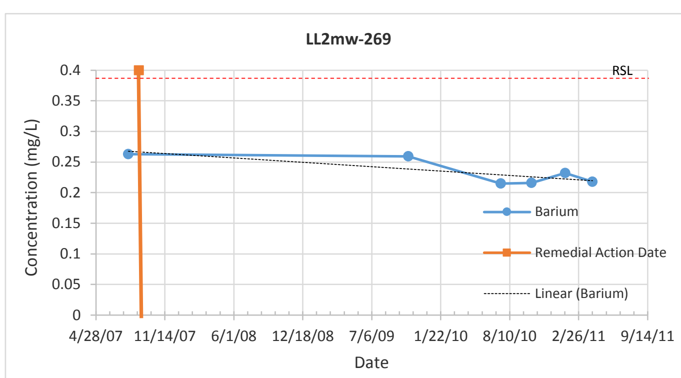


Table A10-6
Load Line 2 Groundwater Trend Plots

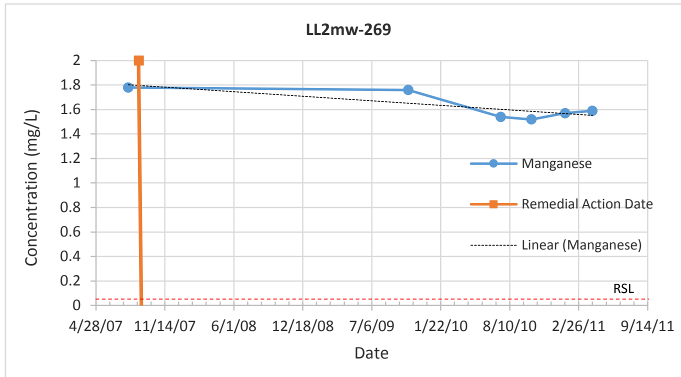
Mann-Kendall Test Using Normal Approximation for Small Sample Size

n	6	
S	-5	
p	-0.235	
α	-0.1	
Ho:	No trend	
Ha:	Downward trend	
	p>α	Ho rejected at 90% level of confidence; downward trend

LL2mw-269
Manganese (mg/L)

Date	Result	
7/31/2007	1.78	
10/20/2009	1.76	mean of 2 results
7/15/2010	1.54	
10/12/2010	1.52	
1/18/2011	1.57	
4/7/2011	1.59	

RSL = 0.043 mg/L



Mann-Kendall Test Using Normal Approximation for Small Sample Size

n	6	
S	-5	
p	-0.235	
α	-0.1	
Ho:	No trend	
Ha:	Downward trend	
	p>α	Ho rejected at 90% level of confidence; downward trend

Notes:

FWCUG = Facility Wide Cleanup Goal from EQM, 2010, *Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant, Ravenna, Ohio.* March 23

RSL = USEPA Regional Screeing Level from Table 3-3 Screening Criteria, *Draft Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Annual Report for 2015*. February 2016

(yellow) Exceeds FWCUG or RSL

Load Line 3

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Table A10-7
Load Line 3 Groundwater Data Summary

Well	Zone Monitored	COC	Discussion
LL3mw-236	Sandstone bedrock	Aluminum	6 samples collected after the remedial action, 4 results ND
		Antimony	6 samples collected after the remedial action, 5 results ND
		Arsenic	6 samples collected after the remedial action, all results ND
		Barium	6 samples collected after the remedial action, 4 results ND
		Cadmium	6 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	6 samples collected after the remedial action, all results > RSL, downward trend
		Lead	6 samples collected after the remedial action, all results ND
		2,4,6-TNT	5 samples collected after the remedial action, 1 result > FWCUG, downward trend
		RDX	5 samples collected after the remedial action, all results ND
		Aroclor-1254	4 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND
LL3mw-238	Sandstone bedrock	Aluminum	9 samples collected after the remedial action, 7 results ND
		Antimony	9 samples collected after the remedial action, 8 results ND
		Arsenic	9 samples collected after the remedial action, 8 results ND
		Barium	9 samples collected after the remedial action, all results < RSL, no apparent trend
		Cadmium	9 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	9 samples collected after the remedial action, 4 results ND, 2 results estimated (< detection limit)
		Lead	9 samples collected after the remedial action, 8 results ND
		2,4,6-TNT	8 samples collected after the remedial action, all results > FWCUG, downward trend
		RDX	8 samples collected after the remedial action, all results > FWCUG, downward trend
		Aroclor-1254	2 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND
LL3mw-239	Sandstone bedrock	Aluminum	5 samples collected after the remedial action, 2 results ND, all results < RSL
		Antimony	5 samples collected after the remedial action, all results ND
		Arsenic	5 samples collected after the remedial action, 2 results ND, 2 results estimated (< detection limit)
		Barium	5 samples collected after the remedial action, all results < RSL, no apparent trend
		Cadmium	5 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	5 samples collected after the remedial action, all results > RSL, downward trend
		Lead	5 samples collected after the remedial action, 4 results ND
		2,4,6-TNT	4 samples collected after the remedial action, all results < FWCUG, downward trend
		RDX	4 samples collected after the remedial action, 4 results > FWCUG, upward trend
		Aroclor-1254	4 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND

Notes:

FWCUG = Facility Wide Cleanup Goal from EQM, 2010, *Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant, Ravenna, Ohio.* March 23

ND = not detected

RSL = USEPA Regional Screeing Level from Table 3-3 Screening Criteria, *Draft Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Annual Report for 2015* . February 2016

Table A10-8
Load Line 3 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL3mw-236	LL3MW236-073107	7/31/2007	2,4,6-Trinitrotoluene	0.00105	mg/L	
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	2,4,6-Trinitrotoluene	0.00031	mg/L	J
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	2,4,6-Trinitrotoluene	0.00017	mg/L	
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	2,4,6-Trinitrotoluene	0.000084	mg/L	J
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	2,4,6-Trinitrotoluene	0.00018	mg/L	
LL3mw-236	FWGLL3mw-236C-1775-GW	8/4/2011	2,4,6-Trinitrotoluene	0.00037	mg/L	
LL3mw-236	LL3MW236-073107	7/31/2007	Aluminum	0.1	mg/L	
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Aluminum	0.05	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Aluminum	0.05	mg/L	
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Aluminum	0.05	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Aluminum	0.05	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Aluminum	0.05	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Aluminum	0.05	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Aluminum	0.04	mg/L	B
LL3mw-236	LL3MW236-073107	7/31/2007	Antimony	0.001	mg/L	
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Antimony	0.002	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Antimony	0.002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Antimony	0.00015	mg/L	J
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Antimony	0.002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Antimony	0.002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Antimony	0.002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Antimony	0.002	mg/L	U
LL3mw-236	LL3MW236-073107	7/31/2007	Arsenic	0.000277	mg/L	
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Arsenic	0.005	mg/L	U
LL3mw-236	LL3MW236-073107	7/31/2007	Barium	0.01	mg/L	
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Barium	0.0095	mg/L	J
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Barium	0.003	mg/L	B
LL3mw-236	LL3MW236-073107	7/31/2007	Benz(a)anthracene	0.00526	mg/L	
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Benz(a)anthracene	0.0002	mg/L	UJ
LL3mw-236	LL3MW236-073107	7/31/2007	Benzo(a)pyrene	0.00526	mg/L	
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Benzo(a)pyrene	0.0002	mg/L	UJ
LL3mw-236	LL3MW236-073107	7/31/2007	Benzo(b)fluoranthene	0.00526	mg/L	
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Benzo(b)fluoranthene	0.0002	mg/L	U

Table A10-8
Load Line 3 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Benzo(b)fluoranthene	0.0002	mg/L	UJ
LL3mw-236	LL3MW236-073107	7/31/2007	Cadmium	0.01	mg/L	
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Cadmium	0.0005	mg/L	U
LL3mw-236	LL3MW236-073107	7/31/2007	Dibenz(a,h)anthracene	0.00526	mg/L	
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Dibenz(a,h)anthracene	0.0002	mg/L	UJ
LL3mw-236	LL3MW236-073107	7/31/2007	Lead	0.001	mg/L	
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Lead	0.003	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Lead	0.003	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Lead	0.003	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Lead	0.003	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Lead	0.003	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Lead	0.003	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Lead	0.003	mg/L	U
LL3mw-236	LL3MW236-073107	7/31/2007	Manganese	0.599	mg/L	
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Manganese	0.0039	mg/L	J
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Manganese	2.13	mg/L	
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Manganese	0.235	mg/L	
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Manganese	0.24	mg/L	
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Manganese	0.129	mg/L	
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Manganese	0.344	mg/L	J
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Manganese	0.97	mg/L	
LL3mw-236	LL3MW236-073107	7/31/2007	PCB-1254	0.000562	mg/L	
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	PCB-1254	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	PCB-1254	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	PCB-1254	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	PCB-1254	0.0005	mg/L	UJ
LL3mw-236	LL3MW236-073107	7/31/2007	RDX	0.00105	mg/L	
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	RDX	0.000098	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	RDX	0.00011	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	RDX	0.0001	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	RDX	0.0001	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GW	8/4/2011	RDX	0.0001	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	2,4,6-Trinitrotoluene	0.0642	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	2,4,6-Trinitrotoluene	0.096	mg/L	J
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	2,4,6-Trinitrotoluene	0.069	mg/L	
LL3mw-238	FWGLL3mw-238C-1776-GW	8/3/2011	2,4,6-Trinitrotoluene	0.095	mg/L	J
LL3mw-238	FWGLL3mw-238C-0359-GW	8/19/2013	2,4,6-Trinitrotoluene	0.079	mg/L	
LL3mw-238	FWGLL3mw-238C-0400-GW	1/21/2014	2,4,6-Trinitrotoluene	0.12	mg/L	J
LL3mw-238	FWGLL3mw-238C-0474-GW	7/23/2014	2,4,6-Trinitrotoluene	0.062	mg/L	
LL3mw-238	FWGLL3mw-238C-0530-GW	3/11/2015	2,4,6-Trinitrotoluene	0.045	mg/L	J
LL3mw-238	FWGLL3mw-238C-0592-GW	7/20/2015	2,4,6-Trinitrotoluene	0.055	mg/L	J

Table A10-8
Load Line 3 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL3mw-238	LL3MW238-073107	7/31/2007	Aluminum	0.1	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Aluminum	0.0165	mg/L	J
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Aluminum	0.0583	mg/L	
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Aluminum	5.84	mg/L	
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Aluminum	0.05	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Aluminum	0.05	mg/L	UJ
LL3mw-238	FWGLL3mw-238C-0359-GF	8/19/2013	Aluminum	0.027	mg/L	J
LL3mw-238	FWGLL3mw-238C-0400-GF	1/21/2014	Aluminum	0.06	mg/L	U
LL3mw-238	FWGLL3mw-238C-0474-GF	7/23/2014	Aluminum	0.06	mg/L	U
LL3mw-238	FWGLL3mw-238C-0530-GF	3/11/2015	Aluminum	0.06	mg/L	U
LL3mw-238	FWGLL3mw-238C-0592-GF	7/20/2015	Aluminum	0.079	mg/L	
LL3mw-238	LL3MW238-073107	7/31/2007	Antimony	0.001	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Antimony	0.002	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Antimony	0.002	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Antimony	0.00026	mg/L	J
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Antimony	0.002	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Antimony	0.002	mg/L	U
LL3mw-238	FWGLL3mw-238C-0359-GF	8/19/2013	Antimony	0.001	mg/L	U
LL3mw-238	FWGLL3mw-238C-0400-GF	1/21/2014	Antimony	0.001	mg/L	U
LL3mw-238	FWGLL3mw-238C-0474-GF	7/23/2014	Antimony	0.001	mg/L	U
LL3mw-238	FWGLL3mw-238C-0530-GF	3/11/2015	Antimony	0.001	mg/L	U
LL3mw-238	FWGLL3mw-238C-0592-GF	7/20/2015	Antimony	0.001	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Arsenic	0.000434	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Arsenic	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Arsenic	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Arsenic	0.0117	mg/L	
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Arsenic	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Arsenic	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-0359-GF	8/19/2013	Arsenic	0.01	mg/L	U
LL3mw-238	FWGLL3mw-238C-0400-GF	1/21/2014	Arsenic	0.01	mg/L	U
LL3mw-238	FWGLL3mw-238C-0474-GF	7/23/2014	Arsenic	0.01	mg/L	U
LL3mw-238	FWGLL3mw-238C-0530-GF	3/11/2015	Arsenic	0.01	mg/L	U
LL3mw-238	FWGLL3mw-238C-0592-GF	7/20/2015	Arsenic	0.01	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Barium	0.01	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Barium	0.0067	mg/L	J
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Barium	0.0108	mg/L	
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Barium	0.0416	mg/L	
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Barium	0.0089	mg/L	J
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Barium	0.0084	mg/L	J
LL3mw-238	FWGLL3mw-238C-0359-GF	8/19/2013	Barium	0.0079	mg/L	
LL3mw-238	FWGLL3mw-238C-0400-GF	1/21/2014	Barium	0.0081	mg/L	
LL3mw-238	FWGLL3mw-238C-0474-GF	7/23/2014	Barium	0.0073	mg/L	
LL3mw-238	FWGLL3mw-238C-0530-GF	3/11/2015	Barium	0.0051	mg/L	
LL3mw-238	FWGLL3mw-238C-0592-GF	7/20/2015	Barium	0.0076	mg/L	B
LL3mw-238	LL3MW238-073107	7/31/2007	Benz(a)anthracene	0.0051	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Benzo(a)pyrene	0.0051	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Benzo(b)fluoranthene	0.0051	mg/L	

Table A10-8
Load Line 3 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Cadmium	0.01	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Cadmium	0.0005	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Cadmium	0.0005	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Cadmium	0.0005	mg/L	U
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Cadmium	0.0005	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Cadmium	0.0005	mg/L	U
LL3mw-238	FWGLL3mw-238C-0359-GF	8/19/2013	Cadmium	0.001	mg/L	U
LL3mw-238	FWGLL3mw-238C-0400-GF	1/21/2014	Cadmium	0.001	mg/L	U
LL3mw-238	FWGLL3mw-238C-0474-GF	7/23/2014	Cadmium	0.001	mg/L	U
LL3mw-238	FWGLL3mw-238C-0530-GF	3/11/2015	Cadmium	0.001	mg/L	U
LL3mw-238	FWGLL3mw-238C-0592-GF	7/20/2015	Cadmium	0.001	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Dibenz(a,h)anthracene	0.0051	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Lead	0.001	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Lead	0.003	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Lead	0.003	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Lead	0.0056	mg/L	
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Lead	0.003	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Lead	0.003	mg/L	U
LL3mw-238	FWGLL3mw-238C-0359-GF	8/19/2013	Lead	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-0400-GF	1/21/2014	Lead	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-0474-GF	7/23/2014	Lead	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-0530-GF	3/11/2015	Lead	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-0592-GF	7/20/2015	Lead	0.005	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Manganese	0.01	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Manganese	0.0019	mg/L	J
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Manganese	0.0056	mg/L	J
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Manganese	0.279	mg/L	
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Manganese	0.01	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Manganese	0.0012	mg/L	J
LL3mw-238	FWGLL3mw-238C-0359-GF	8/19/2013	Manganese	0.0026	mg/L	B
LL3mw-238	FWGLL3mw-238C-0400-GF	1/21/2014	Manganese	0.005	mg/L	UJ
LL3mw-238	FWGLL3mw-238C-0474-GF	7/23/2014	Manganese	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-0530-GF	3/11/2015	Manganese	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-0592-GF	7/20/2015	Manganese	0.0031	mg/L	B
LL3mw-238	LL3MW238-073107	7/31/2007	PCB-1254	0.00051	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	PCB-1254	0.0005	mg/L	UJ
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	PCB-1254	0.0005	mg/L	UJ
LL3mw-238	LL3MW238-073107	7/31/2007	RDX	0.00842	mg/L	
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	RDX	0.0066	mg/L	J
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	RDX	0.011	mg/L	J
LL3mw-238	FWGLL3mw-238C-1776-GW	8/3/2011	RDX	0.0048	mg/L	J
LL3mw-238	FWGLL3mw-238C-0359-GW	8/19/2013	RDX	0.0072	mg/L	
LL3mw-238	FWGLL3mw-238C-0400-GW	1/21/2014	RDX	0.0058	mg/L	J
LL3mw-238	FWGLL3mw-238C-0474-GW	7/23/2014	RDX	0.0064	mg/L	J
LL3mw-238	FWGLL3mw-238C-0530-GW	3/11/2015	RDX	0.0045	mg/L	J
LL3mw-238	FWGLL3mw-238C-0592-GW	7/20/2015	RDX	0.0068	mg/L	J
LL3mw-239	LL3MW239-073007	7/30/2007	2,4,6-Trinitrotoluene	0.00105	mg/L	

Table A10-8
Load Line 3 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	2,4,6-Trinitrotoluene	0.00026	mg/L	J
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	2,4,6-Trinitrotoluene	0.00019	mg/L	
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	2,4,6-Trinitrotoluene	0.00015	mg/L	
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	2,4,6-Trinitrotoluene	0.0002	mg/L	
LL3mw-239	LL3MW239-073007	7/30/2007	Aluminum	0.1	mg/L	
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Aluminum	0.0384	mg/L	J
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Aluminum	1.36	mg/L	
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Aluminum	0.0466	mg/L	J
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Aluminum	0.05	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Aluminum	0.394	mg/L	
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Aluminum	0.05	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Antimony	0.00053	mg/L	
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Antimony	0.002	mg/L	U
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Antimony	0.00013	mg/L	UJ
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Antimony	0.002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Antimony	0.002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Antimony	0.002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Antimony	0.002	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Arsenic	0.000981	mg/L	
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Arsenic	0.005	mg/L	U
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Arsenic	0.0134	mg/L	
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Arsenic	0.005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Arsenic	0.0039	mg/L	J
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Arsenic	0.005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Arsenic	0.0036	mg/L	J
LL3mw-239	LL3MW239-073007	7/30/2007	Barium	0.0133	mg/L	
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Barium	0.0122	mg/L	
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Barium	0.0205	mg/L	
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Barium	0.0104	mg/L	
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Barium	0.0147	mg/L	
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Barium	0.0192	mg/L	
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Barium	0.0111	mg/L	
LL3mw-239	LL3MW239-073007	7/30/2007	Benz(a)anthracene	0.00521	mg/L	
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Benzo(a)pyrene	0.00521	mg/L	
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Benzo(b)fluoranthene	0.00521	mg/L	
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Cadmium	0.01	mg/L	
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Cadmium	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Cadmium	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Cadmium	0.0005	mg/L	U

Table A10-8
Load Line 3 Groundwater Data

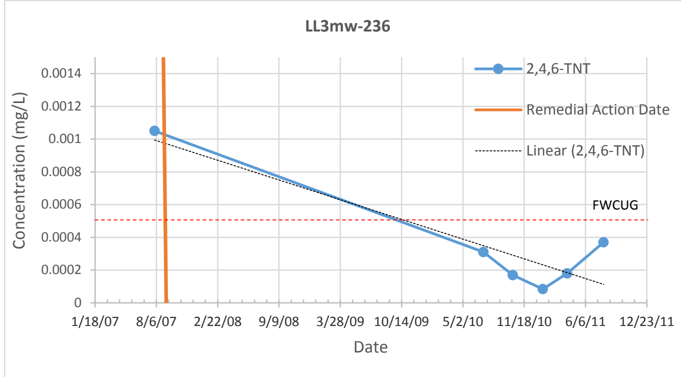
Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Cadmium	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Cadmium	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Cadmium	0.0005	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Dibenz(a,h)anthracene	0.00521	mg/L	
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Lead	0.001	mg/L	
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Lead	0.003	mg/L	U
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Lead	0.0018	mg/L	J
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Lead	0.003	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Lead	0.003	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Lead	0.003	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Lead	0.003	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Manganese	0.413	mg/L	
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Manganese	0.137	mg/L	
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Manganese	0.125	mg/L	
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Manganese	0.101	mg/L	
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Manganese	0.175	mg/L	
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Manganese	0.182	mg/L	
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Manganese	0.101	mg/L	J
LL3mw-239	LL3MW239-073007	7/30/2007	PCB-1254	0.000532	mg/L	
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	PCB-1254	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	PCB-1254	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	PCB-1254	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	PCB-1254	0.0005	mg/L	UJ
LL3mw-239	LL3MW239-073007	7/30/2007	RDX	0.00105	mg/L	
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	RDX	0.0017	mg/L	
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	RDX	0.0016	mg/L	
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	RDX	0.0016	mg/L	J
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	RDX	0.0017	mg/L	

Table A10-9
Load Line 3 Groundwater Trend Plots

LL3mw-236
2,4,6-TNT (mg/L)

Date	Result
7/31/2007	0.00105
7/8/2010	0.00031
10/12/2010	0.00017
1/18/2011	0.000084
4/7/2011	0.00018
8/4/2011	0.00037

FWCUG = 0.000521 mg/L



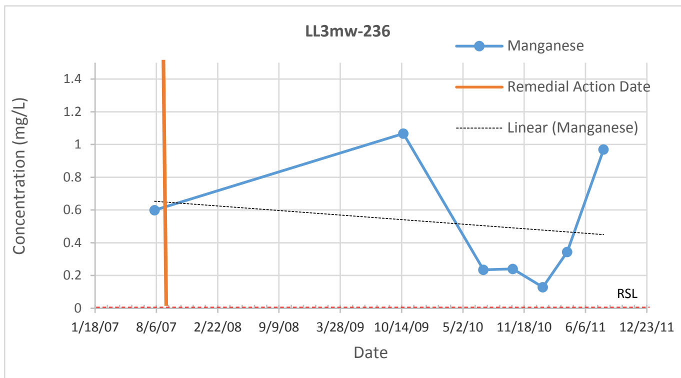
Mann-Kendall Test Using Normal Approximation for Small Sample Size

n	6	
S	-3	
p	-0.36	
α	-0.1	
Ho:	No trend	
Ha:	Downward trend	
	p>α	Ho rejected at 90% level of confidence; downward trend

LL3mw-236
Manganese (mg/L)

Date	Result	
7/31/2007	0.599	
10/20/2009	1.06695	mean of 2 results
7/8/2010	0.235	
10/12/2010	0.24	
1/18/2011	0.129	
4/7/2011	0.344	
8/4/2011	0.97	

RSL = 0.0043 mg/L



Mann-Kendall Test Using Normal Approximation for Small Sample Size

n	7	
S	-1	
p	-0.5	
α	-0.1	
Ho:	No trend	
Ha:	Downward trend	
	p>α	Ho rejected at 90% level of confidence; downward trend

LL3mw-238
2,4,6-TNT (mg/L)

Date	Result
7/31/2007	0.0642
10/8/2007	0.096
1/19/2011	0.069
8/3/2011	0.095
8/19/2013	0.079
1/21/2014	0.12
7/23/2014	0.062
3/11/2015	0.045
7/20/2015	0.055

FWCUG = 0.000521 mg/L

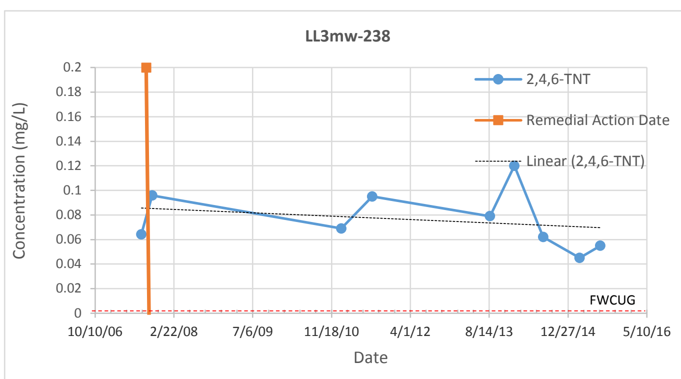


Table A10-9
Load Line 3 Groundwater Trend Plots

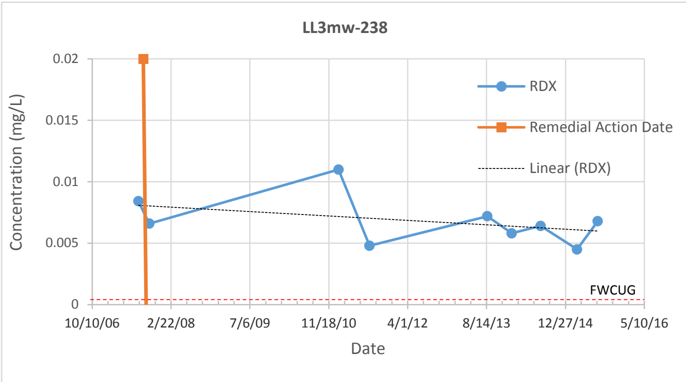
Mann-Kendall Test Using Normal Approximation for Small Sample Size

n	9	
S	-12	
p	-0.13	
α	-0.1	
Ho:	No trend	
Ha:	Downward trend	
	p>α	Ho rejected at 90% level of confidence; downward trend

LL3mw-238
RDX (mg/L)

Date	Result
7/31/2007	0.00842
10/8/2007	0.0066
1/19/2011	0.011
8/3/2011	0.0048
8/19/2013	0.0072
1/21/2014	0.0058
7/23/2014	0.0064
3/11/2015	0.0045
7/20/2015	0.0068

FWCUG = 0.000774 mg/L



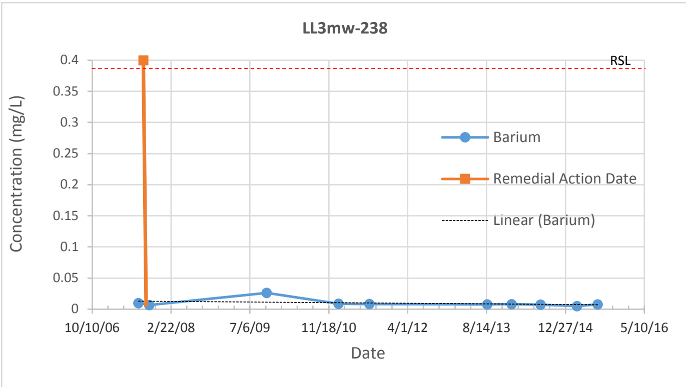
Mann-Kendall Test Using Normal Approximation for Small Sample Size

n	9	
S	-8	
p	-0.238	
α	-0.1	
Ho:	No trend	
Ha:	Downward trend	
	p>α	Ho rejected at 90% level of confidence; downward trend

LL3mw-238
Barium (mg/L)

Date	Result	
7/31/2007	0.01	
10/8/2007	0.0067	
10/20/2009	0.0262	mean of 2 results
1/19/2011	0.0089	
8/3/2011	0.0084	
8/19/2013	0.0079	
1/21/2014	0.0081	
7/23/2014	0.0073	
3/11/2015	0.0051	
7/20/2015	0.0076	

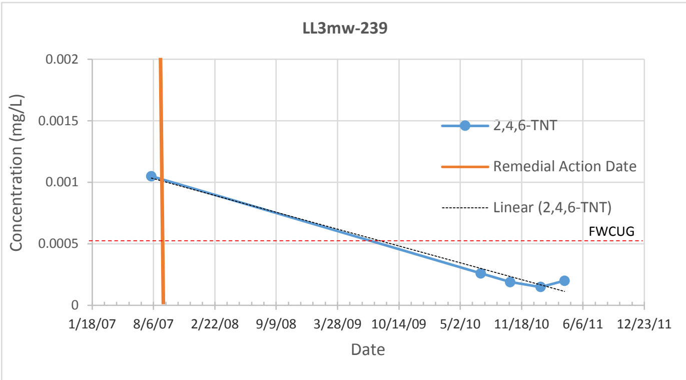
RSL = 0.38 mg/L



LL3mw-239
2,4,6-TNT (mg/L)

Date	Result
7/30/2007	
7/8/2010	0.00026
10/12/2010	0.00019
1/19/2011	0.00015
4/7/2011	0.0002

FWCUG = 0.000521 mg/L



Mann-Kendall Test Using Normal Approximation for Small Sample Size

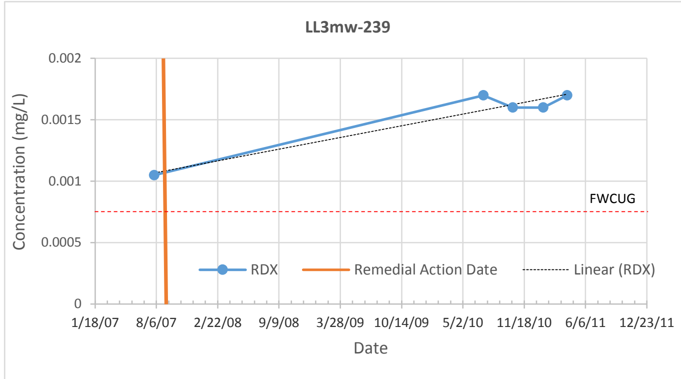
n	5	
S	-6	
p	-0.117	
α	-0.1	
Ho:	No trend	
Ha:	Downward trend	
	p>α	Ho rejected at 90% level of confidence; downward trend

Table A10-9
Load Line 3 Groundwater Trend Plots

LL3mw-239
RDX (mg/L)

Date	Result
7/30/2007	0.00105
7/8/2010	0.0017
10/12/2010	0.0016
1/19/2011	0.0016
4/7/2011	0.0017

FWCUG = 0.000774 mg/L



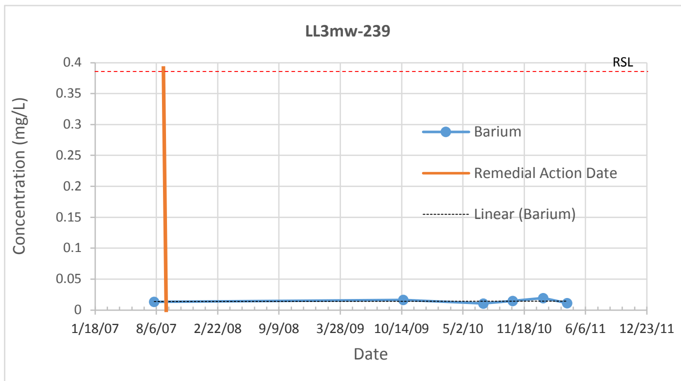
Mann-Kendall Test Using Normal Approximation for Small Sample Size

n	5
S	4
p	0.242
α	0.1
Ho:	No trend
Ha:	Upward trend
	p>α Ho rejected at 90% level of confidence; upward trend

LL3mw-239
Barium (mg/L)

Date	Result	
7/30/2007	0.0133	
10/20/2009	0.01635	mean of 2 results
7/8/2010	0.0104	
10/12/2010	0.0147	
1/19/2011	0.0192	
4/7/2011	0.0111	

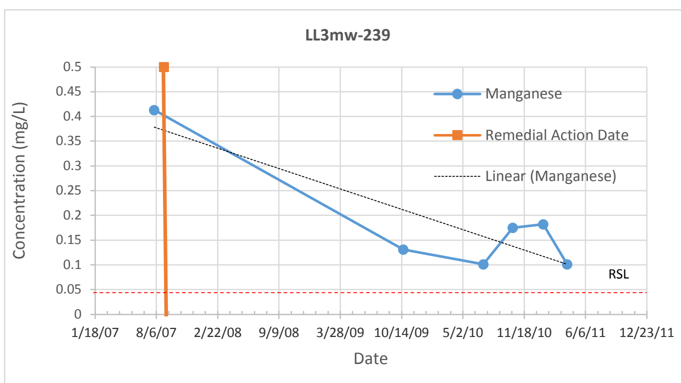
FWCUG = 0.38 mg/L



LL3mw-239
Manganese (mg/L)

Date	Result	
7/30/2007	0.413	
10/20/2009	0.131	mean of 2 results
7/8/2010	0.101	
10/12/2010	0.175	
1/19/2011	0.182	
4/7/2011	0.101	

FWCUG = 0.043 mg/L



Mann-Kendall Test Using Normal Approximation for Small Sample Size

n	6
S	-4
p	-0.2934
α	-0.1
Ho:	Downward trend
Ha:	p>α Ho rejected at 90% level of confidence; downward trend

Notes:

FWCUG = Facility Wide Cleanup Goal from EQM, 2010, *Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant, Ravenna, Ohio.* March 23

RSL = USEPA Regional Screeing Level from Table 3-3 Screening Criteria, *Draft Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Annual Report for 2015*. February 2016

Exceeds FWCUG or RSL

Load Line 4

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Table A10-10
Load Line 4 Groundwater Data Summary

Well	Zone Monitored	COC	Discussion
LL4mw-196	Unconsolidated	Aluminum	5 samples collected after the remedial action, all results < RSL, no apparent trend
		Antimony	5 samples collected after the remedial action, all results ND
		Arsenic	5 samples collected after the remedial action, all results < RSL, 3 results ND
		Barium	5 samples collected after the remedial action, all results < RSL, no apparent trend
		Cadmium	5 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	5 samples collected after the remedial action, all results > RSL, no apparent trend
		Lead	5 samples collected after the remedial action, all results ND
		2,4,6-TNT	4 samples collected after the remedial action, all results ND
		RDX	4 samples collected after the remedial action, all results ND
		Aroclor-1254	4 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND
LL4mw-197	Unconsolidated	Aluminum	5 samples collected after the remedial action, 3 results ND & 1 result estimated (< detection limit)
		Antimony	5 samples collected after the remedial action, 4 results ND & 1 result estimated (< detection limit)
		Arsenic	5 samples collected after the remedial action, all results ND
		Barium	5 samples collected after the remedial action, all results < RSL, no apparent trend
		Cadmium	5 samples collected after the remedial action, all results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	5 samples collected after the remedial action, 3 results ND & 1 result estimated (< detection limit)
		Lead	5 samples collected after the remedial action, 4 results ND
		2,4,6-TNT	4 samples collected after the remedial action, 3 results ND & 1 result estimated (< detection limit)
		RDX	4 samples collected after the remedial action, all results ND
		Aroclor-1254	4 samples collected after the remedial action, all results ND
		Benz(a)anthracene	4 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	4 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	4 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	4 samples collected after the remedial action, all results ND
LL4mw-198	Unconsolidated	Aluminum	3 samples collected after the remedial action, 2 results < RSL
		Antimony	3 samples collected after the remedial action, all results ND
		Arsenic	3 samples collected after the remedial action, 2 results ND, all results < RSL
		Barium	3 samples collected after the remedial action, all results < RSL
		Cadmium	3 samples collected after the remedial action, 2 results ND
		Chromium (hexavalent)	No samples collected after the remedial action
		Manganese	3 samples collected after the remedial action, all results > RSL
		Lead	3 samples collected after the remedial action, 2 results ND
		2,4,6-TNT	2 samples collected after the remedial action, all results ND
		RDX	2 samples collected after the remedial action, all results ND
		Aroclor-1254	2 samples collected after the remedial action, all results ND
		Benz(a)anthracene	2 samples collected after the remedial action, all results ND
		Benzo(a)pyrene	2 samples collected after the remedial action, all results ND
		Benzo(b)fluoranthene	2 samples collected after the remedial action, all results ND
		Dibenz(a,h)anthracene	2 samples collected after the remedial action, all results ND

Notes:

ND = not detected

RSL = USEPA Regional Screeing Level from Table 3-3 Screening Criteria, Draft Facility-Wide Groundwater Monitoring Program *RVAAP-66 Facility-Wide Groundwater Annual Report for 2015*. February 2016

Table A10-11
Load Line 4 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL4mw-196	LL4MW196-073007	7/30/2007	2,4,6-Trinitrotoluene	0.00102	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	2,4,6-Trinitrotoluene	0.000096	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	2,4,6-Trinitrotoluene	0.000096	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Aluminum	0.1	mg/L	
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Aluminum	0.05	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Aluminum	0.715	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Aluminum	0.0228	mg/L	J
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Aluminum	0.0358	mg/L	J
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Aluminum	0.0199	mg/L	J
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Aluminum	0.05	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Antimony	0.001	mg/L	
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Antimony	0.002	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Antimony	0.002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Antimony	0.002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Antimony	0.002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Antimony	0.002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Antimony	0.002	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Arsenic	0.000709	mg/L	
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Arsenic	0.005	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Arsenic	0.0066	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Arsenic	0.005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Arsenic	0.0046	mg/L	J
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Arsenic	0.005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Arsenic	0.005	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Barium	0.0284	mg/L	
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Barium	0.0358	mg/L	
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Barium	0.0438	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Barium	0.0334	mg/L	
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Barium	0.0497	mg/L	
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Barium	0.0434	mg/L	
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Barium	0.0452	mg/L	
LL4mw-196	LL4MW196-073007	7/30/2007	Benz(a)anthracene	0.0051	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Benzo(a)pyrene	0.0051	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Benzo(b)fluoranthene	0.0051	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Cadmium	0.01	mg/L	
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Cadmium	0.0005	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Cadmium	0.0005	mg/L	U

Table A10-11
Load Line 4 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Cadmium	0.0005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Cadmium	0.0005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Cadmium	0.0005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Cadmium	0.0005	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Dibenz(a,h)anthracene	0.0051	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Lead	0.001	mg/L	
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Lead	0.003	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Lead	0.003	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Lead	0.003	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Lead	0.003	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Lead	0.003	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Lead	0.003	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Manganese	0.115	mg/L	
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Manganese	0.149	mg/L	
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Manganese	0.185	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Manganese	0.183	mg/L	
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Manganese	0.136	mg/L	
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Manganese	0.0419	mg/L	
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Manganese	0.059	mg/L	
LL4mw-196	LL4MW196-073007	7/30/2007	PCB-1254	0.00051	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	PCB-1254	0.0005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	PCB-1254	0.0005	mg/L	UJ
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	PCB-1254	0.0005	mg/L	UJ
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	PCB-1254	0.0005	mg/L	UJ
LL4mw-196	LL4MW196-073007	7/30/2007	RDX	0.00102	mg/L	
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	RDX	0.0001	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	RDX	0.000096	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	RDX	0.000096	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	RDX	0.0001	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	2,4,6-Trinitrotoluene	0.00102	mg/L	
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	2,4,6-Trinitrotoluene	0.000097	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	2,4,6-Trinitrotoluene	0.000096	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	2,4,6-Trinitrotoluene	0.000075	mg/L	J
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	2,4,6-Trinitrotoluene	0.000099	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Aluminum	0.1	mg/L	
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Aluminum	0.05	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Aluminum	0.872	mg/L	
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Aluminum	0.05	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Aluminum	0.05	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Aluminum	0.0268	mg/L	J
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Aluminum	0.05	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Antimony	0.000333	mg/L	
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Antimony	0.002	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Antimony	0.002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Antimony	0.00016	mg/L	J
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Antimony	0.002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Antimony	0.002	mg/L	U

Table A10-11
Load Line 4 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Antimony	0.002	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Arsenic	0.000268	mg/L	
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Arsenic	0.005	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Arsenic	0.005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Arsenic	0.005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Arsenic	0.005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Arsenic	0.005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Arsenic	0.005	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Barium	0.00397	mg/L	
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Barium	0.0085	mg/L	J
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Barium	0.0182	mg/L	
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Barium	0.0151	mg/L	
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Barium	0.0298	mg/L	
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Barium	0.0208	mg/L	
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Barium	0.0131	mg/L	
LL4mw-197	LL4MW197-073007	7/30/2007	Benz(a)anthracene	0.0051	mg/L	
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Benzo(a)pyrene	0.0051	mg/L	
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Benzo(b)fluoranthene	0.0051	mg/L	
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Cadmium	0.01	mg/L	
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Cadmium	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Cadmium	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Cadmium	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Cadmium	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Cadmium	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Cadmium	0.0005	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Dibenz(a,h)anthracene	0.0051	mg/L	
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Lead	0.000333	mg/L	
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Lead	0.003	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Lead	0.0019	mg/L	J
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Lead	0.003	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Lead	0.003	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Lead	0.003	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Lead	0.003	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Manganese	0.01	mg/L	
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Manganese	0.01	mg/L	U

Table A10-11
Load Line 4 Groundwater Data

Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Manganese	0.216	mg/L	
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Manganese	0.01	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Manganese	0.01	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Manganese	0.005	mg/L	J
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Manganese	0.01	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	PCB-1254	0.00051	mg/L	
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	PCB-1254	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	PCB-1254	0.0005	mg/L	UJ
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	PCB-1254	0.0005	mg/L	UJ
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	PCB-1254	0.0005	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	RDX	0.00102	mg/L	
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	RDX	0.000097	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	RDX	0.000096	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	RDX	0.000098	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	RDX	0.000099	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	2,4,6-Trinitrotoluene	0.00102	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	2,4,6-Trinitrotoluene	0.000099	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	2,4,6-Trinitrotoluene	0.000098	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Aluminum	0.1	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Aluminum	0.022	mg/L	J
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Aluminum	0.473	mg/L	
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Aluminum	10.3	mg/L	
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Aluminum	0.05	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Antimony	0.001	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Antimony	0.002	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Antimony	0.002	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Antimony	0.00046	mg/L	UJB
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Antimony	0.002	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Arsenic	0.000421	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Arsenic	0.005	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Arsenic	0.0033	mg/L	J
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Arsenic	0.0174	mg/L	
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Arsenic	0.005	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Barium	0.00941	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Barium	0.0153	mg/L	
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Barium	0.0205	mg/L	
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Barium	0.0523	mg/L	
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Barium	0.0087	mg/L	J
LL4mw-198	LL4MW198-073007	7/30/2007	Benz(a)anthracene	0.00556	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Benzo(a)pyrene	0.00556	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Benzo(b)fluoranthene	0.00556	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Cadmium	0.01	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Cadmium	0.0005	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Cadmium	0.0005	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Cadmium	0.0002	mg/L	J

Table A10-11
Load Line 4 Groundwater Data

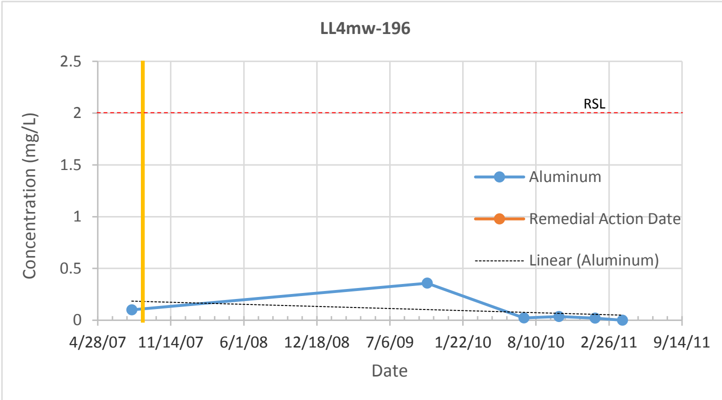
Station	Sample ID	Date Collected	Chemical	Results	Units	Data Qual
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Cadmium	0.0005	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Dibenz(a,h)anthracene	0.00556	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Lead	0.001	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Lead	0.003	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Lead	0.003	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Lead	0.0115	mg/L	
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Lead	0.003	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Manganese	1.23	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Manganese	1.46	mg/L	
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Manganese	1.42	mg/L	
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Manganese	1.65	mg/L	
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Manganese	1.01	mg/L	
LL4mw-198	LL4MW198-073007	7/30/2007	PCB-1254	0.0005	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	PCB-1254	0.0005	mg/L	UJ
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	PCB-1254	0.0005	mg/L	UJ
LL4mw-198	LL4MW198-073007	7/30/2007	RDX	0.00102	mg/L	
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	RDX	0.000099	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	RDX	0.000098	mg/L	U

Table A10-12
Load Line 4 Groundwater Trend Plots

LL4mw-196
Aluminum (mg/L)

Date	Result	
7/30/2007	0.1	
10/16/2009	0.3575	mean of 2 results
7/8/2010	0.0228	
10/12/2010	0.0358	
1/19/2011	0.0199	
4/4/2011	0	

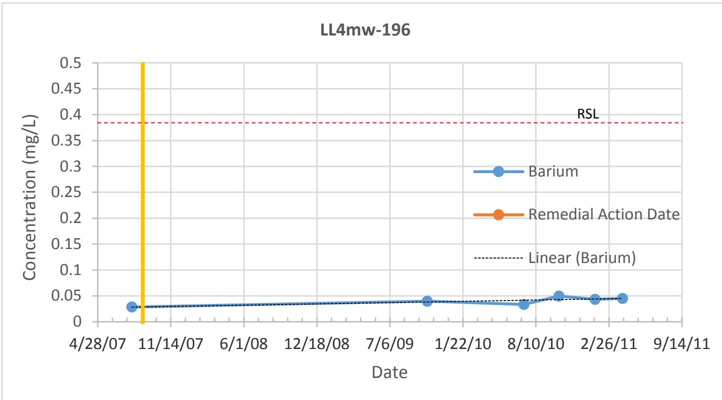
RSL = 2 mg/L



LL4mw-196
Barium (mg/L)

Date	Result	
7/30/2007	0.0284	
10/16/2009	0.0398	mean of 2 results
7/8/2010	0.0334	
10/12/2010	0.0497	
1/19/2011	0.0434	
4/4/2011	0.0452	

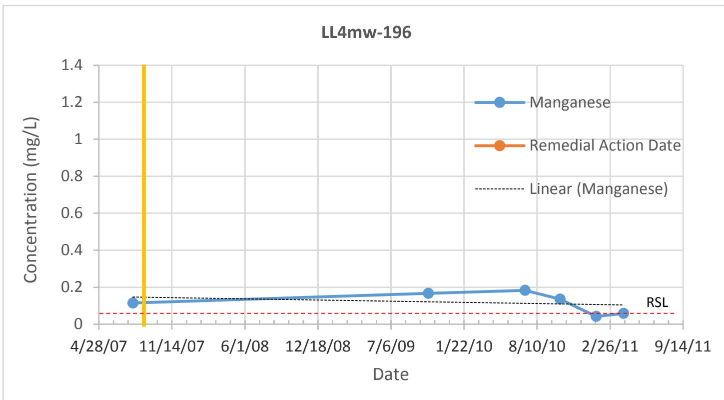
RSL = 0.38 mg/L



LL4mw-196
Manganese (mg/L)

Date	Result	
7/30/2007	0.115	
10/16/2009	0.167	mean of 2 results
7/8/2010	0.183	
10/12/2010	0.136	
1/19/2011	0.0419	
4/4/2011	0.059	

RSL = 0.043 mg/L



LL4mw-197
Barium (mg/L)

Date	Result	
7/30/2007	0.00397	
10/16/2009	0.01335	mean of 2 results
7/8/2010	0.0151	
10/12/2010	0.0298	
1/19/2011	0.0208	
4/4/2011	0.0131	

RSL = 0.38 mg/L

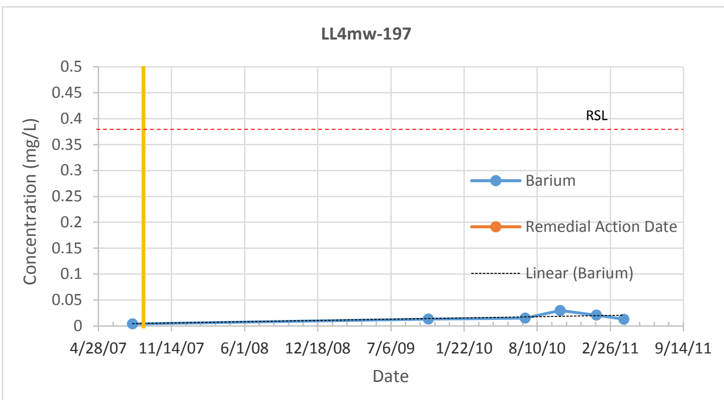
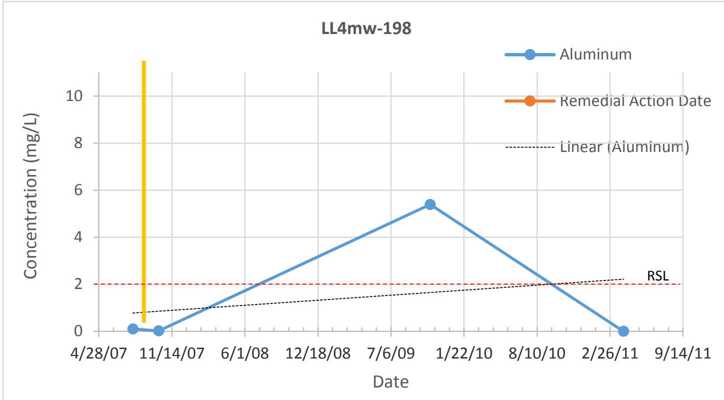


Table A10-12
Load Line 4 Groundwater Trend Plots

LL4mw-198
Aluminum (mg/L)

Date	Result	
7/30/2007	0.1	
10/9/2007	0.022	
10/21/2009	5.387	mean of 2 results
4/4/2011	0	

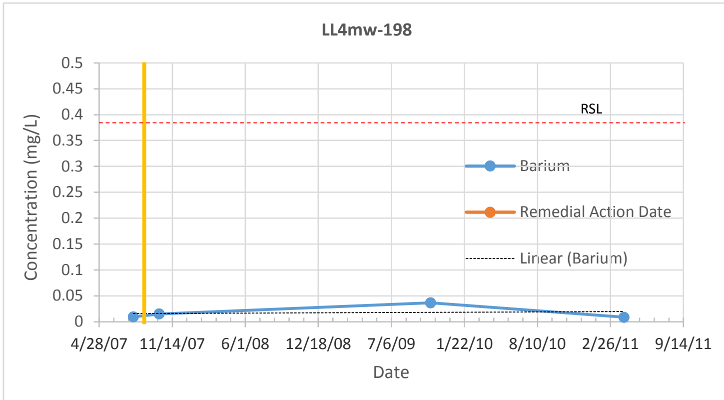
RSL = 2 mg/L



LL4mw-198
Barium (mg/L)

Date	Result	
7/30/2007	0.00941	
10/9/2007	0.0153	
10/21/2009	0.0364	mean of 2 results
4/4/2011	0.0087	

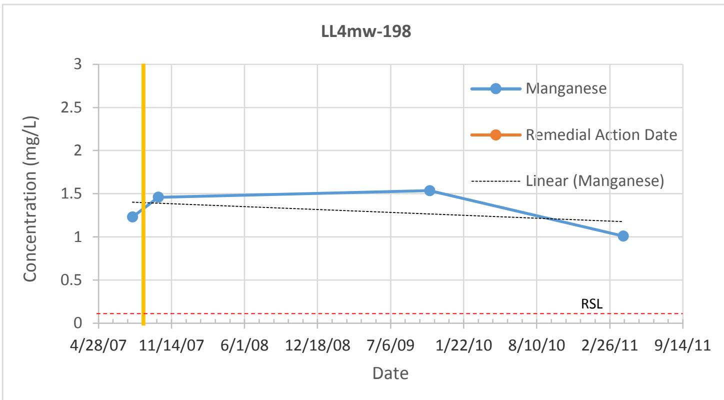
RSL = 0.38 mg/L



LL4mw-198
Manganese (mg/L)

Date	Result	
7/30/2007		
10/9/2007		
10/21/2009		mean of 2 results
4/4/2011		

RSL = 0.043 mg/L



Notes:

RSL = USEPA Regional Screeing Level from Table 3-3 Screening Criteria, *Draft Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Annual Report for 2015*. February 2016

exceeds RSL

ATTACHMENT 11

Soil and Dry Sediment Data

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Load Lines 1 – 4

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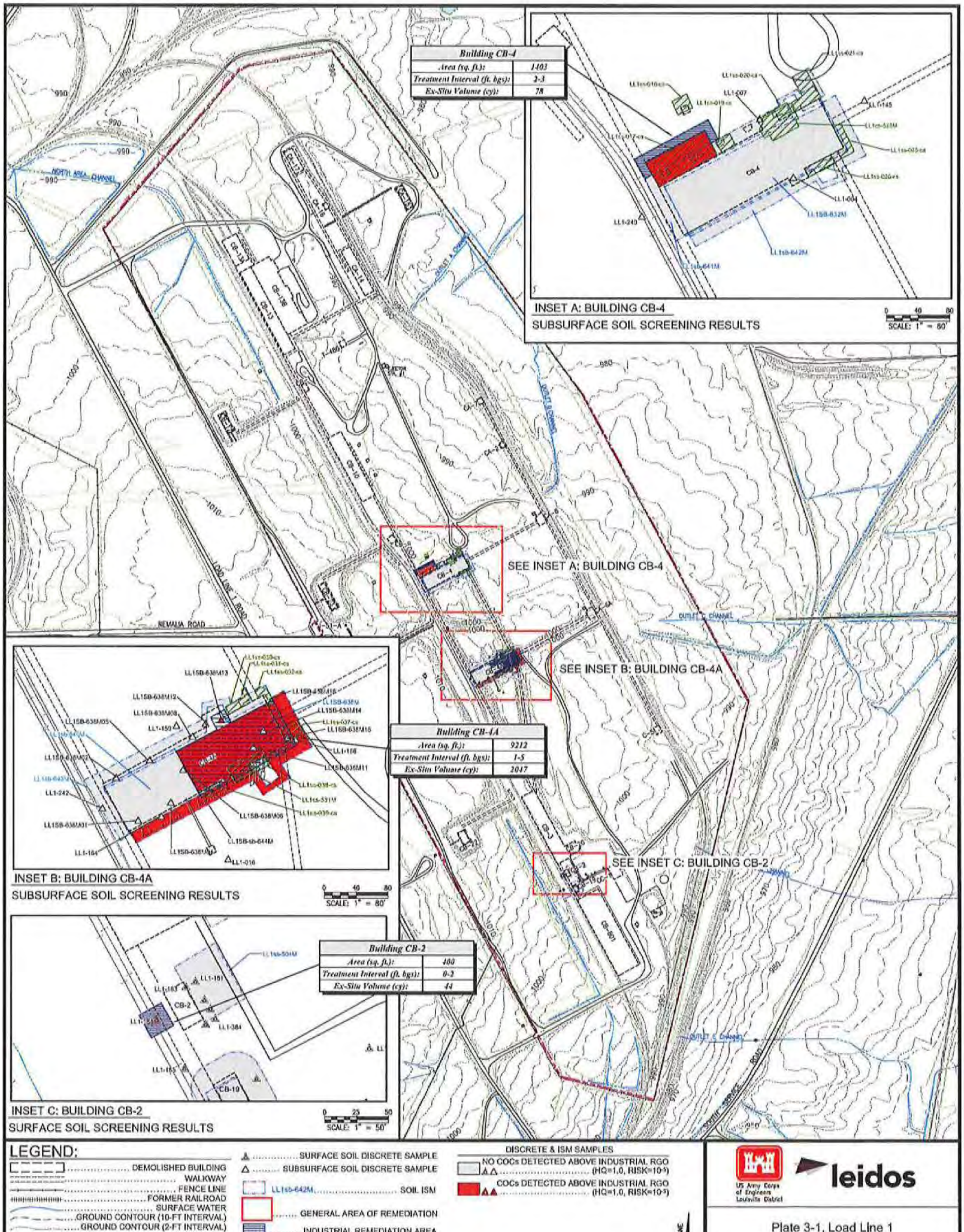


Building CB-4
Area (sq. ft.): 1403
Treatment Interval (ft. bgs): 2-3
Ex-Situ Volume (cy): 78
INSET A: BUILDING CB-4
SUBSURFACE SOIL SCREENING RESULTS
SCALE: 1" = 80'
SEE INSET A: BUILDING CB-4
SEE INSET B: BUILDING CB-4A
SEE INSET C: BUILDING CB-2
Building CB-4A
Area (sq. ft.): 9212
Treatment Interval (ft. bgs): 1-5
Ex-Situ Volume (cy): 2047
INSET B: BUILDING CB-4A
SUBSURFACE SOIL SCREENING RESULTS
SCALE: 1" = 80'
Building CB-2
Area (sq. ft.): 400
Treatment Interval (ft. bgs): 0-2
Ex-Situ Volume (cy): 44
INSET C: BUILDING CB-2
SURFACE SOIL SCREENING RESULTS
SCALE: 1" = 50'
NORTH AREA CHANNEL
REMALIA ROAD
LOAD LINE 1 ROAD
OUTLET C CHANNEL
LEGEND:
DEMOLISHED BUILDING
WALKWAY
FENCE LINE
FORMER RAILROAD
SURFACE WATER
GROUND CONTOUR (10-FT INTERVAL)
GROUND CONTOUR (2-FT INTERVAL)
VEGETATION
AOC BOUNDARY
LL2ss-005-cs REMEDIATION AREA
-CS CONFIRMATION SAMPLE
SURFACE SOIL DISCRETE SAMPLE
SUBSURFACE SOIL DISCRETE SAMPLE
LL1sb-642M SOIL ISM
GENERAL AREA OF REMEDIATION
INDUSTRIAL REMEDIATION AREA
DISCRETE & ISM SAMPLES
NO COCs DETECTED ABOVE INDUSTRIAL RGO (HQ=1.0, RISK=10-5)
COCs DETECTED ABOVE INDUSTRIAL RGO (HQ=1.0, RISK=10-5)
NOTE:
SAMPLE LOCATIONS SHOWN ONLY IN REMEDIATION AREAS
SCALE: 1" = 300'
OHIO STATE PLANE (NAD 83)
US Army Corps of Engineers Louisville District
leidos
Plate 3-1. Load Line 1
Industrial Remediation Areas
DRAWN BY: P. HOLM
REV. NO./DATE: R1/11/14/18
CAD FILE: C:\14015\DWGS R15-LL1-PLATE3-1

Table 2-4. Summary of Human Health COC Concentrations and Conclusions for Unrestricted (Residential) Land Use at Load Line 1

				COC											Conclusion for Unrestricted Land Use
				Metal		Explosive		PAH					Pesticide	PCB	
		Residential RGO		31	400	36	61	1.6	0.16	1.6	0.16	1.6	0.34	1.2	
Station	Sample Type	Date	Depth (ft)	Antimony	Lead	TNT	RDX	B(a)A	B(a)P	B(b)F	DA	IP	Dieldrin	PCB-1254	
Building CB-4															
LL1-005	D	09/13/00	0.0 - 1.0	--	1,110	--	--	--	--	--	--	--	--	--	NFA
LL1-341	D	10/02/00	0.0 - 1.0	--	--	83	--	--	--	--	--	--	--	--	Remediate
LL1-342	D	09/29/00	0.0 - 1.0	--	--	39	--	--	--	--	--	--	--	--	NFA
LL1-343	D	09/29/00	0.0 - 1.0	--	--	150	--	--	--	--	--	--	--	--	Remediate
LL1ss-609	ISM	12/01/09	0.0 - 0.5	--	--	--	--	--	0.24[b]	0.38[a,b]	--	--	--	4.9	Remediate
LL1sb-641M	ISM	07/06/11	1.0 - 3.0	--	--	--	--	0.23[a]	0.19	0.22[a]	0.03[a]	--	--	--	NFA
LL1sb-642M	ISM	07/06/11	1.0 - 3.0	--	--	--	--	0.21[a]	0.19	0.25[a]	--	0.12[a]	--	--	NFA
LL1ss-017-cs	ISM	10/29/07	2.0 - 3.0	--	--	--	--	--	--	--	--	--	--	10.9	Remediate
Building CA-6															
LL1-136	D	09/15/00	0.0 - 1.0	--	--	180	--	--	--	--	--	--	--	--	Remediate
LL1SB-635M03	D	08/31/10	1.0 - 5.0	--	--	--	--	3.2	2	2.7	--	--	--	--	Remediate
LL1SB-635M04	D	08/31/10	1.0 - 5.0	--	--	--	--	5.5	3.5	5.5	--	--	--	--	Remediate
LL1SB-635M	ISM	08/31/10	1.0 - 3.0	--	--	--	--	1.8	1	1.5[a]	--	--	--	--	Remediate
LL1SB-635M	ISM	08/31/10	5.0 - 7.0	--	--	--	--	1.8	1.2	1.8	--	--	--	--	Remediate
Outlet B Channel															
LL1ss-024-cs	ISM	09/12/07	2.5 - 3.5	--	--	290	--	--	--	--	--	--	--	--	Remediate
Building CB-4A															
LL1-156	D	09/13/00	0.0 - 1.0	--	--	--	67	--	--	--	--	--	--	--	Remediate
LL1-159	D	09/14/00	0.0 - 1.0	--	--	64	--	--	--	--	--	--	--	--	Remediate
LL1-160	D	09/14/00	0.0 - 1.0	--	454[b]	250	--	--	--	--	--	--	--	--	Remediate
LL1-161	D	09/14/00	0.0 - 1.0	--	411[b]	200	--	--	--	--	--	--	--	--	Remediate
LL1-162	D	09/14/00	0.0 - 1.0	--	1,430	--	--	--	--	--	--	--	--	--	NFA
LL1-168	D	09/13/00	0.0 - 1.0	--	--	--	--	1.2[a]	0.93	1.2[a]	0.096[a]	--	--	--	Remediate
LL1-356	D	09/30/00	0.0 - 1.0	--	636	--	--	--	--	--	--	--	--	--	NFA
LL1-407	D	10/01/00	0.0 - 1.0	--	--	180	--	--	--	--	--	--	--	--	Remediate
LL1SB-638M13	D	09/01/10	1.0 - 5.0	--	--	--	1,500	--	--	--	--	--	--	--	Remediate
LL1SB-638M14	D	09/01/10	1.0 - 5.0	--	--	100	--	--	--	--	--	--	--	--	Remediate
LL1ss-523M	ISM	10/26/09	0.0 - 1.0	--	--	--	--	--	--	--	--	--	--	1.22	NFA
LL1ss-524M	ISM	10/26/09	0.0 - 1.0	--	--	158	60.3[a]	--	--	--	--	--	--	0.915[a]	Remediate
LL1ss-525M	ISM	10/26/09	0.0 - 1.0	--	--	--	--	1.87	1.4	1.15[a]	--	--	--	--	Remediate
LL1ss-619	ISM	12/01/09	0.0 - 0.5	--	--	--	--	--	0.087[a]	0.15[a]	--	--	0.09[ab]	2.2	Remediate
LL1SB-638M	ISM	09/01/10	1.0 - 3.0	--	--	150	490	--	--	--	--	--	--	--	Remediate

Table 2-4. Summary of Human Health COC Concentrations and Conclusions for Unrestricted (Residential) Land Use at Load Line 1 (continued)

				COC											Conclusion for Unrestricted Land Use
				Metals		Explosives		PAHs					Pesticide	PCB	
		Residential RGO		31	400	36	61	1.6	0.16	1.6	0.16	1.6	0.34	1.2	
Station	Sample Type	Date	Depth (ft)	Antimony	Lead	TNT	RDX	B(a)A	B(a)P	B(b)F	DA	IP	Dieldrin	PCB-1254	
LL1SB-638M	ISM	09/01/10	3.0 - 5.0	--	--	2,700	--	--	--	--	--	--	--	--	Remediate
LL1sb-644M	ISM	07/05/11	3.0 - 5.0	--	--	--	--	--	0.1[a]	--	--	--	--	14	Remediate
LL1sb-644M	ISM	07/05/11	5.0 - 7.0	--	--	--	--	--	--	--	--	--	--	1.8	Remediate
Building CA-6A															
LL1-333	D	09/16/00	0.0 - 1.0	--	674	--	--	--	--	--	--	--	--	--	NFA
LL1SB-633M	ISM	08/25/10	3.0 - 5.0	--	--	47	--	--	--	--	--	--	--	--	Remediate
LL1ss-033-cs	ISM	09/11/07	2.3 - 3.3	--	--	160	--	--	--	--	--	--	--	--	Remediate
Building CB-3															
LL1-184	D	09/18/00	0.0 - 1.0	648	1,620	--	--	--	--	--	--	--	--	--	Remediate
LL1-185	D	09/18/00	0.0 - 1.0	429	736	--	--	0.22[a,b]	0.21[b]	0.41[a,b]	--	--	--	1.7	Remediate
LL1-386	D	09/28/00	0.0 - 1.0	--	550	--	--	--	--	--	--	--	--	--	NFA
LL1-387	D	09/29/00	0.0 - 1.0	--	639	--	--	--	--	--	--	--	--	--	NFA
LL1-410	D	09/29/00	0.0 - 1.0	--	510	--	--	--	--	--	--	--	--	--	NFA
FWCss-001	ISM	12/01/09	0.0 - 0.5	--	--	--	--	0.9[a]	0.84	1.5[a]	--	--	--	--	Remediate
LL1ss-040-cs	ISM	09/12/07	2.0 - 3.0	--	--	--	--	--	0.49	--	--	--	--	--	NFA
Isolated Discrete Soil Locations															
CB12-02	D	11/04/99	0.0 - 1.0	--	532	--	--	--	--	--	--	--	--	--	NFA
CB23-01	D	11/04/99	0.0 - 1.0	--	426	--	--	--	--	--	--	--	--	--	NFA
LL1-049	D	09/16/00	0.0 - 0.5	1,180	1,210	--	--	--	--	--	--	--	--	--	Remediate
LL1-087	D	09/25/00	0.0 - 1.0	--	602	--	--	--	--	--	--	--	--	--	NFA
LL1-091	D	09/25/00	0.0 - 1.0	--	--	--	--	--	0.84	1.1[a]	0.18	--	--	4.7	NFA
LL1-103	D	09/19/00	0.0 - 1.0	--	--	--	--	0.64[a]	0.53	0.75[a]	0.086[a]	--	--	0.74[a]	NFA
LL1-130	D	09/27/00	0.0 - 1.0	--	--	--	--	0.41[a]	0.37	0.47[a]	--	--	--	2.4	NFA
LL1-252	D	09/17/00	0.0 - 0.5	--	1,140	--	--	--	--	--	--	--	--	--	NFA
LL1-369	D	09/28/00	0.0 - 1.0	--	--	--	--	--	--	--	--	--	--	1.7	NFA
LL1-087	D	09/28/00	1.0 - 2.5	--	558	--	--	--	--	--	--	--	--	--	NFA

[a]Sample concentration is less than RGO; however, this chemical contributes to a sum of ratios greater than 1.
[b]Sample location is recommended for remediation for other chemicals of interest; however, this chemical is not recommended as a COC for remediation.

All units are mg/kg.
B(a)A = Benz(a)anthracene.
B(a)P = Benzo(a)pyrene.
B(b)F = Benzo(b)fluoranthene.
COC = Chemical of Concern.
D = Discrete soil sample.
DA = Dibenz(a,h)anthracene.
ft = Feet.
-- = Chemical is not a human health COC in this sample.
ISM = Incremental Sampling Methodology.
IP = Indeno(1,2,3-cd)pyrene.
NFA = No further action or evaluation required for this COC.
PAH = Polycyclic Aromatic Hydrocarbon.
PCB = Polychlorinated Biphenyl.
RDX = Hexahydro-1,3,5-Trinitro-1,3,5-Triazine.
RGO = Remedial Goal Option.
TNT = Trinitrotoluene.

Table 2-5. Summary of Human Health COC Concentrations and Conclusions for Commercial/Industrial Land Use at Load Line 1

				COC								
				Metal		Explosive		PAH			PCB	Conclusion for Commercial/ Industrial Land Use
		Industrial RGO		470	800	510	280	29	2.9	29	9.7	
Station	Sample Type	Date	Depth (ft)	Antimony	Lead	TNT	RDX	B(a)A	B(a)P	B(b)F	PCB-1254	
					Building CB-4							
LL1-005	D	09/13/00	0.0 - 1.0	--	1,110	--	--	--	--	--	--	NFA
LL1ss-017-cs	ISM	10/29/07	2.0 - 3.0	--	--	--	--	--	--	--	10.9	Remediate
					Building CB-4A							
LL1-162	D	09/14/00	0.0 - 1.0	--	1,430	--	--	--	--	--	--	NFA
LL1SB-638M13	D	09/01/10	1.0 - 5.0	--	--	--	1,500	--	--	--	--	Remediate
LL1SB-638M	ISM	09/01/10	1.0 - 3.0	--	--	150[a]	490	--	--	--	--	Remediate
LL1SB-638M	ISM	09/01/10	3.0 - 5.0	--	--	2,700	--	--	--	--	--	Remediate
LL1sb-644M	ISM	07/05/11	3.0 - 5.0	--	--	--	--	--	0.1[a]	--	14	NFA
					Building CA-6							
LL1SB-635M04	D	08/31/10	1.0 - 5.0	--	--	--	--	5.5[a]	3.5	5.5[a]	--	NFA
					Building CB-3							
LL1-184	D	09/18/00	0.0 - 1.0	648	1,620	--	--	--	--	--	--	Remediate
					Isolated Discrete Soil Location							
LL1-049	D	09/16/00	0.0 - 0.5	1,180	1,210	--	--	--	--	--	--	NFA
LL1-252	D	09/17/00	0.0 - 0.5	--	1,140	--	--	--	--	--	--	NFA

[a]Sample concentration is less than RGO; however, this chemical contributes to a sum of ratios greater than 1.
All units are mg/kg.
B(a)A = Benz(a)anthracene.
B(a)P = Benzo(a)pyrene.
B(b)F = Benzo(b)fluoranthene.
COC = Chemical of Concern.
D = Discrete soil sample.
ft = Feet.
ISM = Incremental Sampling Methodology.
NFA = No further action or evaluation required for this COC.
PAH = Polycyclic Aromatic Hydrocarbon.
PCB = Polychlorinated Biphenyl.
RDX = Hexahydro-1,3,5-Trinitro-1,3,5-Triazine.
RGO = Remedial Goal Option.
TNT = Trinitrotoluene.
-- = Chemical is not a human health COC in this sample.

Table 2-9. Summary of Human Health COC Concentrations in Soil and Sediment and Conclusions for Unrestricted (Residential) Land Use

Station	Sample Type	Residential RGO[b]		Metal			Explosive		PAH					PCB		Conclusion for Unrestricted Land Use
				31	400	0.78	36	17	1.6	0.16	1.6	0.16	1.6	1.2	2.4	
		Date	Depth (ft)	Antimony	Lead	Thallium	TNT	2,4-DNT	B(a)A	B(a)P	B(b)F	DA	IP	PCB-1254	PCB-1260	
Building DB-10																
LL2ss-315M	ISM	06/22/10	1.3 - 2.3	–	–	–	46.4	–	1.01[a]	1.13	0.957[a]	–	–	–	–	Remediate
LL2ss-298M	ISM	06/24/08	0.0 - 1.0	–	–	–	–	–	0.445[a]	0.406	0.339[a]	–	–	2.24	0.785[a]	Remediate
LL2-120	D	07/25/01	0.0 - 1.0	–	820	–	–	–	–	–	–	–	–	–	–	NFA
Building DB-4																
LL2ss-285M	ISM	06/20/08	0.0 - 1.0	–	–	–	125	–	0.427[a]	0.379	0.301[a]	–	–	0.437[a]	–	Remediate
LL2ss-407	ISM	12/02/09	0.0 - 0.5	–	–	–	–	–	3.9	3.8	5.1	–	2	1.3	–	Remediate
LL2-130	D	07/27/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	2.5	–	All of these discrete samples are within LL2ss-407, which is recommended for remediation; therefore, alone, these results might not drive remediation, but they will be taken care of as part of the 407 excavation
LL2-130	D	07/28/01	1.0 - 3.0	–	747	–	46	–	–	–	–	–	–	–	–	
LL2-133	D	07/28/01	0.0 - 1.0	–	–	–	–	–	0.39[a]	0.5	0.66[a]	–	–	0.77[a]	–	
LL2-133	D	07/29/01	1.0 - 3.0	–	–	–	53	–	–	–	–	–	–	–	–	
LL2-131	D	07/26/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	5	–	
LL2-134	D	07/28/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	4.4	–	
LL2ss-519M	ISM	07/02/11	0.0 - 1.0	–	–	–	–	–	0.52[a]	0.59	0.63[a]	0.097[a]	0.4[a]	–	–	NFA
LL2-127	D	07/26/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	1.2[a]	–	NFA
LL2sb-513M	ISM	07/01/11	1.0 - 3.0	–	–	–	–	–	1[a]	0.88	1.1[a]	0.16[a]	–	–	–	NFA
Building DA-6																
LL2-082	D	07/25/01	0.0 - 1.0	–	–	–	1100	–	–	–	–	–	–	–	–	NFA
LL2SB-508M	ISM	08/25/10	1.0 - 3.0	–	–	–	230	–	–	–	–	–	–	–	–	Remediate
LL2ss-055-cs	ISM	10/08/07	2.0 - 3.0	–	–	–	77.6	–	–	–	–	–	–	–	–	Remediate
Building DB-4A																
LL2-158	D	07/27/01	0.0 - 1.0	–	–	–	610	–	–	–	–	–	–	–	–	Remediate
LL2ss-288M	ISM	06/18/08	0.0 - 1.0	–	–	–	66.6	–	–	–	–	–	–	–	–	NFA
LL2ss-287M	ISM	06/24/08	0.0 - 1.0	–	–	–	–	–	–	0.167	–	–	–	–	–	NFA
LL2-146	D	07/27/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	–	2.8	NFA
LL2-148	D	07/27/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	1.8	–	NFA
Building DA-6A																
LL2-087	D	07/26/01	0.0 - 1.0	–	–	–	240	3.3[a]	–	–	–	–	–	2.6	–	Remediate
LL2-087	D	07/30/01	3.0 - 5.0	–	–	–	240	–	–	–	–	–	–	–	–	Remediate
LL2SB-506M	ISM	08/24/10	3.0 - 5.0	–	–	–	130	–	–	–	–	–	–	–	–	Remediate
LL2ss-406	ISM	12/01/09	0.0 - 0.5	–	–	–	38	–	–	–	–	–	–	–	–	Remediate
LL2-093	D	07/26/01	0.0 - 1.0	–	–	–	–	–	0.17[a]	0.21	0.22[a]	–	–	–	–	NFA
Building DB-3																
LL2-165	D	07/28/01	0.0 - 1.0	–	–	–	–	–	–	1.9	2.4	0.22	–	9.4	–	Remediate
LL2ss-516M	ISM	07/03/11	0.0 - 1.0	–	–	–	–	–	1.5[a]	1.6	1.9	0.24	–	–	–	Remediate
LL2ss-280M	ISM	06/18/08	0.0 - 1.0	–	–	–	–	–	0.392[a]	0.402	0.285[a]	–	–	–	–	NFA
LL2ss-279M	ISM	06/18/08	0.0 - 1.0	–	–	–	–	–	0.371[a]	0.316	0.24[a]	–	–	–	–	NFA
Building DC-1																
LL2-170	D	07/24/01	0.0 - 1.0	–	–	–	–	–	1.1[a]	1.5	1.3[a]	–	–	–	–	NFA
LL2-171	D	07/24/01	0.0 - 1.0	–	–	–	–	–	0.44[a]	0.56	0.61[a]	0.11[a]	–	–	–	NFA
LL2-169	D	07/24/01	0.0 - 1.0	–	–	–	–	–	1.7	1.8	2	0.28	–	–	–	Remediate
FWCss-002	ISM	12/03/09	0.0 - 0.5	–	–	–	–	–	1.5[a]	1.4	2.5	–	–	–	–	Remediate
LL2-172	D	07/24/01	0.0 - 1.0	–	–	–	–	–	0.22[a]	0.3	0.35[a]	–	0.19[a]	–	–	NFA
Building DB-13																
LL2-100	D	07/26/01	0.0 - 1.0	59.5	1220	0.99	–	–	–	–	–	–	–	3	–	NFA
LL2-100	D	07/29/01	1.0 - 3.0	–	1530	–	–	–	–	–	–	–	–	–	–	NFA
LL2-108	D	07/27/01	0.0 - 1.0	–	–	–	–	–	0.16[a]	0.19	0.28[a]	–	0.13[a]	–	–	NFA
Isolated Discrete Samples																
LL2-252	D	07/30/01	0.0 - 0.5	69.2	656	–	–	–	–	–	–	–	–	–	–	Remediate

Table 2-9. Summary of Human Health COC Concentrations in Soil and Sediment and Conclusions for Unrestricted (Residential) Land Use (continued)

				Metals			Explosives		PAHs					PCBs		
	Sample	Residential RGO		31	400	0.78	36	17	1.6	0.16	1.6	0.16	1.6	1.2	2.4	
Station	Type	Date	Depth (ft)	Antimony	Lead	Thallium	TNT	2,4-DNT	BaA	BaP	BbF	DA	IP	PCB-1254	PCB-1260	Conclusion for Unrestricted Land Use
Kelly's Pond and Exit Drainage																
LL2sd-053	D	07/30/01	0 - 0.5	--	--	--	--	--	0.15[a]	0.18	0.25[a]	--	0.11[a]	--	--	Remediate
LL2sd-182	D	07/31/01	0 - 0.5	--	--	--	--	--	0.6[a]	0.55	0.71[a]	0.082[a]	--	--	--	NFA
Kelly's Pond	ISM	06/23/03	0 - 0.3	--	--	--	--	--	1.25[a]	1.4	2.3	0.135[a]	1.045[a]	--	--	Remediate
LL2SD-630	D	05/16/16	0 - 1	--	--	--	--	--	0.228[a]	0.216	0.311[a]	0.0296[a]	--	--	--	NFA
LL2SD-632	D	05/16/16	0 - 1	--	--	--	--	--	0.471[a]	0.463	0.675[a]	0.0797[a]	--	--	--	Remediate
LL2SD-633	D	05/16/16	0 - 1	--	--	--	--	--	0.806[a]	0.941	1.39[a]	0.154[a]	0.646[a]	--	--	Remediate
LL2SD-631	D	05/17/16	0 - 1	--	--	--	--	--	16.4	23.6	41.2	4.55	19.1	--	--	Remediate

[a]Sample concentration is less than RGO; however, this chemical contributes to a sum of ratios greater than 1.

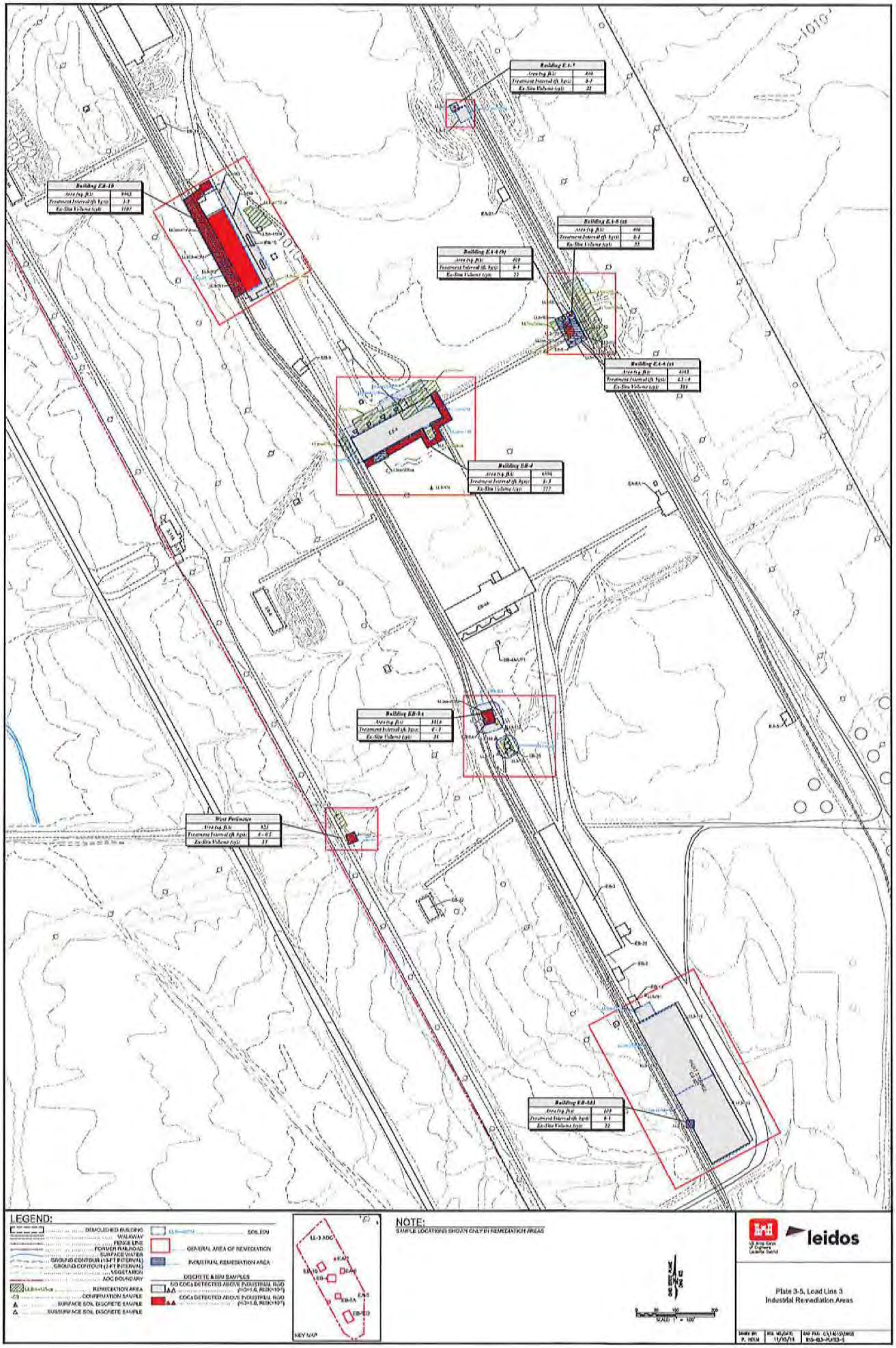
[b]Residential RGOs are the same for soil and sediment. This results in a very conservative assessment of sediment.

All units are mg/kg.
B(a)A = Benz(a)anthracene.
B(a)P = Benzo(a)pyrene.
B(b)F = Benzo(b)fluoranthene.
COC = Chemical of Concern.
D = Discrete soil sample.
DA = Dibenz(a,h)anthracene.
DNT = Dinitrotoluene.
ft = Feet.
IP = Indeno(1,2,3-cd)pyrene.
ISM = Incremental Sampling Methodology.
NFA = No further action or evaluation required for this COC.
PAH = Polycyclic Aromatic Hydrocarbon.
PCB = Polychlorinated Biphenyl.
RGO = Remedial Goal Option.
TNT = Trinitrotoluene.
-- = Chemical is not a COC in this sample.

Table 2-10. Summary of Human Health COC Concentrations in Soil and Conclusions for Industrial/Commercial Land Use

				Metal		Explosive	PAH			Pesticide	PCB	Conclusion for Commercial/Industrial Land Use
	Sample	Residential RGO		470	800	510	29	2.9	29	1.4	9.7	
Station	Type	Date	Depth (ft)	Antimony	Lead	TNT	B(a)A	B(a)P	B(b)F	Dieldrin	PCB-1254	
Building DB-10												
LL2-120	D	07/25/01	0.0 - 1.0	--	820	--	--	--	--	--	--	NFA
Building DB-4												
LL2ss-407	ISM	12/02/09	0.0 - 0.5	--	--	--	3.9[a]	3.8	5.1[a]	--	1.3[a]	NFA
Building DA-6												
LL2-082	D	07/25/01	0.0 - 1.0	--	--	1100	--	--	--	--	--	NFA
Building DB-4A												
LL2-158	D	07/27/01	0.0 - 1.0	--	--	610	--	--	--	--	--	Remediate
Building DB-3												
LL2-165	D	07/28/01	0.0 - 1.0	--	--	--	--	1.9[a]	--	0.29[a]	9.4[a]	NFA
Building DB-13												
LL2-100	D	07/26/01	0.0 - 1.0	--	1220	--	--	--	--	--	--	NFA
LL2-100	D	07/29/01	1.0 - 3.0	--	1530	--	--	--	--	--	--	NFA

[a]Sample concentration is less than RGO; however, this chemical contributes to a sum of ratios greater than 1.
All units are mg/kg.
B(a)A = Benz(a)anthracene.
B(a)P = Benzo(a)pyrene.
B(b)F = Benzo(b)fluoranthene.
COC = Chemical of Concern.
D = Discrete soil sample.
ft = Feet.
ISM = Incremental Sampling Methodology.
NFA = No further action or evaluation required for this COC.
PAH = Polycyclic Aromatic Hydrocarbon.
PCB = Polychlorinated Biphenyl.
RGO = Remedial Goal Option.
TNT = Trinitrotoluene.
-- = Chemical is not a human health COC in this sample.



Building EA-7
Building EB-19
Area (sq. ft.)
Treatment Interval (ft. bgs)
Ex-Situ Volume (cy)
Building EA-6 (a)
Building EA-6 (b)
Building EA-6 (c)
Building EB-4
Building EB-3A
West Perimeter
Building EB-803
LEGEND:
DEMOLISHED BUILDING
WALKWAY
FENCE LINE
FORMER RAILROAD
SURFACE WATER
GROUND CONTOUR (10-FT INTERVAL)
GROUND CONTOUR (2-FT INTERVAL)
VEGETATION
AOC BOUNDARY
REMEDIATION AREA
CONFIRMATION SAMPLE
SURFACE SOIL DISCRETE SAMPLE
SUBSURFACE SOIL DISCRETE SAMPLE
SOIL ISM
GENERAL AREA OF REMEDIATION
INDUSTRIAL REMEDIATION AREA
DISCRETE & ISM SAMPLES
NO COCs DETECTED ABOVE INDUSTRIAL RGO
COCs DETECTED ABOVE INDUSTRIAL RGO
KEY MAP
LL-3 AOC
NOTE:
SAMPLE LOCATIONS SHOWN ONLY IN REMEDIATION AREAS
SCALE: 1" = 100'
leidos
Plate 3-5, Load Line 3
Industrial Remediation Areas

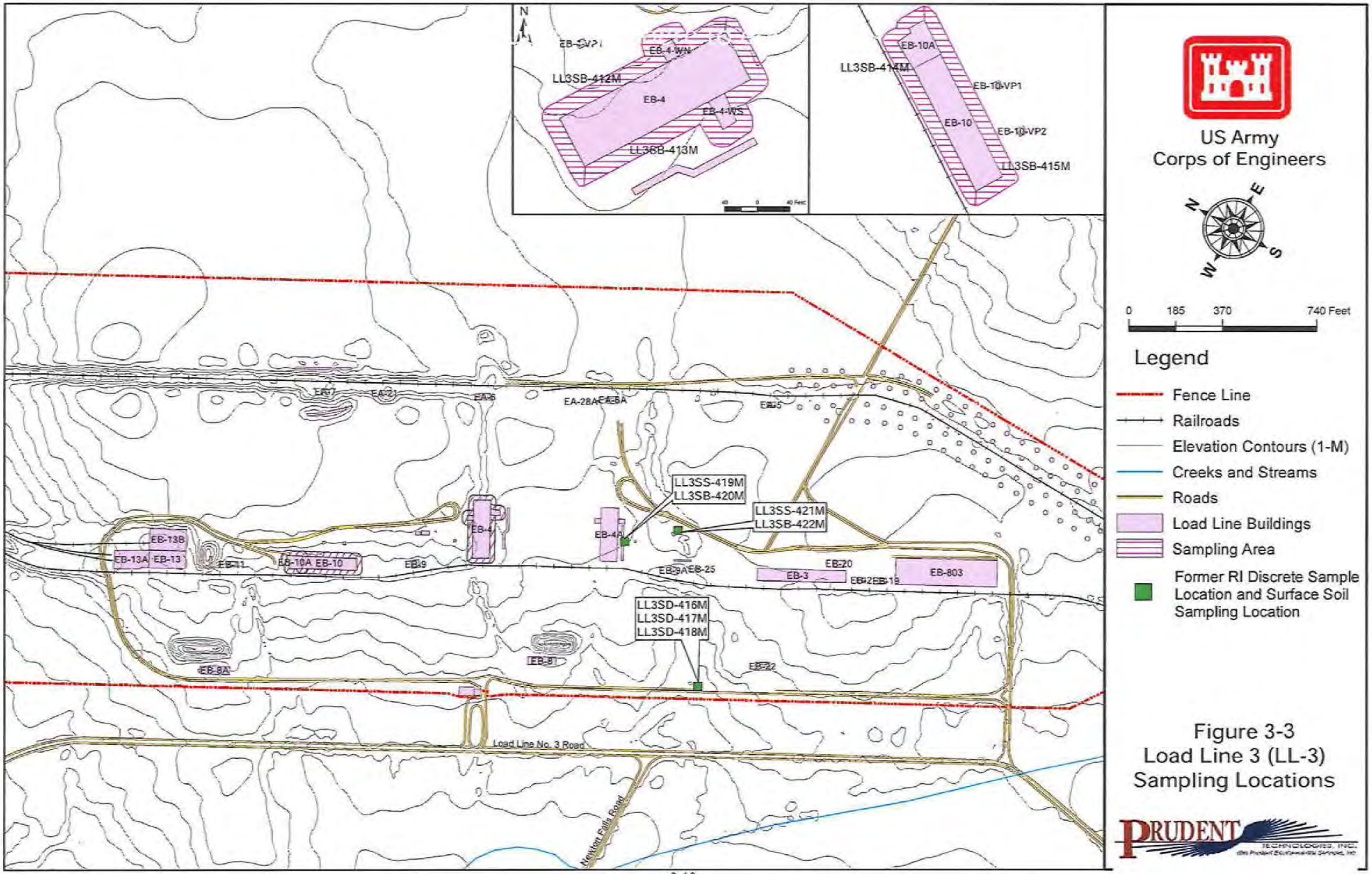


Figure 3-3
Load Line 3 (LL-3)
Sampling Locations

Table 2-14. Summary of Human Health COC Concentrations and Conclusions for Unrestricted (Residential) Land Use at Load Line 3

				COC													
				Metal		Explosive		PAH					Pesticide		PCB		Conclusion for Unrestricted Land Use
		Residential RGO		6.8	400	36	61	1.6	0.16	1.6	0.16	1.6	0.34	1.3	1.2	2.4	
Station	Sample Type	Date	Depth (ft)	Arsenic	Lead	TNT	RDX	B(a)A	B(a)P	B(b)F	DA	IP	Dieldrin	Heptachlor	PCB-1254	PCB-1260	
Building EB-10																	
LL3-083	D	08/06/01	0.0 - 1.0	–	–	–	–	0.26[a]	0.26	0.33[a]	–	–	–	–	–	–	Remediate
LL3-085	D	08/06/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	–	3.9	–	NFA
LL3-088	D	08/06/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	–	1.8	–	NFA
LL3-092	D	08/07/01	0.0 - 1.0	–	599	–	–	–	–	–	–	–	–	–	20	–	NFA
LL3SB-409M	ISM	08/30/10	1.0 - 3.0	–	–	–	–	–	0.17	–	–	–	–	–	–	–	NFA
LL3SB-409M02	D	08/30/10	1.0 - 7.0	–	–	–	–	0.43[a]	0.41	0.5[a]	0.059[a]	–	–	–	–	–	Remediate
LL3SB-409M06	D	08/30/10	1.0 - 7.0	–	–	–	–	0.25[a]	0.27	0.3	0.039[a]	–	–	–	–	–	Remediate
LL3SB-409M08	D	08/30/10	1.0 - 7.0	–	–	–	–	0.17[a]	0.17	0.24[a]	–	–	–	–	–	–	Remediate
LL3SB-409M09	D	08/30/10	1.0 - 7.0	–	–	–	–	0.4[a]	0.38	0.47[a]	0.045[a]	–	–	–	–	–	Remediate
LL3SB-409M11	D	08/30/10	1.0 - 7.0	–	–	–	–	0.2[a]	0.21	0.28[a]	–	–	–	–	–	–	Remediate
LL3sb-414M	ISM	06/29/11	1.0 - 3.0	–	–	–	–	0.71[a]	0.58	0.76[a]	0.12[a]	–	–	–	–	–	Remediate
LL3sb-414M	ISM	06/29/11	3.0 - 5.0	–	–	–	–	63	47	54	7.2	21	–	–	–	–	Remediate
LL3sb-415M	ISM	06/29/11	3.0 - 5.0	–	–	–	–	0.36[a]	0.4	0.48[a]	0.065[a]	–	–	–	–	–	Remediate
LL3ss-266M	ISM	06/25/08	0.0 - 1.0	–	–	–	–	0.286[a]	0.268	0.223[a]	–	–	–	–	–	–	Remediate
Building EB-11																	
LL3ss-073-cs	ISM	10/22/07	2.5 - 3.5	–	–	–	–	–	–	–	–	–	–	–	13.8	–	Remediate
LL3-074	D	08/09/01	0.0 - 1.0	–	–	–	–	0.17[a]	0.21	0.32[a]	–	–	–	–	–	–	NFA
Building EA-7																	
LL3-054	D	08/10/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	–	17	–	Remediate
Building EA-21																	
No COCs were identified in Building EA-21.																	
Building EB-4																	
LL3-104	D	08/08/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	–	2.3	–	Remediate
LL3-227	D	08/24/01	0.0 - 1.0	–	–	37	–	–	–	–	–	–	–	–	–	–	Remediate
LL3sb-413M	ISM	06/30/11	1.0 - 3.0	–	–	–	–	–	–	–	–	–	–	–	100	5[a]	Remediate
LL3ss-077-cs	ISM	11/20/07	2.5 - 3.5	–	–	–	–	–	–	–	–	–	–	–	6.09	–	Remediate
LL3ss-085-cs	ISM	10/31/07	2.5 - 3.5	–	–	–	–	–	–	–	–	–	–	–	3.38	–	Remediate
LL3ss-253M	ISM	06/15/10	3.3 - 4.3	–	–	37.5	–	–	0.147[a,b]	–	0.0862[a,b]	–	–	–	1.28	–	Remediate
LL3ss-297M	ISM	06/16/10	3.9 - 4.9	–	–	29.3[a]	–	–	0.093[a,b]	–	0.0852[a,b]	–	–	–	2.9	–	Remediate
LL3ss-355	ISM	12/03/09	0.0 - 0.5	–	–	–	–	0.21[a]	0.11[a]	0.21[a]	–	–	–	0.27[a]	0.86[a]	–	NFA
Building EA-6																	
LL3-057	D	07/31/01	0.0 - 1.0	–	–	52[b]	–	4.8	5.8	7	0.74	2.4	–	–	–	–	Remediate
LL3-060	D	07/31/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	–	4	–	Remediate
LL3-063	D	07/31/01	0.0 - 1.0	–	–	650[b]	–	5.7	5.4	5.5	0.93	3	–	–	14[b]	–	Remediate
LL3-063	D	08/07/01	1.0 - 3.0	–	–	240	–	–	–	–	–	–	–	–	–	–	NFA
LL3ss-293M	ISM	06/04/10	4.7 - 5.7	–	–	–	–	7.57	5.88	4.6	0.847	–	–	–	–	–	Remediate
West Perimeter Area																	
LL3-050(p2)	D	08/08/01	0.0 - 0.5	–	–	–	–	2.8	3	4.2	0.41	1.3	–	–	–	–	Remediate
LL3sd-416M	ISM	07/02/11	0.0 - 0.5	–	–	–	–	8.6	6.8	9.1	1.2	4.1	–	–	–	–	Remediate
Building EB-4A																	
LL3-117	D	08/06/01	0.0 - 1.0	–	432	–	34[a]	–	–	–	–	–	1.2	–	15	–	NFA
LL3ss-098-cs	ISM	09/21/07	2.0 - 3.0	–	–	83	–	–	–	–	–	–	–	–	–	–	Remediate
LL3ss-256M	ISM	06/26/08	0.0 - 1.0	–	–	51	–	0.772[a]	0.622	0.478[a]	–	–	–	–	1.38	–	Remediate
LL3ss-258M	ISM	06/27/08	0.0 - 1.0	–	–	40.9	–	–	–	–	–	–	–	–	–	–	Remediate
LL3ss-419M	ISM	07/02/11	0.0 - 1.0	–	–	–	–	0.48[a]	0.4	0.44[a]	0.056[a]	–	–	–	–	–	Remediate

Table 2-14. Summary of Human Health COC Concentrations and Conclusions for Unrestricted (Residential) Land Use at Load Line 3 (continued)

				COC													
				Metals		Explosives		PAHs					Pesticide		PCB		
		Residential RGO		6.8	400	36	61	1.6	0.16	1.6	0.16	1.6	0.34	1.3	PCB		Conclusion for
Station	Sample Type	Date	Depth (ft)	Arsenic	Lead	TNT	RDX	B(a)A	B(a)P	B(a)F	DA	IP	Dieldrin	Heptachlor	PCB-1254	PCB-1260	Unrestricted Land Use
Building EB-9A																	
LL3ss-265M	ISM	06/24/08	0.0 - 1.0	–	–	700	–	–	–	–	–	–	–	–	–	–	Remediate
LL3ss-421M	ISM	07/02/11	0.0 - 1.0	–	–	–	–	0.25[a]	0.26	0.4[a]	0.06[a]	0.2[a]	–	–	–	–	NFA
Building EB-25																	
No COCs were identified in Building EB-25.																	
Building EA-6A																	
LL3-064	D	07/31/01	0.0 - 1.0	–	–	–	–	0.79[a]	0.6	0.67[a]	0.12[a]	–	–	–	–	–	NFA
LL3-065	D	08/07/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	–	1.3	–	NFA
LL3-066	D	08/08/01	0.0 - 1.0	–	–	–	–	0.19[a]	0.14[a]	0.21[a]	–	–	–	–	–	1.4[a]	NFA
LL3-067	D	07/31/01	0.0 - 1.0	–	758	–	–	–	–	–	–	–	–	–	5.6	–	Remediate
LL3-152	D	08/13/01	0.0 - 1.0	–	–	–	–	0.69[a]	0.7	0.98[a]	0.097[a]		–	–	–	–	NFA
LL3ss-261M	ISM	06/07/10	5.3 - 6.3	–	–	28.1[a]	–	0.323[a]	0.249	0.2[a]	–	–	–	–	–	–	NFA
Isolated Discrete Soil Samples																	
LL3-047(p2)	D	08/08/01	0.0 - 0.5	22.3[b]	–	–	–	–	0.099[a,b]	–	–	–	–	–	9	–	Remediate
LL3-056	D	08/10/01	0.0 - 1.0	–	–	–	–	–	–	–	–	–	–	–	1.5	–	NFA
LL3-056	D	08/12/01	1.0 - 3.0	–	–	500	–	–	–	–	–	–	–	–	–	–	Remediate
LL3-136	D	08/10/01	0.0 - 1.0	–	–	–	31[a]	0.54[a]	0.53	0.76[a]	0.069[a]		–	–	–	–	NFA
LL3-138	D	08/10/01	0.0 - 1.0	–	–	–	–	–	0.12[a]	0.16[a]	–	–	–	–	2.5	–	NFA
LL3-142	D	08/09/01	0.0 - 1.0	–	–	–	–	0.45[a]	0.61	0.96[a]	0.083[a]	–	–	–	–	–	NFA
LL3-144	D	08/09/01	0.0 - 1.0	–	634[b]	–	–	–	–	–	–	–	–	–	14	–	Remediate
LL3-145	D	08/09/01	0.0 - 1.0	–	572	–	–	–	–	–	–	–	–	–	–	–	NFA
LL3sd/sw-048(d)	D	08/08/01	0.0 - 0.5	–	–	110	–	0.28[a,b]	0.26[a]	0.37[a,b]	–	–	–	–	–	–	Remediate

[a]Sample concentration is less than RGO; however, this chemical contributes to a sum of ratios greater than 1.
[b]Sample location is recommended for remediation for other chemicals of interest; however, this chemical is not recommended as a COC for remediation.
All units are mg/kg.
B(a)A = Benz(a)anthracene.
B(a)P = Benzo(a)pyrene.
B(b)F = Benzo(b)fluoranthene.
COC = Chemical of Concern.
D = Discrete soil sample.
DA = Dibenz(a,h)anthracene.
ft = Feet.
IP = Indeno(1,2,3-cd)pyrene.
ISM = Incremental Sampling Methodology.
NFA = No further action or evaluation required for this COC.
PAH = Polycyclic Aromatic Hydrocarbon.
PCB = Polychlorinated Biphenyl.
RDX = Hexahydro-1,3,5-Trinitro-1,3,5-Triazine.
RGO = Remedial Goal Option.
TNT = Trinitrotoluene.
– = Chemical is not a human health COC in this sample.

Table 2-15. Summary of Human Health COC Concentrations and Conclusions for Commercial/Industrial Land Use at Load Line 3

				COC								Conclusion for Commercial/ Industrial Land Use
				Explosive		PAH				PCB		
		Industrial RGO		510	280	29	2.9	29	2.9	9.7	9.9	
Station	Sample Type	Date	Depth (ft)	TNT	RDX	B(a)A	B(a)P	B(b)F	DA	PCB-1254	PCB-1260	
Building EB-10												
LL3-092	D	08/07/01	0.0 - 1.0	--	--	--	--	--	--	20	--	NFA
LL3sb-414M	ISM	06/29/11	3.0 - 5.0	--	--	63	47	54	7.2	--	--	Remediate
Building EB-11												
LL3ss-073-cs	ISM	10/22/07	2.5 - 3.5	--	--	--	--	--	--	13.8	--	Remediate
Building EA-7												
LL3-054	D	08/10/01	0.0 - 1.0	--	--	--	--	--	--	17	--	Remediate
Building EA-21												
No COCs for the Industrial Receptor were identified in Building EA-21												
Building EB-4												
LL3sb-413M	ISM	06/30/11	1.0 - 3.0	--	--	--	--	--	--	100	5[a]	Remediate
Building EA-6												
LL3-057	D	07/31/01	0.0 - 1.0	--	--	4.8[a]	5.8	7[a]	0.74[a]	--	--	Remediate
LL3-063	D	07/31/01	0.0 - 1.0	650[b]	--	--	5.4	--	0.93[a]	14[b]	--	Remediate
LL3ss-293M	ISM	06/04/10	4.7 - 5.7	--	--	7.57[a]	5.88	4.6[a]	0.847[a]	--	--	Remediate
West Perimeter Area												
LL3-050(p2)	D	08/08/01	0.0 - 0.5	--	--	--	3	--	--	--	--	Remediate
LL3sd-416M	ISM	07/02/11	0.0 - 0.5	--	--	8.6[a]	6.8	9.1[a]	1.2[a]	--	--	Remediate
Building EB-4A												
LL3-117	D	08/06/01	0.0 - 1.0	--	34[a]	--	--	--	--	15	--	NFA
Building EB-9A												
LL3ss-265M	ISM	06/24/08	0.0 - 1.0	700	--	--	--	--	--	--	--	Remediate
Building EB-25												
No COCs for the Industrial Receptor were identified in Building EB-25												
Building EA-6A												
No COCs for the Industrial Receptor were identified in Building EA-6A												

Table 2-15. Summary of Human Health COC Concentrations and Conclusions for Commercial/Industrial Land Use at Load Line 3 (continued)

				COC								Conclusion for Commercial/ Industrial Land Use
				Explosive		PAH				PCB		
		Industrial RGO		510	280	29	2.9	29	2.9	9.7	9.9	
Station	Sample Type	Date	Depth (ft)	TNT	RDX	B(a)A	B(a)P	B(b)F	DA	PCB-1254	PCB-1260	
LL3-056	D	08/12/01	1.0 - 3.0	--	--	--	--	--	--	--	--	NFA
LL3-144	D	08/09/01	0.0 - 1.0	--	--	--	--	--	--	14	--	Remediate

[a]Sample concentration is less than RGO; however, this chemical contributes to a sum of ratios greater than 1.
[b]Sample location is recommended for remediation for other chemicals of interest; however, this chemical is not recommended as a COC for remediation.
All units are mg/kg.
B(a)A = Benz(a)anthracene.
B(a)P = Benzo(a)pyrene.
B(b)F = Benzo(b)fluoranthene.
COC = Chemical of Concern.
D = Discrete soil sample.
DA = Dibenz(a,h)anthracene.
ft = Feet.
ISM = Incremental Sampling Methodology.
NFA = No further action or evaluation required for this COC.
PAH = Polycyclic Aromatic Hydrocarbon.
PCB = Polychlorinated Biphenyl.
RDX = Hexahydro-1,3,5-Trinitro-1,3,5-Triazine.
RGO = Remedial Goal Option.
TNT = Trinitrotoluene.
-- = Chemical is not a human health COC in this sample.

Table 7-5-A Ravenna LL 3 Surface and Subsurface Soil Sampling Results: Metals

				Location	Southwest & northwest sides of Bldg. EB-10, 20						Northeast & southeast side of Bldg. EB-10, 20						RI Discrete Sample Locations						% RSD
				Sample ID	LL3SB-414M-0101-SO		LL3SB-414M-0102-SO		LL3SB-414M-0103-SO		LL3SB-415M-0101-SO		LL3SB-415M-0102-SO		LL3SB-415M-0103-SO		LL3SD-416M-0001-SO		LL3SD-417M-0001-SO		LL3SD-418M-0001-SO		
			Type Sample		Primary		Primary		Primary		Primary		Primary		Primary		Primary		QC		QA		
			Sample Date		6/29/2011		6/29/2011		6/29/2011		6/29/2011		6/29/2011		6/29/2011		7/6/2011		7/6/2011		6/26/2011		
			Sample Depth		1 - 3		3 - 5		5 - 7		1 - 3		3 - 5		5 - 7		0 - 0.5		0 - 0.5		0 - 0.5		
			Min REC or RSL																				
	Analyte	Units	Value	REC or RSL	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	
Metals	Aluminum	mg/kg	34,960	NG													10000	D	9400	D	10600	B	6.0
	Antimony	mg/kg	136	RFA													1.4	J-	1.5	J-	5.9		87.6
	Arsenic	mg/kg	19.8	BKG1	11	J-	7.5	J-	9.5	J-	11		13		19		14	J-	13	J-	12.9		4.6
	Barium	mg/kg	3,506	NG													150	J-	130	J-	158		9.9
	Beryllium	mg/kg	160	RSL													1.3	D	1.2	D	1.2		4.7
	Cadmium	mg/kg	109	NG													1.0	J	1.1	J	0.71		21.6
	Calcium	mg/kg	NA	NA													15000	D	9800		10700	B	23.5
	Chromium (as Cr-3)	mg/kg	196,942	NG													26	J-	31	J-	298		131.5
	Cobalt	mg/kg	70.3	NG													21	J-	19	J-	13.3		22.5
	Copper	mg/kg	27,138	RFA													9.6	J-	10	J-	18.6		39.9
	Iron	mg/kg	NA	NA													24000		25000		43200		35.2
	Lead	mg/kg	4,000	RSL													23	J-	22	J-	56.1		57.6
	Magnesium	mg/kg	NA	NA													3400		2400		2780		17.6
	Manganese (1' - 5')	mg/kg	1,450	BKG1													3700	J-	3400	J-	4880		19.6
	Nickel	mg/kg	13,463	RFA													28	J-	30	J-	25.4		8.3
	Potassium	mg/kg	NA	NA													730		670		1040		24.4
	Selenium	mg/kg	390	RSL													1.1	J-	1.1	J-	2.4		48.9
	Silver	mg/kg	3,240	RFA													0.43	U	0.5	U	0.017	U	
	Sodium	mg/kg	NA	NA													110		69	J	431		97.5
	Thallium	mg/kg	47.6	RFA													0.16	J	0.13	J	4		155.6
	Vanadium	mg/kg	1,558	RFA													23		23		20.8		5.7
	Zinc	mg/kg	196,589	RFA													160	J-	170	J-	136	B	11.2
	Chromium, hexavalent	mg/kg	16.4	NG													0.46	J	0.45	J	2.7	U	
	Mercury	mg/kg	165	RFA													0.30		0.33		0.23		17.9
																			% RSD Average =				38.7

See page 7-49 for a list of acronyms and definitions.

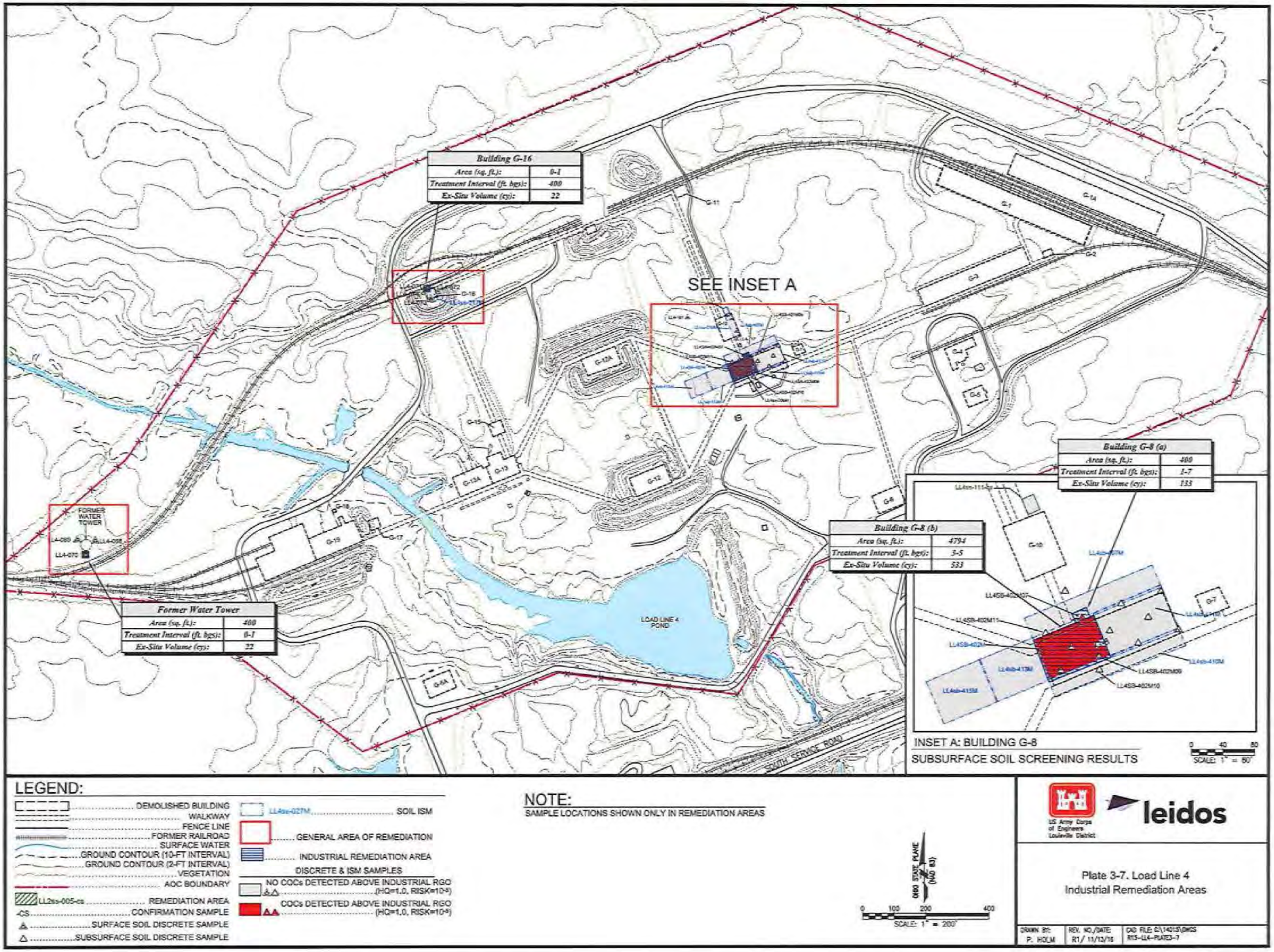

SEE INSET A
Building G-16
Area (sq. ft.): 0-1
Treatment Interval (ft. bgs): 400
Ex-Situ Volume (cy): 22
FORMER WATER TOWER
Former Water Tower
Area (sq. ft.): 400
Treatment Interval (ft. bgs): 0-1
Ex-Situ Volume (cy): 22
Building G-8 (a)
Area (sq. ft.): 400
Treatment Interval (ft. bgs): 1-7
Ex-Situ Volume (cy): 133
Building G-8 (b)
Area (sq. ft.): 4794
Treatment Interval (ft. bgs): 3-5
Ex-Situ Volume (cy): 533
LOAD LINE 4 POND
SOUTH SERVICE ROAD
INSET A: BUILDING G-8
SUBSURFACE SOIL SCREENING RESULTS
SCALE: 1" = 80'
LEGEND:
DEMOLISHED BUILDING
WALKWAY
FENCE LINE
FORMER RAILROAD
SURFACE WATER
GROUND CONTOUR (10-FT INTERVAL)
GROUND CONTOUR (2-FT INTERVAL)
VEGETATION
AOC BOUNDARY
LL2ss-005-cs REMEDIATION AREA
-CS CONFIRMATION SAMPLE
SURFACE SOIL DISCRETE SAMPLE
SUBSURFACE SOIL DISCRETE SAMPLE
LL4ss-027M SOIL ISM
GENERAL AREA OF REMEDIATION
INDUSTRIAL REMEDIATION AREA
DISCRETE & ISM SAMPLES
NO COCs DETECTED ABOVE INDUSTRIAL RGO (HQ=1.0, RISK=10-5)
COCs DETECTED ABOVE INDUSTRIAL RGO (HQ=1.0, RISK=10-5)
NOTE:
SAMPLE LOCATIONS SHOWN ONLY IN REMEDIATION AREAS
OHIO STATE PLANE (NAD 83)
SCALE: 1" = 200'
US Army Corps of Engineers Louisville District
leidos
Plate 3-7. Load Line 4
Industrial Remediation Areas
DRAWN BY: P. HOLM
REV. NO./DATE: R1/ 11/13/18
CAD FILE: C:\14015\DWGS R15-LL4-PLATE3-7

Table 2-19. Summary of Human Health COC Concentrations in Soil and Conclusions for Unrestricted (Residential) Land Use at Load Line 4

			COC								Conclusion for Unrestricted (Residential) Land Use
			Metal	PAH					PCB		
	Residential RGO		400	1.6	0.16	1.6	0.16	1.6	1.2	2.4	
Station	Date	Depth (ft)	Lead	B(a)A	B(a)P	B(b)F	DA	IP	PCB-1254	PCB-1260	
Former Water Tower											
LL4-070	08/21/01	0 - 1	1340	--	--	--	--	--	--	--	Remediate
LL4-068	08/21/01	0 - 1	599	--	--	--	--	--	--	--	Remediate
LL4-069	08/21/01	0 - 1	414	--	--	--	--	--	--	--	Remediate
Building G-16											
LL4-071	08/21/01	0 - 1	618[b]	0.15[a,b]	0.21[b]	0.54[a,b]	--	0.15[a,b]	--	28	Remediate
Building G-9											
LL4-075	08/22/01	0 - 1	--	--	0.15[a,b]	0.32[a,b]	--	0.098[a,b]	--	4.5	Remediate
LL4-076	08/22/01	0 - 1	--	--	0.19	0.3[a]	--	0.19[a]	--	0.18[a]	NFA
LL4-078	08/22/01	0 - 1	--	--	--	--	--	--	--	2.6	Remediate
Building G-18											
LL4ss-219M	06/27/08	0 - 1	--	0.382[a]	0.325	0.291[a]	--	--	--	--	NFA
Building G-19											
LL4-095	08/22/01	0 - 1	501	--	--	--	--	--	--	--	NFA
Buildings G-12 and G-12A											
LL4-116	08/14/01	0 - 1	418	--	--	--	--	--	--	--	Remediate
LL4-113	08/21/01	0 - 1	--	--	0.77	1.3[a]	0.38	1.4[a]	--	--	Remediate
LL4-158	08/24/01	0 - 1	--	0.99[a]	--	5.4	--	--	--	--	NFA
LL4ss-420M	06/26/11	0 - 1	--	0.48[a]	0.38	0.51[a]	0.065[a]	--	--	--	Remediate
Building G-8											
LL4SB-402M	08/16/10	1 - 3.0	--	0.13[a]	0.17	0.28[a]	0.033[a]	--	--	--	Remediate
LL4SB-402M	08/16/10	3.0 - 5.0	--	4.1	3.7	4.5	0.48	2.1	--	--	Remediate
LL4SB-402M	08/16/10	5.0 - 7.0	--	2.2	1.9	2.4	0.3	--	--	--	Remediate
LL4SB-402M07	08/16/10	1 - 7.0	--	54	51	61	6.2	29	--	--	Remediate
LL4SB-402M10	08/16/10	1 - 7.0	--	--	0.28	0.65[a]	0.062[a]	0.2[a]	--	--	Remediate
LL4SB-402M11	08/16/10	1 - 7.0	--	0.29[a]	0.38	0.46[a]	0.059[a]	0.3[a]	--	--	Remediate
LL4sb-407M	06/27/11	1 - 3.0	--	3.3	2.9	3.1	0.38	1.6	--	--	Remediate
LL4sb-407M	06/27/11	3.0 - 5.0	--	0.62[a]	0.53	0.63[a]	0.069[a]	--	--	--	Remediate
LL4sb-410M	06/27/11	5.0 - 7.0	--	0.56[a]	0.57	1.1[a]	0.16	--	--	--	Remediate
LL4sb-411M	06/27/11	1 - 3.0	--	0.16[a]	0.16[a]	0.31[a]	0.036[a]	--	--	--	Remediate
LL4ss-206M	07/01/08	0 - 1	--	2.02	2	1.94	0.327	--	--	--	Remediate

Table 2-19. Summary of Human Health COC Concentrations in Soil and Conclusions for Unrestricted (Residential) Land Use at Load Line 4 (continued)

			COC								Conclusion for Unrestricted (Residential) Land Use
			Metal	PAH					PCB		
	Residential RGO		400	1.6	0.16	1.6	0.16	1.6	1.2	2.4	
Station	Date	Depth (ft)	Lead	B(a)A	B(a)P	B(b)F	DA	IP	PCB-1254	PCB-1260	
Building G-10											
LL4-117	08/21/01	0 - 1	--	--	--	--	--	--	2.9	--	Remediate
Building G-6											
LL4-141	08/14/01	0 - 1	--	0.53[a]	0.5	0.67[a]	0.085[a]	--	--	--	Remediate
North of Building G-1A											
LL4-185	08/11/01	0 - 0.5	563	--	--	--	--	--	--	--	Remediate
Building G-4											
LL4-131	08/14/01	0 - 1	987	--	--	--	--	--	--	--	NFA

[a]Sample concentration is less than RGO; however, this chemical contributes to a sum of ratios greater than 1.
[b]Sample location is recommended for remediation for other chemicals of interest; however, this chemical is not recommended as a COC for remediation.
All units are mg/kg.
B(a)A = Benz(a)anthracene.
B(a)P = Benzo(a)pyrene.
B(b)F = Benzo(b)fluoranthene.
COC = Chemical of Concern.
D = Discrete soil sample.
DA = Dibenz(a,h)anthracene.
ft = Feet.
IP = Indeno(1,2,3-cd)pyrene.
ISM = Incremental Sampling Methodology.
NFA = No further action or evaluation required for this COC.
PAH = Polycyclic Aromatic Hydrocarbon.
PCB = Polychlorinated Biphenyl.
RGO = Remedial Goal Option.
-- = Chemical is not a human health COC in this sample.

Table 2-20. Summary of Human Health COC Concentrations in Soil and Conclusions for Industrial/Commercial Land Use at Load Line 4

			COC						
			Metals	PAHs				PCBs	
	Industrial RGO		800	29	2.9	29	2.9	9.9	Conclusion for Commercial/Industrial Land Use
Station	Date	Depth (ft)	Lead	B(a)A	B(a)P	B(b)F	DA	PCB-1260	
Former Water Tower									
LL4-070	08/21/01	0 - 1	1340	--	--	--	--	--	Remediate
Building G-16									
LL4-071	08/21/01	0 - 1	--	--	--	--	--	28	Remediate
Building G-8									
LL4SB-402M	08/16/10	3 - 5	--	4.1[a]	3.7	4.5[a]	0.48[a]	--	Remediate
LL4SB-402M07	08/16/10	1 - 7	--	54	51	61	6.2	--	Remediate
Building G-4									
LL4-131	08/14/01	0 - 1	987	--	--	--	--	--	NFA

[a]Sample concentration is less than RGO; however, this chemical contributes to a sum of ratios greater than 1.
All units are mg/kg.
B(a)A = Benz(a)anthracene.
B(a)P = Benzo(a)pyrene.
B(b)F = Benzo(b)fluoranthene.
COC = Chemical of Concern.
DA = Dibenz(a,h)anthracene.
ft = Feet.
NFA = No further action or evaluation required for this COC.
PAH = Polycyclic Aromatic Hydrocarbon.
PCB = Polychlorinated Biphenyl.
RGO = Remedial Goal Option.
-- = Chemical is not a human health COC in this sample.