FINAL
FIRST INSTALLATION-WIDE FIVE-YEAR REVIEW REPORT
FOR
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

RAVENNA ARMY AMMUNITION PLANT

RAVENNA, OHIO

AUGUST 2012

Prepared for:

U.S. Army
Base Realignment and Closure Division

Army National Guard

Ohio Army National Guard

Prepared by:

U.S. Army Corps of Engineers

Buffalo District

1776 Niagara Street

Buffalo, New York 14207

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Barker, Michelle, C
Bartolomei, Lindsey, A
Keil, Karen, G
Stachowski, James, R

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US Army Corps of Engineers - Buffalo
1776 Niagara Street
Buffalo, NY 14207

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US Army
Base Realignment and Closure Division
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44226

National Guard Bureau
111 S. George Mason Dr.
Arlington, VA 22204

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First five-year review report of remedial actions at the Ravenna Army Ammunition Plant 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.

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Five-Year Review, Load Lines 1, 2, 3, 4, and 12, Winklepeck Burning Grounds, and Ramsdell Quarry Landfill

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(716) 879-4252

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FIRST INSTALLATION WIDE FIVE-YEAR REVIEW REPORT

FOR

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

Approved by:

William J. O'Donnell, II — 27 AUG 2012

Signature — *Date*

William J. O'Donnell, II
Chief, Operational Army, Medical,
Industrial, and Reserve Branch
Base Realignment and Closure Division

Approved by:

Ann M. Wood — 30 Aug 2012

Signature — *Date*

Ann M. Wood
Chief, Cleanup and Restoration Branch
Environmental Programs Division
Army National Guard Directorate

Approved by:

William E. Meade — 31 Aug 2012

Signature — *Date*

William E. Meade
LTC, Ohio Army National Guard
Garrison Commander - CRJMTC

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DOCUMENT DISTRIBUTION

Name / Organization	Number of Printed Copies	Number of Electronic Copies
Mark Leeper, ARNG (Environmental Cleanup Program Manager)	0	1
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Nancy Zikmanis, Ohio EPA – DERR-NEDO (Environmental Supervisor)	3	3
Justin Burke, Ohio EPA Central Office (DERR Coordinator)	1	1
Gregory F Moore, CELRL (USACE – LRL RVAAP Project Manager)	1	1
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ARNG – Army National Guard Directorate
CELRL – Corps of Engineers, Louisville District
CRJMTC – Camp Ravenna Joint Military Training Center
DERR-NEDO – Division of Environmental Response and Revitalization – Northeast District Office
NGB – National Guard Bureau
OHARNG – Ohio Army National Guard
REIMS – Ravenna Army Ammunition Plant Environmental Information Management System

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LIST OF ACRONYMS AND ABBREVIATIONS

ACM	asbestos-containing material
amsl	above mean sea level
AOC	area of concern
ARAR	Applicable or Relevant and Appropriate Requirement
ARNG	Army National Guard
ASTDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BRACD	Base Realignment and Closure Division
Cal EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COC	constituent of concern
COEC	constituent of ecological concern
COPC	constituent of potential concern
CRJMTC	Camp Ravenna Joint Military Training Center
DERP	Defense Environmental Restoration Program
DQO	data quality objective
EPA	Environmental Protection Agency
EPC	exposure point concentration
EQM	Environmental Quality Management, Inc.
FS	Feasibility Study
ft	foot (feet)
ft^2	square feet
g	gram(s)
GIS	Geographic Information System
GSDI	geometric standard deviation PbB
HI	Hazard Index
HMX	cyclotetramethylenetetranitramine
HVAC	heating, ventilation, and air conditioning
IC	Institutional Control
ILCR	Incremental Lifetime Cancer Risk
IRIS	Integrated Risk Information System
IUR	inhalation unit cancer risk
kg	kilogram(s)
LUC	land-use control
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
mg/m^3	milligrams per cubic meter
MKM	MKM Engineers, Inc.
NC	no change
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ND	not detected
NGB	National Guard Bureau
NJDEP	New Jersey Department of Environmental Protection

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

NPL	National Priorities List (USEPA)
OHARNG	Ohio Army National Guard
PAHs	polycyclic aromatic hydrocarbons
PbB	lead concentration in blood
PbBo	baseline PbB
PCB	Polychlorinated Biphenyl
PIKA	PIKA International, Inc.
PLM	Polarized Light Microscopy
PMP	Property Management Plan
PP	Proposed Plan
ppm	parts per million
Prudent	Prudent Technologies, Inc.
RA	remedial action
RAB	Restoration Advisory Board
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RDX	cyclotrimethylenetrinitramine
REIMS	Ravenna Army Ammunition Plant Environmental Information Management System
RfCi	inhalation reference concentration
RfDi	inhalation reference dose
RfDo	oral reference dose
RI	Remedial Investigation
ROD	Record of Decision
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation / SAIC Engineering of Ohio
Shaw	Shaw Environmental, Inc. / Shaw E&I
SFo	Oral Cancer Slope Factor
SVOC	semi-volatile organic compound
SWPPP	storm water pollution prevention plan
TAL	Target Analyte List
TNT	Trinitrotoluene
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Command
USAEHA	U.S. Army Environmental Health Administration
USEPA	U.S. Environmental Protection Agency
UE	unrestricted exposure
UU	unlimited use
UXO	unexploded ordnance
VOC	volatile organic compound
yd^3	cubic yard(s)
µg	micrograms
µg/dL	micrograms per deciliter

EXECUTIVE SUMMARY

Purpose

This is the first installation-wide five-year review of remedial actions taken at the Ravenna Army Ammunition Plant (RVAAP). The purpose of this review is to evaluate information to determine if remedial actions implemented at the sites identified below are and will continue to be protective of human health and the environment.

- 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)
- RVAAP-05 (Winklepeck Burning Grounds)
- RVAAP-01 (Ramsdell Quarry Landfill)

This five-year review report is required because hazardous substances remain at the sites thereby preventing unlimited use and unrestricted exposure. The methods, findings, and conclusions of the review are documented in this report. In addition, this report summarizes issues identified during the review and includes recommendations and follow-up actions for them. The triggering action for this five-year review was the start of remedial actions at Load Line 1 in August 2007.

Ravenna Army Ammunition Plant

The 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. The site originally encompassed 21,683 acres of which accountability for 20,423 acres has since been transferred to the U.S. Property and Fiscal Officer for Ohio. That acreage is used by the Ohio Army National Guard (OHARNG) as a military training site referred to as Camp Ravenna. The current RVAAP consists of 1,260 acres in several distinct parcels scattered throughout Camp Ravenna. RVAAP / Camp Ravenna is located in northeastern Ohio approximately one mile northwest of the city of Newton Falls (Figure 1). The surrounding area is predominately woodland or farm acreage with the remainder being residential. The locations of the sites evaluated in this five-year review are shown in Figure 2.

Load Lines 1 Through 4

Industrial operations at the RVAAP primarily consisted of 12 munitions assembly facilities referred to as “load lines.” Load Lines 1, 2, 3, and 4, shown in Figure 2, are 150, 212, 167, and 125 acres in size, respectively, and were used for industrial operations associated with munitions load, assembly, packaging, reconditioning, demilitarization, and quality assurance/quality control operations. Explosives (2,4,6-trinitrotoluene [TNT], cyclotetramethylenetetranitramine [HMX], and cyclotrimethylenetrinitramine [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 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). Intended future use of the sites is for OHARNG mounted training with no digging. Currently, OHARNG has not used the sites. The selected remedies consisted of excavation and off-site disposal of contaminated soil and dry sediment, groundwater monitoring, maintenance of former building slabs to prevent leaching of potentially contaminated soil and dry sediment, and five-year reviews to assess performance of the remedial actions. An Interim Record of Decision (ROD) for soil and dry sediment was signed on 4 June 2007, and the remedial actions were implemented during August to November 2007. Subsequent environmental activities were conducted that included removal of the building slabs, and characterization and removal of chemically-contaminated soil and dry sediment from beneath and adjacent to the slabs. Groundwater monitoring has been performed as part of a facility-wide groundwater monitoring program, however, not in accordance with requirements in the Interim ROD.

Load Line 12

Load Line 12 is an 80-acre parcel situated in the southeastern portion of the RVAAP facility as shown in Figure 2. Load Line 12 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 intended future use of the site is for OHARNG mounted training with no digging. OHARNG has not currently used the site. The selected remedy consisted of excavation and off-site disposal of contaminated soil and dry sediment, implementation of LUCs, and five-year reviews to assess performance of the remedial action. A ROD was signed 10 August 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).

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 RDX and PAHs (benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd) pyrene). Asbestos-containing materials (ACM) 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 the RVAAP facility as shown in Figure 2. The Army transferred approximately 180 of the 200 acres to OHARNG in 2006 for the construction of a Mark 19 Grenade Machine Gun range. The selected remedy for the remaining 20 acres 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 from one former burning pad (70). The remedy also included screening and removal of any munitions, and five-year reviews to assess performance of the remedial action. A ROD was signed 19 August 2008, the remedial action was completed in 2008 and 2009, and the remaining 20 acres were transferred in June 2010 to the OHARNG. Future use of the site by OHARNG includes development as a Multipurpose Machine Gun range. Subsequent environmental activities have been performed that included evaluating site data to determine if further actions are needed to facilitate use of the site for this range. LUCs have not been officially implemented for Winklepeck Burning Grounds through a PMP.

Ramsdell Quarry Landfill

Ramsdell Quarry Landfill is a 14-acre site located in the eastern section of the RVAAP facility as shown in Figure 2. The site was an 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 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 20 August 2009 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 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 offsite. Not all of the chemically-contaminated areas were remediated. Because of the discovery of friable ACM, new remedial alternatives have been evaluated and the selected remedy will be established in a ROD Amendment or Explanation of Significant Differences.

Site Inspections and Interviews

Five-year review site inspections were performed on 24 January 2012 (Load Lines 1, 2, 3, and 4) and 28 February 2012 (Load Line 12, Winklepeck Burning Grounds, and Ramsdell Quarry Landfill). Interviews were conducted with representatives of the Ohio Environmental Protection Agency (EPA), ARNG, OHARNG, U.S. Army Corps of Engineers (USACE), RVAAP Restoration Advisory Board (RAB), and contractors with insight on decisions made and activities completed at the sites.

Public Notice

A public notice that the five-year review process had begun was published in two local newspapers, the Akron Beacon Journal and the Ravenna Record Courier, on 23 March 2012.

Protectiveness Statements, Issues, Recommendations, and Follow-Up Actions

The remedies were executed in accordance with the RODs for sites 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), and RVAAP-05 (Winklepeck Burning Grounds). Contaminated soil and dry sediment have been excavated from these sites and disposed offsite. The remedy for Ramsdell Quarry Landfill was not completed.

Cleanup levels have been achieved through the CERCLA process to support the land uses listed below:

- Load Lines 1-4 and 12 – Mounted Training, No Digging
- Winklepeck Burning Grounds – Mark 19 Range
- Ramsdell Quarry Landfill – Restricted Access

Current issues identified in the five-year review that affect current or future protectiveness include:

- LUCs have not been officially implemented for Load Line 12, Winklepeck Burning Grounds, and the Ramsdell Quarry Landfill through a PMP
- 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
- The remedial action was not completed at Ramsdell Quarry Landfill due to the presence of ACM in the subsurface

Recommendations and follow-up actions of this five-year review include:

- Complete the facility-wide PMP currently being drafted for each of the RVAAP sites to ensure future protectiveness and officially implement LUCs
- Evaluate current environmental data for Load Line 3 and determine if additional sampling and/or remediation is needed to address the presence of benzo(a)pyrene, Aroclor-1254, and manganese at concentrations that exceed the Interim ROD cleanup goals
- Re-evaluate remedial alternatives for Ramsdell Quarry Landfill due to the fundamental change resulting from the presence of friable ACM encountered during the 2010 remedial action

The remedies for RVAAP-08 (Load Line 1), RVAAP-09 (Load Line 2), and RVAAP-11 (Load Line 4) are considered protective of the OHARNG Trainee engaged in mounted training with no digging because contaminated soil and dry sediment were removed in accordance with the RODs.

The remedy for RVAAP-12 (Load Line 12) is considered short-term protective because contaminated soil and dry sediment were removed in accordance with the ROD. It is not considered long-term protective because LUCs have not been officially implemented through a PMP.

The remedy for RVAAP-10 (Load Line 3) is considered short-term protective because OHARNG has not used the site and access is restricted by a perimeter fence. The remedy is not considered long-term protective because benzo(a)pyrene, Aroclor-1254, and manganese were detected post-remediation in soil and dry sediment at concentrations that exceeded the cleanup goals specified in the Interim ROD.

The remedy for site RVAAP-05 (Winklepeck Burning Grounds) is considered short-term protective because contaminated soil and dry sediment were removed in accordance with the ROD. The remedy is not considered long-term protective because LUCs have not been officially implemented through a PMP.

The ARNG is currently moving forward with plans to support less restrictive future use of these sites.

The remedy for site RVAAP-01 (Ramsdell Quarry Landfill) is considered not protective because the remedy was not completed and LUCs were not officially implemented through a PMP.

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FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Ravenna Army Ammunition Plant (RVAAP)		
EPA ID: OH5210020736		
Region: 5	**State:** OH	**City/County:** Ravenna/Portage and Trumbull Counties

SITE STATUS	
NPL Status: Non-NPL	
Multiple AOCs? RVAAP-01 RVAAP-05 RVAAP-08 RVAAP-09 RVAAP-10 RVAAP-11 RVAAP-12	**Has the site achieved construction completion?** Six sites have achieved construction completion: RVAAP-05 RVAAP-08 RVAAP-09 RVAAP-10 RVAAP-11 RVAAP-12

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): U.S. Army Corps of Engineers (USACE)
Author affiliation: U.S. Army Engineer
Review period: December 2011 – August 2012
Date of site inspection: 24 January 2012 and 28 February 2012
Type of review: Statutory
Review number: 1
Triggering action date: August 2007
Due date *(five years after triggering action date)*: 31 August 2012

Five-Year Review Summary Form (continued)

Issues/Recommendations				
AOC(s) without Issues/Recommendations Identified in the Five-Year Review:				
RVAAP-08, RVAAP-09 and RVAAP-11				
Issues and Recommendations Identified in the Five-Year Review:				
AOC(s): RVAAP-01 RVAAP-05 RVAAP-12	**Issue Category:** Land-use Controls (LUCs) **Issue:** LUCs have not been officially implemented through a PMP **Recommendation:** Implement LUCs in accordance with the signed Record of Decision documents and Property Management Plan (pending)			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	Other	September 2013
RVAAP-10	**Issue Category:** New information that calls into question the protectiveness of the remedy **Issue:** Benzo(a)pyrene, Aroclor-1254, and manganese were detected in soil and dry sediment at concentrations that exceeded cleanup goals specified in the Interim ROD **Recommendation:** Evaluate environmental data and determine if additional sampling and/or remediation is needed to address the presence of benzo(a)pyrene, Aroclor-1254, and manganese in soil and dry sediment			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	Other	September 2014

Five-Year Review Summary Form (continued)

Issues/Recommendations				
AOC(s): RVAAP-01	**Issue Category:** Remedial action implementation			
	Issue: The remedial action was not completed due to the presence of ACM in the subsurface			
	Recommendation: Re-evaluate remedial alternatives due to a fundamental change resulting from the presence of ACM encountered during the 2010 remedial action			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	Federal Facility	Other	September 2013

Protectiveness Statement(s)		
AOC: RVAAP-01	*Protectiveness Determination:* Not Protective	*Addendum Due Date (if applicable):* Not Applicable
AOC: RVAAP-05	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):* Not Applicable
AOC: RVAAP-08	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
AOC: RVAAP-09	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
AOC: RVAAP-10	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):* Not Applicable
AOC: RVAAP-11	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
AOC: RVAAP-12	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):* Not Applicable

Five-Year Review Summary Form (continued)

Protectiveness Statement:

The remedy at Load Lines 1, 2, and 4 protects the OHARNG Trainee engaged in mounted training with no digging because contaminated soil and dry sediment exceeding cleanup levels have been excavated and disposed offsite. Load Lines 1-4 are not currently used by OHARNG, and access is restricted by perimeter fences. Contaminated soil and dry sediment exceeding cleanup levels have recently been identified at Load Line 3; however, the site is currently protective since it is not used by OHARNG and access is restricted by a perimeter fence. The remedy at Load Line 12 currently protects the OHARNG Trainee engaged in mounted training with no digging because contaminated soil and dry sediment exceeding the cleanup level have been excavated and disposed offsite. 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. 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 have been excavated and disposed offsite. The site is used by OHARNG as a firing range, and access is controlled by the OHARNG. However, in order for the remedy to be protective in the long-term, LUCs must be officially implemented through a PMP. The ARNG is currently moving forward with plans to support less restrictive future use of these sites. The remedy at Ramsdell Quarry Landfill was not fully implemented and does not protect the National Guard Security Guard/Maintenance Worker from contaminated soil and dry sediment that are present at the site.

1.0 INTRODUCTION

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

The Army has prepared this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National 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.*

The Army conducted a review of remedial actions implemented at the RVAAP from August 2007 to July 2010 for the following sites:

- 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)
- RVAAP-05 (Winklepeck Burning Grounds)
- RVAAP-01 (Ramsdell Quarry Landfill)

This is the first five-year review for these RVAAP sites, which was triggered by the start of remedial actions at Load Line 1 in August 2007. Review is required for these sites because the selected remedies do not allow unlimited use (UU) and unrestricted exposure (UE) after the ROD cleanup actions are completed and the cleanup goals have been met.

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2.0 SITE CHRONOLOGY

The following table lists the dates of important events for the RVAAP sites subject to this five-year review.

Table 1 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	May 1999
An agreement was signed to transfer an additional 3,774 uncontaminated acres to the National Guard Bureau with the remaining acreage to be transferred as restoration of sites is 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
A total of 20,423 acres of the former RVAAP had been transferred to the National Guard Bureau for use by the OHARNG	June 2010

Event	Date
Load Line 1 (RVAAP-08)	
Melt and load activities (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 remedial investigation (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 Feasibility Study (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 (RA) 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	May 2009
Surface and subsurface soil sampling performed at areas corresponding to the former building slabs	October-November 2009
Sampling and characterization of surface soils around former building slabs performed	December 2009
Sampling and characterization of deeper soils beneath the former building slabs performed	August-September 2010
Sub slab soil RA performed	September 2010

Event	Date
Comprehensive data gap sampling of subsurface soil below former floor slabs at selected buildings and surface soil adjacent to former building footprints to guide future remedial and administrative measures at the site	June-July 2011
Load Line 2 (RVAAP-09)	
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
RA 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 areas corresponding to the former building slabs	March-October 2008
Sampling and characterization of surface soils around former building slabs performed	December 2009
Sub slab soil RA 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 floor slabs at selected buildings and surface soil adjacent to former building footprints to guide future remedial and administrative measures at the site	June-July 2011
Load Line 3 (RVAAP-10)	
Melt and load activities (Composition B) and demilitarization activities conducted	1941-1945, 1951-1957, and 1969-1971

Event	Date
Site buildings demolished	1999 and 2007
Preliminary site assessment completed	February 1996
Phase I RI performed	1996
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
RA 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 areas corresponding to the former building slabs.	March-October 2008 and October-November 2009
Sampling and characterization of surface soils around former building slabs performed	December 2009
Sub slab soil RA 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 floor slabs at selected buildings and surface soil adjacent to former building footprints to guide future remedial and administrative measures at the site	June-July 2011
Load Line 4 (RVAAP-11)	
Melt and load activities (TNT) conducted	1941-1945, and 1951-1957
Site buildings demolished	1999 and 2007
Preliminary site assessment completed	February 1996
Phase I RI performed	1996
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

Event	Date
Final Interim ROD for the remediation of soils at Load Lines 1-4 issued	January 2007
RA 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 areas corresponding to the former building slabs	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 floor slabs at selected buildings and surface soil adjacent to former building footprints to guide future remedial and administrative measures at the site	June-July 2011
Load Line 12 (RVAAP-12)	
Ammonium nitrate production operations conducted	November 1941-May 1943
Buildings 900, 904, and 905 were 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

Event	Date
Approximately 1,500 cubic feet of soil was removed from four pits near Building 904	1999
Additional sampling performed by the USACE	August 2001
Phase II RI performed	2000
Preliminary draft characterization report issued	2005
Supplemental Phase II RI performed	2004-2005
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 RA performed	June 2010
Surface soil samples were collected to guide future remedial and administrative measures at the site	June-July 2011
Winklepeck Burning Grounds (RVAAP-05)	
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
Munitions and explosives of concern (MEC) density survey performed	2004
MEC cleanup 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

Event	Date
Removal action conducted, which included soil contaminated with MEC, chemicals, and ACM	March-August 2005
Proposed Plan for soil and dry sediment issued	October 2005
Construction of Mark 19 Machine Gun range completed	December 2006
RA Work Plan issued	July 2008
ROD for soil and dry sediment remediation issued	August 2008
Contract awarded for Data Quality Objectives (DQO) study for MEC and chemical contaminants	September 2005
Soil and dry sediment RA for burning pads 61/61A, 67, and 70 performed	September 2008-May 2009
DQO Report issued	June 2011
Ramsdell Quarry Landfill (RVAAP-01)	
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 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
Revised final Remedial Design issued	June 2010
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

3.0 BACKGROUND

The RVAAP was constructed in 1940 and 1941 for ammunition assembly/loading and depot storage and 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, the RVAAP was a 21,419-acre installation. In 2003 the property boundary was resurveyed and found to be 21,683 acres. To date, accountability for a total of 20,423 acres has been transferred to the U.S. Property and Fiscal Officer for Ohio and licensed to the OHARNG as a military training site (Camp Ravenna). The lead agency for property transfer and cleanup is BRACD. The lead agency for property accountability is ARNG.

The current RVAAP consists of approximately 1,260 acres in several distinct parcels scattered throughout Camp Ravenna. RVAAP and Camp Ravenna are co-located and contiguous parcels of property.

3.1 PHYSICAL CHARACTERISTICS

RVAAP and Camp Ravenna are 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). RVAAP portions of the property are solely located in Portage County. Camp Ravenna (inclusive of RVAAP) 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.

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 to the immediate southwest, and Wayland is three miles to the south. RVAAP 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 being residential. According to the Camp Ravenna Rare Species List, dated 27 April 2010, there are State Endangered and State Threatened species within Camp Ravenna / RVAAP. Restricted land use and sound forest management practices within Camp Ravenna / RVAAP have preserved and enabled forest tracts to mature (SAIC 2005a).

3.2 HYDROLOGY

Geology at Camp Ravenna / RVAAP 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.

Groundwater at Camp Ravenna / RVAAP is present in both the unconsolidated glacial deposits and in the bedrock. Groundwater in the unconsolidated deposits is limited to sandy lenses in the glacial tills, saturated lake sediments, outwash material, and alluvial deposits. Groundwater is also present at the glacial till-bedrock contact. The principle 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 within the unconsolidated water-bearing zone and Sharon aquifer predominately flows in an eastward direction. The unconsolidated water-bearing zone also shows 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 in the unconsolidated deposits is generally in direct hydraulic communication with surface water and that surface water drainage ways may also act as groundwater discharge locations (USACE 2004).

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

It is estimated that at least one-third to one-half of Camp Ravenna / RVAAP would meet the criteria for a jurisdictional wetland (OHARNG 2001). Wetland areas include seasonally saturated areas, wet fields, and forested wetlands.

3.2.1 Load Lines 1 Through 4

Industrial operations at RVAAP primarily consisted of 12 munitions assembly facilities referred to as “load lines.” Load Lines 1-4 are situated in the southeast portion of RVAAP / Camp Ravenna (Figure 2). The physical characteristics of Load Lines 1-4 are illustrated in Figures 3-6. All buildings have been demolished and the original security fences are intact. Unimproved access roads and former railroad beds traverse portions of the sites.

Load Line 1

Ground surface elevations range from approximately 980 to 1,020 feet above mean sea level (ft amsl). The land surface generally slopes from the southwest to northeast. Most of the site consists of open grass-covered areas.

The water table surface typically varies from less than 10 ft bgs to 40 ft bgs (USACE 2004). The general groundwater flow direction mimics the topography and surface water drainage patterns. Surface water drainage generally flows from south to north across the site.

Load Line 2

Ground surface elevations range from approximately 990 to 1,100 ft amsl. Most of the site consists of open grass-covered areas. The land surface generally slopes from west to east. Surface water in the southern section of the site flows from north to south. Surface water in the northern section of the site flows from south to north.

The water table surface typically varies between 10 to 40 ft bgs (USACE 2004). The general groundwater flow direction mimics the topography and surface water drainage patterns.

Load Line 3

Ground surface elevations range from approximately 970 to 1,010 ft amsl. Most of the site consists of open grass-covered areas. The land surface generally slopes from northeast to southwest. Surface water drainage is to the west-southwest.

The water table surface typically varies between 10 to 30 ft bgs (USACE 2004). The general groundwater flow direction mimics the topography and surface water drainage patterns.

Load Line 4

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 990 ft amsl. Load Line 4 Pond is located in the southern portion of the site. Surface water flow into and out of the pond is from the southeast to northwest.

The water table surface is typically less than 15 ft bgs (USACE 2004). The general groundwater flow direction mimics the topography and surface water drainage patterns.

3.2.2 Load Line 12

Load Line 12 is situated in the southeastern portion of Camp Ravenna / RVAAP (Figure 2). The 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. The original security fence around Load Line 12 and access gates are intact. Unimproved access roads and former railroad beds traverse portions of the site.

Silt and clay soils and glacial sediments overlie shale bedrock except where disturbed by previous site activities. The majority of Load Line 12 was disturbed and re-graded during demolition activities that occurred between 1998 and 2000. Soil in the former production area contains a mix of sandy fill, sand, ballast material, slag, and residual debris such as metal, brick, and concrete (SAIC 2010c).

The water table at Load Line 12 is typically less than 15 ft bgs (USACE 2004). The general groundwater flow pattern at most of the site is to the north, which mimics the topography and surface water drainage patterns.

Surface water drainage generally flows from south to north across the site. The 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.

3.2.3 Winklepeck Burning Grounds

Winklepeck Burning Grounds is situated in the center of Camp Ravenna / RVAAP (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

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.

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 bgs.

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

3.2.4 Ramsdell Quarry Landfill

Ramsdell Quarry Landfill is located in the eastern portion of Camp Ravenna / RVAAP. Physical characteristics of the site are illustrated in Figure 9. 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 in a seasonally flooded wetland at the quarry bottom.

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.

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

3.3 LAND AND RESOURCE USE

The only activities still being carried out at RVAAP are environmental restoration, ordnance clearance, and infrequent demolition of any unexploded ordnance (UXO) discovered during investigation and remediation activities. RVAAP is fenced and access is controlled. Load lines 1-4 and 12 are not currently being used by OHARNG. Ramsdell Quarry Landfill is managed as a restricted access site due to post-closure care and monitoring requirements for the closed sanitary landfill until the year 2040. The site is closed to all normal training and administrative activities.

Camp Ravenna is used by OHARNG for military training purposes under an operating license issued by USACE. Training and related activities include ranges, field operations and bivouac training, convoy training, equipment maintenance, and storage of heavy equipment. Winklepeck Burning Grounds is used by OHARNG as a Mark 19 Range.

Current land uses achieved through the CERCLA process are listed below:

- Load Lines 1-4 and 12 – Mounted Training-No Digging
- Winklepeck Burning Grounds – Mark 19 Range

- Ramsdell Quarry Landfill – Restricted Access

The anticipated exposure for each of these training activities was discussed with OHARNG. The human health risk assessments that were conducted as part of remedial investigations and feasibility studies for each site incorporated site-specific but conservative estimates for the reasonable maximum exposure that would be expected as each activity occurred at the areas listed above. At Load Lines 1-4 and Load Line 12, the reasonable maximum exposure was assumed to occur to a National Guard Trainee who trained 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. For Winklepeck Burning Grounds, the Range Maintenance Soldier was expected to have more frequent exposure but for a shorter period of time (six hours a day, 85 days a year for 25 years). At Ramsdell Quarry Landfill, it was anticipated that a Security Guard or Maintenance Worker could have daily exposure during the work week, but only for one hour a day (250 days a year for 25 years).

3.4 HISTORY OF CONTAMINATION

RVAAP is not on the USEPA National Priorities List (NPL) of hazardous waste sites that are priorities for cleanup, although it is included in the USEPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database. Management of the sites subject to this five-year review follows the CERCLA requirements. The Army has also entered into a *Director's Final Findings and Orders* with the Ohio EPA that provides the legal framework for the investigation and remediation of various areas of concern (AOCs) at the RVAAP. These orders were entered into by the 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 CFR Part 300. Currently, there are 83 AOCs; this five-year review addresses seven of these 83 areas.

3.4.1 Load Lines 1 Through 4

Load Lines 1-4 were used to melt and load TNT, Composition B (a mixture of TNT and RDX), and HMX into large-caliber shells. The load lines were also 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 in Table 2. 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.

Table 2 Previous Industrial Operations at Load Lines 1 Through 4

Load Line	Approximate Size (acres)	Previous Industrial Operations
1	150	• 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
2	212	• Handling and screening of bulk TNT, RDX, and HMX • Melting and loading TNT and Composition B explosives into large-caliber shells and and general purpose bombs • Painting, drilling and boostering shells • Munitions demilitarization activities • QA/QC using x-ray units • 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
3	167	• Handling and screening of bulk TNT, RDX, and HMX • Melting and loading Composition B explosives into large-caliber shells and and general purpose bombs • Munitions demilitarization activities • QA/QC using x-ray units • Ancillary facilities for power generation (steam plant and power house), waste water treatment, elevator machine house, shipping, cafeteria, and worker change houses
4	125	• Handling and screening of bulk TNT • Melting and loading TNT into large-caliber shells, general purpose bombs, and anti-tank mines • Drilling and boostering shells • QA/QC using x-ray units • Ancillary facilities for power generation (steam plant and power house), waste water treatment, shipping, warehousing, cafeteria, and worker change houses

3.4.2 Load Line 12

Load Line 12 is approximately 80 acres and 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 this 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.

3.4.3 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.

Prior to1980, burning was conducted in earthen-bermed pits that were constructed on bare ground, on designated gravel pads, roadways, and ditches. 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.

The Army transferred approximately 180 acres of the site to the NGB in 2006 for the construction of a Mark 19 Grenade Machine Gun range. The remaining 20 acres contained four burn pad locations where soil and dry sediment contamination remained in-place. Transite and friable asbestos were also present, which was considered a health and safety hazard for range personnel. The 20 acres were transferred to the ARNG in June 2010.

3.4.4 Ramsdell Quarry Landfill

Ramsdell Quarry Landfill is a 14-acre parcel with a 10-acre unlined landfill located in part of 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.

The landfill was used from 1941 to 1989. From 1946 to 1950 the site was also 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 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.

Wastes disposed in the landfill include the following: domestic, commercial, industrial, and solid wastes including but not limited to explosives (TNT and Composition B), napalm, gasoline, acid-dip liquor, annealing residue (sulfuric acid, shell casings, sodium ortho silicate, chromic acid and alkali), aluminum chloride, and inert material.

3.5 INITIAL RESPONSE

3.5.1 Load Lines 1 Through 4

Melt and load activities at Load Lines 1 and 4 were discontinued in 1957; melt and load activities at Load Lines 2 and 3 were discontinued in 1971. In 1951, soil contaminated with explosives was removed from Load Line 1 and replaced with clean fill. Munitions rehabilitation activities were performed from 1961 to 1967. Salvage and building demolition activities occurred in 1999 and 2007.

Investigations conducted by the Army at Load Lines 1-4 included a preliminary site assessment, Phase I RI, and Phase II RI. Shallow soil and dry sediment contamination was verified in the vicinity of former production buildings and beneath the buildings. An Interim ROD was issued in January 2007. Interim status was applied to the ROD because soil beneath the former building slabs was excluded. Groundwater is monitored on a regular basis as part of a facility-wide groundwater monitoring program, however, it has not been conducted in accordance with Interim ROD requirements.

3.5.2 Load Line 12

Ammonium nitrate production activities at Load Line 12 were discontinued in 1943. Munitions demilitarization activities ended in 1993. Ammonium nitrate fertilizer production was discontinued in 1950 and aluminum chloride production ceased in 1967. Primers were produced at Load Line 12 until 1971. Site buildings were demolished in 1973 to 1975, 1980, and 1998 to 2000.

The following assessments and/or investigations were conducted at Load Line 12:

- 1996 Relative Risk Site Evaluation, U.S. Army Center for Health Promotion and Preventative Medicine
- 1996 Preliminary Assessment for the RVAAP, USACE
- 1998 Phase I RI for High-Priority AOCs at the RVAAP, USACE
- 2001 additional USACE sampling
- 2004 Phase II Supplemental Remedial Investigation, USACE
- 2005 Characterization of 14 RVAAP AOCs, MKM Engineers, Inc.
- 2005 RVAAP Load Line 12 Phase II RI Supplemental Report

A RI/FS was completed in 2006 for soil and dry sediment. A ROD was issued in March 2009 that required removal and off-site disposal of contaminated soil and dry sediment.

3.5.3 Winklepeck Burning Grounds

Open burning of explosives on the ground surface was discontinued prior to 1980. A hazardous waste management study conducted by the Army was issued in 1983, which was followed by a soils, groundwater, and surface water characterization report in 1992. A preliminary site assessment was completed in 1996. Subsequent investigations included a Phase I RI (1996), a Phase II RI (1998), an Ecological Field Effects Study (2003), and a Phase III RI (2005).

A MEC density survey was performed in 2004 and MEC cleanup activities were performed on various portions of the site during 2004 to 2005 and 2008 to 2009. A ROD was issued in August 2008 for remediation of four areas associated with former burn pits 61, 61A, 67, and 70.

3.5.4 Ramsdell Quarry Landfill

Quarrying operations were discontinued in 1941 and the site was used for landfilling of non-hazardous waste until 1989. Waste explosives from Load Line 1 were also burned at the site during 1946 to 1950. Ramsdell Quarry Landfill was operated as a state of Ohio permitted sanitary landfill in 1978 and the facility was closed under state of Ohio solid waste regulations in 1990. Initial and follow-up groundwater investigations were conducted in 1998 and 1999. A Phase I RI was completed in 2004. A FS was issued in 2006 and a ROD was issued in March 2009 for remediation of soil and dry sediment.

3.6 BASIS FOR TAKING ACTION

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

3.6.1 Load Lines 1 Through 4

Table 3 lists constituents of concern (COCs) that were detected in soil and dry sediment at Load Lines 1-4. These COCs 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 1). 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	

COC	Load Line			
	1	2	3	4
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			

SVOCs – semi-volatile organic compounds

3.6.2 Load Line 12

Soil and dry sediment within a section of the main ditch contained arsenic at concentrations that exceeded an ILCR greater than 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.

3.6.3 Winklepeck Burning Grounds

The COCs listed in Table 4 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.

Table 4 COCs in Soil and Dry Sediment at Winklepeck Burning Grounds

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

3.6.4 Ramsdell Quarry Landfill

The COCs listed in Table 5 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.

Table 5 COCs in Soil and Dry Sediment at Ramsdell Quarry Landfill

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

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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 Interim ROD was established to prevent ingestion, inhalation, or direct contact with COCs exceeding cleanup goals (identified in Table 6) for soil and dry sediment.

Table 6 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

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 greater than 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
- Five-year reviews to assess remedy performance

The Interim ROD required groundwater monitoring for five years at select wells to ensure that the remedial activities did not impact groundwater and to determine pre-remedial conditions. 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 (Shaw 2007):

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

Groundwater analysis was specified for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), PCBs, pesticides, explosives, propellants, and Target Analyte List (TAL) metals. Results would be evaluated in the context of a facility-wide groundwater monitoring program and any follow-up actions would be determined by the 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 2007 to November 2007. A total of 11,241 tons of contaminated soil and dry sediment was removed from 119 locations and disposed offsite. The excavated material included 1,752 tons of PCB-contaminated soil/dry sediment and 9,489 tons of non-hazardous soil/dry sediment as summarized in Table 7. The maximum depth of excavation was 3 ft bgs and most excavations were typically 2 ft bgs. The excavated areas are illustrated in Figures 10-13.

Table 7 Volume of PCB-Contaminated and Non-Hazardous Excavated Soil and Dry Sediment 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. 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 Remedial Action Work Plan.

4.1.3 Operation, Maintenance and Monitoring

The Interim ROD requirement for post remedial action groundwater monitoring was transferred to the contractor responsible for implementing a RVAAP Facility-Wide Groundwater Monitoring Program (Environmental Quality Management, Inc. - EQM). Of the 17 selected monitoring wells previously identified, those that were actually monitored after completion of the remedial action are identified in Table 8.

Table 8 Wells Monitored at Load Lines 1 Through 4 After Completion of the 2007 Remedial Action

January 2007	April 2007	July 2007	October 2007
LL1mw-078 LL2mw-262 LL2mw-263 LL3mw-238 LL4mw-198	LL1mw-078 LL2mw-262 LL3mw-238 LL4mw-198	LL1mw-078 LL2mw-262 LL2mw-263 LL3mw-238 LL4mw-198	LL1mw-078 LL2mw-262 LL2mw-263 LL3mw-238 LL4mw-198
January 2008	**April 2008**	**July 2008**	**October 2008**
NONE[1]	NONE	NONE	NONE
January 2009	**April 2009**	**July 2009**	**October 2009**
NONE	NONE	NONE	LL1mw-067 LL1mw-078 LL1mw-081 LL1mw-082 LL1mw-084 LL1mw-085 LL2mw-262

January 2009	April 2009	July 2009	October 2009
NONE	NONE	NONE	LL2mw-263 LL2mw-266 LL2mw-267 LL2mw-269 LL3mw-236 LL3mw-238 LL3mw-239 LL4mw-196 LL4mw-197 LL4mw-198
January 2010	**April 2010**	**July 2010**	**October 2010**
NONE	NONE	LL1mw-067 LL1mw-078 LL1mw-081 LL1mw-082 LL1mw-084 LL1mw-085 LL2mw-262 LL2mw-263 LL2mw-266 LL2mw-267 LL2mw-269 LL3mw-236 LL3mw-239 LL4mw-196 LL4mw-197	LL1mw-067 LL1mw-081 LL1mw-082 LL1mw-084 LL1mw-085 LL2mw-266 LL2mw-267 LL2mw-269 LL3mw-236 LL3mw-239 LL4mw-196 LL4mw-197
January 2011	**April 2011**	**July 2011**	**October 2011**
LL1mw-067 LL1mw-081 LL1mw-082 LL1mw-084 LL1mw-085 LL2mw-266 LL2mw-267 LL2mw-269 LL2mw-236 LL3mw-238 LL3mw-239	LL1mw-067 LL1mw-081 LL1mw-082 LL1mw-084 LL1mw-085 LL2mw-266 LL2mw-267 LL2mw-269 LL2mw-236 LL3mw-239 LL4mw-196	LL1mw-081 LL1mw-082 LL1mw-084 LL1mw-085 LL3mw-236 LL3mw-238	N/A[2]

January 2011	April 2011	July 2011	October 2011
LL4mw-196 LL4mw-197	LL4mw-197 LL4mw-198		

1 "None" denotes that none of the select wells were sampled during this sampling event

2 As of the date of this report, no data from the October 2011 sampling event were available on the REIMS System.

Inspection and maintenance of the building slabs and foundations was not performed because these structures were removed in 2008. 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) and contaminated soil and dry sediment was subsequently removed and disposed offsite. This activity was not specified in the Interim ROD, however additional decision documentation is being prepared.

Sampling, analysis, and remedial actions performed in areas not addressed by the Interim ROD have been addressed 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.*
- *Draft 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. December 2011.*

4.2 LOAD LINE 12

4.2.1 Remedy Selection

The RAO was established to prevent a National Guard Trainee from exposure to contamination in soil and dry sediment in the main ditch within surface soil, which has been defined as being within the top four feet of soil. The cleanup goal is identified in Table 9.

Table 9 Load Line 12 Cleanup Goal

COC [1,2]	Cleanup Goal (mg/kg)
Arsenic	31

1 Sediment from the main ditch aggregate
2 Total ILCR greater than 10^{-5} to a National Guard Trainee from contaminants in the main ditch

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, and 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 re-vegetation
- Implementation of LUCs until the arsenic concentrations in soil and groundwater are reduced to levels that allow for unrestricted use
- Five-year reviews to assess remedy performance

Details of the LUC implementation, maintenance, and periodic inspections were provided in the remedial design (SAIC 2009c). The LUC performance objectives included:

- Maintenance of the Camp Ravenna perimeter fence
- Restricting future land use to mounted training (military use of the site)
- Maintenance of the LUC program
- 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 document 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 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 ROD remedy was implemented in 2010. A total of 1,181 tons of sediment were removed from the main ditch and disposed offsite (SAIC 2010c). 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 pattern and neighboring elevations. Re-vegetation of the ditch and disturbed construction support areas was performed after backfilling and grading was completed.

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

4.2.3 Operation, Maintenance, and Monitoring

Surface soil samples were collected in 2011 to address data gaps that were identified during a comprehensive assessment of previous environmental data that was conducted to guide future remedial and administrative measures at the site (Prudent 2011c). 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).

4.3 WINKLEPECK BURNING GROUNDS

4.3.1 Remedy Selection

The RAO identified in the 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. The cleanup goals are listed in Table 10.

Table 10 Winklepeck Burning Grounds Cleanup Goals

COC	Cleanup Goal (mg/kg) [1,2]
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

1 Soil 0 to 4 ft bgs, National Guard Range Maintenance Soldier

2 Cleanup goals are based on a cumulative ILCR greater than 10^{-5} to an OHARNG Range Maintenance Soldier

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 MEC removal. The selected remedy for former burning pad 70 was ACM removal. These remedies included the following components (SAIC 2008):

- Clearing of vegetation
- 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 a depth 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 Army and Ohio EPA
- Site restoration
- Implementation of LUCs for the AOC
- Conducting five-year reviews to determine performance of the selected remedy

LUC details were provided in the Final Remedial Action Work Plan (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 UXO/MEC/discarded military munitions

The Remedial Action Work Plan 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 one 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 were expected to remain in place indefinitely. LUCs restricting use of the range 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 unlimited use and unrestricted exposure.

Periodic monitoring of the LUCs was required by conducting site inspections to confirm whether the LUCS remain effective and meet objectives for continued remedy protectiveness. The frequency of the inspections was not less than once per quarter and as necessary. Monitoring results were to be provided in an annual LUC monitoring report that would be provided to the Ohio EPA and used for preparation of the five-year review. The LUC monitoring report required a written certification stating whether or not the LUCs remain in place and are effective.

4.3.2 Remedy Implementation

The ROD remedy was implemented in 2008 and 2009. A total of 7,384yd^3 of soil was removed from the AOC and disposed offsite (Table 11). The excavated areas are illustrated in Figure 8.

Table 11 Volume of Excavated Soil and Dry Sediment from Winklepeck Burning Grounds

Location	Excavated Soil and Dry Sediment (yd^3)
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 and was subsequently shipped offsite for recycling.

ACM was discovered dring excavation activities at burning pads 61 and 61A. Work was paused while health and safety concerns were addressed, then the excavation resumed as planned.

All confirmation samples from the excavations were below the site cleanup goals.

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

4.3.3 Operation, Maintenance, and Monitoring

There were no remedial action-related operation, maintenance, and monitoring activities at Winklepeck Burning Grounds after completion of the remedial action.

4.4 RAMSDELL QUARRY LANDFILL

4.4.1 Remedy Selection

The RAO identified in the ROD was established to prevent Security Guard / Maintenance Worker exposure to contaminants in soil and dry sediment that exceeded cleanup goals listed in Table 12 to a depth of 1 ft bgs (SAIC 2009b).

Table 12 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 the reasonably anticipated activities performed at the site. The following components were included in the remedy:

- 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
- Five-year reviews

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 also 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 indentify the areas where the LUCs apply
- Incorporating an environmental overlay and appropriate notice procedures into the PMP
- Through the PMP, prohibit 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 the minimum five year period.

4.4.2 Remedy Implementation

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 AOC. 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 for soil and dry sediment at the Ramsdell Quarry Landfill; as a result, 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 offsite. The excavation area encompassed approximately 10,000 square feet (ft^2) and extended approximately 5,800 ft^2 beyond the delineated 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 the remedial action. New alternatives were subsequently evaluated (SAIC 2011b).

4.4.3 Operation, Maintenance, and Monitoring

There were no remedial action-related operation, maintenance, and monitoring activities at Ramsdell Quarry Landfill due to partial completion of the remedial action.

5.0 FIVE-YEAR REVIEW PROCESS

5.1 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 Ohio EPA, ARNG, OHARNG, and RVAAP RAB representatives, USACE staff members, and contractors with insight on decisions made and activities completed at the sites

5.2 COMMUNITY NOTIFICATION

A public notice was issued to potentially interested parties and RVAAP RAB members on 23 March 2012 that the five-year review process had begun. The notice was also published in two local newspapers, the Akron Beacon Journal and the Ravenna Record Courier. 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 this document will be placed in the designated public repositories identified below.

Reed Memorial Library
167 East Main Street
Ravenna, OH 44226

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

An electronic copy of the report will also be available on the RVAAP Public Access site at http://www.rvaap.org.

Upon completion of the Five-Year Review report, a public notice will be placed in the Akron Beacon Journal and the Ravenna Record Courier to announce the availability of the final Five-Year Review report in the document repositories.

5.3 DOCUMENT REVIEW

Relevant, site-related documents were reviewed, including the RODs, remedial action work plans, remedial design documents, remedial action completion reports, and recent monitoring/sampling data. A complete list of documents reviewed is provided in Attachment 2.

Applicable or Relevant and Appropriate Requirements (ARARs) Review

Section 121 (d)(2)(A) of CERCLA specifies that remedial actions must meet any federal standards, requirements, criteria, or limitations that are determined to be legally ARARs. There were no chemical-specific ARARs identified in the RODs for the sites. Location and/or action-specific ARARs for Load Lines 1-4, Load Line 12, Winklepeck Burning Grounds, and Ramsdell Quarry Landfill are identified in Attachment 7. Several of these ARARs no longer apply since the remedial actions have been completed.

Risk Assessment Review

Human health risk assessments were completed for each of the sites as part of their respective remedial investigations. Pertinent reports which were used to assess risk or develop risk-based cleanup goals are listed in Attachment 8. The risk assessments for each of the sites followed standard protocols and procedures recommended by the USEPA for sites under going evaluation under CERCLA. In addition, ecological risk assessment protocols recommended by Ohio EPA as well as site-specific human health and ecological risk assessment work plans were developed and followed. No changes in risk assessment methods have occurred within the last five years that would affect the outcome of the risk assessments or the development of risk-based cleanup goals.

The exposure assessment included consideration of representative current and future land-use receptors, focusing on activities identified for future use of the sites by the OHARNG. Exposure to contaminated soil and sediment via inhalation of fugitive dust and vapors, dermal contact, and incidental ingestion was assessed for all receptors. In addition, groundwater was assumed to be a source of drinking water for the National Guard Trainee receptor, as well as for hypothetical future residential receptors. The exposure assessment was reviewed to determine if updates to USEPA recommended exposure parameter values would affect the protectiveness of the remedy, as well as to determine if land use was still consistent with the exposure assessment used for cleanup goal development. This review is detailed in Attachment 8 and summarized in Section 6 as part of the discussion of Question B.

Risk characterization results were compared to acceptable risk limits established by USEPA and Ohio EPA. The target ILCR for individual compounds is 1 in 100,000 (10^{-5}) for carcinogens, and the acceptable target HI for non-carcinogens is 1. These acceptable risk limits are still valid.

Toxicity Values

Toxicity criteria for the risk assessments from these sites were obtained from USEPA's Integrated Risk Information System (IRIS) and other accepted sources (when not available from the USEPA). The toxicity criteria used in development of cleanup goals was reviewed to ascertain if there have been any updates to the toxicity criteria for any of the COCs. The toxicity criteria for hexavalent chromium are currently under review by the USEPA IRIS. Although this could affect the cleanup criterion for this COC for Load Line 2, the extent of hexavalent chromium contamination was extremely limited prior to remediation and post-remediation sampling indicates that it is no longer detected at the Load Line 2. This is explained in Attachment 8 and further discussed in Section 6.1.2.

5.4 DATA REVIEW

5.4.1 Soil and Dry Sediment at Load Lines 1 Through 4

Soil and dry sediment data obtained during and after the 2007 remedial action were evaluated against the cleanup goals identified in the Interim ROD. Sampling activities are summarized in Table 13 and analytical results are provided in Attachment 11.

Table 13 Analytical Data Collected from Load Lines 1 Through 4 Soil and Dry Sediment After the 2007 Remedial Action

Activity	Date	Analyses
Remedial action confirmation sampling	2007	• Field screening for inorganics, explosives, and PCBs • Laboratory analysis (inorganics, propellants, explosives, PCBs, and PAHs)
Multi-increment sampling to address data gaps	2011	• Laboratory analysis (inorganics, explosives, propellants, VOCs, SVOCs, pesticides, and PCBs)

5.4.1.1 Remedial Action Confirmation Sampling Results (2007)

Confirmation sample results obtained in 2007 verify that contaminated soil and dry sediment were removed to below the applicable cleanup goals except as noted below.

- **Load Line 1**: Sample location LL1ss-029-cs contained Aroclor-1254 at 54.3 mg/kg, which was above the 35 mg/kg cleanup goal. This location was situated adjacent to a concrete building foundation (CB-4A) and bedrock outcrop. The excavation could not be advanced deeper at this location. The Ohio EPA concurred and agreed that PCB contamination had been removed to the furthest extent possible (Shaw 2008).

Additional soil was excavated at locations where initial confirmation sample results exceeded the cleanup goals. Follow-up sampling results confirm that the cleanup goals were attained.

5.4.1.2 Data Gap Sampling Results (2011)

The analytical results from samples collected in 2011 indicate that contamination above the ROD cleanup goals was present in soil and dry sediment at the following locations from Load Line 3:

- One location adjacent to former building EB-10A (LL3SB-414M-0102-SO) (3-5 ft) contained benzo(a)pyrene at 47 mg/kg (ROD cleanup goal is 10 mg/kg)
- One location adjacent to former building EB-4 (LL3SB-413M-0101-SO) (1-3 ft) contained Aroclor-1254 at 100 mg/kg (ROD cleanup goal is 35 mg/kg)
- Three locations from a creek bed at the southwest section of the site contained manganese above the cleanup goal of 3,030 mg/kg:

- LL3SD-416M-001-SO (0-0.5 ft) – 3,700 mg/kg
- LL3SD-417M-001-SO (0-0.5 ft) – 3,400 mg/kg
- LL3SD-418M-001-SO (0-0.5 ft) – 4,880 mg/kg

5.4.2 Groundwater at Load Lines 1 Through 4

Groundwater data were obtained from the Ravenna Army Ammunition Plant Environmental Information Management System (REIMS) from all groundwater sampling events following the completion of the remedial action. Data from the baseline sampling event that took place immediately prior to remedial action implementation were also obtained. These data are provided in Attachment 10. Note that the monitoring of groundwater immediately after remedial action at Load Lines 1-4 was not performed in accordance with the ROD. Due to the lack of groundwater monitoring data, no evaluation of constituent trends in groundwater could be performed to ascertain whether or not groundwater was impacted by the soil remedial action.

5.4.3 Soil and Dry Sediment at Load Line 12

Soil and dry sediment data obtained during the remedial action were evaluated against the cleanup goals identified in the ROD. Three confirmation samples were collected in 2010 from the excavation footprint using a multi-increment sampling strategy. The analytical results, provided in Attachment 11, indicate that the cleanup goal was attained.

5.4.4 Soil and Dry Sediment at Winklepeck Burning Grounds

Soil and dry sediment data obtained during and after the remedial action were evaluated for the ROD COCs and for 2,4,6-TNT, which may contribute to unacceptable risk in a UU/UE scenario. Samples were collected from former burning pads 61, 61A, and 67 for PAHs and explosives and from 70 for ACM during November 2008 to January 2009. Analytical results are provided in Attachment 11 and summarized below.

- All RDX concentrations were below the ROD cleanup goal (617 mg/kg).
- The TNT concentrations ranged from 1,600 mg/kg to 0.078 mg/kg (average of 191 mg/kg). There is no TNT cleanup goal in the ROD.
- Concentration of PAHs (benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h) anthracene, and indeno(1,2,3-cd)pyrene) were below the ROD cleanup goals.

The analytical results indicate that the cleanup goal was attained.

5.4.5 Soil and Dry Sediment at Ramsdell Quarry Landfill

Soil and dry sediment chemical data were not obtained during or after the remedial action, which was not completed due to the presence of friable asbestos. Asbestos analysis, using polarized light microscopy (PLM), was performed after the remedial action.

5.5 SITE INSPECTIONS

Site inspections were conducted by USACE to obtain familiarity with the sites, review records, examine the remediated areas, and assess the 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.

Site inspections were conducted on the following dates:

- 24 January 2012; Load Lines 1-4
- 28 February 2012; Load Line 12, Winklepeck Burning Grounds, and Ramsdell Quarry Landfill

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 re-vegetated. There was no evidence of unauthorized access or use of the sites. The monitoring wells were observed to be secure and in good condition. No significant maintenance issues were identified during the site inspection.

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 controlled by OHARNG due to its use as a firing range. No significant maintenance issues were identified during the site inspection.

Ramsdell Quarry Landfill is a closed landfill located within a former quarry. The site is bounded to the north by an active Camp Ravenna road and to the south by a rail line. The landfill surface slopes to the quarry bottom from the south, east, and west. The quarry bottom contains a flooded wetland. 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 re-vegetated. There was no evidence of trespass or OHARNG use. The site is not enclosed with a fence. No significant maintenance issues were identified during the site inspection.

5.6 INTERVIEWS

USACE interviewed the on-site Ohio EPA site representative, ARNG Cleanup Program Manager, OHARNG site representatives, RVAAP RAB Co-Chair, USACE, Louisville District personnel with knowledge of remedial actions completed at the sites and decisions made, and site contractor (Vista Environmental Services, Inc. – Vista) staff with knowledge of remedial actions completed at the sites and decisions made. A list of individuals interviewed and completed interview records are provided in Attachment 6.

6.0 TECHNICAL ASSESSMENT

6.1 LOAD LINES 1 THROUGH 4

6.1.1 Question A:

Is the remedy functioning as intended by the decision documents?

The remedy is functioning as intended by the Interim ROD for Load Lines 1, 2, and 4 as described below. However, COCs were detected post-remediation at Load Line 3 at concentrations that exceeded the cleanup goals in areas covered by the Interim ROD.

6.1.1.1 Remedial Action Performance and Operations

The focus of the remedial action was to remove contaminated soil from 0 to 4 ft bgs to facilitate future use of the sites by OHARNG for mounted training with no digging. Contaminated soil and dry sediment were removed in accordance with the Interim ROD and disposed offsite. Remediated areas were backfilled and re-vegetated. The building slabs and underlying contaminated soil/dry sediment were also removed, which eliminated the need for inspection and maintenance of these structures.

Groundwater monitoring to assess impacts to groundwater due to remedial actions was not completed in accordance with the Interim ROD and Remedial Action Work Plan. However, groundwater monitoring has been performed at Load Lines 1-4 in accordance with the facility-wide groundwater monitoring program. Evaluation of the data to determine impacts to groundwater could not be performed due to the lack of necessary data.

6.1.1.2 Opportunities for Optimization

Opportunities for optimization were not identified.

6.1.1.3 Early Indicators of Potential Issues

No early indicators of potential issues were identified.

6.1.2 Question B:

Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

OHARNG was consulted during development of the risk assessment, which was ultimately used to set cleanup objectives for Load Lines 1-4. As explained in Section 3.3, the reasonable maximum exposure receptor for the Load Lines 1-4 is a National Guard Trainee, who would train at the sites 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 a 25 year enlistment. 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 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 of soil. Remediation was limited to the top four feet of soil. The trainee can move about the sites on foot or in a vehicle with unlimited exposure to surface soil. The only restrictions should be to exposure to soils deeper than four feet. This would be consistent with the site-specific risk assessment performed for these anticipated military uses of the sites.

The previous exposure parameter values used for the National Guard Trainee are still protective. However, the sites are currently being evaluated for unrestricted National Guard use. Further characterization is underway to re-evaluate residual contamination levels remaining after further cleanup not specified in the Interim ROD was accomplished (Prudent 2011a, c). This may allow for expanded use of the sites. In addition, the toxicity criteria for hexavalent chromium are currently under review, and updates could affect the protectiveness of the cleanup goal for hexavalent chromium. Post-remedial action sampling indicates that hexavalent chromium contamination no longer exists at Load Line 2.

A detailed evaluation of the exposure assumptions and toxicity data is presented in Attachment 8. The significant findings and recommendations are summarized here.

Human Health: There is one COC for which a change in toxicity criteria could potentially affect the protectiveness. The toxicity for hexavalent chromium is currently under review by the USEPA. Newer studies by the National Toxicology Program evaluated by the New Jersey Department of Environmental Protection indicate that hexavalent chromium can cause cancer not only via inhalation, but also via the oral exposure route. The addition of carcinogenicity via this pathway could affect the protectiveness of the hexavalent chromium cleanup goal for Load Lines 1, 2, 3, and 4. To account for carcinogenic exposure via the ingestion pathway (in addition to the inhalation pathway already evaluated), the cleanup goal for hexavalent chromium may have to be lowered in order to remain protective. However, as the extent of hexavalent chromium contamination was extremely limited prior to remediation and post-remediation sampling at Load Line 2 indicates that it is no longer detected at the site, further review of the cleanup criteria based on newer toxicity evaluations for hexavalent chromium are not warranted.

Environmental Health: 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, 2, 3, and 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). The Integrated Natural Resource Management Plan for the sites (OHARNG 2007) stipulates that the sites will be managed to provide for sustainable, healthy ecosystems and comply with applicable environmental laws and regulations. Furthermore, "Stewardship of the environment will be a major consideration in all phases of planning, design, and implementation of the military mission" (National Guard training). As such, the remedy allowing for OHARNG use of the sites would continue to provide adequate protection for the environment.

6.1.3 Question C:

Has any other information come to light that would call into question the protectiveness of the remedy?

Soil sampling results obtained during a recent (2011) data gap investigation have identified benzo(a)pyrene, Aroclor-1254, and manganese at Load Line 3 at concentrations that exceeded the cleanup goals specified in the Interim ROD. No other information has come to light that would call into question the protectiveness of the remedy for the intended use of Load Lines 1, 2, and 4 as described in the Interim ROD.

6.2 LOAD LINE 12

6.2.1 Question A:

Is the remedy functioning as intended by the decision documents?

The remedy is functioning as intended by the ROD as described below.

6.2.1.1 Remedial Action Performance and Operations

The focus of the remedial action was to remove contaminated soil and dry sediment from a drainage ditch to facilitate future use of the sites by the OHARNG for mounted training, no digging. Contaminated soil and dry sediment were removed in accordance with the ROD and disposed off site. Remediated areas were backfilled and re-vegetated.

6.2.1.2 Opportunities for Optimization

Opportunities for optimization were not identified.

6.2.1.3 Early Indicators of Potential Issues

No early indicators of potential issues were identified.

6.2.2 Question B:

Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

The exposure assumptions for the National Guard Trainee receptor are still valid, as well as the toxicity data and cleanup levels. The RAOs were designed to be protective of all site activities conducted by a National Guard Trainee. Further evaluation of the protectiveness of the remedy is currently underway (Prudent 2011a,c).

The OHARNG was consulted during development of the risk assessment, which was ultimately used to set cleanup objectives for Load Line 12. As explained in Section 3.3, the reasonable maximum exposure receptor for the Load Line 12 is a National Guard Trainee who would 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 a 25 year enlistment. 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 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 trainee can move about the site on foot or in a vehicle with unlimited exposure to surface soil. The only restrictions should be to exposure to soils deeper than four feet. This would be consistent with the site-specific risk assessment performed for these anticipated military uses of the site.

A detailed evaluation of the exposure assumptions and toxicity data is presented in Attachment 8. The significant findings and recommendations are summarized here.

Human Health: The information on human health indicates that the standards meet today's standards of protectiveness for a National Guard Trainee. The toxicity and exposure related aspects of the remedy are considered to provide adequate protectiveness for this land use and this particular receptor specified in the ROD. The previous exposure parameter values used for the National Guard Trainee are still protective. Should the need for less restrictive land use be identified by OHARNG beyond what was stated in the ROD, further action may be required to reduce concentrations of hazardous substances in soil to levels that allow for other uses of the site.

Environmental Health: Although some constituents of ecological concern were identified for Load Line 12, remediation to meet human health cleanup goals will reduce overall contaminant concentrations and ecological risk. Additional removal of soil and dry sediment to further reduce any adverse ecological effects would destroy habitat (vegetation) temporarily in the narrow main ditch at the site. Since Load Line12 will not be managed for ecological purposes but instead will have intensive use by the OHARNG, protection of human health will drive remedial action objectives and the remedy would provide adequate protection of the environment. The Integrated Natural Resource Management Plan (OHARNG 2007) stipulates that the site will be managed to provide for sustainable, healthy ecosystems and comply with applicable environmental laws and regulations. Furthermore, "Stewardship of the environment will be a major consideration in all phases of planning, design, and implementation of the military mission" (National Guard training). As such, the remedy allowing for OHARNG use of the site would continue to provide adequate protection for the environment.

6.2.3 Question C:

Has any other information come to light that would 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 for the intended use of the site described in the ROD.

6.3 WINKLEPECK BURNING GROUNDS

6.3.1 Question A:

Is the remedy functioning as intended by the decision documents?

The remedy is functioning as intended by the ROD as described below.

6.3.1.1 Remedial Action Performance and Operations

The focus of the remedial action was to remove contaminated soil and dry sediment from former burning pads 61, 61A, 67, and 70 to facilitate future use of the site by OHARNG as a Mark 19 Grenade Machine Gun range. Contaminated soil and dry sediment were removed in accordance with the ROD and disposed offsite. Remediated areas were backfilled and re-vegetated.

6.3.1.2 Opportunities for Optimization

Opportunities for optimization were not identified.

6.3.1.3 Early Indicators of Potential Issues

No early indicators of potential issues were identified.

6.3.2 Question B:

Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

The exposure assumptions for the Range Maintenance Soldier receptor are still valid, as well as the toxicity data and cleanup levels.

A detailed evaluation of the exposure assumptions and toxicity data is presented in Attachment 8. The significant findings and recommendations are summarized here.

<u>Human Health</u>: The information on human health indicates that the standards meet today's standards of protectiveness for the National Guard Maintenance Soldier (SAIC 2005a and 2006a). The toxicity and exposure related aspects of the remedy are considered to provide adequate protectiveness for this land use and this particular receptor specified in the ROD. Should the need for less restrictive land use be identified by OHARNG beyond what was stated in the ROD, further action may be required to reduce concentrations of hazardous substances in soil to levels that allow for other uses of the site.

<u>Environmental Health</u>: 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 site will have intensive use by OHARNG,

protection of human health will drive RAOs and the remedy would provide adequate protection of the environment. The Integrated Natural Resource Management Plan (OHARNG 2007) stipulates that the site will be managed to provide for sustainable, healthy ecosystems and comply with applicable environmental laws and regulations. Furthermore, "Stewardship of the environment will be a major consideration in all phases of planning, design, and implementation of the military mission" (National Guard training). As such, the remedy allowing for OHARNG use of the site would continue to provide adequate protection for the environment.

6.3.3 Question C:

Has any other information come to light that would 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. Should the need for less restrictive land use be identified by OHARNG beyond what was stated in the ROD, further action may be required to reduce concentrations of hazardous substances in soil to levels that allow for other uses of the site.

6.4 RAMSDELL QUARRY LANDFILL

6.4.1 Question A:

Is the remedy functioning as intended by the decision documents?

The remedy is not functioning as intended by the ROD as described below.

6.4.1.1 Remedial Action Performance and Operations

The ROD remedy was not completed due to the presence of ACM. New remedial alternatives have been evaluated and the selected remedy will be established in a ROD Amendment or Explanation of Significant Differences.

6.4.1.2 Opportunities for Optimization

Opportunities for optimization were not identified.

6.4.1.3 Early Indicators of Potential Issues

The presence of ACM in the subsurface was identified as a potential issue.

6.4.2 Question B:

Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

The exposure assumptions for the Security Guard/Maintenance Worker receptor are still valid, as well as the toxicity data and cleanup levels.

A detailed evaluation of the exposure assumptions and toxicity data is presented in Attachment 8. The significant findings and recommendations are summarized here.

Human Health: The information on human health indicates that the standards meet today's standards of protectiveness for the Security Guard/Maintenance Worker. The toxicity and exposure related aspects of the remedy are considered to provide adequate protectiveness for this land use and this particular receptor specified in the ROD.

Environmental Health: Remediation to meet human health cleanup goals will reduce overall contaminant concentrations and ecological risk. 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.

A new remedy will be selected to address contaminated soil and dry sediment that were not excavated and disposed offsite.

6.4.3 Question C:

Has any other information come to light that would call into question the protectiveness of the remedy?

The remedial action was not completed.

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7.0 ISSUES

Table 14 summarizes the current issues for sites reviewed in this Five-Year Review:

Table 14 Current Issues for the RVAAP Sites

Issue	Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)
1. LUCs have not been officially implemented through a PMP on Load Line 12, Winklepeck Burning Grounds, and the Ramsdell Quarry Landfill	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	No	Yes
3. The remedial action was not completed at Ramsdell Quarry Landfill due to the presence of ACM in the subsurface	Yes	Yes

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8.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 15 provides recommendations to address current issues at the RVAAP sites subject to this five-year review.

Table 15 Recommendations to Address Current Issues at the RVAAP Sites

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Yes or No)	
					Current	Future
1	Complete the Facility-Wide PMP currently being drafted for each of the RVAAP sites to ensure future protectiveness and officially implement LUCs.	BRACD and OHARNG/ ARNG	Ohio EPA	September 2013	No	Yes
2	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 cleanup levels specified in the Interim ROD	BRACD and OHARNG/ ARNG	Ohio EPA	September 2014	No	Yes
3	Re-evaluate remedial alternatives for Ramsdell Quarry Landfill due to the fundamental change resulting from the presence of friable ACM encountered during the remedial action	BRACD and OHARNG/ ARNG	Ohio EPA	September 2013	Yes	Yes

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9.0 PROTECTIVENESS STATEMENTS

9.1 LOAD LINES 1 THROUGH 4

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 have been excavated and disposed offsite.

The remedy at Load Line 3 is protective of a 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.

Available data do not allow for the evaluation of impacts to groundwater associated with remedies for Load Lines 1-4 since no data are available from the select wells until one year and seven months after the conclusion of the remedial action. However, the site groundwater is being monitored under the Facility Wide Groundwater Monitoring Program. The sites are not used by OHARNG and access is restricted by perimeter fences. ARNG is currently moving forward with plans to support less restrictive future use of these sites.

9.2 LOAD LINE 12

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 have been excavated and disposed offsite. 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.

OHARNG was consulted during development of the risk assessment, which was ultimately used to set cleanup objectives for Load Line 12. The reasonable maximum exposure receptor for the Load Line 12 is a National Guard Trainee, who would 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 a 25 year enlistment. 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 cleanup goals were designed to be fully protective of all Trainee activities within 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 trainee can move about the site on foot or in a vehicle with unlimited exposure to surface soil. The only restrictions should be to exposure to soils deeper than four feet. This would be consistent with the site-specific risk assessment performed for these anticipated military uses of the site. LUCs consistent with this military training use of the site would include access controls and restrictions on digging beyond the top four feet of soil. ARNG is currently moving forward with plans to support less restrictive future use of this site.

9.3 WINKLEPECK BURNING GROUNDS

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 have 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. The ARNG is currently moving forward with plans to support less restrictive future use of this site.

9.4 RAMSDELL QUARRY LANDFILL

The remedy at Ramsdell Quarry Landfill 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.

10.0 NEXT REVIEW

The next five-year review for the RVAAP sites addressed in this report will be conducted by August 31, 2017.

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ATTACHMENTS

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ATTACHMENT 1

FIGURES

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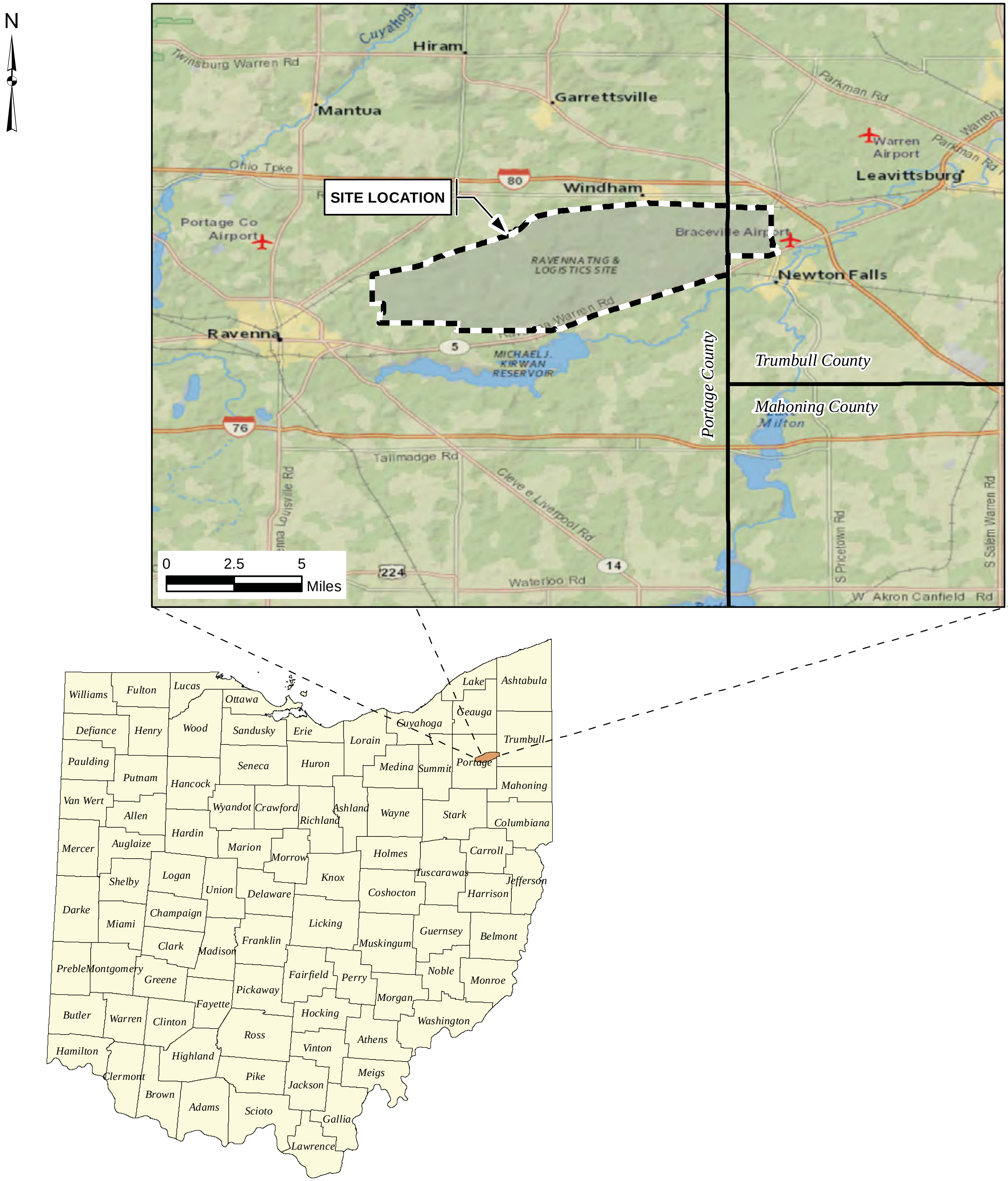

US Army Corps of Engineers
Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

RVAAP SITE LOCATION MAP

Document Name: SiteLocation_5Year.mxd
Drawn By: H5TDESPM
Date Saved: 25 May 2012
Time Saved: 11:13:50 AM

RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 1

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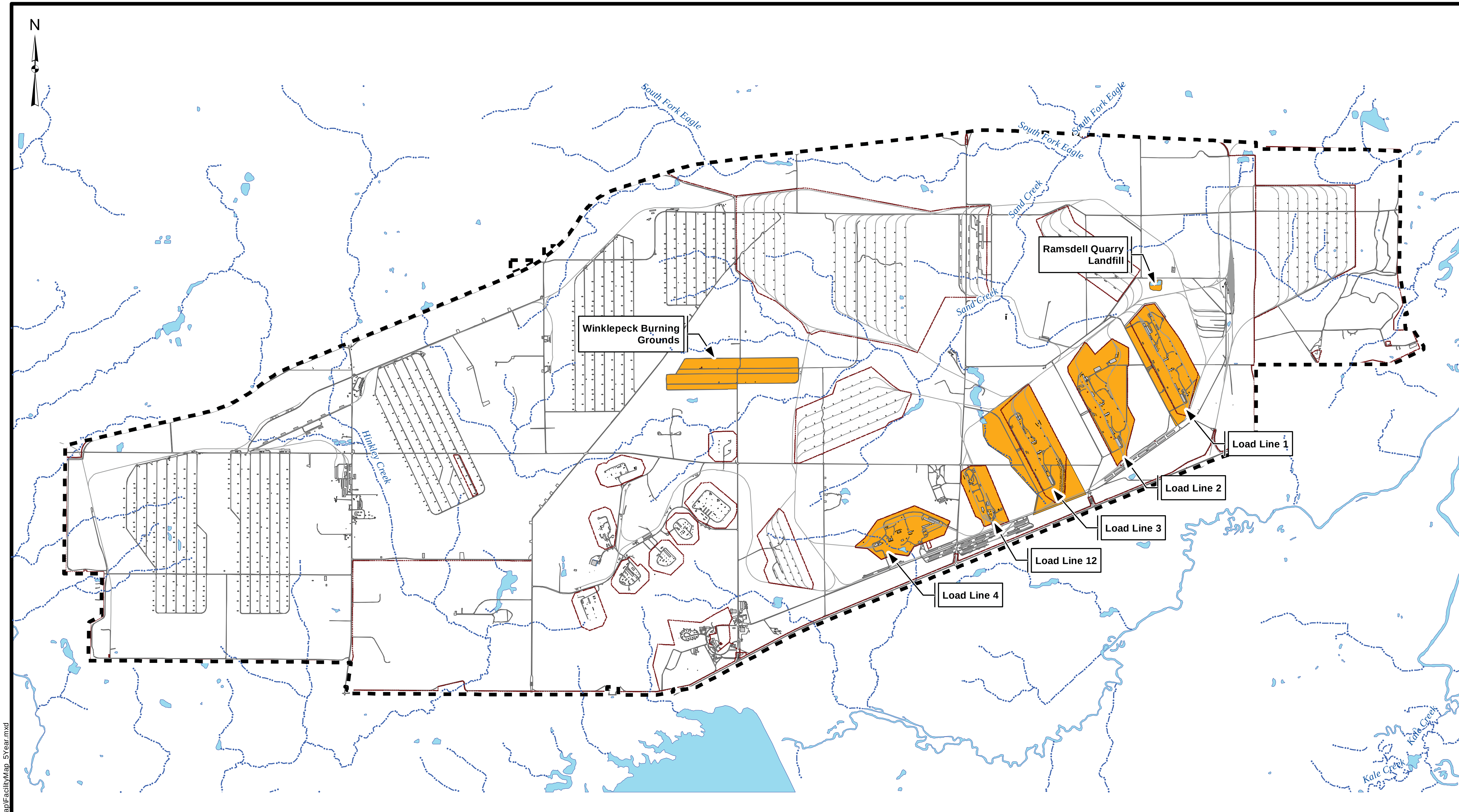

Legend

Property Boundary
Fence Line
Water Body/Pond
Asphalt Roads
Stream or Creek
AOC Under IRP/JMC Use Areas
Railroads
Former Buildings

0 2,000 4,000 8,000 Feet

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

RVAPP FACILITY MAP

Document Name: FacilityMap_5Year.mxd
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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 2

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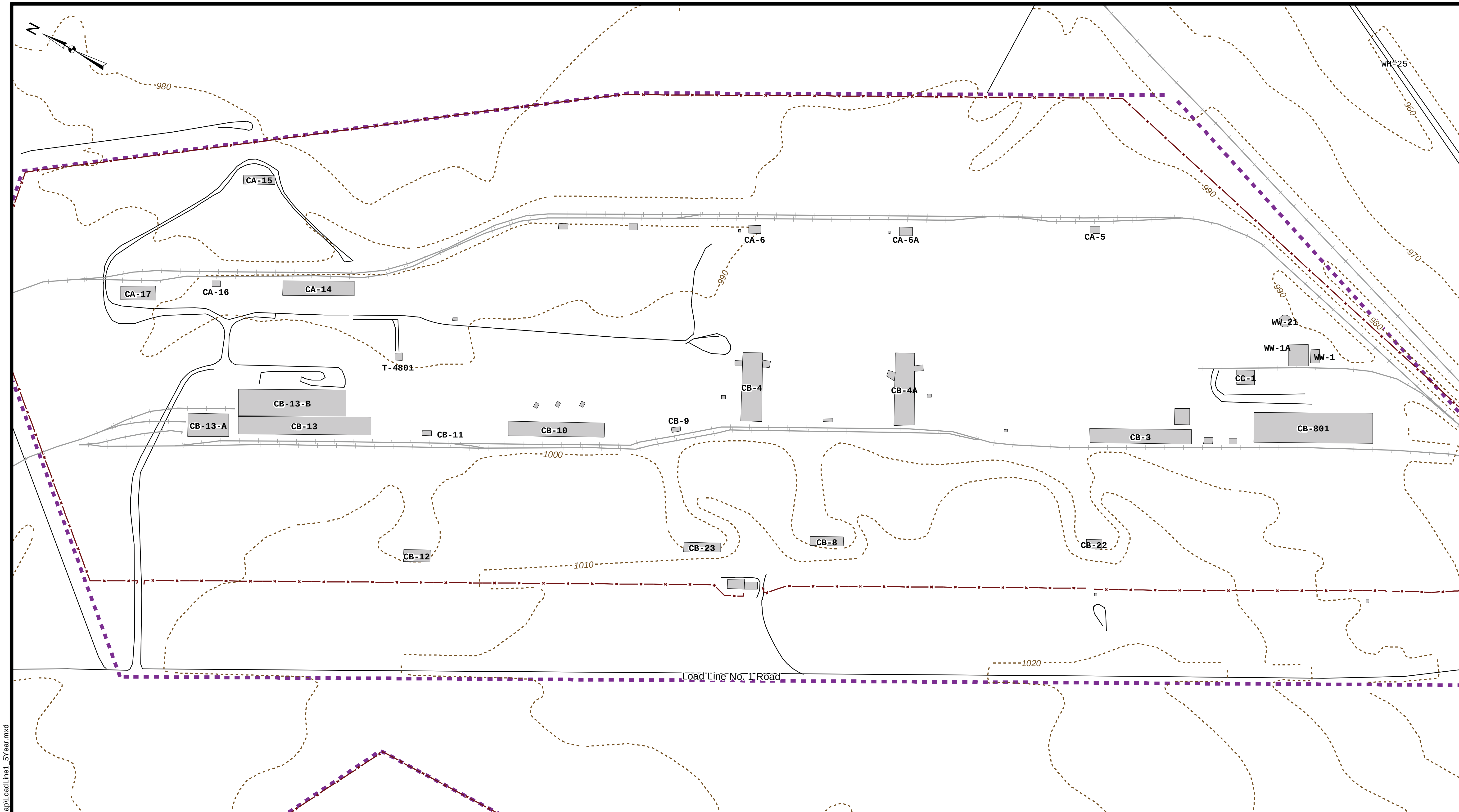

Legend

AOC Boundary

Fence Line

Water Body/Pond

Asphalt Roads

Stream or Creek

Contour (10ft Interval)

Railroads

Former Buildings

0 150 300 600 Feet

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Buffalo District

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CORPS OF ENGINEERS
BUFFALO, NY

LOAD LINE 1

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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 3

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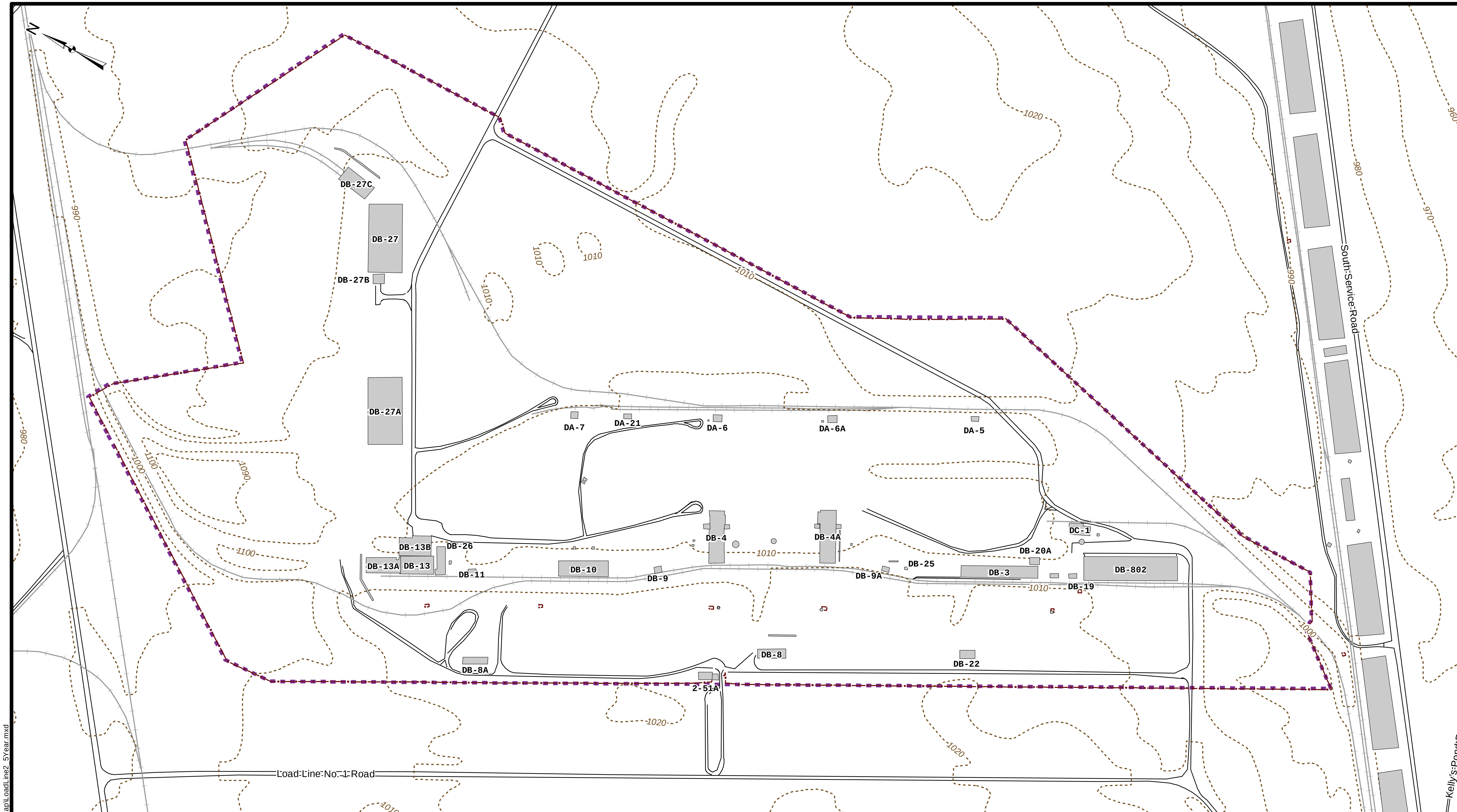

Legend

AOC Boundary

Fence Line

Water Body/Pond

Asphalt Roads

Stream or Creek

Contour (10ft Interval)

Railroads

Former Buildings

0 200 400 800 Feet

US Army Corps of Engineers
Buffalo District

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CORPS OF ENGINEERS
BUFFALO, NY

LOAD LINE 2

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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 4

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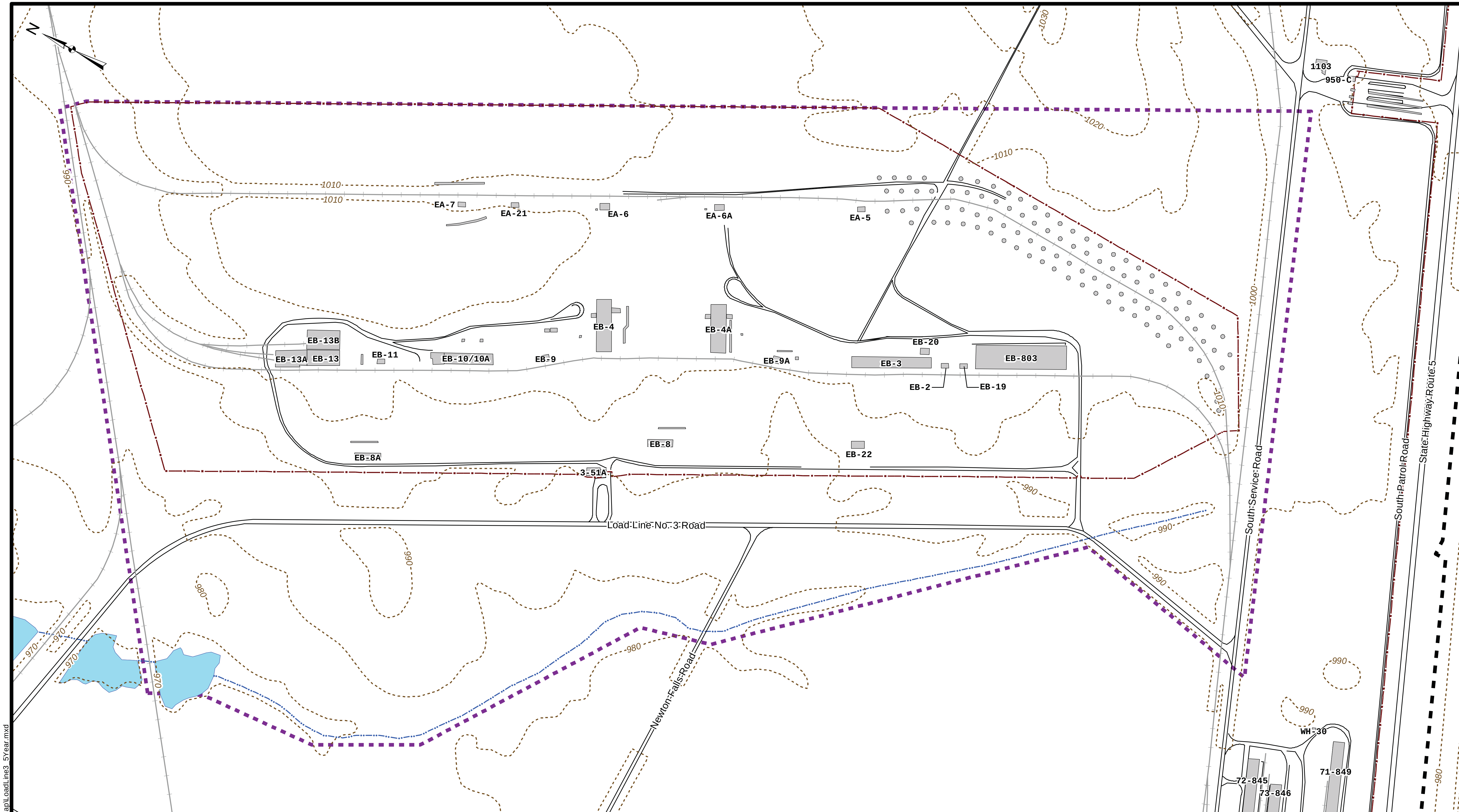

Legend

AOC Boundary
Fence Line
Water Body/Pond
Asphalt Roads
Stream or Creek
Contour (10ft Interval)
Railroads
Former Buildings

0 200 400 800 Feet

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BUFFALO, NY

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Buffalo District

LOAD LINE 3

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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 5

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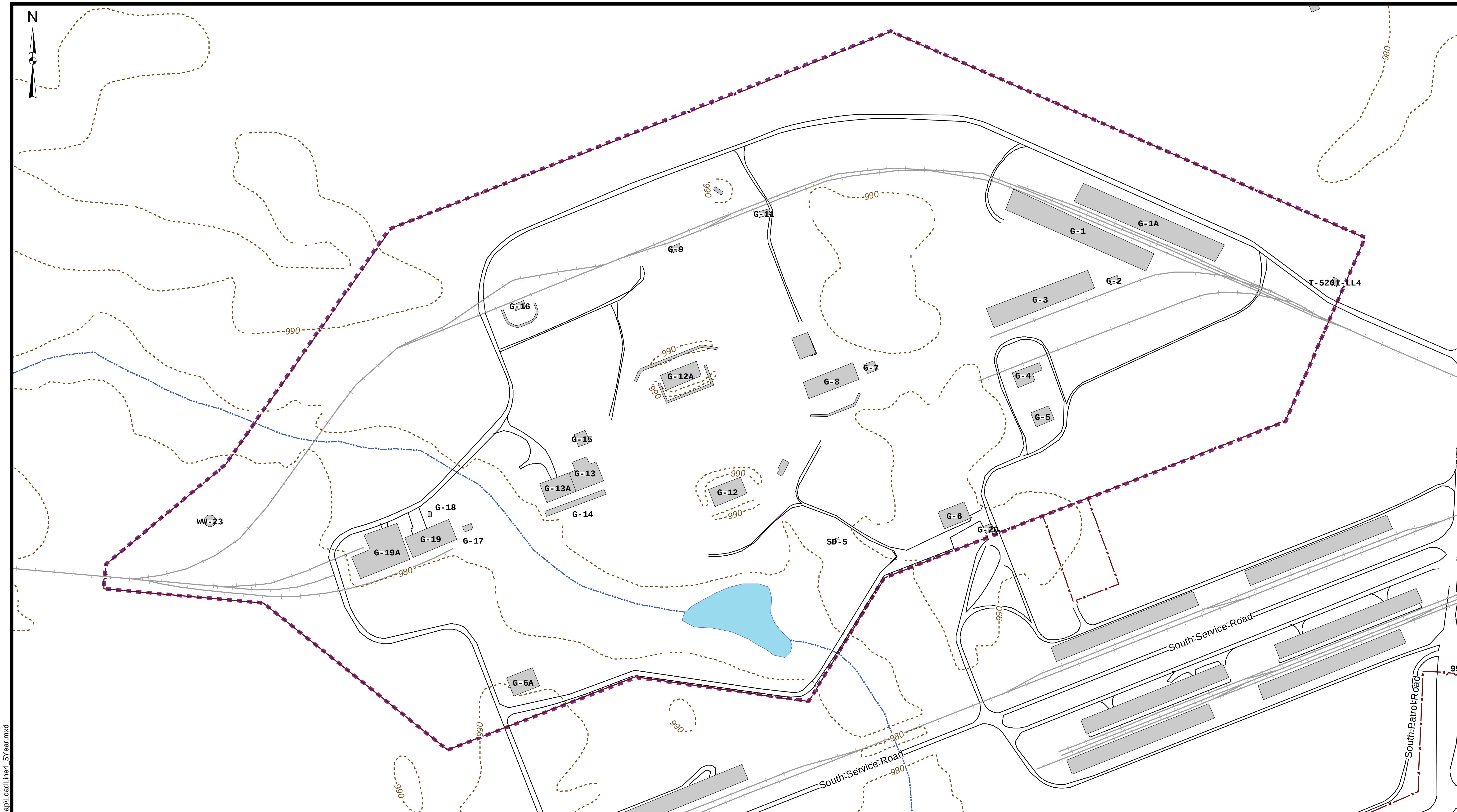

Legend

AOC Boundary	Fence Line	Water Body/Pond
Asphalt Roads	Stream or Creek	Contour (10ft Interval)
Railroads	Former Buildings	

0 150 300 600 Feet

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

US Army Corps of Engineers
Buffalo District

LOAD LINE 4

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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 6

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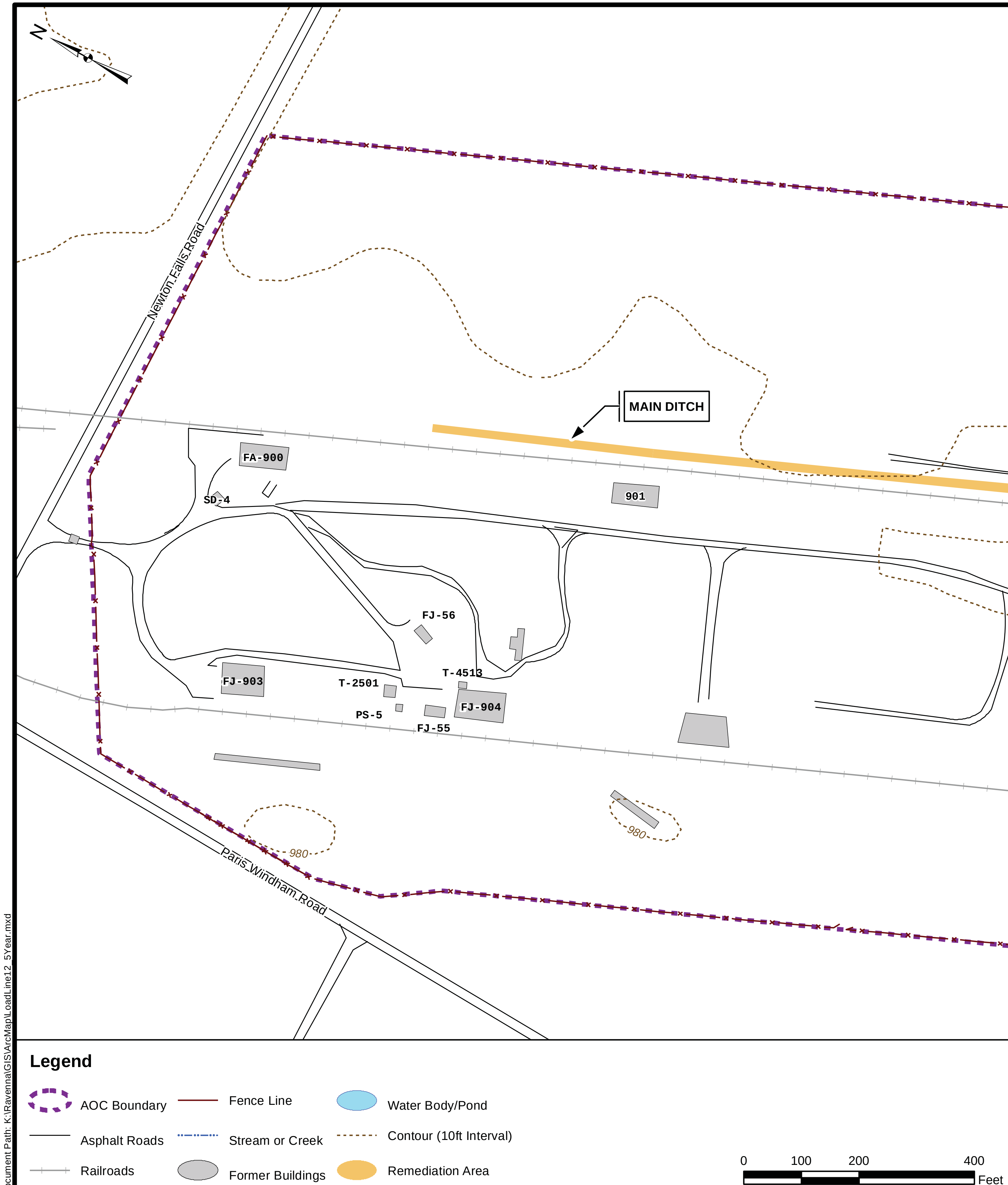

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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

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LOAD LINE 12

RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 7

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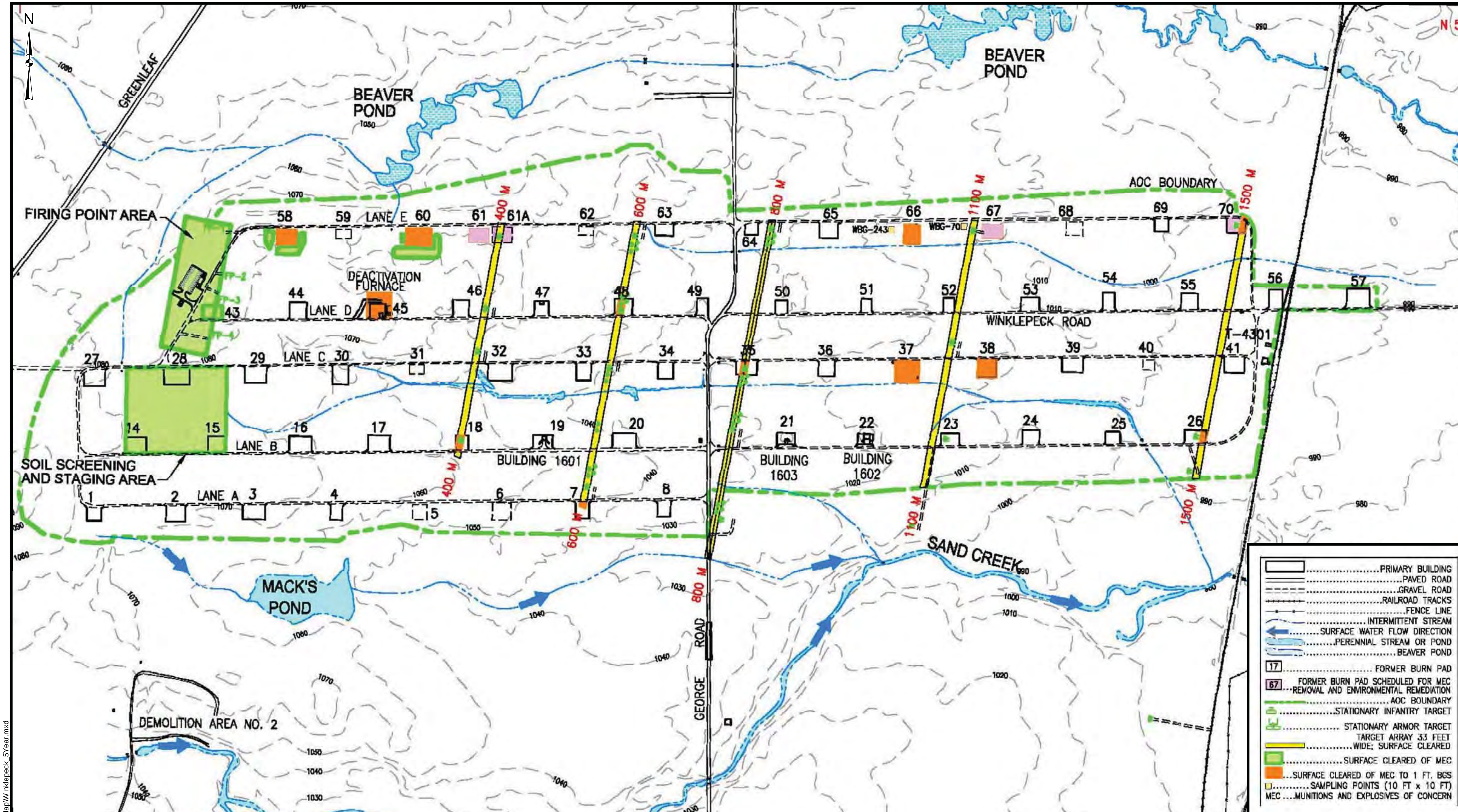

SOURCE: Record of Decision for Soil and Dry Sediment at the RVAAP-05 Winklepeck Burning Grounds (August 2008).

0 225 450 900 Feet

US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

WINKLEPECK BURNING GROUNDS

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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 8

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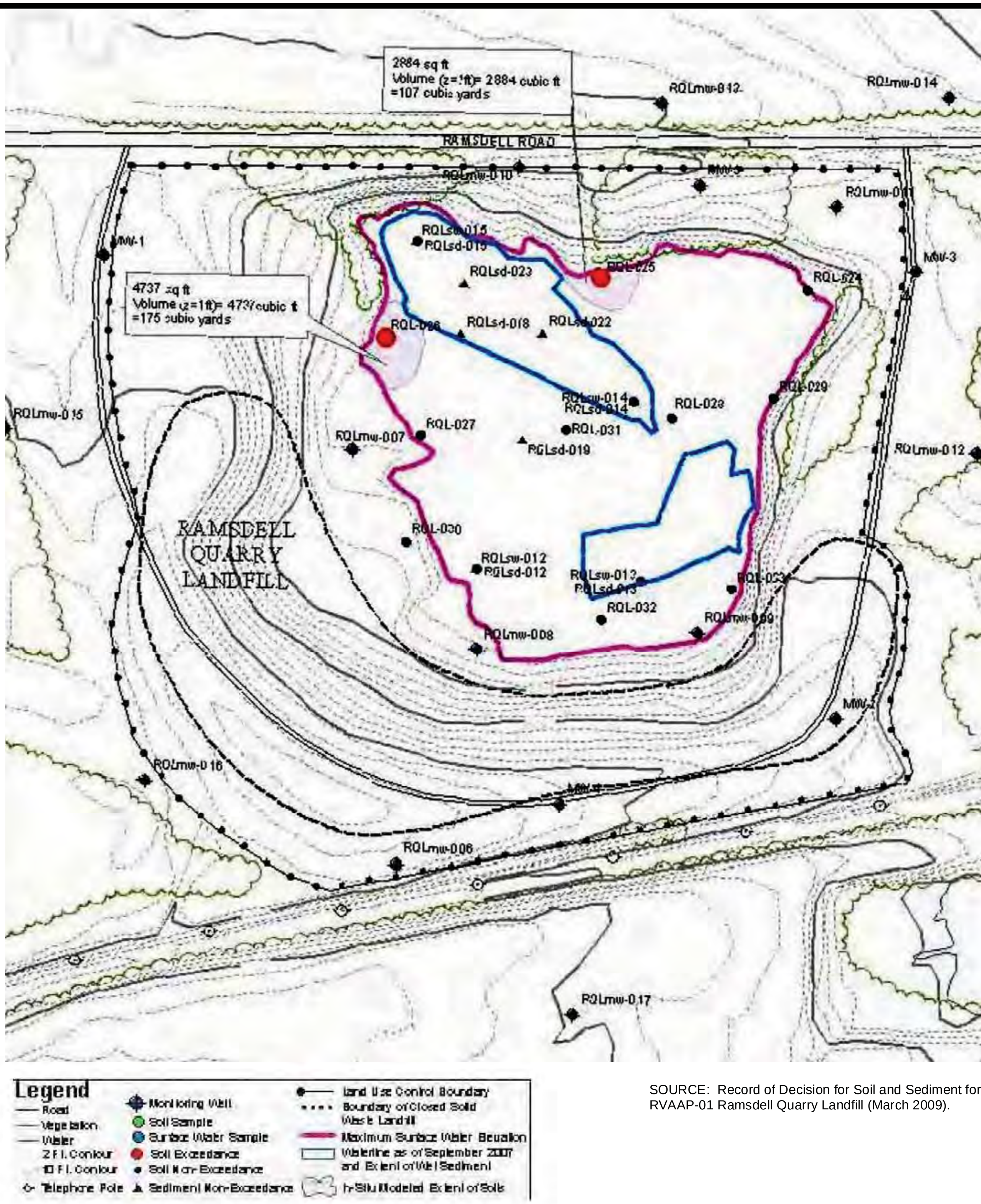

SOURCE: Record of Decision for Soil and Sediment for the RVAAP-01 Ramsdell Quarry Landfill (March 2009).

US Army Corps of Engineers
Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

RAMSDELL QUARRY LANDFILL

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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 9

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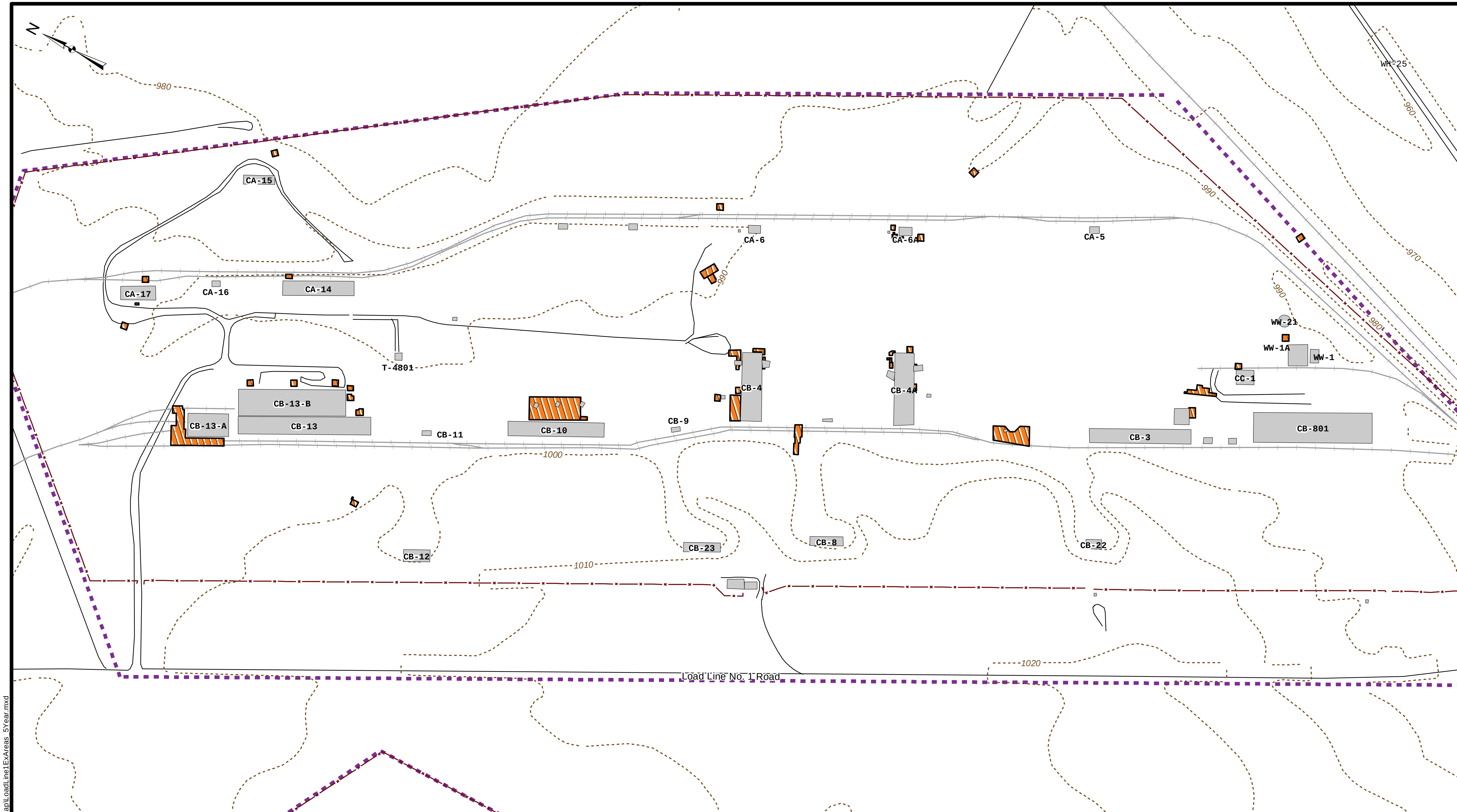

Legend

Area of Excavation
AOC Boundary
Asphalt Roads
Railroads
Fence Line
Stream or Creek
Former Buildings
Water Body/Pond
Contour (10ft Interval)

0 150 300 600 Feet

US Army Corps of Engineers
Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

EXCAVATED AREAS AT LOAD LINE 1

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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 10

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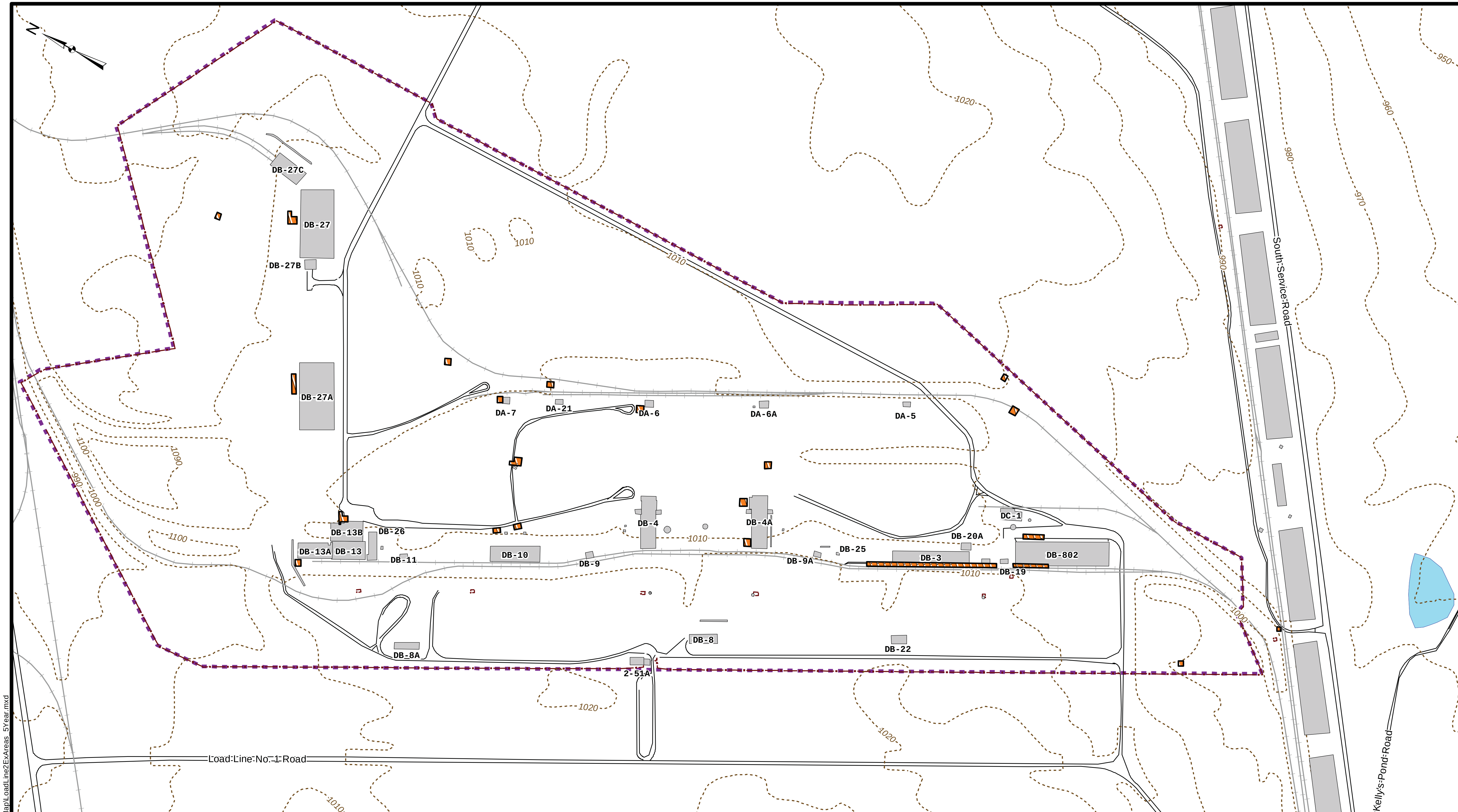

Legend

- Area of Excavation
- AOC Boundary
- Asphalt Roads
- Railroads
- Fence Line
- Stream or Creek
- Former Buildings
- Water Body/Pond
- Contour (10ft Interval)

0 200 400 800 Feet

US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

EXCAVATED AREAS AT LOAD LINE 2

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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 11

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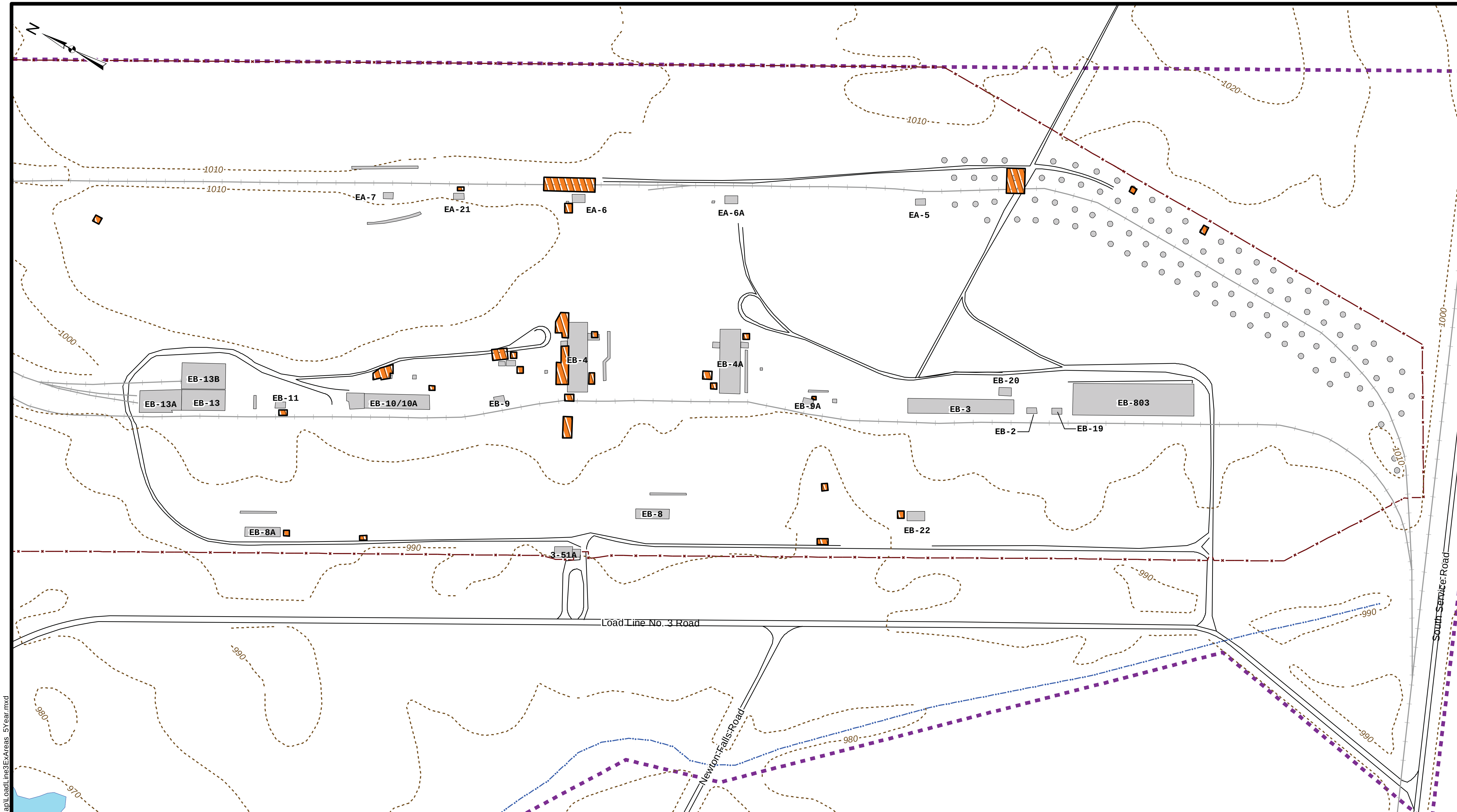

Legend

Area of Excavation
AOC Boundary
Asphalt Roads
Railroads
Fence Line
Stream or Creek
Former Buildings
Water Body/Pond
Contour (10ft Interval)

0 150 300 600 Feet

US Army Corps of Engineers Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

EXCAVATED AREAS AT LOAD LINE 3

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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 12

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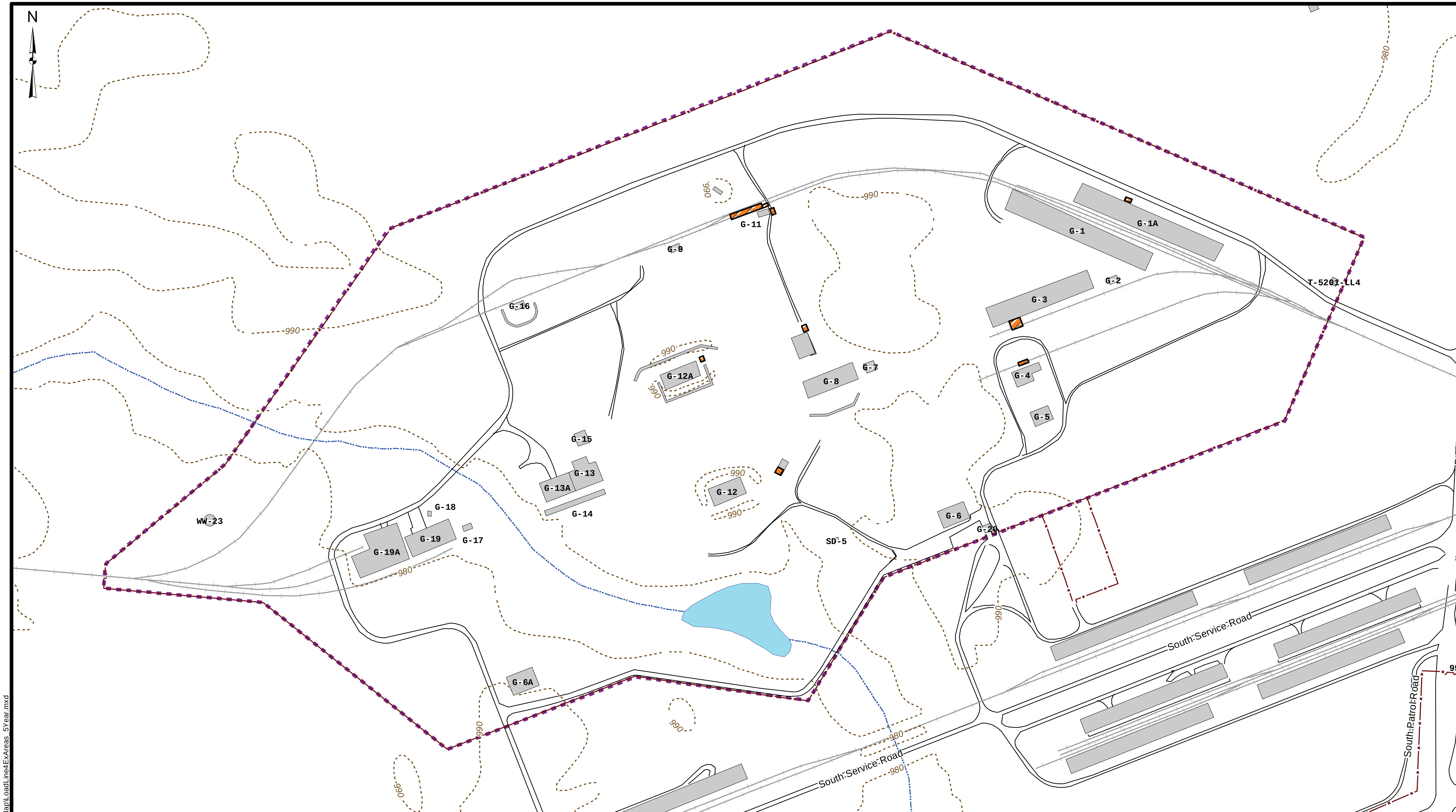

Legend

Area of Excavation
AOC Boundary
Asphalt Roads
Railroads
Fence Line
Stream or Creek
Former Buildings
Water Body/Pond
Contour (10ft Interval)

0 150 300 600
Feet

US Army Corps of Engineers
Buffalo District

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BUFFALO, NY

EXCAVATED AREAS AT LOAD LINE 4

Document Name: LoadLine4ExAreas_5Year.mxd
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RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FIGURE 13

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ATTACHMENT 2

LIST OF DOCUMENTS REVIEWED

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Prudent. 2011c. *Draft 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.* December.

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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 Title:	INTERIM RECORD OF DECISION FOR THE REMEDIATION OF SOILS AT LOAD LINES 1 THROUGH 4 AT THE RAVENNA ARMY AMMUNITION PLANT
Regulatory Framework:	CERCLA Non-NPL
Remedy Chosen:	Alternative Soil and Dry Sediment 3 (SDS3) – Excavation and Off-Site Disposal
Media of Concern:	Surface and subsurface soils and dry sediment "Other COC-impacted media at LLs 1-4 and other AOCs at RVAAP will be managed as separate actions by the Army and will be considered under separate RODs." (IROD Pg 7, Para D)
Chemicals of Concern:	***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 LLs 1-4 at RVAAP were presented in tables 2 and 3 of the Interim ROD. (Pg 8 and 11)
Land Use:	Current: Closed facilities being prepared for transfer from BRACD to ARNG. 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

Decision Document Title:	INTERIM RECORD OF DECISION FOR THE REMEDIATION OF SOILS AT LOAD LINES 1 THROUGH 4 AT THE RAVENNA ARMY AMMUNITION PLANT
Remedy Chosen:	Alternative Soil and Dry Sediment 3 (SDS3) – Excavation and Off-Site Disposal
Remedial Action Objectives:	"The RAO for surface and subsurface soils and dry sediment at LLs 1-4 is to prevent ingestion, inhalation, or direct contact with COCs exceeding the identified clean-up goals." "Attainment of the RAO will address potential risks to human and ecological receptors identified in the risk assessment through removal of surface and subsurface soil and dry sediment with concentrations of COCs exceeding clean-up goals." (IROD Pg 10-11)
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 Pg10-11)
Applicable or Relevant and Appropriate Requirements:	"There are no chemical-specific ARARs." "The action- and location-specific ARARs are varied and numerous for each alternative; thus, the ARARs are identified for the Selected Remedy in Attachment 1." (IROD Pg14)
Components of the Remedy:	• 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 • Five-year reviews *Institutional Control Components:* "Land use controls are not a component of Alternative SDS3 as presented in this Interim ROD." (IROD Pg 13)

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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
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
Chemicals of Concern:	***Inorganics:*** Arsenic COCs identified in soil and dry sediment at LL 12 were presented in Table 2 of the ROD (Pg 12)
Land Use:	Current: Closed facilities being prepared for transfer from BRACD to ARNG. 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)

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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
Remedy Chosen:	Alternative 3: Excavation and Off-site Disposal – National Guard Trainee Land Use
Remedial Action Objectives:	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. (Pg 11)
Clean-Up Goal:	Presented in Table 2, ROD Part II, Pg 12 "The remedial action objective (RAO) references clean-up goals and target risk levels that are considered protective of human health under current and reasonably anticipated future use scenarios." (ROD Pg 11)
Applicable or Relevant and Appropriate Requirements:	"There are no identified chemical-specific or location-specific applicable and relevant or appropriate requirements (ARARs)." "Action-specific ARARs were identified for Alternative 3." (Pg 16)
Components of the Remedy:	• Remedial Design (RD) Plan • Excavation • Handling of waste materials • Off-site disposal • Confirmatory sampling • Restoration • Land-use controls • Five-year reviews *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)

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Table A3-5 Decision Document Summary

Component: Background/Basis for Taking Action Winklepeck Burning Grounds

Decision Document Title:	RECORD OF DECISION FOR SOIL AND DRY SEDIMENT AT THE RVAAP-05 WINKLEPECK BURNING GROUNDS
Regulatory Framework:	CERCLA Non-NPL
Remedy Chosen:	Alternative 2: Chemical Contamination Removal Concurrent with MEC Removal Action – Excavation, Screen for Potential MEC, Composite Sampling, and Disposal. (ROD Pg II-27)
Media of Concern:	Soil and dry sediment
Chemicals of Concern:	***Explosives:*** RDX ***SVOCs:*** Benzo(a)pyrene and Dibenz(a,h)anthracene; Benzo(a)anthracene, Benzo(b)fluoranthene, and Indeno(1,2,3-cd)pyrene COCs identified in soil at WBG were presented in Table 2 of the ROD (Pg II-14)
Land Use:	Current: OHARNG, Mark 19 Grenade Machine Gun range Future: Mounted and dismounted maneuver training areas and development of ranges, as well as the construction of additional field support and cantonment facilities to support future training
Receptors:	Range Maintenance Soldier (ROD Pg. II-12)
Exposure Pathway:	Inhalation, ingestion or direct contact (Phase II RI, Section 6 Baseline Risk Assessment)
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).

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

Decision Document Title:	RECORD OF DECISION FOR SOIL AND DRY SEDIMENT AT THE RVAAP-05 WINKLEPECK BURNING GROUNDS
Remedy Chosen:	Alternative 2: Chemical Contamination Removal Concurrent with MEC Removal Action – Excavation, Screen for Potential MEC, Composite Sampling, and Disposal. (ROD Pg II-27)
Remedial Action Objectives:	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 bgs.
Clean-Up Goals:	Presented in ROD Table 2, Pg II-14 "The numeric criteria developed to meet [the] RAO are risk-based cleanup goals. Risk-based cleanup goals were calculated for the Range Maintenance Soldier using the methodology presented in Risk Assessment Guidance for Superfund Part B and incorporating site-specific exposure parameters applicable to WBG."
Applicable or Relevant and Appropriate Requirements:	"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)
Components of the Remedy:	• 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

Table A3-6 Decision Document Summary

Component: Remedial Action Winklepeck Burning Grounds

	• Implementation of LUCs for the AOC • Conducting five-year reviews of the performance of the selected remedy *Institutional Control Components:* "The RD shall include a LUC component describing the details of LUC implementation and maintenance, including periodic inspections." (ROD Pg II-32)

Table A3-7 Decision Document Summary

Component: Background/Basis for Taking Action Ramsdell Quarry Landfill

Decision Document Title:	FINAL RECORD OF DECISION FOR SOIL AND DRY SEDIMENT FOR THE RVAAP-01 RAMSDELL QUARRY LANDFILL
Regulatory Framework:	CERCLA Non-NPL
Remedy Chosen:	Alternative 3: Excavation and Off-site Disposal, Security Guard/Maintenance Worker Land Use
Media of Concern:	Soil and dry sediment (ROD Part 1 Pg 2)
Chemicals of Concern:	***SVOCs:*** Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, and Indeno(1,2,3-cd)pyrene COCs identified in soil were presented in Table 2 of the ROD (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:	ROD: "The BRA identifies the exposure pathways, COCs, if any, and provides a basis for the remedial decisions." 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)

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Table A3-8 Decision Document Summary
Component: Remedial Action Ramsdell Quarry Landfill

Decision Document Title:	FINAL RECORD OF DECISION FOR SOIL AND DRY SEDIMENT FOR THE RVAAP-01 RAMSDELL QUARRY LANDFILL
Remedy Chosen:	Alternative 3: Excavation and Off-site Disposal, Security Guard/Maintenance Worker Land Use
Remedial Action Objectives:	The remedial action objective is to 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)
Clean-Up Goals:	Presented in ROD Table 2, Part II, Pg 12 "The RAO references clean-up goals and target risk levels that are considered protective of human health under current and reasonably anticipated future use scenarios." (ROD Part II Pg 11)
Applicable or Relevant and Appropriate Requirements:	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)
Components of the Remedy:	• Remedial Design (RD) Plan • Excavation • Handling of waste materials • Off-site disposal • Confirmatory sampling • Restoration • Land-use controls • Five-year reviews *Institutional Control Components:* "The RD shall include a LUC component describing the details of LUC implementation and maintenance, including periodic inspections." (ROD Part II Pg 21)

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ATTACHMENT 4

SITE INSPECTION CHECKLISTS

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Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

I. SITE INFORMATION

Site name: *Ravenna Army Ammunition Plant Load Line 1 (RVAAP-08)*	**Date of inspection:** *24 January 2012*
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:** *Overcast, calm, ~ 36°F*

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)* (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** Jim McGee (Vista Sciences Corp.) — Name; Project Manager — Title; 21-March-2012 — Date

   Interviewed ☐ at site ☐ at office ☒ by phone Phone no. (330) 358-3005

   Problems, suggestions; ☒ Report attached See Interview Record

2. **O&M staff** ____ Name ____ Title ____ Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ____

   Problems, suggestions; ☐ Report attached ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

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 (Ohio EPA)
Contact Eileen Mohr — Environmental Specialist 3 — 3-April-2012 — (330) 963-1221
Name — Title — Date — Phone no.
Problems; suggestions; ☒ Report attached See Interview Record

Agency ______
Contact ______ ______ ______ ______
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ ______ ______ ______
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ ______ ______ ______
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached ______

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

- Kimberly Harriz, P.G., Army National Guard (ARNG) Directorate, former Cleanup Program Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2
- Tim Morgan, OHARNG, Fort Ohio Environmental Supervisor
- Tom Tadsen, RAB Co-Chair
- Derek Kinder, P.E., US Army Corps of Engineers, Louisville District (CELRL), Task Manager/Civil-Environmental Engineer

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: ______

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: Facility-Wide Safety and Health Plan for Environmental Investigations, Ravenna Army Ammunition Plant Ravenna, Ohio, Revision 0 February 2011.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

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: Baseline and semi-annual monitoring has been conducted for VOCs, SVOCs, pesticides, PCBs, explosives, propellants, inorganics, and cyanide as documented in *Facility-Wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant (September 2004)* and Facility-Wide Monitoring Program annual reports for 2007, 2008, 2009, 2010, and 2011 (preliminary draft).

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 Corp. – maintenance only)
☐ Other:______

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

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)

From________ (Date)	To________ (Date)	________ (Total cost)	☐ Breakdown attached
From________ (Date)	To________ (Date)	________ (Total cost)	☐ Breakdown attached
From________ (Date)	To________ (Date)	________ (Total cost)	☐ Breakdown attached
From________ (Date)	To________ (Date)	________ (Total cost)	☐ Breakdown attached
From________ (Date)	To________ (Date)	________ (Total cost)	☐ Breakdown attached

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

Describe costs and reasons: ________________________________

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

A. Fencing

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

Remarks: RVAAP / Camp Ravenna is surrounded by a perimeter fence that provides controlled access via security gates. RVAAP-08 is further enclosed with a chain link fence. This secondary fence appears to be intact, although some isolated areas are in poor condition and show signs of distress.

B. Other Access Restrictions

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

Remarks: The RVAAP-08 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.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

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, see below.
Frequency
Responsible party/agency Vista Sciences Corp.

Contact	Jim McGee	Project Manager	21-March-2012	(330) 358-7311
	Name	Title	Date	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
LUCs / ICs have not been implemented pending completion of a facility-wide Property Management Plan (PMP).

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
The final PMP will establish LUCs/ICs for the site and responsibilities for implementing and maintaining the LUCs/ICs.

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: RVAAP / Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for site inspection and environmental activities.

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.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface ☐ Applicable ☒ N/A

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

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: ____

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 ______________
   ☐ 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.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
   Remarks: ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks: ______________________________

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks: ______________________________

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.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent__________ Depth__________
Remarks: ______________________________

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type__________ Areal extent__________
Remarks: ______________________________

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent__________ Depth__________
Remarks: ______________________________

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent__________ Depth __________
Remarks: ______________________________

5. **Obstructions** Type __________ ☐ No obstructions
☐ Location shown on site map Areal extent __________
Size__________
Remarks: ______________________________

6. **Excessive Vegetative Growth** Type __________
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent __________
Remarks ______________________________

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 ______________________________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

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

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks ____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks ____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks ____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks ____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks ____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent ______________Depth ______________ ☐ N/A
☐ Siltation not evident
Remarks ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

2.	**Erosion** Areal extent ______________ Depth ______________ ☐ Erosion not evident Remarks ____		
3.	**Outlet Works** ☐ Functioning ☐ N/A Remarks ____		
4.	**Dam** ☐ Functioning ☐ N/A Remarks ____		
H. Retaining Walls	☐ Applicable ☒ N/A		
1.	**Deformations** ☐ Location shown on site map ☐ Deformation not evident Horizontal displacement ______________ Vertical displacement ______________ Rotational displacement ______________ Remarks ____		
2.	**Degradation** ☐ Location shown on site map ☐ Degradation not evident Remarks ____		
I. Perimeter Ditches/Off-Site Discharge	☐ Applicable ☒ N/A		
1.	**Siltation** ☐ Location shown on site map ☐ Siltation not evident Areal extent______________ Depth ______________ Remarks ____		
2.	**Vegetative Growth** ☐ Location shown on site map ☐ N/A ☐ Vegetation does not impede flow Areal extent______________ Type ______________ Remarks ____		
3.	**Erosion** ☐ Location shown on site map ☐ Erosion not evident Areal extent______________ Depth ______________ Remarks ____		
4.	**Discharge Structure** ☐ Functioning ☐ N/A Remarks ____		
VIII. VERTICAL BARRIER WALLS	☐ Applicable ☒ N/A		
1.	**Settlement** ☐ Location shown on site map ☐ Settlement not evident Areal extent______________ Depth ______________ Remarks ____		

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

2. **Performance Monitoring** Type of monitoring ______
☐ Performance not monitored
Frequency ______ ☐ Evidence of breaching
Head differential ______
Remarks ______

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

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks ______

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks ______

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks ______

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks ______

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks ______

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks ______

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon absorbers
☐ Filters ______________________
☐ Additive (*e.g.*, chelation agent, flocculent) ______________________
☐ Others ______________________
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually ______________________
☐ Quantity of surface water treated annually ______________________
Remarks ______________________

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks: ______________________

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks : ______________________

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks : ______________________

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks: ______________________

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ______________________

D. Monitoring Data ☒ Applicable ☐ N/A

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests: (statistical trend evaluations of the data cannot be performed)
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ____

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. Engineering controls consist of a perimeter fence with warning signs and reflective tape placed in strategic areas to prevent access by OHARNG personnel. Access by the general public is restricted by a RVAAP / Camp Ravenna facility-wide perimeter fence and security gates. The site inspection did not identify evidence of trespass or OHARNG training. Groundwater monitoring is performed under a facility-wide program.

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 the building slabs, prescribed in the Interim ROD, is no longer required because the slabs and contaminated soil beneath the slabs were removed and disposed off site.

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 within sub slab soils and underground utility lines.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-08) Load Line 1

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. None

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Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

I. SITE INFORMATION	
Site name: *Ravenna Army Ammunition Plant Load Line 2 (RVAAP-09)*	**Date of inspection:** *24 January 2012*
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:** *Overcast, calm, ~ 36°F*

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)* (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** Jim McGee (Vista Sciences Corp.) — Name; Project Manager — Title; 21-March-2012 — Date
   Interviewed ☐ at site ☐ at office ☒ by phone Phone no. (330) 358-3005
   Problems, suggestions; ☒ Report attached See Interview Record

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

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

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 (Ohio EPA)

Contact	Name	Title	Date	Phone no.
	Eileen Mohr	Environmental Specialist 3	3-April-2012	(330) 963-1221

Problems; suggestions; ☒ Report attached See Interview Record

Agency ______

Contact ______ Name ______ Title ______ Date ______ Phone no. ______

Problems; suggestions; ☐ Report attached ______

Agency ______

Contact ______ Name ______ Title ______ Date ______ Phone no. ______

Problems; suggestions; ☐ Report attached ______

Agency ______

Contact ______ Name ______ Title ______ Date ______ Phone no. ______

Problems; suggestions; ☐ Report attached ______

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

- Kimberly Harriz, P.G., Army National Guard (ARNG) Directorate, Former Cleanup Program Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2
- Tim Morgan, OHARNG, Fort Ohio Environmental Supervisor
- Tom Tadsen, RAB Co-Chair
- Derek Kinder, P.E., US Army Corps of Engineers, Louisville District (CELRL), Task Manager/Civil-Environmental Engineer

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: ______

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: Facility-Wide Safety and Health Plan for Environmental Investigations, Ravenna Army Ammunition Plant Ravenna, Ohio, Revision 0 February 2011.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

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: Baseline and semi-annual monitoring has been conducted for VOCs, SVOCs, pesticides, PCBs, explosives, propellants, inorganics, and cyanide as documented in *Facility-Wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant (September 2004)* and Facility-Wide Monitoring Program annual reports for 2007, 2008, 2009, 2010, and 2011 (preliminary draft).

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 Corp. – maintenance only)
☐ Other:

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

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)

From________ To________ ________ ☐ Breakdown attached
Date Date Total cost
From________ To________ ________ ☐ Breakdown attached
Date Date Total cost
From________ To________ ________ ☐ Breakdown attached
Date Date Total cost
From________ To________ ________ ☐ Breakdown attached
Date Date Total cost
From________ To________ ________ ☐ Breakdown attached
Date Date Total cost

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

Describe costs and reasons:

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

A. Fencing

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

Remarks: RVAAP / Camp Ravenna is surrounded by a perimeter fence that provides controlled access via security gates. RVAAP-09 is further enclosed with a chain link fence. This secondary fence appears to be intact, although some isolated areas are in poor condition and show signs of distress.

B. Other Access Restrictions

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

Remarks: The RVAAP-09 fence is absent at a former Gate House building location. Access at this location is restricted by using warning signs and a cable barricade with reflective tape markers. Warning signs restricting access are also posted at the site entrance gate.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

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, see below.
Frequency
Responsible party/agency Vista Sciences Corp.

Contact	Jim McGee	Project Manager	21-March-2012	(330) 358-7311
	Name	Title	Date	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
LUCs / Institutional Controls (ICs) have not been implemented pending completion of a facility-wide Property Management Plan (PMP).

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
The final PMP will establish LUCs/ICs for the site and responsibilities for implementing and maintaining the LUCs/ICs.

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: RVAAP / Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for site inspection and environmental activities.

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.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface ☐ Applicable ☒ N/A

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

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: ____

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 _______________
☐ 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.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks: ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks: ______

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks: ______

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.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent______ Depth______
Remarks: ______

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type______ Areal extent______
Remarks: ______

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent______ Depth______
Remarks: ______

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent______ Depth ______
Remarks: ______

5. **Obstructions** Type ______ ☐ No obstructions
☐ Location shown on site map Areal extent ______
Size______
Remarks: ______

6. **Excessive Vegetative Growth** Type ______
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent ______
Remarks ______

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 ______

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

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

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks ______________________________

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks ______________________________

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks ______________________________

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks ______________________________

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks ______________________________

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent ______ Depth ______ ☐ N/A
☐ Siltation not evident
Remarks ______________________________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

2.	**Erosion** Areal extent ______________ Depth ______________ ☐ Erosion not evident Remarks ____
3.	**Outlet Works** ☐ Functioning ☐ N/A Remarks ____
4.	**Dam** ☐ Functioning ☐ N/A Remarks ____
H. Retaining Walls	☐ Applicable ☒ N/A
1.	**Deformations** ☐ Location shown on site map ☐ Deformation not evident Horizontal displacement ______________ Vertical displacement ______________ Rotational displacement ______________ Remarks ____
2.	**Degradation** ☐ Location shown on site map ☐ Degradation not evident Remarks ____
I. Perimeter Ditches/Off-Site Discharge	☐ Applicable ☒ N/A
1.	**Siltation** ☐ Location shown on site map ☐ Siltation not evident Areal extent______________ Depth ______________ Remarks ____
2.	**Vegetative Growth** ☐ Location shown on site map ☐ N/A ☐ Vegetation does not impede flow Areal extent______________ Type ______________ Remarks ____
3.	**Erosion** ☐ Location shown on site map ☐ Erosion not evident Areal extent______________ Depth ______________ Remarks ____
4.	**Discharge Structure** ☐ Functioning ☐ N/A Remarks ____
VIII. VERTICAL BARRIER WALLS	☐ Applicable ☒ N/A
1.	**Settlement** ☐ Location shown on site map ☐ Settlement not evident Areal extent______________ Depth ______________ Remarks ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

2. **Performance Monitoring** Type of monitoring ______________
☐ Performance not monitored
Frequency ______________ ☐ Evidence of breaching
Head differential ______________
Remarks ______________

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

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks ______________

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks ______________

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks ______________

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks ______________

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks ______________

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks ______________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon absorbers
☐ Filters ______
☐ Additive (*e.g.*, chelation agent, flocculent) ______
☐ Others ______
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually ______
☐ Quantity of surface water treated annually ______
Remarks ______

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks: ______

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks : ______

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks : ______

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks: ______

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ______

D. Monitoring Data ☒ Applicable ☐ N/A

3. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

4. Monitoring data suggests: (statistical trend evaluations of the data cannot be performed)
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) Load Line 2

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ____

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. Engineering controls consist of a perimeter fence with warning signs and reflective tape placed in strategic areas to prevent access by OHARNG personnel. Access by the general public is restricted by a RVAAP / Camp Ravenna facility-wide perimeter fence and security gates. The site inspection did not identify evidence of trespass or OHARNG training. Groundwater monitoring is performed under a facility-wide program.

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 the building slabs, prescribed in the Interim ROD, is no longer required because the slabs and contaminated soil beneath the slabs were removed and disposed off site.

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 within sub slab soil and underground utility lines.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-09) 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. None

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Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

I. SITE INFORMATION	
Site name: *Ravenna Army Ammunition Plant Load Line 3 (RVAAP-10)*	**Date of inspection:** *24 January 2012*
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:** *Overcast, calm, ~ 36°F*

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)* (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** Jim McGee (Vista Sciences Corp.) — Name; Project Manager — Title; 21-March-2012 — Date
   Interviewed ☐ at site ☐ at office ☒ by phone Phone no. (330) 358-3005
   Problems, suggestions; ☒ Report attached

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

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

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 (Ohio EPA)
Contact: Eileen Mohr (Name) | Environmental Specialist 3 (Title) | 3-April-2012 (Date) | (330) 963-1221 (Phone no.)
Problems; suggestions; ☒ Report attached See Interview Record

Agency ______
Contact ______ Name ______ Title ______ Date ______ Phone no. ______
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ Name ______ Title ______ Date ______ Phone no. ______
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ Name ______ Title ______ Date ______ Phone no. ______
Problems; suggestions; ☐ Report attached ______

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

- Kimberly Harriz, P.G., Army National Guard (ARNG) Directorate, Former Cleanup Program Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2
- Tim Morgan, OHARNG, Fort Ohio Environmental Supervisor
- Tom Tadsen, RAB Co-Chair
- Derek Kinder, P.E., US Army Corps of Engineers, Louisville District (CELRL), Task Manager/Civil-Environmental Engineer

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: ______

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: Facility-Wide Safety and Health Plan for Environmental Investigations, Ravenna Army Ammunition Plant Ravenna, Ohio, Revision 0 February 2011.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

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: Baseline and semi-annual monitoring has been conducted for VOCs, SVOCs, pesticides, PCBs, explosives, propellants, inorganics, and cyanide as documented in *Facility-Wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant (September 2004)* and Facility-Wide Monitoring Program annual reports for 2007, 2008, 2009, 2010, and 2011 (preliminary draft).

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 Corp. – maintenance only)
☐ Other:

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

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)

From______ (Date)	To______ (Date)	______ (Total cost)	☐ Breakdown attached
From______ (Date)	To______ (Date)	______ (Total cost)	☐ Breakdown attached
From______ (Date)	To______ (Date)	______ (Total cost)	☐ Breakdown attached
From______ (Date)	To______ (Date)	______ (Total cost)	☐ Breakdown attached
From______ (Date)	To______ (Date)	______ (Total cost)	☐ Breakdown attached

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

Describe costs and reasons: ____________________

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

A. Fencing

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

Remarks: RVAAP / Camp Ravenna is surrounded by a perimeter fence that provides controlled access via security gates. RVAAP-10 is further enclosed with a chain link fence. This secondary fence appears to be intact, although some isolated areas are in poor condition and show signs of distress.

B. Other Access Restrictions

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

Remarks: TheRVAAP-10 fence is absent at a former Gate House building. Access at this location is restricted by using warning signs and a cable barricade with reflective tape markers. Warning signs restricting access are also posted at the site entrance gate.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

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, see below.
Frequency
Responsible party/agency Vista Sciences Corp.

Contact	Jim McGee	Project Manager	21-March-2012	(330) 358-7311
	Name	Title	Date	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
LUCs / Institutional Controls (ICs) have not been implemented pending completion of a facility-wide Property Management Plan (PMP).

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
The final PMP will establish LUCs/ICs for the site and responsibilities for implementing and maintaining the LUCs/ICs.

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: RVAAP / Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for site inspection and environmental activities.

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.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface ☐ Applicable ☒ N/A

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

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: ____

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 ______________
☐ 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.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks: ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks: ______________________________

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks: ______________________________

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.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent__________ Depth__________
Remarks: ______________________________

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type__________ Areal extent__________
Remarks: ______________________________

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent__________ Depth__________
Remarks: ______________________________

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent__________ Depth __________
Remarks: ______________________________

5. **Obstructions** Type __________ ☐ No obstructions
☐ Location shown on site map Areal extent __________
Size__________
Remarks: ______________________________

6. **Excessive Vegetative Growth** Type __________
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent __________
Remarks ______________________________

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 ______________________________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

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

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks ____________________

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks ____________________

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks ____________________

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks ____________________

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks ____________________

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent ____________ Depth ____________ ☐ N/A
☐ Siltation not evident
Remarks ____________________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

2.	**Erosion** Areal extent ______________ Depth ______________ ☐ Erosion not evident Remarks ______________________________	
3.	**Outlet Works** ☐ Functioning ☐ N/A Remarks ______________________________	
4.	**Dam** ☐ Functioning ☐ N/A Remarks ______________________________	
H. Retaining Walls	☐ Applicable ☒ N/A	
1.	**Deformations** ☐ Location shown on site map ☐ Deformation not evident Horizontal displacement ______________ Vertical displacement ______________ Rotational displacement ______________ Remarks ______________________________	
2.	**Degradation** ☐ Location shown on site map ☐ Degradation not evident Remarks ______________________________	
I. Perimeter Ditches/Off-Site Discharge	☐ Applicable ☒ N/A	
1.	**Siltation** ☐ Location shown on site map ☐ Siltation not evident Areal extent______________ Depth ______________ Remarks ______________________________	
2.	**Vegetative Growth** ☐ Location shown on site map ☐ N/A ☐ Vegetation does not impede flow Areal extent______________ Type ______________ Remarks ______________________________	
3.	**Erosion** ☐ Location shown on site map ☐ Erosion not evident Areal extent______________ Depth ______________ Remarks ______________________________	
4.	**Discharge Structure** ☐ Functioning ☐ N/A Remarks ______________________________	
VIII. VERTICAL BARRIER WALLS	☐ Applicable ☒ N/A	
1.	**Settlement** ☐ Location shown on site map ☐ Settlement not evident Areal extent______________ Depth ______________ Remarks ______________________________	

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

2.	**Performance Monitoring** Type of monitoring ______ ☐ Performance not monitored Frequency ______ ☐ Evidence of breaching Head differential ______ Remarks ______
IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A	
1.	**Pumps, Wellhead Plumbing, and Electrical** ☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A Remarks ______
2.	**Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks ______
3.	**Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks ______
B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A	
1.	**Collection Structures, Pumps, and Electrical** ☐ Good condition ☐ Needs Maintenance Remarks ______
2.	**Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks ______
3.	**Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks ______

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

C. Treatment System ☐ Applicable ☒ N/A	
1.	**Treatment Train** (Check components that apply) ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation ☐ Air stripping ☐ Carbon absorbers ☐ Filters ________ ☐ Additive (*e.g.*, chelation agent, flocculent) ________ ☐ Others ________ ☐ Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of groundwater treated annually ________ ☐ Quantity of surface water treated annually ________ Remarks ________
2.	**Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks: ________
3.	**Tanks, Vaults, Storage Vessels** ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance Remarks : ________
4.	**Discharge Structure and Appurtenances** ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks : ________
5.	**Treatment Building(s)** ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair ☐ Chemicals and equipment properly stored Remarks: ________
6.	**Monitoring Wells** (pump and treatment remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks : ________
D. Monitoring Data ☒ Applicable ☐ N/A	
5.	Monitoring Data ☒ Is routinely submitted on time ☒ Is of acceptable quality
6.	Monitoring data suggests: (statistical trend evaluations of the data cannot be performed) ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) Load Line 3

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ____

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. Engineering controls consist of a perimeter fence with warning signs and reflective tape placed in strategic areas to prevent access by OHARNG personnel. Access by the general public is restricted by a RVAAP / Camp Ravenna facility-wide perimeter fence and security gates. The site inspection did not identify evidence of trespass or OHARNG training. Groundwater monitoring is performed under a facility-wide program.

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 the building slabs, prescribed in the Interim ROD, is no longer required because the slabs and contaminated soil beneath the slabs were removed and disposed off site.

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 within sub slab soils and underground utility lines.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-10) 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. None

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Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

I. SITE INFORMATION

Site name: *Ravenna Army Ammunition Plant Load Line 4 (RVAAP-11)*	**Date of inspection:** *24 January 2012*
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:** *Overcast, calm, ~ 36°F*

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)* (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** Jim McGee (Vista Sciences Corp.) — Name; Project Manager — Title; 21-March-2012 — Date
   Interviewed ☐ at site ☐ at office ☒ by phone Phone no. (330) 358-3005
   Problems, suggestions; ☒ Report attached See Interview Record

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

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

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 (Ohio EPA)
Contact Eileen Mohr | Environmental Specialist 3 | 3-April-2012 | (330) 963-1221
Name | Title | Date | Phone no.
Problems; suggestions; ☒ Report attached See Interview Record

Agency ______
Contact ______ ______ ______ ______
Name | Title | Date | Phone no.
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ ______ ______ ______
Name | Title | Date | Phone no.
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ ______ ______ ______
Name | Title | Date | Phone no.
Problems; suggestions; ☐ Report attached ______

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

- Kimberly Harriz, P.G., Army National Guard (ARNG) Directorate, Former Cleanup Program Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2
- Tim Morgan, OHARNG, Fort Ohio Environmental Supervisor
- Tom Tadsen, RAB Co-Chair
- Derek Kinder, P.E., US Army Corps of Engineers, Louisville District (CELRL), Task Manager/Civil-Environmental Engineer

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: ______

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: Facility-Wide Safety and Health Plan for Environmental Investigations, Ravenna Army Ammunition Plant Ravenna, Ohio, Revision 0 February 2011.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

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: Baseline and semi-annual monitoring has been conducted for VOCs, SVOCs, pesticides, PCBs, explosives, propellants, inorganics, and cyanide as documented in *Facility-Wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant (September 2004)* and Facility-Wide Monitoring Program annual reports for 2007, 2008, 2009, 2010, and 2011 (preliminary draft).

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 Corp. – maintenance only)
☐ Other:

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

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)

From (Date)	To (Date)	Total cost	
			☐ Breakdown attached
			☐ Breakdown attached
			☐ Breakdown attached
			☐ Breakdown attached
			☐ Breakdown attached

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

Describe costs and reasons: ______

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

A. Fencing

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

Remarks: RVAAP / Camp Ravenna is surrounded by a perimeter fence that provides controlled access via security gates. RVAAP-11 is further enclosed with a chain link fence. This secondary fence appears to be intact, although some isolated areas are in poor condition and show signs of distress.

B. Other Access Restrictions

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

Remarks: Warning signs restricting access are posted at the site entrance gate.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

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, see below.
   Frequency
   Responsible party/agency Vista Sciences Corp.
   Contact Jim McGee (Name) Project Manager (Title) 21-March-2012 (Date) (330) 358-7311 (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
   LUCs / Institutional Controls (ICs) have not been implemented pending completion of a facility-wide Property Management Plan (PMP).

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
   The final PMP will establish LUCs/ICs for the site and responsibilities for implementing and maintaining the LUCs/ICs.

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: RVAAP / Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for site inspection and environmental activities.

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. Warning signs restricting access are also posted at the site entrance gate.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

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: ____

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 ______________
☐ 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.)

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks: ______________________________

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks: ______________________________

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks: ______________________________

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.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent__________ Depth__________
Remarks: ______________________________

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type__________ Areal extent__________
Remarks: ______________________________

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent__________ Depth__________
Remarks: ______________________________

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent__________ Depth __________
Remarks: ______________________________

5. **Obstructions** Type __________ ☐ No obstructions
☐ Location shown on site map Areal extent __________
Size__________
Remarks: ______________________________

6. **Excessive Vegetative Growth** Type __________
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent __________
Remarks ______________________________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

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

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for Reuse
☐ Good condition ☐ Needs Maintenance
Remarks ______________________________

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks ______________________________

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks ______________________________

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks ______________________________

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks ______________________________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent ______ Depth ______ ☐ N/A
   ☐ Siltation not evident
   Remarks ______

2. **Erosion** Areal extent ______ Depth ______
   ☐ Erosion not evident
   Remarks ______

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks ______

4. **Dam** ☐ Functioning ☐ N/A
   Remarks ______

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement ______ Vertical displacement ______
   Rotational displacement ______
   Remarks ______

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks ______

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent______ Depth ______
   Remarks ______

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent______ Type ______
   Remarks ______

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent______ Depth ______
   Remarks ______

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks ______

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent______________ Depth ______________
Remarks ____

2. **Performance Monitoring** Type of monitoring ______________
☐ Performance not monitored
Frequency ______________ ☐ Evidence of breaching
Head differential ______________
Remarks ____

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

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks ____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks ____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks ____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks ____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks ____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

C. Treatment System	☐ Applicable ☒ N/A
1.	**Treatment Train** (Check components that apply) ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation ☐ Air stripping ☐ Carbon absorbers ☐ Filters __________ ☐ Additive (*e.g.*, chelation agent, flocculent) __________ ☐ Others __________ ☐ Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of groundwater treated annually __________ ☐ Quantity of surface water treated annually __________ Remarks __________
2.	**Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks: __________
3.	**Tanks, Vaults, Storage Vessels** ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance Remarks : __________
4.	**Discharge Structure and Appurtenances** ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks : __________
5.	**Treatment Building(s)** ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair ☐ Chemicals and equipment properly stored Remarks: __________
6.	**Monitoring Wells** (pump and treatment remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks : __________
D. Monitoring Data	☒ Applicable ☐ N/A
7.	Monitoring Data ☒ Is routinely submitted on time ☒ Is of acceptable quality
8.	Monitoring data suggests: (statistical trend evaluations of the data cannot be performed) ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ______

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. Engineering controls consist of a perimeter fence with warning signs and reflective tape placed in strategic areas to prevent access by OHARNG personnel. Access by the general public is restricted by a RVAAP / Camp Ravenna facility-wide perimeter fence and security gates. The site inspection did not identify evidence of trespass or OHARNG training. Groundwater monitoring is performed under a facility-wide program.

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 the building slabs, prescribed in the Interim ROD, is no longer required because the slabs and contaminated soil beneath the slabs were removed and disposed off site.

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 within sub slab soils and underground utility lines.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) 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. None

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-11) Load Line 4

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Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

I. SITE INFORMATION

Site name: *Ravenna Army Ammunition Plant Load Line 12 (RVAAP-12)*	**Date of inspection:** *24 January 2012*
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:** *Overcast, calm, ~ 36^{o}F*

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 from a drainage ditch at the eastern end of the site that exceeded the cleanup goal identified in the *Final Record of Decision for Soil and Dry Sediment for the RVAAP-12 Load Line 12, Ravenna Army Ammunition Plant (March 2009)* (ROD).

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

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jim McGee (Vista Sciences Corp.) — Name; Project Manager — Title; 21-March-2012 — Date

   Interviewed ☐ at site ☐ at office ☒ by phone Phone no. (330) 358-3005

   Problems, suggestions; ☒ Report attached See Interview Record

2. **O&M staff** ______ Name ______ Title ______ Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ______

   Problems, suggestions; ☐ Report attached ______

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

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 (Ohio EPA)
Contact Eileen Mohr | Environmental Specialist 3 | 3-April-2012 | (330) 963-1221
Name | Title | Date | Phone no.
Problems; suggestions; ☒ Report attached See Interview Record

Agency ______
Contact ______ | ______ | ______ | ______
Name | Title | Date | Phone no.
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ | ______ | ______ | ______
Name | Title | Date | Phone no.
Problems; suggestions; ☐ Report attached ______

Agency ______
Contact ______ | ______ | ______ | ______
Name | Title | Date | Phone no.
Problems; suggestions; ☐ Report attached ______

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

- Kimberly Harriz, P.G., Army National Guard (ARNG) Directorate, Former Cleanup Program Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2
- Tim Morgan, OHARNG, Fort Ohio Environmental Supervisor
- Tom Tadsen, RAB Co-Chair
- Tom Chanda., US Army Corps of Engineers, Louisville District (CELRL), PB05 Task Manager/Biologist

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: ______

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: Facility-Wide Safety and Health Plan for Environmental Investigations, Ravenna Army Ammunition Plant Ravenna, Ohio, Revision 0 February 2011.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

3.	**O&M and OSHA Training Records** Remarks:	☐ Readily available	☐ Up to date	☒ N/A
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** Remarks:	☐ Readily available	☐ Up to date	☒ N/A
6.	**Settlement Monument Records** Remarks :	☐ Readily available	☐ Up to date	☒ N/A
7.	**Groundwater Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: Baseline and semi-annual monitoring has been conducted for VOCs, SVOCs, pesticides, PCBs, explosives, propellants, inorganics, and cyanide as documented in *Facility-Wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant (September 2004)* and Facility-Wide Monitoring Program annual reports for 2007, 2008, 2009, 2010, and 2011 (preliminary draft).			
8.	**Leachate Extraction Records** Remarks	☐ Readily available	☐ Up to date	☒ N/A
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 Corp. – maintenance only)
	☐ Other:	

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

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)

From (Date)	To (Date)	Total cost	
From______	To______	______	☐ Breakdown attached
From______	To______	______	☐ Breakdown attached
From______	To______	______	☐ Breakdown attached
From______	To______	______	☐ Breakdown attached
From______	To______	______	☐ Breakdown attached

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

Describe costs and reasons: ______________________

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

A. Fencing

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

Remarks: RVAAP / Camp Ravenna is surrounded by a perimeter fence that provides controlled access via security gates. RVAAP-12 is further enclosed with a chain link fence. This secondary fence appears to be intact, although some isolated areas are in poor condition and show signs of distress.

B. Other Access Restrictions

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

Remarks: Warning signs restricting access are posted at the site entrance gate.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

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, see below.
Frequency
Responsible party/agency Vista Sciences Corp.

Contact	Jim McGee	Project Manager	21-March-2012	(330) 358-7311
	Name	Title	Date	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
LUCs / Institutional Controls (ICs) have not been officially implemented pending completion of a facility-wide Property Management Plan (PMP).

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
The final PMP will establish LUCs/ICs for the site and responsibilities for implementing and maintaining the LUCs/ICs.

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: RVAAP / Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for site inspection and environmental activities.

B. Other Site Conditions

Remarks The former buildings, including floor slabs, have been removed. The site consists of open grass-covered areas and areas containing trees and brush. Monitoring wells are present.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

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: __________

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 __________
   ☐ 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.)

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
   Remarks: ______________________________

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
   Remarks: ______________________________

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
   Remarks: ______________________________

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.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
   Areal extent______________ Depth____________
   Remarks: ______________________________

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
   Material type_______________ Areal extent_____________
   Remarks: ______________________________

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
   Areal extent______________ Depth____________
   Remarks: ______________________________

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
   Areal extent______________ Depth ______________
   Remarks: ______________________________

5. **Obstructions** Type __________________ ☐ No obstructions
   ☐ Location shown on site map Areal extent ______________
   Size____________
   Remarks: ______________________________

6. **Excessive Vegetative Growth** Type __________________
   ☐ No evidence of excessive growth
   ☐ Vegetation in channels does not obstruct flow
   ☐ Location shown on site map Areal extent ______________
   Remarks : ______________________________

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Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

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

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks : ____________________

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks : ____________________

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks : ____________________

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks : ____________________

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks : ____________________

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Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

G. Detention/Sedimentation Ponds	☐ Applicable ☒ N/A		
1.	**Siltation** Areal extent ______ Depth ______ ☐ N/A ☐ Siltation not evident Remarks : ______		
2.	**Erosion** Areal extent ______ Depth ______ ☐ Erosion not evident Remarks: ______		
3.	**Outlet Works** ☐ Functioning ☐ N/A Remarks : ______		
4.	**Dam** ☐ Functioning ☐ N/A Remarks: ______		
H. Retaining Walls	☐ Applicable ☒ N/A		
1.	**Deformations** ☐ Location shown on site map ☐ Deformation not evident Horizontal displacement ______ Vertical displacement ______ Rotational displacement ______ Remarks: ______		
2.	**Degradation** ☐ Location shown on site map ☐ Degradation not evident Remarks: ______		
I. Perimeter Ditches/Off-Site Discharge	☐ Applicable ☒ N/A		
1.	**Siltation** ☐ Location shown on site map ☐ Siltation not evident Areal extent______ Depth ______ Remarks : ______		
2.	**Vegetative Growth** ☐ Location shown on site map ☐ N/A ☐ Vegetation does not impede flow Areal extent______ Type ______ Remarks: ______		
3.	**Erosion** ☐ Location shown on site map ☐ Erosion not evident Areal extent______ Depth ______ Remarks : ______		
4.	**Discharge Structure** ☐ Functioning ☐ N/A Remarks : ______		

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent______________ Depth ______________
Remarks: ____

2. **Performance Monitoring** Type of monitoring ______________
☐ Performance not monitored
Frequency ______________ ☐ Evidence of breaching
Head differential ______________
Remarks; ____

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

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks: ____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks; ____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks : ____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks: ____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks : ____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks : ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon absorbers
☐ Filters ______
☐ Additive (*e.g.*, chelation agent, flocculent) ______
☐ Others ______
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually ______
☐ Quantity of surface water treated annually ______
Remarks: ______

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks: ______

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks : ______

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks : ______

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks: ______

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ______

D. Monitoring Data ☐ Applicable ☒ N/A

9. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

10. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ____________________

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 health, welfare, 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 RVAAP / Camp Ravenna facility-wide perimeter fence and security gates. LUCs have not been fully implemented pending completion of the facility-wide PMP. The site inspection did not identify evidence of trespass or OHARNG training.

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.

Subsequent sampling and analysis has been conducted to evaluate the presence and extent of contamination within underground utility lines and in soil and dry sediment (to address data gaps).

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-12) Load Line 12

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. None

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Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

I. SITE INFORMATION	
Site name: *Ravenna Army Ammunition Plant Winklepeck Burning Grounds (RVAAP-05)*	**Date of inspection:** *28 February 2012*
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:** *Clear, calm, ~ 42°F*

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 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** Jim McGee (Vista Sciences Corp.) (Name) Project Manager (Title) 21-March-2012 (Date)
   Interviewed ☐ at site ☐ at office ☒ by phone Phone no. (330) 358-7311
   Problems, suggestions; ☒ Report attached See Interview Record

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

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

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 (Ohio EPA)

	Name	Title	Date	Phone no.
Contact	Eileen Mohr	Environmental Specialist 3	3-April-2012	(330) 963-1221

Problems; suggestions; ☒ Report attached See Interview Record

Agency ______

	Name	Title	Date	Phone no.
Contact				

Problems; suggestions; ☐ Report attached ______

Agency ______

	Name	Title	Date	Phone no.
Contact				

Problems; suggestions; ☐ Report attached ______

Agency ______

	Name	Title	Date	Phone no.
Contact				

Problems; suggestions; ☐ Report attached ______

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

- Kimberly Harriz, P.G., Army National Guard (ARNG) Directorate, Former Cleanup Program Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2
- Tim Morgan, OHARNG, Fort Ohio Environmental Supervisor
- Tom Tadsen, RAB Co-Chair
- Tom Chanda., US Army Corps of Engineers, Louisville District (CELRL), PB05 Task Manager/Biologist

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: ______

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

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: Facility-Wide Safety and Health Plan for Environmental Investigations, Ravenna Army Ammunition Plant Ravenna, Ohio, Revision 0 February 2011.

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.

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 Corp.)
☐ Other:______

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

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)

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

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

Describe costs and reasons: _____

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

A. Fencing

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

Remarks: RVAAP / Camp Ravenna is surrounded by a perimeter fence that provides controlled access via security gates.

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.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) 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) None, see below.
Frequency
Responsible party/agency Vista Sciences Corp.

Contact	Jim McGee	Project Manager	21-March-2012	(330) 358-7311
	Name	Title	Date	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
LUCs / Institutional Controls (ICs) have not been officially implemented pending completion of a facility-wide Property Management Plan (PMP).

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
The final PMP will establish LUCs/ICs for the site and responsibilities for implementing and maintaining the LUCs/ICs.

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 target range for the Mark 19 Grenade Machine Gun, 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: RVAAP / 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
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

B. Other Site Conditions

Remarks The former Winklepeck Burning Grounds encompasses approximately 200 acres. The site is open and used as a target range by OHARNG for the Mark 19 Grenade Machine Gun. 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.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

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
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

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 ______________
☐ 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.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks: ____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks: ____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks: ____

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.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent______________ Depth____________
Remarks: ____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_______________ Areal extent_____________
Remarks: ____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent______________ Depth____________
Remarks: ____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent______________ Depth ______________
Remarks: ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

5. **Obstructions** Type ____________________ ☐ No obstructions
☐ Location shown on site map Areal extent _______________
Size_____________
Remarks: ____

6. **Excessive Vegetative Growth** Type ____________________
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _______________
Remarks ____

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

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks ____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks ____________________

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks ____________________

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks ____________________

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent ________ Depth ________ ☐ N/A
☐ Siltation not evident
Remarks ____________________

2. **Erosion** Areal extent ________ Depth ________
☐ Erosion not evident
Remarks ____________________

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks ____________________

4. **Dam** ☐ Functioning ☐ N/A
Remarks ____________________

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement ________ Vertical displacement ________
Rotational displacement ________
Remarks ____________________

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks ____________________

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent________ Depth ________
Remarks ____________________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent______________ Type ______________
Remarks: ____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent______________ Depth ______________
Remarks : ____

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks: ____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent______________ Depth ______________
Remarks : ____

2. **Performance Monitoring** Type of monitoring ______________
☐ Performance not monitored
Frequency ______________ ☐ Evidence of breaching
Head differential ______________
Remarks : ____

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

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks: ____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks : ____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks: ____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks : ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks: ____________________

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks : ____________________

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon absorbers
☐ Filters ____________________
☐ Additive (*e.g.*, chelation agent, flocculent) ____________________
☐ Others ____________________
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually ____________________
☐ Quantity of surface water treated annually ____________________
Remarks : ____________________

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks: ____________________

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks : ____________________

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks : ____________________

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks: ____________________

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ____________________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

D. Monitoring Data ☐ Applicable ☒ N/A

11. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

12. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ______

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 RVAAP 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. The remedy was implemented in 2009.

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

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 are conducted by OHARNG and consist of grass cutting, maintenance of targetry and associated mechanisms, and natural resources management activities. 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.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None

Five-Year Review Site Inspection Checklist Ravenna Army Ammunition Plant Site (RVAAP-05) Winklepeck Burning Grounds

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Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-01) Ramsdell Quarry Landfill

I. SITE INFORMATION	
Site name: *Ravenna Army Ammunition Plant Ramsdell Quarry Landfill (RVAAP-01)*	**Date of inspection:** *28 February 2012*
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:** *Clear, calm, ~ 42^{o}F*

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 (Attachment 1)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jim McGee (Vista Sciences Corp.) (Name) Project Manager (Title) 21-March-2012 (Date)
   Interviewed ☐ at site ☐ at office ☒ by phone Phone no. (330) 358-7311
   Problems, suggestions; ☒ Report attached See Interview Record

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

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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 (Ohio EPA)

Contact	Name	Title	Date	Phone no.
	Eileen Mohr	Environmental Specialist 3	3-April-2012	(330) 963-1221

Problems; suggestions; ☒ Report attached See Interview Record

Agency ______

Contact ______ Name ______ Title ______ Date ______ Phone no. ______

Problems; suggestions; ☐ Report attached ______

Agency ______

Contact ______ Name ______ Title ______ Date ______ Phone no. ______

Problems; suggestions; ☐ Report attached ______

Agency ______

Contact ______ Name ______ Title ______ Date ______ Phone no. ______

Problems; suggestions; ☐ Report attached ______

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

- Kimberly Harriz, P.G., Army National Guard (ARNG) Directorate, Former Cleanup Program Manager
- Katie Tait, Ohio Army National Guard (OHARNG), Environmental Specialist 2
- Tim Morgan, OHARNG, Fort Ohio Environmental Supervisor
- Tom Tadsen, RAB Co-Chair
- Tom Chanda., US Army Corps of Engineers, Louisville District (CELRL), PB05 Task Manager/Biologist

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: ______

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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: Facility-Wide Safety and Health Plan for Environmental Investigations, Ravenna Army Ammunition Plant Ravenna, Ohio, Revision 0 February 2011.

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.

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 Corp.)
☐ Other:

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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)

From ____ (Date)	To ____ (Date)	____ (Total cost)	☐ Breakdown attached
From ____ (Date)	To ____ (Date)	____ (Total cost)	☐ Breakdown attached
From ____ (Date)	To ____ (Date)	____ (Total cost)	☐ Breakdown attached
From ____ (Date)	To ____ (Date)	____ (Total cost)	☐ Breakdown attached
From ____ (Date)	To ____ (Date)	____ (Total cost)	☐ Breakdown attached

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

Describe costs and reasons: ____

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

A. Fencing

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

Remarks: RVAAP/Camp Ravenna is surrounded by a perimeter fence that provides controlled access via security gates.

B. Other Access Restrictions

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

Remarks: Signs (caution, unauthorized personnel keep out) have been installed.

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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, see below.
Frequency
Responsible party/agency Vista Sciences Corp.

Contact	Jim McGee	Project Manager	21-March-2012	(330) 358-7311
	Name	Title	Date	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
LUCs/Institutional Controls (ICs) have not been officially implemented pending completion of a facility-wide Property Management Plan (PMP).

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
The final PMP will establish LUCs/ICs for the site and responsibilities for implementing and maintaining the LUCs/ICs.

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, 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: RVAAP / Camp Ravenna roads outside of the site consist of bituminous concrete pavement. Site roads are unpaved and adequate for inspection and environmental monitoring activities.

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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 in 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 throughout 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: ______________

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Ravenna Army Ammunition Plant Site (RVAAP-01) Ramsdell Quarry Landfill

8.	**Wet Areas/Water Damage** ☐ Wet areas ☒ Ponding ☐ Seeps ☐ Soft subgrade Remarks: ____	☐ Wet areas/water damage not evident ☐ Location shown on site map Areal extent ____ ☒ Location shown on site map Areal extent ____ ☐ Location shown on site map Areal extent ____ ☐ Location shown on site map Areal extent ____
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.)	
1.	**Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay Remarks: ____	
2.	**Bench Breached** ☐ Location shown on site map ☐ N/A or okay Remarks: ____	
3.	**Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay Remarks: ____	
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.)	
1.	**Settlement** ☐ Location shown on site map ☐ No evidence of settlement Areal extent____ Depth____ Remarks: ____	
2.	**Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation Material type____ Areal extent____ Remarks: ____	
3.	**Erosion** ☐ Location shown on site map ☐ No evidence of erosion Areal extent____ Depth____ Remarks: ____	
4.	**Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting Areal extent____ Depth ____ Remarks: ____	

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5. **Obstructions** Type ____________ ☐ No obstructions
☐ Location shown on site map Areal extent ____________
Size____________
Remarks: ____________

6. **Excessive Vegetative Growth** Type ____________
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent ____________
Remarks: ____________

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

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks : ____________

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks : ____________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-01) Ramsdell Quarry Landfill

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks : ______________________________

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks: ______________________________

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks: ______________________________

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent ____________ Depth ____________ ☐ N/A
☐ Siltation not evident
Remarks : ______________________________

2. **Erosion** Areal extent ____________ Depth ____________
☐ Erosion not evident
Remarks : ______________________________

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks : ______________________________

4. **Dam** ☐ Functioning ☐ N/A
Remarks ______________________________

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement ____________ Vertical displacement ____________
Rotational displacement ____________
Remarks : ______________________________

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks : ______________________________

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent ____________ Depth ____________
Remarks: ______________________________

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Ravenna Army Ammunition Plant Site (RVAAP-01) Ramsdell Quarry Landfill

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent_______________ Type _______________
Remarks : ____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent_______________ Depth _______________
Remarks : ____

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks : ____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent_______________ Depth _______________
Remarks : ____

2. **Performance Monitoring** Type of monitoring _______________
☐ Performance not monitored
Frequency _______________ ☐ Evidence of breaching
Head differential _______________
Remarks : ____

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

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks : ____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks : ____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks: ____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks : ____

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-01) Ramsdell Quarry Landfill

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks : ______________________________

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks: ______________________________

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon absorbers
☐ Filters ______________________________
☐ Additive (*e.g.*, chelation agent, flocculent) ______________________________
☐ Others ______________________________
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually ______________________________
☐ Quantity of surface water treated annually ______________________________
Remarks: ______________________________

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks: ______________________________

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks : ______________________________

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks : ______________________________

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks: ______________________________

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ______________________________

Five-Year Review Site Inspection Checklist
Ravenna Army Ammunition Plant Site (RVAAP-01) Ramsdell Quarry Landfill

D. Monitoring Data ☐ Applicable ☒ N/A

13. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

14. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation ☐ Applicable ☒ N/A

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks : ______

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 physical implementation of the remedy. An engineering evaluation (USACE, 2011) was performed to re-evaluate the selected alternative and to evaluate additional alternatives to determine if the remedy identified in the ROD required change.

The site inspection did not identify evidence of trespass or OHARNG training.

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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 (Vista Environmental Services, Inc. - Vista) and monthly inspections by the Portage County Health Department. Inspection reports are prepared by Vista. 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.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None

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ATTACHMENT 5

SITE PHOTOGRAPHS

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PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant

Load Line 1 (RVAAP-08)

Photo No. 1
(24-Jan-2012)

Description:

Looking northwest across Load Line 1from former building CB-801

Photo No. 2
(24-Jan-2012)

Description:

Looking north across Load Line 1from former building CB-801

PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant

Load Line 1 (RVAAP-08)

Photo No. 3
(24-Jan-2012)

Description:

Looking northeast at raised concrete platform between former buildings CB-801 & CB-3

Photo No. 4
(24-Jan-2012)

Description:

Looking north at monitoring well LL1mw 085 and remediated areas associated with LL1ss-040-cs & LL1ss-041-cs

PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant

Load Line 1 (RVAAP-08)

Photo No. 5
(24-Jan-2012)

Description:

Looking north at remediated area associated with LL1ss-028-cs

Photo No. 6
(24-Jan-2012)

Description:

Looking southwest at remediated areas associated with former building CB-04A

PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant

Load Line 1 (RVAAP-08)

Photo No. 7 (24-Jan-2012)	
Description: Looking southwest at remediated areas associated with former building CB-4	
Photo No. 8 (24-Jan-2012)	
Description: Looking west at remediated area associated with building CB-13A	

PHOTOGRAPHIC RECORD **Ravenna Army Ammunition Plant**	
Load Line 1 (RVAAP-08) / Load Line 2 (RVAAP-09)	
Photo No. 9 (24-Jan-2012) Description: Load Line 1; looking southwest at worker entrance to the site. A former gate house building was situated where the fence opening is present.	
Photo No. 10 (24-Jan-2012) Description: Load Line 2; looking northwest at remediated areas associated with building DB-802	

<table>
<tr><th colspan="2">PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant</th></tr>
<tr><td colspan="2">Load Line 2 (RVAAP-09)</td></tr>
<tr><td>Photo No. 11
(24-Jan-2012)

<u>Description</u>:

Looking north at remediated areas associated with building DB-4</td><td></td></tr>
<tr><td>Photo No. 12
(24-Jan-2012)

<u>Description</u>:

Looking southwest at remediated area associated with DB-13 & DB-13B</td><td></td></tr>
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<tr><td colspan="2">PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant</td></tr>
<tr><td colspan="2">Load Line 3 (RVAAP-10)</td></tr>
<tr><td>Photo No. 13
(24-Jan-2012)

<u>Description</u>:

Looking east at remediated area associated with LL3ss-099-cs</td><td></td></tr>
<tr><td>Photo No. 14
(24-Jan-2012)

<u>Description</u>:

Looking southeast at former ore storage area at east end of the site</td><td></td></tr>
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PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant

Load Line 4 (RVAAP-11)

Photo No. 15 (24-Jan-2012) <u>Description</u>: Looking west at remediated area associated with LL4ss-113-cs	
Photo No. 16 (24-Jan-2012) <u>Description</u>: Looking north at well LL4mw-195	

PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant

Load Line 4 (RVAAP-11)

Photo No. 17
(24-Jan-2012)

Description:

Looking south at remediated area associated with building G-12A

Photo No. 18
(24-Jan-2012)

Description:

Looking west at remediated area associated with building G-11

PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant

Winklepeck Burning Grounds (RVAAP-05)

Photo No. 19
(28-Feb-2012)

Description:

Looking south at former burning area 58

Photo No. 20
(28-Feb-2012)

Description:

Looking south at former burning area 60, west side

PHOTOGRAPHIC RECORD **Ravenna Army Ammunition Plant**	
Winklepeck Burning Grounds (RVAAP-05)	
Photo No. 21 (28-Feb-2012) Description: Looking south at former burning area 60, east side	
Photo No. 22 (28-Feb-2012) Description: Looking northeast at former burning areas 61 and 61A	

<table>
<tr><td colspan="2">PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant</td></tr>
<tr><td colspan="2">Winklepeck Burning Grounds (RVAAP-05)</td></tr>
<tr><td>Photo No. 23
(28-Feb-2012)

<u>Description</u>:

Looking northeast at former burning area 67</td><td></td></tr>
<tr><td>Photo No. 24
(28-Feb-2012)

<u>Description</u>:

Looking south at former burning area 70</td><td></td></tr>
</table>

PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant

Winklepeck Burning Grounds (RVAAP-05) / Load Line 12 (RVAAP-12)

Photo No. 25
(28-Feb-2012)

Description:

Winklepeck Burning Grounds; looking south at former soil screening and staging area

Photo No. 26
(28-Feb-2012)

Description:

Load Line 12; looking north at remediated section of the main ditch

PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant

Load Line 12 (RVAAP-12)

Photo No. 27
(28-Feb-2012)

Description:

Looking southwest at remediated section of the main ditch

Photo No. 28
(28-Feb-2012)

Description:

Looking southwest at remediated section of the main ditch

<table>
<tr><td colspan="2">PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant</td></tr>
<tr><td colspan="2">Ramsdell Quarry Landfill (RVAAP-01)</td></tr>
<tr><td>Photo No. 29
(28-Feb-2012)

<u>Description</u>:

Looking east at previously remediated area that contained ACM</td><td></td></tr>
<tr><td>Photo No. 30
(28-Feb-2012)

<u>Description</u>:

Looking west from previously remediated area</td><td></td></tr>
</table>

PHOTOGRAPHIC RECORD **Ravenna Army Ammunition Plant**	
Ramsdell Quarry Landfill (RVAAP-01)	
Photo No. 31 (28-Feb-2012) <u>Description</u>: Looking southwest from previously remediated area	
Photo No. 32 (28-Feb-2012) <u>Description</u>: Looking southwest from north end of the site	

PHOTOGRAPHIC RECORD **Ravenna Army Ammunition Plant**	
Ramsdell Quarry Landfill (RVAAP-01)	
Photo No. 33 (28-Feb-2012) <u>Description</u>: Looking southeast from north end of the site	
Photo No. 34 (28-Feb-2012) <u>Description</u>: Looking south at previously remediated area that contained ACM	

PHOTOGRAPHIC RECORD
Ravenna Army Ammunition Plant

Ramsdell Quarry Landfill (RVAAP-01)

Photo No. 35
(28-Feb-2012)

Description:

Looking west at landfill from southeast corner

Photo No. 36
(28-Feb-2012)

Description:

Looking east at landfill from west end

ATTACHMENT 6

INTERVIEW RECORDS

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INTERVIEW DOCUMENTATION FORM

Ravenna Army Ammunition Plant (RVAAP)

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

Name	Title/Position	Organization	Date
Eileen Mohr	*Environmental Specialist 3*	*Ohio EPA*	*03 April 2012*
J. Kimberly Harriz, P.G.	*Former Cleanup Program Manager*	*ARNG Directorate*	*03 April 2012*
Tim Morgan	*Fort Ohio Environmental Supervisor*	*OHARNG*	*02 April 2012*
Katie Tait	*Environmental Specialist 2*	*OHARNG*	*19 March 2012*
Tom Tadsen	*RAB Co-Chair*	*RVAAP RAB*	*07 June 2012*
Derek Kinder, P.E.	*Task Manager/Civil-Environmental Engineer*	*USACE, Louisville District*	*26 March 2012*
Tom Chanda	*PB05 Task Manager/Biologist*	*USACE, Louisville District*	*14 March 2012*
Jim McGee	*Project Manager*	*Vista Environmental Services, Inc.*	*21 March 2012*

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INTERVIEW RECORD

Site Name: *Ravenna Army Ammunition Plant (RVAAP)*		**EPA ID No.:** *OH5210020736*	
Subject: *Five-year Review of Remedial Actions for 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).*		**Time:** *10:00 – 11:15*	**Date:** *03 April 2012*
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** *Not Applicable*		☐ Incoming ☐ Outgoing	

Contact Made By:

Name: *James R. Stachowski, P.E.*	**Title:** *Project Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted:

Name: *Eileen Mohr*	**Title:** *Environmental Specialist 3*	**Organization:** *Ohio EPA*
Telephone No: *(330) 963-1221* **Fax No:** *(330) 487-0769* **E-Mail Address:** *Eileen.mohr@epa.state.oh.us*	**Street Address:** *2110 East Aurora Rd.* **City, State, Zip:** *Twinsburg, Ohio 44087*	

Summary Of Conversation

General

1. What are your role and responsibilities with respect to these projects?
Ohio EPA Project Manager for environmental investigations and remedial actions at RVAAP. Other individuals from Ohio EPA are also involved with RVAAP, including Todd Fisher, who works on the Ramsdell Quarry Landfill and Load Line 12 sites.

2. Have Land-use Controls (LUCs) been implemented on these sites?
LUCs have not been fully implemented. They are described in the Record of Decision (ROD) documents (little detail), in the remedial action work plan/remedial design documents (greater detail), and in the facility-wide Property Management Plan (PMP) (most detail). The PMP has not been finalized and is targeted for completion by the beginning of the next fiscal year.

RVAAP-01 (Ramsdell Quarry Landfill)

3. What is your overall impression of the project (general sentiment)?
The remedial action has not been completed due to the presence of asbestos containing materials (ACM) that were not identified during the remedial investigation. A new Proposed Plan (PP) that addresses the ACM has been prepared and reviewed. The PMP must be finalized prior to presenting the PP to the public. An amendment to the ROD will be required to address the ACM.

4. 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, most communications are conducted by USACE, Louisville District. Monthly landfill cap inspections are done by the Portage County Health Department and reports are provided by Vista Sciences Corporation.

5. 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.
Yes, an OHARNG military vehicle previously caused damage to the landfill cap, which required repair.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *10:00 – 11:15*	**Date:** *03 April 2012*

6. Do you feel well informed about the site's activities and progress?
   Yes.
7. Is the remedy functioning as intended?
   No, the remedy was not completed.
8. Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the site at the time of the remedy still valid?
   No, the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the site at the time of the remedy did not address ACM.
9. Has any other information come to light that could call into question the protectiveness of the remedy?
   Yes, ACM was encountered and LUCs have not been officially implemented. Additionally, the PMP has not been finalized.
10. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    Finalize the PMP and implement LUCs for the site. The public comment period for the PP should occur after the PMP is finalized. In the event that the PMP is not finalized prior to the PP public meeting, Ohio EPA will publically indicate that they do not concur with the proposed remedy due to the lack of ability to monitor, inspect and enforce LUCs.

RVAAP-05 (Winklepeck Burning Grounds)

11. What is your overall impression of the project (general sentiment)?
    The site remediation contractor did a good job. The site is used by OHARNG as a firing range for the Mark 19 machine gun and OHARNG is planning to expand use of the site as a multi-purpose machine gun range. A Data Quality Objectives report (prepared by Shaw Environment and Infrastructure, Inc. for USACE/BRACD) evaluated environmental data and remedial actions conducted across the site to determine if additional investigations and/or remediation are needed for the multi-purpose machine gun range. However, since the date of the report, the required MMPG targetry has changed; and it is unclear as to how applicable any of the sampling suggestions in the DQO report will be.
12. 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.
    None.
13. 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.
    None.
14. Do you feel well informed about the site's activities and progress?
    Absolutely not, neither with respect to future site development plans or the LUCs in the RD. Ohio EPA does not have any knowledge of how the LUCs specified in the approved RD have been implemented, and are being inspected, monitored and enforced.
15. Is the remedy functioning as intended?
    I am currently unable to answer the question; as we are currently unaware of the activities occurring on site.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *10:00 – 11:15*	**Date:** *03 April 2012*

16. Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the site at the time of the remedy still valid?
    Yes, solely for the Mark 19 machine gun range operations.
17. Has any other information come to light that could call into question the protectiveness of the remedy?
    Yes, inspections, monitoring, and enforcement of site LUCs have not been performed in accordance with the ROD and Remedial Action Work Plan. Ohio EPA views the Remedial Action Work Plan as an enforceable document and therefore, the specified LUCs should be implemented regardless of whether or not the PMP is finalized.
18. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    Site LUCS should be implemented and project stakeholders should keep Ohio EPA informed about future site development plans. The PMP must be finalized.

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

19. What is your overall impression of the project (general sentiment)?
    An Interim ROD was issued in 2007 because building slabs were left in place and Ohio EPA was concerned about possible contamination beneath the slabs. The Interim ROD addressed remediation of accessible soil and dry sediments (i.e. outside of the building footprints). Future land use is OHARNG mounted training, no digging, which means stuck vehicles (e.g. tank), can be removed but other digging is prohibited. USACE (with Prudent Technologies, Inc. as the A-E contractor) is evaluating site soils to determine what is needed for unrestricted use of these sites.
20. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the sites? If so, please give purpose and results.
    Site contractors have done a good job communicating site activities.
21. 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.
    None.
22. Do you feel well informed about the site's activities and progress?
    Yes.
23. Is the remedy functioning as intended?
    Yes.
24. Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the site at the time of the remedy still valid?
    Yes, for areas outside of the former building footprints. No, for areas within the former building footprints.
25. Has any other information come to light that could call into question the protectiveness of the remedy?
    The remediation goals (i.e. cleanup levels) should be modified if less restricted land uses (than mounted training, no digging) are required. Additional remediation may be required.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *10:00 – 11:15*	**Date:** *03 April 2012*

26. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
The US Army's Performance-Based Acquisition (PBA) contracting mechanism has not worked well with respect to environmental investigations and remedial actions at RVAAP. This PBA has resulted in work being done on a "piecemeal" basis, which has extended project schedules. Additionally, the burden has been put on the regulator to ensure appropriate scoping, investigations and cleanup; as the Federal government is not allowed to "direct" a contractor under the PBA system.

RVAAP-12 (Load Line 12)

27. What is your overall impression of the project (general sentiment)?
The remedial action went well.

28. 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.
Ohio EPA (Todd Fisher) recently inspected the remediated area to evaluate re-establishment of riparian vegetation.

29. 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.
None

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

31. Is the remedy functioning as intended?
Yes.

32. Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the site at the time of the remedy still valid?
Yes.

33. Has any other information come to light that could call into question the protectiveness of the remedy?
Lack of documentation with respect to LUC implementation.

34. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
Implement LUCs and finalize the PMP.

INTERVIEW RECORD

Site Name: *Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*
Subject: *Five-year Review of Remedial Actions for 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).*	**Time:** *13:00 – 14:00* **Date:** *03 April 2012*
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** *Not Applicable*	☐ Incoming ☐ Outgoing

Contact Made By:

Name: *James R. Stachowski, P.E.*	**Title:** *Project Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted:

Name: *J. Kimberly Harriz, P.G.*	**Title:** *Cleanup Program Manager*	**Organization:** *ARNG Directorate*

Telephone No: *(703) 607-7991* **Fax No:** *(703) 607-8329* **E-Mail Address:** *kim.harriz@us.army.mil*	**Street Address:** *111 S. George Mason Dr.* **City, State, Zip:** *Arlington, VA 22204*

Summary Of Conversation

General

1. What is your role and responsibility with respect to these projects?
   I work for the Army National Guard (ANG) Directorate, which is a federal agency responsible for National Guard properties. RVAAP is licensed to OHARNG and ARNG provides the channel of communication between the U.S. Army and OHARNG. At ARNG I am responsible for reviewing environmental documents for RVAAP mission critical projects and also serve as the point of contact for environmental restoration activities at ARNG properties.

2. Have Land-use Controls (LUCs) been implemented on these sites?
   LUCs have not been officially implemented and will become effective after the facility-wide Property Management Plan (PMP) is finalized. Several preliminary LUCs for these sites contradicted the intent of the remedies (i.e. remedial action objectives – RAOs) and revisions were required.

RVAAP-01 (Ramsdell Quarry Landfill)

3. What is your overall impression of the project (general sentiment)?
   Asbestos-containing materials (ACM) were encountered in the remedial action excavation that required revisions to be made in the field. BRACD and USACE have been dismissive of ARNG concerns about a new remedy.

4. 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.
   No, stakeholder meetings for the site have been discontinued.

5. 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.
   Yes, ARNG responds to OHARNG when incidents occur and in situations when OHARNG concerns are not been adequately addressed by BRACD/USACE.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *13:00 – 14:00*	**Date:** *03 April 2012*

6. Do you feel well informed about the site's activities and progress?
   No, site activities and progress are discussed between OHARNG, BRACD and Ohio EPA. ARNG does not get involved at this level of detail.
7. Is the remedy functioning as intended?
   No, the remedy wasn't fully implemented due to the presence of ACM.
8. Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the site at the time of the remedy still valid?
   No, ACM was not addressed in the exposure assumptions, cleanup levels, and RAOs.
9. Has any other information come to light that could call into question the protectiveness of the remedy?
   Yes, ACM at the site brings into question the protectiveness of the remedy.
10. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    The final remedy (including LUCs) should be consistent with the RAOs.

RVAAP-05 (Winklepeck Burning Grounds)

11. What is your overall impression of the project (general sentiment)?
    There has been confusion about what is stated in the ROD and implications of the risk assessment. The project team does not understand that the current LUCs and RAOs are inconsistent.
12. 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 visited the site a few times after the remedy was implemented and have been involved since the draft PMP was prepared.
13. 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.
    I previously indicated that the site LUCs and RAOs are contradictory. This issue was discussed at a stakeholder meeting and also with the US Army Office of the Assistant Chief of Staff for Installation Management (ACSIM). ACSIM agreed that the LUCs and RAOs are contradictory.
14. Do you feel well informed about the site's activities and progress?
    Yes.
15. Is the remedy functioning as intended?
    No, the LUCs are overly restrictive and incompatible with OHARNG mission requirements.
16. Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the site at the time of the remedy still valid?
    Yes.
17. Has any other information come to light that could call into question the protectiveness of the remedy?
    None.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *13:00 – 14:00*	**Date:** *03 April 2012*

18. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

    Agreed-upon LUCs should be implemented prior to completion of the PMP to address Ohio EPA's concerns.

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INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *09:00 – 10:00*	**Date:** *02 April 2012*
Type:	☒ Telephone ☐ Visit ☐ Other	☐ Incoming ☐ Outgoing	
Location of Visit:	*Not Applicable*		

Contact Made By:

Name: *James R. Stachowski, P.E.*	**Title:** *Project Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted:

Name: *Tim Morgan*	**Title:** *Fort Ohio Environmental Supervisor*	**Organization:** *Ohio Army National Guard (OHARNG)*
Telephone No: *(614)336-6136* **Fax No:** *(614) 336-6135* **E-Mail Address:** *timothy.m.morgan@us.army.mil*	**Street Address:** *1438 State Route 534, SW* **City, State, Zip:** *Newton Falls, OH 44444*	

Summary Of Conversation

General

1. What are your role and responsibilities with respect to these projects?
   I am responsible for environmental management of properties owned by OHARNG and for assuring that the remedial actions/land-use controls (LUCs) on properties used by OHARNG are suitable for intended future uses.

2. Have LUCs been implemented on these sites?
   Load Lines 1, 2, 3, 4, and 12 and Ramsdell Quarry Landfill are owned by the US Army Base Realignment and Closure Division (BRACD) and are not used by OHARNG. A facility-wide Property Management Plan (PMP), which would identify LUCS for these sites, needs to be finalized. The document has been delayed due to misconceptions about permitted site activities. There are LUCs implemented on the sites. The basic LUC is we do not use the sites for training. We do not allow hunters to have access to the sites either.

3. Any other issues?
   Future property uses by OHARNG are limited because the designated land uses are being interpreted/used as LUCs even when the exposure scenarios evaluated in the human health risk assessments would allow more flexibility in use. The environmental restorations/LUCs should provide for greater flexibility.

   Annual controlled deer hunts are conducted inside Camp Ravenna. Hunters are briefed, accompanied by volunteers and maps are distributed to prevent access to restricted areas, which include the sites subject to this five-year review.

   The restoration program in general is very busy with no room in the schedule to react to unscheduled OHARNG support needs. The team does it best to support the OHARNG in planning and scheduling, but the dynamic nature of the OHARNG mission and need for short reaction times is difficult to impossible for the team to support under their current workload.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *09:00 – 10:00*	**Date:** *02 April 2012*

The restoration program is also very complex with multiple sites and many projects. Not one Area of Concern (AOC) has been cleaned up to completion for all media. Soils and dry sediments are usually done together. Wet sediments are being done with facility-wide surface water and groundwater is also being done facility-wide. It is very difficult to keep track of what's been done, what's in progress, and what needs done.

RVAAP-01 (Ramsdell Quarry Landfill)

4. What is your overall impression of the project (general sentiment)?
   The remediation has progressed, although additional actions should be taken to address asbestos-containing materials (ACM) that were discovered at the site.

5. 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.
   None, the sites are owned by BRACD who is responsible for routine activities.

6. 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.
   Minor repairs were required last year that resulted from a military vehicle being driven on the landfill cap. This occurred because access points were not closed by a contractor who was performing site work.

7. Do you feel well informed about the site's activities and progress?
   When needed, I have access to information about the site's activities and progress.

8. Is the remedy functioning as intended?
   Yes, access to the site is not permitted, although landfill cap maintenance will be problematic if ACM is present.

9. Has any other information come to light that could call into question the protectiveness of the remedy?
   Yes, the remedial action was not completed due to presence of ACM.

10. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    Site entrances should be closed to prevent unauthorized access.

RVAAP-05 (Winklepeck Burning Grounds)

11. What is your overall impression of the project (general sentiment)?
    The project (remediation of burning pads 61, 61A, 67, and 70) went well. BRACD (via USACE) is currently evaluating previous site operations, investigations, and data to determine if the entire site has been adequately characterized and remediated to support construction and use of a multi-purpose machine gun (MPMG) range or if additional characterization/remedial work is needed. Currently, the site cannot be used as a planned MPMG range because the remedial work that's been completed was specific to support construction and use of the site for the existing Mark-19 range.

12. 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.
    None, OHARNG inspects the firing range but not the areas of concern.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *09:00 – 10:00*	**Date:** *02 April 2012*

13. 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.
None.

14. Do you feel well informed about the site's activities and progress?
When needed, I have access to information about the site's activities and progress.

15. Is the remedy functioning as intended?
Previous environmental investigations and restorations focused on converting the former munitions burning area into a Mark 19 (M19) machine gun range. The environmental restorations were performed on an accelerated schedule and areas selected for M19 targets were cleared. OHARNG is planning to use the site as a multi-purpose machine gun range but it has only been remediated for the current use as a M19 range. BRACD (USACE) is evaluating environmental data to determine if adequate characterization and remediation has been performed to support construction and use of the MPMG range. We're hopeful that chemical constituents have been adequately characterized and remediated and that we can manage MEC with Unexploded Ordnance (UXO) construction support as done on all other active Army ranges.

16. Has any other information come to light that could call into question the protectiveness of the remedy?
None.

17. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
Construction of the MPMG Range is an FY15 MILCON project that is approaching very quickly. Determining in additional remediation is needed and completing it by mid FY15 is the OHARNG's top restoration program priority.

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

18. What is your overall impression of the project (general sentiment)?
Inadequate remedial activities were completed because the sites cannot be effectively used for their intended purpose, which is mounted (i.e. vehicle) training, because of recommend LUCs that would require decontamination of vehicles that leave the load line foot prints and retention of load line fences.

19. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the sites? If so, please give purpose and results.
None, the sites are owned by BRACD who is responsible for routine activities.

20. 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.
None.

21. Do you feel well informed about the sites activities and progress?
When needed, I have access to information about the site's activities and progress.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *09:00 – 10:00*	**Date:** *02 April 2012*

22. Are the remedies functioning as intended?
No, because the OHARNG is unable to use the load lines as part of a maneuver area. The designated land use of mounted training no digging is being used as a LUC to limit soil disturbance to only incidental disturbance caused by vehicles to a depth no more than 4 feet permitted. OHARNG plans to use these sites (and adjacent areas) as a maneuver area for military vehicles (e.g. tanks). The current remedy does not allow the OHARNG to construct hardened tank trails, storm water and erosion controls, and vehicles would have to be decontaminated prior to leaving each load line, which is incompatible with the intent of the training. BRACD (USACE) is determining if environmental data gaps exist and if contaminated areas can be designated within the greater load line AOC areas and remediated or isolated so greater land-use flexibility for training can be afforded.
23. Has any other information come to light that could call into question the protectiveness of the remedies?
None.
24. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
The data gap evaluation should be completed and additional remedial actions performed, if necessary, so that the sites can be used for mounted training without the need to decontaminate vehicles between sites and without the need to keep the load line fences in place.

RVAAP-12 (Load Line 12)

25. What is your overall impression of the project (general sentiment)?
The project went well and contaminated soils/dry sediments were remediated as planned.
26. 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.
None, the sites are owned by BRACD who is responsible for routine activities.
27. 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.
None.
28. Do you feel well informed about the site's activities and progress?
When needed, I have access to information about the site's activities and progress.
29. Is the remedy functioning as intended?
Yes, because the remedy in question was just the excavation of soil in a ditch, which the OHARNG will continue to use as a drainage ditch.
30. Has any other information come to light that could call into question the protectiveness of the remedy?
None.
31. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
None.

INTERVIEW RECORD

Site Name: *Ravenna Army Ammunition Plant (RVAAP)*

EPA ID No.: *OH5210020736*

Subject: *Five-year Review of Remedial Actions for 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).*

Time: *10:00 – 11:00*

Date: *19 March 2012*

Type: ☒ Telephone ☐ Visit ☐ Other

☐ Incoming ☐ Outgoing

Location of Visit: *Not Applicable*

Contact Made By:

Name: *James R. Stachowski, P.E.*

Title: *Project Engineer*

Organization: *US Army Corps of Engineers, Buffalo District*

Individual Contacted:

Name: *Katie Tait*

Title: *Environmental Specialist 2*

Organization: *Ohio Army National Guard (OHARNG)*

Telephone No: *(614)336-6136*
Fax No: *(614) 336-6135*
E-Mail Address: *kathryn.s.tait@us.army.mil*

Street Address: *Camp Ravenna*
1438 State Route 534 SW
City, State, Zip: *Newton Falls, OH 44444*

Summary Of Conversation

General

1. What is the status of Land-use Controls (LUCs)/Institutional Controls (ICs) for the subject sites?
   A facility-wide Property Management Plan (PMP) is needed to memorialize and implement LUCs. A draft PMP has been issued but has not been finalized. The final PMP will identify LUCs and assign responsibilities for maintaining/implementing the LUCs. Currently, at some sites, inspections are not being performed and documented due to the pending PMP. The US Army Base Realignment and Closure Division (BRACD) is responsible for LUC management while on the facility. OHARNG will take responsibility once BRACD is no longer at the facility. OHARNG maintains the Camp Ravenna perimeter fence to the best of their ability with the funds/staff that we have. Rust-proofing was applied to a portion of the fence along SR5 approximately 1 to 2 years ago. However, funding from the Defense Environmental Restoration Program (DERP) is not currently provided for this.

RVAAP-01 (Ramsdell Quarry Landfill)

2. What is your overall impression of the projects (general sentiment)?
   The project has gone well, although the remedial action has yet to be completed and has taken a considerable amount of time. During the RI/FS, remedial options that would have allowed for unrestricted use would have been a better choice than the restricted use option that was selected. Although the chosen alternative worked out due to the asbestos that was identified during the remedial action. The Ohio EPA chose the restricted use alternative because of the associated closed landfill.

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.
   No, routine communications are not conducted because the site is still owned and managed by BRACD and is part of RVAAP. BRACD currently conducts and is responsible for the site visits, inspections and reporting.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *10:00 – 11:00*	**Date:** *19 March 2012*

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.
   Yes, last year an OHARNG military vehicle mistakenly accessed the site and created ruts in the landfill cap, which had to be repaired.
5. Do you feel well informed about the site's activities and progress?
   Yes.
6. Is the remedy functioning as intended?
   The original remedy was not fully implemented due to unanticipated conditions at the site during the remedial action (asbestos was found). The new remedy (fencing to restrict access) is proposed. A ROD Amendment documenting the new alternative is forthcoming.
7. Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the site at the time of the remedy still valid?
   The remedy has not been achieved. Assumptions and remedial action objectives may change once the new alternative/remedy is achieved.
8. Has any other information come to light that could call into question the protectiveness of the remedy?
   None.
9. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
   None.

RVAAP-05 (Winklepeck Burning Grounds)

10. What is your overall impression of the project (general sentiment)?
    The investigations and remedial actions went well.
11. 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.
    The site is used by OHARNG as a firing range. OHARNG conducts limited maintenance on the main range. Range maintenance staff that access the site are informed about the hazards/controls. Site visits are conducted to prepare the range for firing activities. Troops are only allowed at designated firing points. OHARNG range personnel oversee firing activities and occasionally police fired munitions.
12. 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.
    None.
13. Do you feel well informed about the site's activities and progress?
    Yes, although not much is currently happening.

INTERVIEW RECORD

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14. Is the remedy functioning as intended?
The area where the remedial action was performed (i.e. burning pads 61, 61A, 67, and 70) is not currently developed or used as a firing lane by the OHARNG. The Ohio EPA has indicated that documented LUC inspections need to be completed. The restoration team has been waiting on the PMP before conducting inspections. BRACD is responsible for completing the inspections while on site. Responsibility for inspections will be transferred to OHARNG once BRACD is no longer on site.
15. Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the site at the time of the remedy still valid?
I believe so.
16. Has any other information come to light that could call into question the protectiveness of the remedy?
None.
17. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
The PMP should be completed.

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

18. What is your overall impression of the project (general sentiment)?
The project went well, although land-use restrictions were incompatible with OHARNG's intended use for the sites (mounted training). During discussions regarding LUCs for these sites, a concern about cross contamination associated with military vehicles moving between the sites was raised. In addition, the only digging that would be allowed would be for removal of a stuck vehicle. Fewer restrictions are needed for effective use of the area by OHARNG. Therefore, a process to achieve Unrestricted Guard Use was developed. The sites are currently being assessed to hopefully achieve unrestricted use by OHARNG.
19. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the sites? If so, please give purpose and results.
The sites are not currently used by the OHARNG as they are owned by BRACD. The OHARNG communicates with BRACD when activities are being conducted on adjacent areas or if we must access these sites.
20. 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.
None.
21. Do you feel well informed about the site's activities and progress?
Yes.
22. Are the remedies functioning as intended?
OHARNG cannot effectively use the sites for the intended use.
23. Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the sites at the time of the remedy still valid?
I believe so.
24. Has any other information come to light that could call into question the protectiveness of the remedies?
None.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *10:00 – 11:00*	**Date:** *19 March 2012*

25. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    None, BRACD manages and owns the sites.

RVAAP-12 (Load Line 12)

26. What is your overall impression of the project (general sentiment)?
    The project went well.
27. 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.
    The site is not currently used by OHARNG as it is owned by BRACD. OHARNG communicates with BRACD when activities are being conducted on adjacent areas or if we must access the sites for maintenance issues. Some natural resource management activities are performed on the site.
28. 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.
    None.
29. Do you feel well informed about the site's activities and progress?
    Yes.
30. Is the remedy functioning as intended?
    OHARNG cannot effectively use this site for the intended use.
31. Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the site at the time of the remedy still valid?
    I believe so.
32. Has any other information come to light that could call into question the protectiveness of the remedy?
    None, although the nature and extent of nitrate contamination at the site is being addressed on a facility-wide basis. Elevated nitrate in groundwater is a concern.
33. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    None.

INTERVIEW RECORD

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Type:	☒ Telephone ☐ Visit ☐ Other	☐ Incoming ☐ Outgoing	
Location of Visit:	*Not Applicable*		

Contact Made By:

Name: *James R. Stachowski, P.E.*	**Title:** *Project Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted:

Name: *Tom Tadsen*	**Title:** *RAB Co-Chair*	**Organization:** *RVAAP Restoration Advisory Board (RAB)*

Telephone No: *(330)678-8849* **Fax No:** **E-Mail Address:** *ttadsen@neo.rr.com*	**Street Address:** **City, State, Zip:**

Summary Of Conversation

1. How does the community use the RVAAP/Camp Ravenna in general?

   Some community members are members of the military reserve components and use CR for training. They may also use it during the scheduled deer hunts each fall. The RAB members occasionally tour and visit various sites as part of an annual review tour. Beyond that, occasionally, training with civilian law enforcement and first responders is conducted on site. Vendors and subcontractors working for the OHARNG or environmental contractors may visit selected worksites. Special interest groups may schedule occasional tours supervised and assisted by the OHARNG. CR may permit limited supervised use of the roads for civic and social activities – i.e.: bike rides or distance runs.

RVAAP-01 (Ramsdell Quarry Landfill)

2. What is your overall impression of the project (general sentiment)?

   It's generally moving forward with a few lurches in the process over time. RQL has always been a concern for local environs – particularly concerning migration of explosives and contaminants in groundwater. The (fairly) recently discovered ACM is a wild card at this time. Until the ACM issue is resolved, the PP and PMP need to move forward with the goal of a total ACM solution and completing any necessary changes or amendments to the ROD. Public review and input in this process is of critical importance.

3. What effects have site operations has on the surrounding community?

   As of the present, I am not aware of any effects RQL has had on the general public or surrounding residents.

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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.

   There is always a concern that historical shoddy record keeping or worst management practices may have created additional, unforeseen issues as the process continues. Rocket Ridge is one good example, as is the ACM component at RQL. The community is always concerned about the potential for explosives and / or contaminants to leach into groundwater, even after a great span of time. Previously, concerns were raised about "cancer clusters" and multiple deaths in the immediate surrounding area with similar causes of death. While these rumors were dispelled by the previous Director of the Portage County Health Department, the questions still remain in the minds of those who live in the areas surrounding RVAAP / CR. The additional question of accurately and properly memorializing LUCs has been a lingering issue. If LUCs are not properly memorialized for posterity and enforced by the "landowner," it neither bodes well for proper or responsible land stewardship in the future, nor does it serve to promote a healthy relationship with the State oversight agency, the Ohio EPA. It also erodes public confidence in the entire process and the individual stakeholders.

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.

   Only the issue concerning an OHARNG HMMWV breaching the cap on the RQL landfill. The operators of the HMMWV allegedly plead no knowledge of RQL or any restrictions on crossing it. This is a very recent incident that indicates faulty communication of LUCs and restrictions on training use of specific pieces of land within the perimeter fence. An effective system must be in place and enforced that clearly communicates LUCs and training restrictions to the personnel using the property for training – military and civilian alike. This is not a one-time briefing, either. It must be repeated in detail every time a using organization utilizes land within the fence at CR.

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

   Generally – Yes. I am standing by to hear more about the disposition of the ACM.

7. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

   Only as elaborated previously in # 5.

INTERVIEW RECORD

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RVAAP-05 (Winklepeck Burning Grounds)

8. What is your overall impression of the project (general sentiment)?
The project was completed fairly well, with a number of delays caused by various situations (including discovery of previously unknown ACM dumps). There have been some disconnects in the project and a number of them were related to personnel turnover and subsequent questions concerning accuracy of historical information regarding the cleanup, and its implications. The OHARNG is constrained by the federal government's Planning, Programming, Budgeting and Accounting Process, with a five-year planning cycle and a 3-year budgeting cycle. The entire process is doctrinally driven, based on the current and projected missions of the military and the logistical considerations – i.e. : emerging threats and developing weapons platforms and systems to meet and overcome the threats. The uncertainty in the tail end of the 3- and five- year cycles is always an issue, since doctrine may radically change the training requirements and training land / venue requirements for CR in a relatively short period of time. This uncertainty and the inevitable changes in mission are always an issue when they necessitate changes in land use. The Army always wants the required land-use changes and training land modifications completed yesterday, with no honest consideration for the potential environmental consequences. The end result is that the CR personnel and State regulators are always caught in the middle of the process, and squeezed until they bleed.

9. What effects have site operations has on the surrounding community?
When the wind blows, it may carry the sound of weapons firing beyond the perimeter, but the ranges were planned and designed very thoroughly by the National Guard Bureau The end result is accomplishing the doctrinally required weapons training while ensuring that any weapons related noise leaving CR is always within the regulatory requirements and does not unnecessarily disrupt activity within the surrounding area.

10. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
Only as previously elaborated in # 4. and # 5, concerning LUCs and suspicion of groundwater migration of contaminants.

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.
No.

12. Do you feel well informed about the site's activities and progress?
Yes. The Mark 19 Grenade Machine Gun range in WBG is a regular stop on the RAB's annual tour.

13. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
Only as addressed earlier, concerning properly briefing and supervising users on LUC;'s and land-use restrictions and enforcement of them.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
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RVAAP-08, -09, -10, and -11 (Load Lines 1, 2, 3, and 4)

14. What is your overall impression of the project (general sentiment)?
I think it was a good project with fairly decent execution. The parties "didn't always play well together in the sandbox," but as responsible adults, worked out any issues that surfaced in a relatively short period of time. All in all, the teamwork was outstanding in a difficult process and environment with an amazing amount of outside pressure from many different agencies.

15. What effects have site operations has on the surrounding community?
The lingering suspicion that explosives and / or contaminants may leach into the groundwater and migrate outside the fence.

16. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
No. RVAAP has always communicated their intentions and plans early enough to address any community concerns and answer any related questions. Early on, the issue of thermal demolition was raised amid a significant community uproar and was eventually resolved to the satisfaction of the communities surrounding RVAAP / CR. I have a personal concern that any contamination beneath the building slabs be properly remediated, and that LUCs be modified as military doctrine requires, through coordinated actions of all the stakeholders.

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.
Just the one-time historical issue of a contractor's careless use if a welding torch and igniting the soil itself in LL 1, requiring an emergency response from the Ravenna Fire Department.

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?
Ensure that LUCs are modified through the appropriate process as military training doctrine changes relative to the emerging threats.

RVAAP-12 (Load Line 12)

20. What is your overall impression of the project (general sentiment)?
It was generally well conducted very well and quickly modified when a stash of discarded 90 mm artillery projectiles was discovered where no documentation existed to explain their whereabouts.

INTERVIEW RECORD

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21. What effects have site operations has on the surrounding community?
    Only the lingering suspicion that explosives and / or contaminants may leach into the groundwater and migrate outside the fence.

22. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
    Only as mentioned in # 21.

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.
    Emergency response when the steam plant building collapsed while demolition activities were taking place, resulting in a number of worker fatalities. This incident required significant activity by local emergency, law enforcement and first response personnel. Kudos to Mark Patterson for a job well done in the absence of the assigned Commander's Representative.

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

25. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
    The only concern I have is for the eventual disposition of a below-ground reinforced concrete structure in LL 12 that was buried during remediation. In the event that the CR training requirements are changed significantly by the Army, excavating and removing the structure and any required additional remedial action may delay development of doctrinally driven and critical training land modifications. My greatest concern is that administrative delays to accomplish the required modifications may translate into lives of our young men and women in uniform lost because proper training wasn't, and proper training venues weren't, available to properly prepare them to go to war.

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INTERVIEW RECORD

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Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** *Not Applicable*		☐ Incoming ☐ Outgoing	

Contact Made By:

Name: *James R. Stachowski, P.E.*	**Title:** *Project Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted:

Name: *Derek Kinder, P.E.*	**Title:** *Task Manager/ Civil/Environmental Engineer*	**Organization:** *US Army Corps of Engineers, Louisville District*

Telephone No: *(502)315-6290* **Fax No:** *(502) 315-6309* **E-Mail Address:** *Derek.S.Kinder@usace.army.mil*	**Street Address:** *600 Dr. Martin Luther King Pl.* **City, State, Zip:** *Louisville, KY 40402*

Summary Of Conversation

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

1. What is your overall impression of the project (general sentiment)?
   I became involved with the project after the 2007 remedial actions were completed and while surface and subsurface soil incremental sampling was being performed. The project has progressed satisfactorily and additional work conducted at the sites included: the removal of building slabs, the removal and off-site disposal of contaminated soils from beneath the slabs, and additional investigations to evaluate the nature and extent of soil contamination with respect to Unrestricted National Guard Land Use.

2. What is the current status of remediation (e.g. budget and schedule)?
   The remedial actions identified in the Interim Record of Decision (ROD) for Remediation of Soils were completed in 2007. Subsequent activities and remedial actions included: incremental surface and subsurface soil sampling/analysis of soils beneath the building slabs, removal of the building slabs, excavation and off-site disposal of contaminated soils from beneath the building slabs, and additional investigations (ongoing) to evaluate the nature and extent of soil contamination with respect to Unrestricted National Guard Land Use.

3. Have any problems been encountered that required or will require changes to the remedial design or Record of Decision?
   No problems were encountered. Future National Guard land-use changes may require new remedial design/remedial actions.

4. Have any problems or difficulties been encountered that have impacted construction progress or implementability?
   Remedial construction associated with the Interim ROD was performed prior to my involvement with the project.

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5. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
   None.

6. Is there a Monitoring Plan and/or Sampling Plan for the site? If so, please describe the scope of each document and how they are implemented.
   Sampling plans were prepared and are being implemented for the ongoing characterization effort.

7. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts. Are monitoring and maintenance logs maintained?
   None.

8. Are permits required for the site? If so, please describe each.
   None.

9. Are discharges from the site monitored? If so, are discharge compliance documents maintained?
   None.

10. Is there a land-use control LUC plan for the site? If so, is the program documented and are training records maintained? Are the LUCs being implemented?
    A draft Property Management Plan (PMP) for Designated Areas of Concern at RVAAP was prepared. This document has not been finalized. LUCs for Load Lines 1-4 are not included in the PMP since a final ROD has not yet been completed, and no training records are required since the site has not been and is currently not being used for training.

11. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
    Information on routine inspections can be obtained from Jim McGee of Vista Environmental Services, Inc.

12. Have there been unexpected monitoring/maintenance difficulties or costs at the sites since start-up or in the last five years? If so, please give details.
    Monitoring/maintenance activities associated with the remedies identified in the interim ROD have not been performed.

13. Are Operations and Maintenance cost records readily available? If so, are they up to date and available?
    Not applicable.

14. Have there been opportunities to optimize monitoring, sampling, or maintenance efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
    Not applicable.

INTERVIEW RECORD

Site Name: *Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*
Subject: *Five-year Review of Remedial Actions for 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).*	**Time:** *13:30-15:30* / **Date:** *14 March 2012*
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:** *Not Applicable*	☐ Incoming ☐ Outgoing

Contact Made By:

Name: *James R. Stachowski, P.E.*	**Title:** *Project Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted:

Name: *Tom Chanda*	**Title:** *PBC05 Task Manager /Biologist*	**Organization:** *US Army Corps of Engineers, Louisville District*

Telephone No: *(502)315-6868* **Fax No:** *(502) 315-6864* **E-Mail Address:** *Thomas.M.Chanda@usace.army.mil*	**Street Address:** *600 Dr. Martin Luther King Pl.* **City, State, Zip:** *Louisville, KY 40402*

Summary Of Conversation

RVAAP-01 (Ramsdell Quarry Landfill)

1. What is your overall impression of the project (general sentiment)?
   The project is in a state of flux. Changed conditions were encountered during the remedial action due to the presence of asbestos-containing material (ACM) in the excavation. The site may require a new or modified Record of Decision (ROD).
2. What is the current status of remediation (e.g. budget and schedule)?
   ACM was removed from the excavated area until no longer visible and remedial activities were stopped. An engineering evaluation/cost analysis (EE/CA) was prepared and a new proposed plan is being prepared. The contract period of performance expired and site work was de-scoped in 2011. Work on the site resumed in January 2012.
3. Have any problems been encountered that required or will require changes to the remedial design or Record of Decision (ROD)?
   See response to question #1. ACM encountered in the excavation represented a changed condition that resulted in a new EE/CA. Changes to the ROD are probable.
4. Have any problems or difficulties been encountered that have impacted construction progress or implementability?
   Yes, ACM in the excavation caused delays and work was removed from a performance based action (PBA) contract in 2011. A new remedy will require regulatory approval (Ohio EPA).
5. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
   None.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *13:30-15:30*	**Date:** *14 March 2012*

6. Is there a Monitoring Plan and/or Sampling Plan for the site? If so, please describe the scope of each document and how they are implemented.
Routine groundwater monitoring is performed at the site under a Facility-Wide Groundwater Monitoring Program. Standing water in the bottom of the quarry (identified as an isolated wetland) is not present throughout the year and has not been sampled since start of the remedial action.
7. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts. Are monitoring and maintenance logs maintained?
None.
8. What does the monitoring data show? Are there any trends in the contaminant levels?
I am not aware of any trends in the groundwater data.
9. Are permits required for the site? If so, please describe each.
None. USACE/US Army will have a 5yr. wetland maintenance oversight under Ohio EPA Surface Water Regulations for isolated wetlands; somewhat similar to a 401Water Quality Certification.
10. Are discharges from the site monitored? If so, are discharge compliance documents maintained?
None.
11. Is there a Land-use Control (LUC) plan for the site? If so, is the program documented and are training records maintained? Are the LUCs being implemented?
LUCs are being negotiated between the RVAAP BRAC, National Guard Bureau, and Ohio EPA and will be included in a Property Management Plan (PMP) for Designated Areas of Concern.
12. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
The landfill cap and monitoring wells are routinely inspected. Routine inspections associated with the partially completed remedial action have not been performed because a new ROD and PMP have not been finalized. This will likely include the five-year wetland maintenance and sustainability oversight requirements.
13. Have there been unexpected monitoring/maintenance difficulties or costs at the sites since start-up or in the last five years? If so, please give details.
No, a monitoring and maintenance phase has not started.
14. Are Operations and Maintenance cost records readily available? If so, are they up to date and available?
No, see response to question #13.
15. Have there been opportunities to optimize monitoring, sampling, or maintenance efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
None.

RVAAP-05 (Winklepeck Burning Grounds)

16. What is your overall impression of the project (general sentiment)?
The remedial action was completed on a fast-track basis to get the firing range operational in a short period of time. Contaminants and munitions/explosives were assessed in limited areas and did not include the entire former Winklepeck Burning Grounds.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *13:30-15:30*	**Date:** *14 March 2012*

17. What is the current status of remediation (e.g. budget and schedule)?
All work included in the August 2008 ROD has been completed. A new EE/CA and remedial action scope of work for remaining areas of the former Winklepeck Burning Grounds are being prepared.

18. Have any problems been encountered that required or will require changes to the remedial design or Record of Decision?
Requirements for property transfer/leases and responsibilities of subsequent owners/lessees were required and added to the final Remedial Action Work Plan.

19. Have any problems or difficulties been encountered that have impacted construction progress or implementability?
None.

20. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
None.

21. Is there a Monitoring Plan and/or Sampling Plan for the site? If so, please describe the scope of each document and how they are implemented.
See response to question six. Quarterly inspections are required but are not being implemented because the PMP has not been finalized.

22. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts. Are monitoring and maintenance logs maintained?
None. Current maintenance consists of grass cutting on the firing range and in fire break areas.

23. What does the monitoring data show? Are there any trends in the contaminant levels?
I am not aware of any trends in the groundwater data.

24. Are permits required for the site? If so, please describe each.
None.

25. Are discharges from the site monitored? If so, are discharge compliance documents maintained?
None.

26. Is there a LUC plan for the site? If so, is the program documented and are training records maintained? Are the LUCs being implemented?
LUCs are identified in the final Remedial Action Work Plan. They have not been officially implemented because the PMP has not been finalized.

27. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
None, other than routine inspections performed by the Ohio Army National Guard Range Maintenance Officer.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *13:30-15:30*	**Date:** *14 March 2012*

28. Has there been unexpected monitoring/maintenance difficulties or costs at the site since start-up or in the last five years? If so, please give details.
The site is planned for expansion to include use as a multi-purpose machine gun firing range. Environmental assessments are required for remaining portions of the site to determine the possible presence of contaminants, munitions, and explosives.

29. Are Operations and Maintenance (O&M) cost records readily available? If so, are they up to date and available?
O&M is not performed with respect to the remedy specified in the ROD.

30. Have there been opportunities to optimize monitoring, sampling, or maintenance efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
None.

RVAAP-12 (Load Line 12)

31. What is your overall impression of the project (general sentiment)?
The nature and extent of nitrate contamination has not been addressed. Building demolition and soil excavations were conducted for the RVAAP BRAC and not included in the ROD.

32. What is the current status of remediation (e.g. budget and schedule)?
The soil and dry sediment remediation has been completed.

33. Have any problems been encountered that required or will require changes to the remedial design or Record of Decision?
None.

34. Have any problems or difficulties been encountered that have impacted construction progress or implementability?
None.

35. Do you have any comments, suggestions, or recommendations regarding the project (i.e. design, construction documents, constructability, management, regulatory agencies, etc.)?
None.

36. Is there a Monitoring Plan and/or Sampling Plan for the site? If so, please describe the scope of each document and how they are implemented.
None. There are concerns about possible nitrate contamination at this site due to its former use for ammonium nitrate production. Base-wide groundwater is being evaluated for nitrate contamination.

37. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts. Are monitoring and maintenance logs maintained?
None.

38. What does the monitoring data show? Are there any trends in the contaminant levels?
There is no monitoring data associated with the remedy specified in the ROD.

39. Are permits required for the site? If so, please describe each.
None.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *13:30-15:30*	**Date:** *14 March 2012*

40. Are discharges from the site monitored? If so, are discharge compliance documents maintained?
None.

41. Is there a LUC plan for the site? If so, is the program documented and are training records maintained? Are the LUCs being implemented?
LUCs are identified in the Remedial Design document. The LUCs have not yet been implemented because the PMP is not final. Ohio Army National Guard personnel using the site participate in required training with respect to restricted areas.

42. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
None.

43. Have there been unexpected monitoring/maintenance difficulties or costs at the sites since start-up or in the last five years? If so, please give details.
None.

44. Are Operations and Maintenance cost records readily available? If so, are they up to date and available?
O&M is not performed at the site.

45. Have there been opportunities to optimize monitoring, sampling, or maintenance efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
See response to question #44.

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INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *09:00 – 10:00*	**Date:** *21 March 2012*
Type:	☒ Telephone ☐ Visit ☐ Other	☐ Incoming ☐ Outgoing	
Location of Visit:	*Not Applicable*		

Contact Made By:

Name: *James R. Stachowski, P.E.*	**Title:** *Project Engineer*	**Organization:** *US Army Corps of Engineers, Buffalo District*

Individual Contacted:

Name: *Jim McGee*	**Title:** *Project Manager*	**Organization:** *Vista Sciences Corporation (Vista)*
Telephone No: *(330)358-3005* **Fax No:** *(330) 358-2021* **E-Mail Address:** *jim.d.mcgee@usarmy.mil*	**Street Address:** *8451 State Route 5, Building 1037* **City, State, Zip:** *Ravenna, Ohio, 44266*	

Summary Of Conversation

RVAAP-01 (Ramsdell Quarry Landfill)

1. What is your involvement with the project?
I was the Maintenance Manager when the landfill was closed in 1988 and have since been responsible for cap maintenance/inspections and record keeping for these activities.

2. Is there a Monitoring Plan and/or Sampling Plan for the site? If so, please describe the scope of each document and how they are implemented.
Groundwater monitoring is performed by a separate contractor (Environmental Quality Management, Inc. - EQM) in accordance with a facility-wide groundwater monitoring program.

3. Is there a continuous on-site presence? If so, please describe staff and activities.
Yes, Vista is present at RVAAP during the week (i.e. Monday – Friday, normal business hours) and OHARNG provides continuous security for Camp Ravenna.

4. Are maintenance activities performed at the site? If so, describe the activities and how often maintenance is performed.
Yes, the landfill cap is mowed annually.

5. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
The landfill cap is performing as intended. Weekly inspections are conducted and a monthly report is submitted to Ohio EPA.

6. Have LUC implementation actions identified in the remedial design document (2010) been employed?
Signs (caution, unauthorized personnel keep out) have been installed. A final approved facility-wide Property Management Plan (PMP) has not been completed. The PMP will establish responsibilities for implementing and maintaining LUCs for the site.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *09:00 – 10:00*	**Date:** *21 March 2012*

7. Is there a LUC training program? If so, is the program documented and are training records maintained?
   A LUC training program has not been developed. This would be included in the PMP.
8. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.
   There have been no changes in the requirements and schedules for cap inspection and mowing. Groundwater monitoring requirements, schedules, and routines can be determined from the quarterly and annual reports that are issued under the facility-wide groundwater monitoring program.
9. Have there been unexpected monitoring/maintenance difficulties or costs at the site since start-up or in the last five years? If so, please give details.
   An OHARNG trainee drove a military vehicle on site and cap repairs were needed.
10. Have there been opportunities to optimize monitoring, sampling, or maintenance efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
    None, with respect to maintenance efforts.
11. Has OHARNG used the site since the remedial actions were completed? If so, was the site used in accordance with LUCs identified in the revised final remedial design document (2010)?
    OHARNG is not permitted access to the site.

RVAAP-05 (Winklepeck Burning Grounds)

12. What is your involvement with the project?
    Prior to May 2008, I worked for a contractor (PIKA International, Inc.) that performed remedial actions at the site.
13. Is there a Monitoring Plan and/or Sampling Plan for the site? If so, please describe the scope of each document and how they are implemented.
    None that I'm aware of.
14. Is there a continuous on-site presence? If so, please describe staff and activities.
    OHARNG owns the site and operates it as a firing range. Access is controlled by OHARNG.
15. Are maintenance activities performed at the site? If so, describe the activities and how often maintenance is performed.
    Site maintenance is performed by OHARNG.
16. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
    Any site inspections would be performed by OHARNG.
17. Have LUC implementation actions identified in the remedial design document (2010) been employed?
    See response to question 14 (access is controlled by OHARNG).
18. Is there a LUC training program? If so, is the program documented and are training records maintained?
    See response to question 14.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *09:00 – 10:00*	**Date:** *21 March 2012*

19. Has OHARNG used the site since the remedial actions were completed? If so, was the site used in accordance with LUCs identified in the revised final remedial design document (2010)?
See response to question 14.

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

20. What is your involvement with the project?
Vista monitors and maintains storm water pollution prevention (SWPP) measures for the site and performs routine maintenance activities.

21. Is there a Monitoring Plan and/or Sampling Plan for the sites? If so, please describe the scope of each document and how they are implemented.
Groundwater monitoring is performed by EQM in accordance with a facility-wide groundwater monitoring program. SWPP monitoring is performed by Vista (see response to question 20).

22. Is there a continuous on-site presence? If so, please describe staff and activities.
See response to question 3.

23. Are maintenance activities performed at the sites? If so, describe the activities and how often maintenance is performed.
Routine maintenance activities consist of: keeping the gates closed, keeping the roads passable (i.e. snow plowing), culvert maintenance, mowing (once per year), and clearing vegetation.

24. Are routine inspections performed and records maintained? If so, describe how they are performed and their frequency. Is the reporting up to date?
I was not involved with building slab inspections prior to their removal. Surface water inspections are routinely performed by Vista. The site fence and gate are inspected when on site.

25. Have LUC implementation actions identified in the remedial design document (2010) been employed?
See Response to question six. Signs have been posted at entrances to restrict access.

26. Is there a LUC training program? If so, is the program documented and are training records maintained?
See response to question 7.

27. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.
There have been no changes with respect to SWPP monitoring and other maintenance requirements described above.

28. Have there been unexpected monitoring/maintenance difficulties or costs at the site since start-up or in the last five years? If so, please give details.
None, with respect to SWPP monitoring and other maintenance requirements described above.

29. Have there been opportunities to optimize monitoring, sampling, or maintenance efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
None, with respect to SWPP monitoring and other maintenance requirements described above.

INTERVIEW RECORD

Site Name:	*Ravenna Army Ammunition Plant (RVAAP)*	**EPA ID No.:** *OH5210020736*	
Subject:	*Five-year Review of Remedial Actions for 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).*	**Time:** *09:00 – 10:00*	**Date:** *21 March 2012*

30. Has OHARNG used the sites since the remedial actions were completed? If so, was the site used in accordance with LUCs identified in the revised final remedial design document (2010)?
OHARNG has not used the sites since the remedial actions were completed.

RVAAP-12 (Load Line 12)

31. What is your involvement with the project?
Vista was contracted to inspect and maintain SWPP controls during the remedial action. Routine maintenance activities are also performed.

32. Is there a Monitoring Plan and/or Sampling Plan for the site? If so, please describe the scope of each document and how they are implemented.
Groundwater monitoring is performed by EQM in accordance with a facility-wide groundwater monitoring program.

33. Is there a continuous on-site presence? If so, please describe staff and activities.
See response to question 3.

34. Are maintenance activities performed at the site? If so, describe the activities and how often maintenance is performed.
Routine maintenance activities consist of keeping the gates closed, roads passable (i.e. snow plowing is performed when necessary), culvert maintenance, mowing (once per year), and clearing vegetation.

35. 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 fence and gate are inspected when on site.

36. Have LUC implementation actions identified in the remedial design document (2010) been employed?
See response to questions six and 25.

37. Is there a LUC training program? If so, is the program documented and are training records maintained?
See response to question 7.

38. Have there been significant changes in the monitoring requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.
There have been no changes with respect to SWPP monitoring and other maintenance requirements described above.

39. Have there been unexpected monitoring/maintenance difficulties or costs at the site since start-up or in the last five years? If so, please give details.
None, with respect to SWPP monitoring and other maintenance requirements described above.

40. Have there been opportunities to optimize monitoring, sampling, or maintenance efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
None, with respect to SWPP monitoring and other maintenance requirements described above.

41. Has OHARNG used the site since the remedial actions were completed? If so, was the site used in accordance with LUCs identified in the revised final remedial design document (2010)?
OHARNG has not used the site since the remedial actions were completed.

ATTACHMENT 7

ARAR EVALUATION

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Table A7-1

ARAR EVALUATION

Ravenna Army Ammunition Plant
LOAD LINES 1 THROUGH 4 (RVAAP-08, -09, -10, and -11) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
	Location - Specific		
Surface Waters and Wetlands OAC 3745-1-04 OAC 3745-1-51 OAC 3745-1-54(B)(1)	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 drainage ways) or wetlands, including isolated wetlands.	This ARAR is still applicable.
Native American Graves Protection and Repatriation Act 25 USC 3001-3013 43 CFR Part 10	Regulations that pertain to the identification, protection, and appropriate disposition of human remains, funerary objects, sacred objects, or objects of cultural patrimony	Applicable to activities at LLs 1-4 that may result in contact/unearthing of human remains, funerary objects, sacred objects, or objects of cultural patrimony	This ARAR is applicable
	Action - Specific		
Activities Resulting in the Emission of Particulate Matter, Dusts, Fumes, Gas, Mists, Smoke, etc. From a Hazardous Waste Facility OAC 3734.02(I) OAC 3745-15-07(A)	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	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-1

ARAR EVALUATION

Ravenna Army Ammunition Plant
LOAD LINES 1 THROUGH 4 (RVAAP-08, -09, -10, and -11) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
Activities Causing Fugitive Dust Emissions OAC 3745-17-08(B)	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.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.
Construction Activities Causing Storm Water Runoff (e.g., clearing, grading, and excavation) 40 CFR 122.26 OAC 3745-38-06	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 storm water discharges from land disturbances from a construction activity involving more than 1 acre.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-1

ARAR EVALUATION

Ravenna Army Ammunition Plant
LOAD LINES 1 THROUGH 4 (RVAAP-08, -09, -10, and -11) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
Generation and Characterization of Solid Waste *(all primary and secondary wastes)* 40 CFR 262.11(a)(b)(c) OAC 3745-52-11(A)(B)(C)(D)	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). 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. Site data indicate that soils contain metals at concentrations that exceed 20 times the toxicity characteristic limit and may exhibit the characteristics. Applicable to generation of decontamination wastewater.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.
Generation and Characterization of Solid Waste *(all primary and secondary wastes)* 40 CFR 268.7 OAC 3745-270-07	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.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-1

ARAR EVALUATION

Ravenna Army Ammunition Plant
LOAD LINES 1 THROUGH 4 (RVAAP-08, -09, -10, and -11) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
Generation and Characterization of Solid Waste *(all primary and secondary wastes)* 40 CFR 268.9(a) OAC 3745-270-07 OAC 3745-270-09	The generator must determine each EPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 CFR 268.40, Subpart D. 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 hazardous-contaminated soil and hazardous debris resulting from excavation. Applicable to generation of decontamination wastewater. Applicable to the generation and characterization of RCRA characteristic hazardous waste (except D00I non-wastewaters treated by combustion, recovery of organics, or polymerization) and to hazardous-contaminated soils for their subsequent storage, treatment, or disposal.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.
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 40 CFR 262.34(a)(4) OAC 3745-52-34(A)(4) OAC 3745-66-70 to 66-77	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	Applicable to 90-day accumulation of debris from excavation and screening if such debris contains listed wastes or exhibits a characteristic.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-1

ARAR EVALUATION

Ravenna Army Ammunition Plant
LOAD LINES 1 THROUGH 4 (RVAAP-08, -09, -10, and -11) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
	of hazardous waste or hazardous constituents, or (2) presence of an emergency coordinator on site, could be viewed as substantive.		
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 40 CFR 262.34 (a)(2)(3) OAC 3745-52-34 (A)(2)(3)	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.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.
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 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 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 feet 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.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-1

ARAR EVALUATION

Ravenna Army Ammunition Plant
LOAD LINES 1 THROUGH 4 (RVAAP-08, -09, -10, and -11) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
Placement of hazardous-contaminated soil in a staging pile 40 CFR 264.554 OAC 3745-57-74	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 toxicity characteristic soils.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

1 – There are no chemical-specific ARARs for the selected alternative for contaminated soils and dry sediments at Load Lines 1-4.

Table A7-2

ARAR EVALUATION

Ravenna Army Ammunition Plant
LOAD LINE 12 (RVAAP-12) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
Location – Specific			
Native American Graves Protection and Repatriation Act 25 USC 3001-3013 43 CFR Part 10	Regulations that pertain to the identification, protection, and appropriate disposition of human remains, funerary objects, sacred objects, or objects of cultural patrimony	Applicable to activities at LLs 1-4 that may result in contact/unearthing of human remains, funerary objects, sacred objects, or objects of cultural patrimony	This ARAR is applicable
Action – Specific			
Soil Contaminated with RCRA Hazardous Waste OAC § 3745-400-49 OAC § 3745-400-48 Universal Treatment Standard	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 universal treatment standards is prescribed.	Land disposal restrictions 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 on site, then this rule is potentially applicable to disposal of the soils.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete and RCRA hazardous soils were disposed off site.
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 on site, then these rules are potentially applicable to disposal of the debris.	This ARAR is not applicable since RCRA hazardous debris was disposed off site.

Table A7-2

ARAR EVALUATION

Ravenna Army Ammunition Plant
LOAD LINE 12 (RVAAP-12) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
Soils/Debris Contaminated with RCRA Hazardous Waste – Variance OAC § 3745-400-44	The Director will recognize a variance approved by the Ohio 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 on site.	This ARAR is not applicable since RCRA hazardous soil and debris was disposed off site.
Soils Disposed of in a Corrective Action Management Unit (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 cleanup, depending on the Director's approval or prohibition of specific wastes or waste streams. Use of a CAMU for disposal does not trigger land disposal requirements or minimum technical requirements 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.	This ARAR is not applicable since RCRA hazardous soil and debris was disposed off site.
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. 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 USEPA and USACE have jurisdiction over wetlands. USEPA's Section 404 guidelines are promulgated in 40 CFR § 230; USACE guidelines are promulgated in 33 CFR § 320.	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).	USACE did not categorize the main ditch at LL12 as a jurisdictional wetland. Therefore, Section 404 of the Clean Water Act is no longer potentially applicable. However, Section 401 water quality certification is still applicable.

Table A7-2

ARAR EVALUATION

Ravenna Army Ammunition Plant
LOAD LINE 12 (RVAAP-12) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
Protection of Wetlands Executive Order 11990	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.	This ARAR is still potentially applicable.
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. 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.	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.	This ARAR is still potentially applicable.

1 - There are no chemical-specific ARARs for the selected alternative for contaminated soils and dry sediments at Load Line12.

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Table A7-3

ARAR EVALUATION

Ravenna Army Ammunition Plant
WINKLEPECK BURNING GROUNDS (RVAAP-05) SOIL AND DRY SEDIMENT [1]

ARAR	Description	Compliance	Evaluation
Location – Specific			
Surface Waters and Wetlands OAC 3745-1-04 OAC 3745-1-51 OAC 3745-1-54(B)(1)	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 drainage ways) or wetlands, including isolated wetlands	This ARAR is still applicable.
Native American Graves Protection and Repatriation Act 25 USC 3001-3013 43 CFR Part 10	Regulations that pertain to the identification, protection, and appropriate disposition of human remains, funerary objects, sacred objects, or objects of cultural patrimony	Applicable to activities at Winklepeck Burning Grounds that may result in contact/unearthing of human remains, funerary objects, sacred objects, or objects of cultural patrimony	This ARAR is applicable
Action - Specific			
Activities Causing Fugitive Dust Emissions OAC 3745-17-08(B)	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	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.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-3
ARAR EVALUATION
Ravenna Army Ammunition Plant
WINKLEPECK BURNING GROUNDS (RVAAP-05) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
	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.		
Construction Activities Causing Storm Water Runoff (e.g., clearing, grading, and excavation) 40 *CFR* 122.26 OAC 3745-38-06	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 storm water discharges from land disturbances from a construction activity involving more than 1 acre.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.
Generation and Characterization of Solid Waste *(all primary and secondary wastes)* 40 *CFR* 262.11(a)(b)(c) OAC 3745-52- 11(A)(B)(C)(D)	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). 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. Site data indicate that soil contains metals at concentrations that exceed 20 times the toxicity characteristic	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-3

ARAR EVALUATION

Ravenna Army Ammunition Plant
WINKLEPECK BURNING GROUNDS (RVAAP-05) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
		limit and may exhibit the characteristics. Applicable to generation of decontamination wastewater.	
Generation and Characterization of Solid Waste (all primary and secondary wastes) 40 *CFR* 268.7 OAC 3745-270-07	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.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.
Generation and Characterization of Solid Waste (all primary and secondary wastes) 40 *CFR* 268.9(a) OAC 3745-270-07 OAC 3745-270-09	The generator must determine each USEPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 *CFR* 268.40, Subpart D. 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 hazardous-contaminated soil and hazardous debris resulting from excavation. Applicable to generation of decontamination wastewater. Applicable to the generation and characterization of RCRA characteristic hazardous waste (except D001 non-wastewaters treated by combustion, recovery of organics, or polymerization) and to hazardous-contaminated soil for their subsequent storage, treatment, or disposal.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-3

ARAR EVALUATION

Ravenna Army Ammunition Plant
WINKLEPECK BURNING GROUNDS (RVAAP-05) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
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) 40 *CFR* 262.34(a)(4) OAC 3745-52-34(A)(4) OAC 3745-66-70 to 66-77	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.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-3

ARAR EVALUATION

Ravenna Army Ammunition Plant
WINKLEPECK BURNING GROUNDS (RVAAP-05) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
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) 40 *CFR* 262.34 (a)(2)(3) OAC 3745-52-34 (A)(2)(3)	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.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.
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) 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 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.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-3

ARAR EVALUATION

Ravenna Army Ammunition Plant
WINKLEPECK BURNING GROUNDS (RVAAP-05) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
Placement of Hazardous-contaminated Soil in a Staging Pile 40 CFR 264.554 OAC 3745-57-74	In 1988, USEPA 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. 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, runoff/ 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 soil in staging piles. Potentially relevant and appropriate if excavated soils are determined to not contain listed wastes or exhibit the toxicity characteristics of soil.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.
Generation and Storage of Wastewater from Equipment Decontamination (wastewater may contain listed wastes or exhibit a hazardous waste characteristic) 40 *CFR* 262.11 OAC 3745-52-11 (A)(B)(C)(D)	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.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete.

Table A7-3
ARAR EVALUATION
Ravenna Army Ammunition Plant
WINKLEPECK BURNING GROUNDS (RVAAP-05) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
Asbestos-Containing Materials at Pad 70 (worker training, material handling, containerization, transport and disposal) 40 *CFR* 61.145 OAC 3745-20	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. • 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.	Applicable for asbestos-containing material generated from remedial actions at Pad 70.	The selected remedy for former burning pad 70 was ACM removal. This ARAR is no longer applicable since remedial construction activities to address ACM within the footprint of Pad 70 are complete.

1 - There are no chemical-specific ARARs for the selected alternative for contaminated soil and dry sediment at Winklepeck Burning Grounds.

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Table A7-4

ARAR EVALUATION

Ravenna Army Ammunition Plant
RAMSDELL QUARRY LANDFILL (RVAAP-01) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
Location – Specific			
Native American Graves Protection and Repatriation Act 25 USC 3001-3013 43 CFR Part 10	Regulations that pertain to the identification, protection, and appropriate disposition of human remains, funerary objects, sacred objects, or objects of cultural patrimony	Applicable to activities at Ramsdell Quarry Landfill that may result in contact/unearthing of human remains, funerary objects, sacred objects, or objects of cultural patrimony	This ARAR is applicable
Action – Specific			
Soil Contaminated with RCRA Hazardous Waste OAC Section 3745-400-49 OAC Section 3745-400-48 Universal Treatment Standard	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 Universal Treatment Standard is prescribed.	Land disposal restrictions 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 on site, then this rule is potentially Applicable to disposal of the soils.	This ARAR is no longer applicable since remedial construction activities to address soils and dry sediment identified in the ROD are complete and RCRA hazardous soils were disposed off site.
Asbestos-Containing Materials (worker training, material handling, containerization, transport and disposal) 40 *CFR* 61.145 OAC 3745-20	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. • That no visible dust emissions occur during activities and that sufficient asbestos control	Applicable for asbestos-containing material generated from potential future remedial actions.	This ARAR is relevant and appropriate to future potential remedial construction activities.

Table A7-4

ARAR EVALUATION

Ravenna Army Ammunition Plant
RAMSDELL QUARRY LANDFILL (RVAAP-01) SOIL AND DRY SEDIMENT [1]

ARAR	*Description*	*Compliance*	*Evaluation*
	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.		
Debris Contaminated with RCRA Hazardous Waste OAC Section 3745-400-49 OAC Section 3745-400-47	These rules prescribe conditions and standards for land disposal of debris contaminated with RCRA hazardous waste. Debris subject to this requirement for characteristic RCRA contamination that no longer exhibits the hazardous characteristic after treatment does not need to be disposed of as a hazardous waste. Debris contaminated with listed RCRA contamination remains subject to hazardous waste disposal requirements.	If RCRA hazardous debris is disposed of on site, then these rules are potentially applicable to disposal of the debris.	This ARAR is no longer applicable since RCRA hazardous debris was disposed off site.
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 on site.	This ARAR is no longer applicable since RCRA hazardous soil and debris was disposed off site.

Table A7-4

ARAR EVALUATION

Ravenna Army Ammunition Plant
RAMSDELL QUARRY LANDFILL (RVAAP-01) SOIL AND DRY SEDIMENT [1]

ARAR	Description	Compliance	Evaluation
Soils Disposed of in a Corrective Action Management Unit (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 land disposal requirements or minimum technical requirements 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.	This ARAR is no longer applicable since RCRA hazardous soil and debris was disposed off site.
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. Both USEPA and USACE have jurisdiction over wetlands. USEPA's Section 404 guidelines are promulgated in 40 CFR § 230; USACE guidelines are promulgated in 33 CFR § 320.	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).	USACE did not categorize the Ramsdell Quarry wetland as a jurisdictional wetland. Therefore, Section 404 of the Clean Water Act is no longer potentially applicable. However, Section 401 water quality certification is still applicable.
Protection of Wetlands Executive Order 11990	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.	This ARAR is still potentially applicable.

Table A7-4

ARAR EVALUATION

Ravenna Army Ammunition Plant
RAMSDELL QUARRY LANDFILL (RVAAP-01) SOIL AND DRY SEDIMENT [1]

ARAR	Description	Compliance	Evaluation
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. 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.	Potentially applicable unless otherwise 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.	This ARAR is still potentially applicable.

1 - There are no chemical-specific ARARs for the selected alternative for contaminated soil and dry sediment at Ramsdell Quarry Landfill.

ATTACHMENT 8

RISK ASSESSMENT AND TOXICOLOGY EVALUATION

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This evaluation is 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?"

Note that changes in standards were reviewed as part of Attachment 7, changes in Applicable or Relevant and Appropriate Requirements (ARARs). No standards (ARARs) were used in developing cleanup goals at Ravenna Army Ammunition Plant (RVAAP). No chemical-specific ARARs were available at the time of the records of decision (RODs), and none have been developed since that time to address the types of contaminants addressed under the soil RODs for these sites. All of the cleanup goals at the RVAAP Sites were developed using risk-based concentrations, which is the subject of the evaluation in this Attachment. Other action or location-specific ARARs are reviewed in Attachment 7.

HUMAN HEALTH

Although the risk assessment and toxicity evaluation was performed individually for each of the Sites being reviewed as part of this report, there are two human health assessment reports that encompass risk evaluations across the entire site:

- *Ravenna Army Ammunition Plant's Facility Wide Human Health Risk Assessor Manual,* December 2005 (USACE 2005)
- *Final Facility Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant,* May 2010 (SAIC 2010a)

These reports were reviewed in order to gain an understanding of the overall risk assessment methodology used and types of exposure scenarios being considered in development of the cleanup goals for the RODs for the individual sites.

<u>(1) Load Lines 1 – 4</u>

Along with the January 2007 Interim ROD for Load Lines 1 - 4 (USACE 2007), there are four documents that support the establishment of risk-based cleanup goals for Load Lines 1 - 4.

- *Supplemental Baseline Human Health Risk Assessment for the Load Line 1 Alternative Receptors at the Ravenna Army Ammunition Plant, Ravenna, Ohio.* July 2004 (Shaw 2004a)
- *Phase II Remedial Investigation Report for Load Line 2 at the at the Ravenna Army Ammunition Plant, Ravenna, Ohio.* July 2004 (Shaw 2004b)
- *Proposed Remedial Goal Options for Soil at Load Lines 1, 2, 3, and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio.* September 2004 (Shaw 2004c)
- *Final Focused Feasibility Study for the Remediation of Soil at Load Lines 1 through 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. May 2005 (Shaw 2005a)

The risk assessments from these documents were reviewed as follows.

HUMAN HEALTH

Since Load Line 1 was the most contaminated of the four load lines evaluated as part of this ROD (widest variety of contaminants detected, highest frequency of detection, and highest concentrations) (USACE 2007), the list of constituents of potential concern (COPCs), toxicity criteria, and exposure assessment provided in the *Supplemental Baseline Human Health Risk Assessment for Load Line 1* (Shaw 2004a) was reviewed as a representative risk assessment methodology for all four of the Load Lines. The exception to this is that hexavalent chromium was only identified as a constituent of concern (COC) for Load Line 2. Therefore, toxicity criteria for hexavalent chromium were obtained from the Phase II Remedial Investigation Report for Load Line 2 (Shaw 2004b).

Changes in Toxicity

Toxicity criteria previously identified for COPCs for the Load Lines 1 through 4 were compared to toxicity criteria utilized by the USEPA in development of their Regional Screening Table, as this is updated on a regular basis (last updated in May 2012, USEPA 2012a). Updated toxicity criteria were further confirmed by a review of the primary toxicity criteria source (USEPA 2012b, c). Tables A8-1 and A8-2 present non-carcinogenic and carcinogenic toxicity criteria (as presented in Tables A-8, A-9 and Q-8, Q-9 of Shaw 2004a and b, respectively) for COCs identified in the Interim ROD (USACE 2007) along with any associated updates. There are a total of four COCs with updated toxicity criteria, each of which are discussed below.

As shown in Table A8-1, the California Environmental Protection Agency (a Tier III source for toxicity criteria) has identified an inhalation reference concentration (reference exposure level) for non-carcinogenic health hazards from exposure to arsenic (Cal EPA 2008). This would increase the non-carcinogenic hazards, as the previous toxicity criteria only included hazard identification via the oral exposure route for arsenic. However, as arsenic is also a carcinogen (Table A8-2), and the carcinogenic endpoint was used in development of the arsenic cleanup goal for Load Lines 1 - 4, this additional exposure route toxicity criterion should not adversely affect the protectiveness of the arsenic cleanup goal.

In 2005 (a year after the toxicity criteria for barium were identified for Load Lines1-4), the barium oral reference dose was updated in USEPA's Integrated Risk Infromation System (IRIS) (Table A8-1). This newer, larger oral reference dose would result in a lower hazard quotient for the same intake of barium. Thus, because the toxicity of barium is actually lower now, the barium cleanup goal for the Load Lines1-4 would remain protective.

The New Jersey Department of Environmental Protection (NJDEP) recently determined that hexavalent chromium is likely to be carcinogenic in humans via ingestion, not just via inhalation. As presented in Table A8-2, NJDEP derived a new oral cancer slope factor, based on cancer bioassays conducted by the National Toxicology Program (NJDEP 2009). Although the NJDEP toxicity evaluation of hexavalent chromium would be considered a Tier III source of toxicity criteria (USEPA 2003), the primary source for toxicity criteria, IRIS, is currently completing a review of hexavalent chromium toxicity (USEPA 2010a). The updated IRIS assessment will include an evaluation of the oral pathway. The addition of carcinogenicity via this additional pathway could affect the protectiveness of the hexavalent chromium cleanup goal for Load

Lines1-4. To account for carcinogenic exposure via the ingestion pathway (in addition to the inhalation pathway already evaluated), the cleanup goal for hexavalent chromium may have to be lowered in order to remain protective.

In addition, chromium has been identified as a mutagenic carcinogen. However, under Military Land Use, no exposures to children are expected, and thus, no adjustment to account for the susceptibility of early life exposures to carcinogens is warranted for this assessment (USEPA 2005).

Lead is a COC for load lines1-4 but is not included in Tables A8-1 or A8-2 because risks from exposure to lead are better evaluated by predicting the associated blood lead level. Blood lead levels have been accepted as the best measure of external dose of lead. Sensitive populations include preschool-age children and fetuses. In fetuses and children, a blood lead level of between 10 and 15 micrograms per deciliter (µg/dL) was originally associated with a level at which no adverse effects would be expected. The load lines1-4 clean-up goal for lead was developed using a target level of 10 µg/dL and the adult lead model to back calculate an acceptable level of soil lead (Shaw 2004b). Updates were made to the adult lead model in 2009, as presented in Table A8-3 (USEPA 2009b). In addition, it is now believed that adverse affects may be associated with even lower blood lead levels. Although updates to the adult lead model have been made since the clean-up goal was established in the Interim ROD (USACE 2007), these updates would not result in a lower lead clean-up goal, not even when a target blood level of 5 µg/dL is used (Table A8-3). Therefore, changes in evaluation of the adult lead model recommended input parameter values do not change the protectiveness of the lead clean-up goal for the National Guard Trainee receptor at laod lines 1-4.

Changes in Exposure

The following exposure factor values (soil ingestion rate, dermal exposure factors, inhalation rate, and body weight) used in the risk assessment (Table 3.2, Shaw 2004a) were compared to the values recommended by the latest USEPA guidance for exposure factors (USEPA 2011) and updates to dermal exposure assessment values (USEPA 2004 updated 2007). All of these exposure factor values used in the risk assessment for Load Line 1 were conservative (still should be considered protective) relative to updated USEPA recommendations for exposure factor values. For example, the soil ingestion rate could be halved based on newest guidance for this parameter. Adult body weight should increase by 10 kilograms (kg). No updates to recommended parameter values would indicate that exposure assumptions should result in increased risk characterization. In addition, the inhalation rates used were more conservative than the most current guidance for this parameter (USEPA 2011). Therefore, those previous exposure parameter values identified for the National Guard Trainee are still protective.

Other exposure parameter values used in the development of cleanup goals (such as exposure time, exposure frequency, and areas and depths of the site assumed to produce exposure) further defined the primary receptor (the National Guard Trainee) identified for the reasonable future land use (Military Use by Ohio Army National Guard - OHARNG). Although the reasonable future land use remains the same (it will continue 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 Interim ROD. The OHARNG was consulted during development of the risk assessment, which was ultimately used to set cleanup objectives for Load Lines 1-4. As explained in Section 3.3, the reasonable maximum exposure receptor for the Load Lines 1-4 is the National Guard Trainee, who would 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. 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 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 trainee can move about the site on foot or in a vehicle with unlimited exposure to surface soil. The only restrictions should be to exposure to soils deeper than four feet. This would be consistent with the site-specific risk assessment performed for these anticipated military uses of the site.

Should the need for less restrictive land use be identified by OHARNG beyond what was stated in the Interim ROD, further action may be required to reduce concentrations of hazardous substances in soil to levels that allow for other uses of the site.

Determination of COCs

An initial review of all COPCs identified in Tables A-8, A-9 and Q-8, Q-9 of Shaw 2004a and b, respectively was performed to determine whether or not there were any significant changes in toxicity or exposure that could affect new COCs being identified from the list of COPCs. Although the toxicity criteria for other COPCs (barium, dimethylbenzene, nitrotoluene) has been updated, the updates do not result in enough increase in risk characterization to cause these COPCs to become COCs.

The data for hexavalent chromium were also reviewed from the Phase II Remedial Investigation Report (Shaw 2004b). Hexavalent chromium was identified as a COC in the Load Lines 1 – 4 Interim ROD, although it was only identified as a COPC in Load Line 2 (USACE 2007). Apparently, there were only a total of 13 samples from Load Line 2 soil that were ever analyzed for hexavalent chromium (Shaw 2004b). All of these samples were from the Preparation and Receiving Areas Aggregate. These samples were analyzed for hexavalent chromium due to the potential use of hexavalent chromium in Building DB-802 (considered part of the Preparation and Receiving Area). According to Tables 4-3 and 4-4 of the Phase II Remedial Investigation Report, hexavalent chromium was only analyzed in surface soil samples. Only one of the 13 surface soil samples had a positive detection of hexavalent chromium. This single positive detection of 82 ppm (which represented a frequency of detection of 7.7%) apparently resulted in an elevated exposure point concentration and ultimately the determination that hexavalent chromium was above cleanup goals in Load Line 2. This area of Load Line 2 also had elevated total chromium (maximum detection of 1,900 ppm). Hexavalent chromium does not persist in soils under normal pH and redox conditions; the trivalent form is thermodynamically more stable in the environment (ATSDR 2008). Thus, the extent of actual hexavalent chromium contamination at Load Line 2 may not warrant its inclusion as a COC for Load Lines 1 - 4. Furthermore, a review of post-remedial action data (Attachment 10) indicates that hexavalent chromium was not detected in any samples obtained in 2007 or 2009 in or adjacent to areas remediated from Load Line 2, which include areas around Building DB-802.

Cleanup Goal Development

The cleanup goals presented in the Interim ROD (USACE 2007) differ from what is presented for the National Guard Trainee in the *Final Facility Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (SAIC 2010a), despite the consistency between methodology, toxicity assessment, and exposure assessment for the same receptor identified for cleanup goal development in both documents. Therefore, a spot check of the calculations for cleanup goal development was performed. The cleanup goals for individual polycyclic aromatic hydrocarbons (PAHs) presented in the Interim ROD appear to be calculated correctly and would result in the identified target ILCR of 1E-05 for individual PAHs for the National Guard Trainee receptor.

Changes in Risk Assessment Methodology and Tools

There have not been any standardized risk assessment methodology changes, however, there is now an updated software tool that enhances the ability to better estimate an upper confidence level of the mean of a data set. This allows for a more robust estimation of the exposure point concentration. In 2010, the USEPA produced an updated version of their ProUCL software tool, which allows for greater ease of use with large data sets, such as were generated during the remedial investigation of the RVAAP. This newest version of ProUCL software (version 4.1) includes statistical methods that can be used to estimate the exposure point concentration (EPC) terms for data sets with non-detect (ND) observations (USEPA 2010b). Specifically, most of the statistical methods described and recommended in the *Guidance Document to Compute 95% Upper Confidence Limits* (USEPA 2002) have been incorporated into ProUCL. Using the ProUCL software provides an advantage over the method of calculating EPCs used for the RVAAP sites subject to this five-year review, as more statistical methods are available in ProUCL than previously utilized. The previous method used for calculating the upper confidence limit on the mean relied on only two options: use of the H-statistic for data sets shown to be lognormally distributed, and use of the t-statistic for all other data sets, including data sets with a low number of detections. This last method (use of the t-statistic) works best with normally distribution data when most results are above detection limits. However, in some cases, reliance on only these two statistical methods for determining the upper confidence limit on the mean may over estimate the EPC (i.e., default to the maximum detection concentration within the exposure unit) or even underestimate the upper confidence limit on the mean for some data sets, especially those which are not normally or lognormally distributed and which contain many results below detection limits. Environmental data often does not conform to either a normal or lognormal distribution, and may contain many results below detection limits. The ProUCL software provides a more thorough evaluation of data distribution and also considers results below detection limits. From these data evaluations, it produces several (2 to 10, depending on data distribution) estimates of upper confidence limits on the mean, and recommends the best one to use for a given data set. Since the upper confidence limit on the mean will be used as the exposure point concentration, and the magnitude of the exposure point concentration is directly proportional to the resulting risk, use of the ProUCL software in more accurately estimating the exposure point concentration is an advantage to the project.

The Focused Feasibility Study for Load Lines 1 – 4 compared EPCs to cleanup goals in order to verify that all COCs were present above the one in 10E-05 target cancer risk or above the target hazard index of one. Therefore, proper EPC development is paramount to developing a remedy that is not only protective, but also is not more extensive than needed to ensure protectiveness.

Significant Finding

There is one COC for which a change in toxicity criteria could affect the protectiveness. The toxicity for hexavalent chromium is currently under review by the USEPA. Newer studies by the National Toxicology Program evaluated by NJDEP indicate that hexavalent chromium can cause cancer not only via inhalation, but also via the oral exposure route. The addition of carcinogenicity via this pathway could affect the protectiveness of the hexavalent chromium cleanup goal for Load Lines1-4. To account for carcinogenic exposure via the ingestion pathway (in addition to the inhalation pathway already evaluated), the cleanup goal for hexavalent chromium may have to be lowered in order to remain protective. However, as the extent of hexavalent chromium contamination was extremely limited prior to remediation and post-remediation sampling at Load Line 2 indicates that it is no longer detected at the site, further review of the cleanup criteria based on newer toxicity evaluations for hexavalent chromium are not warranted. Although the previous exposure parameter values used for the National Guard Trainee are still protective, it has already been identified by the OHARNG that the exposure assumptions identified in the Interim ROD are too restrictive, and other military land uses, with different receptors other than what was assumed in the exposure assessment, are planned. Further characterization is underway to re-evaluate residual contamination levels remaining after further cleanup not specified in the Interim ROD was accomplished (Prudent 2011a, c). This may allow for expanded use of the site.. Because hexavalent chromium has been identified as a mutagenic carcinogen, if a child receptor is considered part of the new reasonable future land use at the site, then toxicity criteria for hexavalent chromium should be adjusted to account for increased susceptibility from early-life exposures to carcinogens.

ENVIRONMENTAL HEALTH (ECOLOGICAL ASSESSMENT)

A screening level risk assessment was performed for Load Lines1-4, along with an Ohio EPA Level III baseline ecological risk assessment, which provided site-specific updates (via mathematical modeling) to the ecological effects quotients estimated in the screening level assessment (Ohio EPA 2003). This resulted in the identification of several constituents of ecological concern, notably the PCB Aroclor-1254, chromium, and several heavy metals such as lead and zinc (Shaw 2005a). Field truthing of these constituents of ecological concern was performed for Winklepeck Burning Grounds (discussed below), but not for Load Lines1-4. The following statements are provided in the Focused Feasibility Study for Load Lines1-4 (Shaw 2005a) which are still relevant today. "Remedial activities will decrease the concentrations of constituents of ecological concern (COECs) and reduce the number of COECs in soil to which ecological receptors are exposed, thereby reducing ecological risk. In addition, remediation will indirectly affect the potential exposure pathways to COECs through the food web and habitat. National Guard mounted training (no digging) activities will also result in habitat alteration through cleared vegetation, harmed vegetation and soil compaction. Habitat alteration may be extensive and result in soil compaction (damage to ecosystem), vegetation damage and removal (simpler or missing habitat), shorter food chains (simpler ecosystem), and lower exposure (fewer organisms). These impacts will cause potential ecological receptors to seek food and shelter elsewhere, thereby reducing ecological risk. Suitable nearby habitats are available to receive fleeing wildlife. Given the compelling reasons for lack of ecologically based remediation, ecologically based RAOs are not needed under the implementation of the interim remedy for soils at Load Lines 1-4." The Interim ROD (USACE 2007) goes further in stating;

> *"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."*

Significant Finding:

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 at the RVAAP will not be managed for ecological purposes but instead will have intensive use by the OHARNG, protection of human health will drive remedial action objectives 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.

(2) Load Line 12

Along with the 2009 ROD for Load Line 12 (SAIC 2009a), there are two documents that support the establishment of cleanup goals for Load Line 12.

- *Phase II Remedial Investigation Report for Load Line 12 at the Ravenna Army Ammunition Plant, Ravenna, Ohio* March 2004 (SAIC 2004)
- *Final Feasibility Study for Load Line 12 (RVAAP-12), Ravenna Army Ammunition Plant, Ravenna, Ohio* March 2006 (SAIC 2006b).

The risk assessments from these documents were reviewed as follows.

HUMAN HEALTH

Changes in Toxicity

Toxicity criteria previously identified for arsenic (the only COC for Load Line 12) were compared to toxicity criteria utilized by the USEPA in development of their Regional Screening Table, as this is updated on a regular basis (last updated in May 2012, USEPA 2012a). Updated toxicity criteria were further confirmed by a review of the primary toxicity criteria source (USEPA 2012b, c). As shown in Table A8-1, the California Environmental Protection Agency (Cal EPA) (a Tier III source for toxicity criteria) has identified an inhalation reference concentration (reference exposure level) for non-carcinogenic health hazards from exposure to arsenic (Cal EPA 2008). This would increase the non-carcinogenic hazards, as the previous toxicity criteria only included hazard identification via the oral exposure route for arsenic. However, as arsenic is also a carcinogen (Table A8-2), and the carcinogenic endpoint was used in development of the arsenic cleanup goal for Load Line 12, this additional exposure route toxicity criterion should not adversely affect the protectiveness of the arsenic cleanup goal.

Changes in Exposure

The following exposure factor values (soil ingestion rate, dermal exposure factors, inhalation rate, and body weight) used in the risk assessment for the National Guard Trainee (SAIC 2004) were compared to the values recommended by the latest USEPA guidance for exposure factors (USEPA 2011) and updates to dermal exposure assessment values (USEPA 2004 updated 2007). All of these exposure factor values used in the risk assessment for this receptor were conservative (still should be considered protective) relative to updated USEPA recommendations for exposure factor values. For example, the soil ingestion rate could be halved based on newest guidance for this parameter. Adult body weight should increase by 10 kg. No updates to recommended parameter values would indicate that exposure assumptions should result in increased risk characterization. In addition, the inhalation rates used were more conservative than the most current guidance for this parameter (USEPA 2011). Therefore, those previous exposure parameter values identified for the National Guard Trainee are still protective.

Other exposure parameter values (such as exposure time, exposure frequency, and areas and depths of the site assumed to produce exposure) further defined the primary receptor (the National Guard Trainee) identified for the reasonable future land use (Military Use by OHARNG). Although the reasonable future land use remains the same (it will continue to be used by the OHARNG), the land user must adhere to the digging and vehicle cleaning restrictions implied by the exposure assessment defined in the Interim ROD. The OHARNG was consulted during development of the risk assessment, which was ultimately used to set cleanup objectives for Load Line 12. As explained in Section 3.3, the reasonable maximum exposure receptor for the Load Line 12 is the National Guard Trainee, who would 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. 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 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 trainee can move about the site on foot or in a vehicle with unlimited exposure to surface soil. The only restrictions should be to exposure to soils deeper than four feet. This would be consistent with the site-specific risk assessment performed for these anticipated military uses of the site.

Should the need for less restrictive land use be identified by OHARNG beyond what was stated in the ROD, further action may be required to reduce concentrations of hazardous substances in soil to levels that allow for other uses of the site.

Changes in Risk Assessment Methodology and Tools

As described above for Load lines 1-4, there is now a more efficient and robust method for determining the upper confidence limit of the mean of a data set, which is used for determination of exposure point concentrations (USEPA 2010b). Several constituents that were identified in the risk assessment as contributing significantly to overall risk were eliminated as COCs in the Feasibility Study for Load Line 12 because their EPCs were lower than the cleanup goals developed for the National Guard Trainee (SAIC 2006b). A further comparison was made of maximum detected concentration to cleanup goals. This is a valid comparison and should result in a protective, yet not overly conservative, remediation. Because the maximum detected concentrations and not just EPCs were compared to cleanup goals, a change in EPC development would not affect protectiveness.

Significant Finding

The information on human health in this evaluation indicates that the standards meet today's standards of protectiveness for the National Guard Trainee. The toxicity and exposure related aspects of the remedy are considered to provide adequate protectiveness for this land use and this particular receptor specified in the ROD. The previous exposure parameter values used for the National Guard Trainee are still protective. Should the need for less restrictive land use be identified by OHARNG beyond what was stated in the ROD, further action may be required to reduce concentrations of hazardous substances in soil to levels that allow for other uses of the site.

ENVIRONMENTAL HEALTH (ECOLOGICAL ASSESSMENT)

A screening level risk assessment was performed for Load Line 12, along with an Ohio EPA Level III baseline ecological risk assessment, which provided site-specific updates (via mathematical modeling) to the ecological effects quotients estimated in the screening level assessment (Ohio EPA 2003). In addition, an ecological reconnaissance (field observations) was performed by field biologists to observe and evaluate the existing vegetation and animal life. As stated in the Feasibility Study for Load Line 12 (SAIC 2006b);

> *"This combination of information shows that while the mathematical modeling suggest risk to plants and selected animals at Load Line 12, the field observations reveal the ecological system with the plants and animals is functioning well and organisms appear to be healthy. Further, where surface water is involved, the use attainments are being met per Ohio guidance. Because of the combined finding that ecological systems are healthy as well as*

other reasons, no ecological preliminary cleanup goals are recommended and no remediation for ecological risks is justified at Load Line 12."

Furthermore;

"Stewardship of the environment will be a major consideration in all phases of planning, design, and implementation of the military mission (National Guard training). Potential removal of soil or sediment to achieve human health preliminary cleanup goals would reduce the overall concentrations of some contaminants and would have the effect of lowering the already low ecological exposure and risk. Some habitat alteration by mounted training and no digging exercises is expected to occur and result in some vegetation cut-back and/or removal by the action of brush-hogging (simpler or different habitat patches), shorted food chains in those patches (simpler habitat), and lower exposure (fewer organisms). However, these few changes would be small compared to the existing habitat disturbance (deforested areas, cut-over areas, and roads). These predictions and observations, along with the low concentrations of various constituents of ecological concern, make a case for no remediation recommended for ecological resources at Load Line 12."

Significant Finding

Although some constituents of ecological concern were identified for Load Line 12, remediation to meet human health cleanup goals will reduce overall contaminant concentrations and ecological risk. Additional removal of soil and dry sediment to further reduce any adverse ecological effects would destroy habitat (vegetation) temporarily in the narrow main ditch at Load Line 12. 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 remedial action objectives 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.

(3) Winklepeck Burning Grounds

Along with the August 2008 ROD for the Winklepeck Burning Grounds (SAIC 2008), there are two documents that support the establishment of cleanup goals for the site.

- *Focused Feasibility Study for the Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio.* March 2005 (SAIC 2005a)
- *Supplemental Human Health Risk Assessment for Revised Range Maintenance Soldier at the Former Winklepeck Burning Grounds.* May 2006 (SAIC 2006a)

The risk assessments from these documents were reviewed as follows.

HUMAN HEALTH

Changes in Toxicity

Toxicity criteria previously identified for COCs for the Winklepeck Burning Grounds were compared to toxicity criteria utilized by the USEPA in development of their Regional Screening Table, as this is updated on a regular basis (last updated in May 2012, USEPA 2012a). Updated toxicity criteria were further confirmed by a review of the primary toxicity criteria source (USEPA 2012b, c). Tables A8-1 and A8-2 present non-carcinogenic and carcinogenic toxicity criteria (as presented in Tables 4-1 and 4-2 of SAIC 2005a) along with any associated updates.

None of the hazardous constituents listed in Table A8-1, nor any of the carcinogens listed in Table A8-2 have any updates to their respective toxicity criteria under the exposure assumptions identified for the ROD (National Guard Soldier). Since under Military Land Use no exposures to children are expected, no adjustment to account for the susceptibility of early life exposures to carcinogens is warranted for this assessment (USEPA 2005).

Changes in Exposure

The following exposure factor values (soil ingestion rate, dermal exposure factors, inhalation rate, and body weight) used in the risk assessment for the National Guard Maintenance Soldier (Table 3.2, SAIC 2005a and 2006a) were compared to the values recommended by the latest USEPA guidance for exposure factors (USEPA 2011) and updates to dermal exposure assessment values (USEPA 2004 updated 2007). All of these exposure factor values used in the risk assessment for Winklepeck Burning Grounds were conservative (still should be considered protective) relative to updated USEPA recommendations for exposure factor values. For example, the soil ingestion rate could be halved based on newest guidance for this parameter. Adult body weight should increase by 10 kg. No updates to recommended parameter values would indicate that exposure assumptions should result in increased risk characterization. Therefore, the previous generic exposure parameter values are still protective.

Other exposure parameter values (such as exposure time, exposure frequency, and areas of the site assumed to produce exposure) further defined the primary receptor and activity (the National Guard Range Maintenance Soldier) identified for the reasonable future land use (military use by OHARNG).

Determination of COCs

A significant change in exposure assumptions could lead to the identification of other constituents as COCs, for which a remedial action objective should be developed. These may be constituents that were identified as COPCs but not found to contribute significantly to risk under a limited exposure scenario. For example, 2,4,6-TNT was identified as “the most commonly detected explosive at Winklepeck Burning Grounds” (Section 5.5.1, SAIC 2008). The maximum detected concentration of TNT for the site was 3,800 mg/kg (Table 2-2, SAIC 2006a), which is above the “unrestricted use” cleanup goal developed for an adult resident farmer of 211 mg/kg (Table 5-9, SAIC 2010a).

Changes in Risk Assessment Methodology and Tools

As described above for Load Lines 1-4, there is now a more efficient and robust method for determining the upper confidence limit of the mean of a data set, which is used for determination of exposure point concentrations (USEPA 2010b). In the Focused Feasibility Study for Winklepeck Burning Grounds, remedial actions were targeted toward reducing the upper confidence limit of the mean (i.e. the EPC) of constituent concentrations to below their respective cleanup goals (SAIC 2005b). This should result in a protective, yet not overly conservative, remediation.

Cleanup Goal Development

The cleanup goals presented in the ROD (SAIC 2008) differ from what is presented for the National Guard Range Maintenance Soldier in the *Final Facility Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (SAIC 2010a), despite the consistency between methodology, toxicity assessment, and exposure assessment for the same receptor identified for cleanup goal development in both documents. Therefore, a spot check of the calculations for cleanup goal development was performed. The cleanup goals for individual PAHs presented in the ROD appear to be calculated correctly and would result in the identified target ILCR of 1E-05 for individual PAHs for the National Guard Range Maintenance Soldier receptor.

Significant Finding

The information on human health in this memo indicates that the standards meet today's standards of protectiveness for the National Guard Maintenance Soldier (SAIC 2005 and 2006a). The toxicity and exposure related aspects of the remedy are considered to provide adequate protectiveness for this land use and this particular receptor specified in the ROD. Should the need for less restrictive land use be identified by OHARNG beyond what was stated in the ROD, further action may be required to reduce concentrations of hazardous substances in soil to levels that allow for other uses of the site.

ENVIRONMENTAL HEALTH (ECOLOGICAL ASSESSMENT)

A screening level ecological risk assessment was performed, along with site-specific field studies (considered part of a baseline ecological risk assessment) to ground truth the findings of the screening level ecological risk assessment. The conclusions from these ecological risk assessments are summarized in the Focused Feasibility Study for the Winklepeck Burning Grounds and subsequent documents (SAIC 2005a, 2008). The Winklepeck Burning Grounds ROD states;

> *"In summary, ecological risk exists from chemicals in the soil at Winklepeck Burning Grounds. There are both metal (e.g., chromium and zinc) and explosive (e.g., 2,6-DNT and RDX) ecological COCs, but risks are small as defined by hazard quotients (HQs) and field biological measurements. Any remedial action for protection of human health will alter habitat consisting of typical old fields and typical forest patches, but the potential area of involved habitat is insignificant compared to the total area of Winklepeck Burning Grounds and RVAAP. Soil removal to attain human health cleanup goals will remove contaminant mass and, therefore, reduce already low ecological risks."*

The following statement made in the Focused Feasibility Study for the Winklepeck Burning Grounds remains appropriate (2005).

> *"Stewardship of the environment will be a major consideration in all phases of planning, design, and construction of the Mark 19 Range. Habitat alteration is expected to be intensive and extensive and resulting in vegetation removal (simpler or missing habitat), shorter food chains (simpler ecosystem), and lower exposure (fewer organisms). Ecological risk is present although many of the re-calculated hazard quotients (HQs) are less than one. The weight-of-evidence, which encompasses (1) military land-use; (2) ecological field study results, including revised HQs; (3) consequences of habitat alteration; (4) no known off-site contaminant migration; and (5) partial mitigation from remedial activities involved with human health protection, indicates that there is little need for ecological RGOs at Winklepeck Burning Grounds."*

Significant Finding

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 Winklepeck Burning Grounds at RVAAP will not be managed for ecological purposes but instead will have intensive use by OHARNG, protection of human health will drive remedial action objectives 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.

(4) Ramsdell Quarry Landfill

Along with the ROD for the Ramsdell Quarry Landfill (SAIC 2009b), there are 2 documents that support the establishment of cleanup goals for the RQL.

- *Final Feasibility Study for Ramsdell Quarry Landfill (RVAAP-01) Ravenna Army Ammunition Plant Ravenna, Ohio. October 2006 (SAIC 2006c)*
- *Final Phase I Remedial Investigation Report for Ramsdell Quarry Landfill at the Ravenna Army Ammunition Plant, Ravenna, Ohio. September 2005 (SAIC 2005c).*

The risk assessments from these documents were reviewed as follows.

HUMAN HEALTH

Changes in Toxicity

Toxicity criteria previously identified for COCs for the Ramsdell Quarry Landfill (Appendix L, SAIC 2005c) were compared to toxicity criteria utilized by USEPA in development of their Regional Screening Table, as this is updated on a regular basis (last updated in May 2012, USEPA 2012a). Updated toxicity criteria were further confirmed by a review of the primary toxicity criteria source (USEPA 2012b, c). Tables A8-1 and A8-2 present non-carcinogenic and carcinogenic toxicity criteria along with any associated updates.

None of the hazardous constituents listed in Table A8-1, nor any of the carcinogens listed in Table A8-2 have any updates to their respective toxicity criteria under the exposure assumptions identified for the ROD (Security Guard/Maintenance Worker).

Changes in Exposure

The following exposure factor values (soil ingestion rate, dermal exposure factors, inhalation rate, and body weight) used in the risk assessment for the Security Guard/Maintenance Worker were compared to the values recommended by the latest USEPA guidance for exposure factors (USEPA 2011) and updates to dermal exposure assessment values (USEPA 2004 updated 2007). All of these exposure factor values used in the risk assessment for Ramsdell Quarry Landfill were conservative (still should be considered protective) relative to updated USEPA recommendations for exposure factor values. For example, the soil ingestion rate could be halved based on newest guidance for this parameter. Adult body weight should increase by 10 kg. No updates to recommended parameter values would indicate that exposure assumptions should result in increased risk characterization. Therefore, the previous exposure parameter values are still protective.

Other exposure parameter values (such as exposure time and exposure frequency) indicated that only very limited exposure (one hour a day) would occur for the Security Guard/Maintenance Worker at the Ramsdell Quarry Landfill. This is consistent with current land use.

In addition, the Feasibility Study for the Ramsdell Quarry Landfill evaluated risk to both juvenile and adult trespassers, and found that several COCs identified for the Security Guard / Maintenance Worker scenario would also pose an unacceptable risk to juvenile trespassers (SAIC 2006c). Therefore, remedial action is warranted even if no site-related worker were to be present or exposed to contamination at the Ramsdell Quarry Landfill.

Changes in Risk Assessment Methodology and Tools

As described above for Load Lines1 – 4, there is now a more efficient and robust method for determining the upper confidence limit of the mean of a data set, which is used for determination of exposure point concentrations (USEPA 2010b). The Feasibility Study for Ramsdell Quarry Landfill compared EPCs to cleanup goals in order to verify that all COCs were present above the $10E^{-5}$ target cancer risk or above the target hazard index of one. Therefore, proper EPC development is paramount to developing a remedy that is not only protective, but also is not more extensive than needed to ensure protectiveness.

Significant Finding

The information on human health in this memo indicates that the standards meet today's standards of protectiveness for the Security Guard/Maintenance Worker. The toxicity and exposure related aspects of the remedy are considered to provide adequate protectiveness for this land use and this particular receptor specified in the ROD. Remedial action is warranted also to protect juvenile trespassers.

ENVIRONMENTAL HEALTH (ECOLOGICAL ASSESSMENT)

A screening level risk assessment was performed for Ramsdell Quarry Landfill following Ohio EPA's guidance for a Level II evaluation (Ohio EPA 2003). This evaluation identified several constituents of potential ecological concern at the site, including PAHs, explosives, and metals. In addition, an ecological reconnaissance (field observations) was performed by field biologists to look directly at the existing vegetation and animal life. This included an ecological reconnaissance of existing vegetation and animal life and Ohio Rapid Assessment for Wetlands that involved a systematic documentation of the wetland quantity and quality. As discussed in the Feasibility Study for Ramsdell Quarry Landfill (SAIC 2006c), this combination of Level II screen and field observations shows that (1) while some constituents of potential ecological concern were identified for plants and selected animals at each AOC, and (2) the field observations reveal the ecological system with the plants and animals is functioning well and organisms appear to be healthy. Further, where surface water is involved, the use attainments are being met per Ohio guidance. Because of the combined finding that ecological systems are healthy and remediation would cause habitat destruction, no ecological preliminary cleanup goals are recommended and no remediation for ecological risks is justified at Ramsdell Quarry Landfill.

Significant Finding

Remediation to meet human health cleanup goals will reduce overall contaminant concentrations and ecological risk. Additional removal of soil and dry sediment to further reduce any adverse ecological effects would destroy habitat temporarily at the small soil removal areas at Ramsdell Quarry Landfill. 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.

REFERENCES FOR ATTACHMENT 8

(additional site-specific references are listed in Attachment 2)

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New Jersey Department of Environmental Protection (NJDEP) 2009. *Derivation of Ingestion-Based Soil Remediation Criterion for Cr+6 Based on the NTP Chronic Bioassay Data for Sodium Dichromate Dihydrate*. Prepared for the Risk Assessment Subgroup of the NJDEP Chromium Workgroup. April http://www.state.nj.us/dep/dsr/chromium/soil-cleanup-derivation.pdf

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USEPA 2009b, *Update of the Adult Lead Methodology's Default Baseline Blood Lead concentration and Geometric Standard Deviation Parameters.* Office of Superfund Remediation and Technology Innovation. June. http://www.epa.gov/superfund/health/contaminants/lead/products/almupdate.pdf

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USEPA 2011, *Exposure Factors Handbook 2011 Edition (Final)*, EPA/600/R-09/052F, National Center for Environmental Assessment, Washington, DC (dated September, released October 3); http://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236252

USEPA 2012a, *Regional Screening Levels (RSL) Summary Table, May 2012* (table last updated); available via EPA Region web sites, e.g., http://www.epa.gov/reg3hwmd/risk/human/rbconcentration_table/Generic_Tables/index.htm

USEPA 2012b. *Provisional Peer Reviewed Toxicity Values* Assessments Electronic Library. National Center for Environmental Assessments. http://hhpprtv.ornl.gov/

USEPA 2012c. *Integrated Risk Information System (IRIS), National Center for Environmental Assessments*. http://www.epa.gov/iris/

Table A8-1 Toxicity Evaluation for Non-Carcinogenic COCs for all RVAPP Sites Evaluated

COC	Toxicity Values				Updated Toxicity Source	Date of Update to Toxicity Criteria
	RfDo (mg/kg-day)		RfCi[4] (mg/m^3)			
	Previous	Current	Previous	Current		
Aluminum[1]	1.00E+00	NC	4.90E-03	NC		
Antimony[1]	4.00E-04	NC				
Arsenic[1,2]	3.00E-04	NC		1.5E-05	Cal EPA	Dec 2008
Barium[1]	7.00E-02	2.00E-01	4.90E-04	NC	IRIS	July 2005
Cadmium[1]	1.00E-03	NC				
Chromium, hexavalent[1]	3.00E-03	NC	1.02E-04	NC		
Manganese[1]	4.60E-02	NC	4.90E-05	NC		
2,4,6-Trinitrotoluene[1]	5.00E-04	NC				
PCB-1254[1]	2.00E-05	NC				
RDX[1,3]	3.00E-03	NC				

Blank entry indicates that no toxicity criteria was developed for that exposure route

RfDo - Oral Reference Dose

RfCi - Inhalation Reference Concentration

mg/m^3 – milligrams per cubic meter

NC - No change in toxicity criteria

1 - Designated as a COC for Load Lines 1-4 in the 2007 ROD
2 - Designated as a COC for Load Line 12 in the 2009 ROD
3 - Designated as a COC for Winklepeck Burning Grounds in the 2005 ROD
4 - Previously designated as an "inhalation reference dose (RfDi)", where

$$\text{RfCi (mg/m}^3) = \frac{\text{RfDi (mg/kg-day) x 70 kg}}{20 \text{ m}^3\text{/day}}$$

Table A8-2 Toxicity Evaluation for Carcinogenic COCs, for all RVAPP Sites Evaluated

COC	Toxicity Values				Updated Toxicity Source	Date of Update to Toxicity Criteria
	SFo (mg/kg-day)$^{-1}$		IUR[5] (µg/ m^3)			
	Previous	Current	Previous	Current		
Arsenic[1,2]	1.50E+00	NC	4.29E-03	NC		
Chromium, hexavalent[1,2,6]		5.00E-01	1.2E-02	NC	NJDEP	2009
2,4,6-Trinitrotoluene[1]	3.00E-02	NC		NC		
Benz(*a*)anthracene [1,2,3,4,6]	7.30E-01	NC	8.86E-05	NC		
Benzo(*a*)pyrene[1,2,3,4,6]	7.30E+00	NC	8.86E-04	NC		
Benzo(*b*)fluoranthene[1,2,3,4,6]	7.30E-01	NC	8.86E-05	NC		
Dibenz(*a,h*)anthracene[1,2,3,4,6]	7.30E+00	NC	8.86E-04	NC		
Indeno(1,2,3-*cd*)pyrene[2,3,4,6]	7.30E-01	NC	8.86E-05	NC		
PCB-1254[1]	2.00E+00	NC	5.71E-04	NC		
RDX[1,3]	1.10E-01	NC		NC		

Blank entry indicates that no toxicity criteria was developed for that exposure route

SFo - Oral Cancer Slope Factor

IUR - Inhalation Unit Cancer Risk

NC - No change in toxicity criteria

1 - Designated as a COC for Load Lines 1-4 in the 2007 ROD

2 - Designated as a COC for Load Line 12 in the 2009 ROD

3 - Designated as a COC for Winklepeck Burning Grounds in the 2005 ROD

4 - Designated as a COC for the Ramsdell Quarry Landfill in the 20101 ROD

5 - Previously designated as an "inhalation slope factor (SFi)", where

$$\text{IUR } (\mu g/m^3) = \frac{\text{SFi } (mg/kg\text{-}day)^{-1} \times 20\ m^3/day \times 0.001\ mg/\mu g}{70\ kg}$$

6 - Designated as a mutagenic carcinogen, for which toxicity criteria must be adjusted for early life exposures.

Table A8-3 Adult Lead Model of Calculation of Preliminary Remediation Goals

Description of Variable	Units	2009 updated factors GSDi and PbBo from Analysis of NHANES 1999-2004	2007 factors used in Load Lines 1 through 4 ROD
95^{th} percentile PbB in fetus	ug/dL	5	10
Fetal/maternal PbB ratio	--	0.9	0.9
Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
Geometric standard deviation PbB	--	1.8	2.3
Baseline PbB	ug/dL	1	1.8
Soil ingestion rate (including soil-derived indoor dust)*	g/day	0.1	0.100
Absorption fraction (same for soil and dust)	--	0.12	0.12
Exposure frequency (same for soil and dust)	days/yr	39	39
Averaging time (same for soil and dust)	days/yr	365	365
	ppm	**2,169**	**1,995**

* Note that the latest guidance also recommends that a value of 0.05 g/day be used for the soil ingestion rate.

g – gram(s)
GSDi – geometric standard deviation PbB
PbB – lead concentration in blood
PbBo – baseline PbB
ppm – parts per million
ug - micrograms
ug/dL – micrograms per deciliter

ATTACHMENT 9

PUBLIC NOTICES

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Public Notice

Ravenna Army Ammunition Plant (RVAAP)
THE US ARMY BEGINS FIRST FIVE-YEAR REVIEW

The US Army has begun the first five-year review (FYR) of environmental remedies undertaken at the Ravenna Army Ammunition Plant (RVAAP), Portage and Trumbull Counties, Ohio. The focus of the five-year reviews will be on the following sites:

- Ramsdell Quarry Landfill (site RVAAP-01)
- Winklepeck Burning Grounds (site RVAAP-05)
- Load Lines 1-4 (sites RVAAP-08, RVAAP-09, RVAAP-10, and RVAAP-11)
- Load Line 12 (site RVAAP-12)

The property is a secure Army facility.

The FYRs will be conducted to determine whether each site remedy remains protective of human health and the environment and functions as intended based on the decision documents. The FYRs will also assess factors to determine if the remedies would continue to be protective in the future.

If you have any concerns about the RVAAP sites, please contact Mr. Mark Patterson, Environmental Restoration Manager. The report is scheduled for completion by August 30, 2012. When completed, a copy of the final report will be available at the information repositories listed below and located on the website (rvaap.org).

Information Repository:
Reed Memorial Library
167 East Main Street
Ravenna, OH 44266

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

Contact Information:
Mark Patterson
Ravenna Army Ammunition Plant
8451 State Route 5, Bldg. 1037
Ravenna, OH 44266
(330) 358-7312
mark.c.patterson@us.army.mil

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U.S. Army checking Ravenna ammunition plant cleanup

Environmental reviews will look at four areas contaminated by the old ammunitions plant

By Bob Downing
Beacon Journal staff writer

Published: March 31, 2012 - 11:22 PM

The U.S. Army is kicking off five-year reviews of environmental cleanups at the now-closed Ravenna Army Ammunition Plant.

Those reviews will look at four cleanup projects at the 21,419-acre facility: the Ramsdell Quarry Landfill, the Winklepeck Burning Grounds, Load Lines No. 1-4 and Load Line 12.

Those four areas accounted for seven contaminated sites at the old Ravenna Arsenal in eastern Portage County and western Trumbull County.

The reviews will be conducted by the U.S. Army Corps of Engineers and are expected to be completed by Aug. 30, spokesman Mark Patterson said.

The reviews are required to assure that environmental cleanups continue to protect human health and the environment under federal rules.

They will also determine whether the selected remedies will continue to be effective in the future.

The reviews will be available at the Reed Memorial Library in Ravenna and the Newton Falls Public Library in Newton Falls. They will also be posted at www.rvaap.org.

Cleanup at the Ravenna facility is probably about 75 percent complete, Patterson said.

The Army and the Ohio Environmental Protection Agency are investigating sites on the grounds where rare metals and ores were previously stockpiled, he said.

Final environmental cleanup is expected to top $100 million. The Army must also deal with unexploded ammunition. That work will cost more than $40 million.

The Army is cleaning up the property and most of the site has been turned over to the Ohio National Guard as a training facility.

The Army also is working to transfer responsibility for the reclamation to its National Guard Bureau. That switch is expected to be completed by late September.

The Ravenna complex produced artillery and mortar shells in World War II, the Korean War and the Vietnam War. It closed in 1971.

For information, call Patterson at 330-358-7312.

Bob Downing can be reached at 330-996-3745 or bdowning@thebeaconjournal.com.

Find this article at:
http://www.ohio.com/news/local/u-s-army-checking-ravenna-ammunition-plant-cleanup-1.287865

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Remediation review to begin at the arsenal

Thomas Gallick
March 24, 2012

The U.S. Army has begun the first five-year review of environmental remediation efforts at the Ravenna Army Ammunitions Plant.

The focus of the review will be on the following sites: Ramsdell Quarry Landfill, Winklepeck Burning Grounds, Load lines No. 1-4 and Load line No. 12

The review will determine if environmental remedies are working, and whether they will continue to work in the future.

Anyone with concerns about the sites can call Mark Patterson, environmental restoration manager, at 330-358-7312.

The report will be completed by Aug. 30, with copies available at Reed Memorial Library in Ravenna, Newton Falls Public Library and at rvaap.org.

PUBLIC NOTICE

For Immediate Release:

Ravenna Army Ammunition Plant (RVAAP) Restoration Program
THE US ARMY COMPLETES FIRST FIVE-YEAR REVIEW

The US Army has completed the first five-year review (FYR) of environmental remedies undertaken as part of the Ravenna Army Ammunition Plant (RVAAP) Restoration Program, at the former RVAAP, Portage and Trumbull Counties, Ohio. The focus of the five-year review was on the following sites:

- Ramsdell Quarry Landfill (site RVAAP-01)
- Winklepeck Burning Grounds (site RVAAP-05)
- Load Lines 1-4 (sites RVAAP-08, RVAAP-09, RVAAP-10, and RVAAP-11)
- Load Line 12 (site RVAAP-12)

The federal property is licensed to the Ohio Army National Guard for use as a training facility, now known as the Camp Ravenna Joint Military Training Center.

The FYR was conducted to determine whether each site remedy remains protective of human health and the environment and functions as intended based on the decision documents. The FYR also determined if the remedies will continue to be protective in the future.

If you have any concerns about the RVAAP sites, please contact Mr. Mark Leeper. The report is available at the information repositories listed below and also located at http://www.rvaap.org/

Information Repositories:

Reed Memorial Library
167 East Main Street
Ravenna, OH 44266
Newton Falls Public Library
204 South Canal Street
Newton Falls, OH 44444

Contact Information:

Mark Leeper
Environmental Cleanup Program Manager
Army National Guard Directorate
Environmental Programs Division
ARNG-ILE-CR
111 South George Mason Drive
Arlington, VA 22204-1382
(703) 607-7955
mark.s.leeper.civ@mail.mil

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PUBLIC NOTICE RAVENNA ARMY AMMUNITION PLANT (RVAAP)

PUBLIC NOTICE Ravenna Army Ammunition Plant (RVAAP) Restoration Program THE US ARMY COMPLETES FIRST FIVE-YEAR REVIEW The US Army has completed the first five-year review (FYR) of environmental remedies undertaken as part of the Ravenna Army Ammunition Plant (RVAAP) Restoration Program, at the former RVAAP, Portage and Trumbull Counties, Ohio. The focus of the five-year review was on the following sites: Ramsdell Quarry Landfill (site RVAAP-01) Winklepeck Burning Grounds (site RVAAP-05) Load Lines 1-4 (sites RVAAP-08, RVAAP-09, RVAAP-10, and RVAAP-11) Load Line 12 (site RVAAP-12) The federal property is licensed to the Ohio Army National Guard for use as a training facility, now known as the Camp Ravenna Joint Military Training Center. The FYR was conducted to determine whether each site remedy remains protective of human health and the environment and functions as intended based on the decision documents. The FYR also determined if the remedies will continue to be protective in the future. If you have any concerns about the RVAAP sites, please contact Mr. Mark Leeper. The report is available at the information repositories listed below and also located at http://www.rvaap.org/ Information Repositories: Reed Memorial Library, 167 East Main Street, Ravenna, OH 44266. Newton Falls Public Library, 204 South Canal Street, Newton Falls, OH 44444. Contact Information: Mark Leeper, Environmental Cleanup Program Manager, Army National Guard Directorate, Environmental Programs Division, ARNG-ILE-CR, 111 South George Mason Drive, Arlington, VA 22204-1382. 703-607-7955 mark.s.leeper.civ@mail.mil

Appeared in: ***Akron Beacon Journal*** on Sunday, 03/08/2015

Ravenna Record Courier Sunday March 8, 2015

5 Legals

The US Army has completed the first five-year review (FYR) of environmental remedies undertaken as part of the Ravenna Army Ammunition Plant (RVAAP) Restoration Program, at the former RVAAP, Portage and Trumbull Counties, Ohio. The focus of the five-year review was on the following sites:

Ramsdell Quarry Landfill (site RVAAP-01)
Winklepeck Burning Grounds (site RVAAP-05)
Load Lines 1-4 (sites RVAAP-08, RVAAP-09, RVAAP-10, and RVAAP-11)
Load Line 12 (site RVAAP-12)

The federal property is licensed to the Ohio Army National Guard for use as a training facility, now known as the Camp Ravenna Joint Military Training Center.

The FYR was conducted to determine whether each site remedy remains protective of human health and the environment and functions as intended based on the decision documents. The FYR also determined if the remedies will continue to be protective in the future.

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Contact Information:
Mark Leeper
Environmental Cleanup Program Manager
Army National Guard Directorate
Environmental Programs Division
ARNG-ILE-CR
111 South George Mason Drive
Arlington, VA 22204-1382
(703) 607-7955
mark.s.leeper.civ@mail.mil
RC 3-8-15, #11940327

ATTACHMENT 10

GROUNDWATER MONITORING DATA

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Ravenna Five Year Review
Table A10-1
Groundwater Data

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.001	mg/L	U
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000099	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater		Explosives	RDX	0.001	mg/L	U
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Grab	Groundwater		Explosives	RDX	0.00011	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Grab	Groundwater		Explosives	RDX	0.000099	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Grab	Groundwater		Explosives	RDX	0.00011	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Grab	Groundwater		Inorganics	Aluminum	1.71	mg/L	=
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	J
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Grab	Groundwater		Inorganics	Antimony	0.00015	mg/L	UJ
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Grab	Groundwater		Inorganics	Arsenic	0.0084	mg/L	=
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Barium	0.02	mg/L	=
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Barium	0.0195	mg/L	=
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Grab	Groundwater		Inorganics	Barium	0.0277	mg/L	=
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Barium	0.0112	mg/L	=
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Barium	0.015	mg/L	=
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Barium	0.0341	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Barium	0.0274	mg/L	=
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Manganese	0.05	mg/L	=
LL1mw-067	FWGLL1mw-067-024-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Manganese	0.0132	mg/L	=
LL1mw-067	FWGLL1mw-067-024-GW	10/19/2009	Grab	Groundwater		Inorganics	Manganese	0.104	mg/L	=
LL1mw-067	FWGLL1mw-067C-1523-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Manganese	0.0131	mg/L	=
LL1mw-067	FWGLL1mw-067C-1589-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Manganese	0.0119	mg/L	=
LL1mw-067	FWGLL1mw-067C-1640-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Manganese	0.0677	mg/L	=
LL1mw-067	FWGLL1mw-067C-1715-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Manganese	0.085	mg/L	=
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00051	mg/L	U
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00549	mg/L	U
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00025	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00549	mg/L	U
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00025	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00549	mg/L	U
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00025	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-067	LL1MW067-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00549	mg/L	U
LL1mw-067	FWGLL1mw-067C-1523-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U

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Table A10-1
Groundwater Data

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-067	FWGLL1mw-067C-1589-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-067	FWGLL1mw-067C-1640-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00025	mg/L	U
LL1mw-067	FWGLL1mw-067C-1715-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00102	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater		Explosives	RDX	0.00102	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Grab	Groundwater		Explosives	RDX	0.000095	mg/L	J
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.0698	mg/L	J
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.253	mg/L	=
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Grab	Groundwater		Inorganics	Aluminum	3.12	mg/L	=
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.11	mg/L	=
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	J
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Antimony	0.00024	mg/L	J
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Grab	Groundwater		Inorganics	Antimony	0.002	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Grab	Groundwater		Inorganics	Arsenic	0.0071	mg/L	=
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Barium	0.0163	mg/L	=
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Barium	0.0093	mg/L	J
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Grab	Groundwater		Inorganics	Barium	0.0272	mg/L	=
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Barium	0.0162	mg/L	=
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Manganese	0.06	mg/L	=
LL1mw-078	FWGLL1mw-078C-0535-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Manganese	0.12	mg/L	=
LL1mw-078	FWGLL1mw-078-025-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Manganese	0.0338	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-078	FWGLL1mw-078-025-GW	10/19/2009	Grab	Groundwater		Inorganics	Manganese	0.159	mg/L	=
LL1mw-078	FWGLL1mw-078C-1524-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Manganese	0.071	mg/L	=
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0051	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0051	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0051	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-078	LL1MW078-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0051	mg/L	U
LL1mw-078	FWGLL1mw-078C-0535-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-078	FWGLL1mw-078C-1524-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00102	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000097	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000057	mg/L	J
LL1mw-081	FWGLL1mw-081C-1765-GW	8/1/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00005	mg/L	J
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater		Explosives	RDX	0.00102	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Grab	Groundwater		Explosives	RDX	0.001	mg/L	=
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Grab	Groundwater		Explosives	RDX	0.00035	mg/L	J
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Grab	Groundwater		Explosives	RDX	0.0011	mg/L	J
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Grab	Groundwater		Explosives	RDX	0.0016	mg/L	=
LL1mw-081	FWGLL1mw-081C-1765-GW	8/1/2011	Grab	Groundwater		Explosives	RDX	0.0016	mg/L	J
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Grab	Groundwater		Inorganics	Aluminum	0.0262	mg/L	J
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.025	mg/L	J

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Grab	Groundwater		Inorganics	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Antimony	0.00018	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Grab	Groundwater		Inorganics	Arsenic	0.0044	mg/L	J
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.0032	mg/L	J
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Barium	0.02	mg/L	=
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Barium	0.0168	mg/L	=
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Grab	Groundwater		Inorganics	Barium	0.0188	mg/L	=
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Barium	0.0182	mg/L	=
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Barium	0.0195	mg/L	=
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Barium	0.0206	mg/L	=
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Barium	0.0214	mg/L	=
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Barium	0.018	mg/L	=
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Manganese	2.09	mg/L	=
LL1mw-081	FWGLL1mw-081-028-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Manganese	1.9	mg/L	=
LL1mw-081	FWGLL1mw-081-028-GW	10/19/2009	Grab	Groundwater		Inorganics	Manganese	1.85	mg/L	=
LL1mw-081	FWGLL1mw-081C-1526-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Manganese	1.83	mg/L	=
LL1mw-081	FWGLL1mw-081C-1590-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Manganese	1.95	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-081	FWGLL1mw-081C-1641-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Manganese	2.03	mg/L	=
LL1mw-081	FWGLL1mw-081C-1716-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Manganese	2.17	mg/L	=
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Manganese	2	mg/L	=
LL1mw-081	FWGLL1mw-081C-1765-GF	8/1/2011	Grab	Groundwater	F	Miscellaneous	Chromium, hexavalent	0.02	mg/L	UJ
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0051	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0051	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0051	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-081	LL1MW081-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0051	mg/L	U
LL1mw-081	FWGLL1mw-081C-1526-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1590-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1641-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-081	FWGLL1mw-081C-1716-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.001	mg/L	U
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000098	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-082	FWGLL1mw-082C-1766-GW	8/1/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater		Explosives	RDX	0.001	mg/L	U
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Grab	Groundwater		Explosives	RDX	0.000098	mg/L	U

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LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Grab	Groundwater		Explosives	RDX	0.00042	mg/L	=
LL1mw-082	FWGLL1mw-082C-1766-GW	8/1/2011	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	UJ
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Grab	Groundwater		Inorganics	Aluminum	5.2	mg/L	=
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Grab	Groundwater		Inorganics	Antimony	0.00014	mg/L	UJ
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Grab	Groundwater		Inorganics	Arsenic	0.018	mg/L	=
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.0036	mg/L	J
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.0049	mg/L	J
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Barium	0.0118	mg/L	=
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Grab	Groundwater		Inorganics	Barium	0.045	mg/L	=
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Barium	0.0099	mg/L	J
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Barium	0.0096	mg/L	J
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Barium	0.0111	mg/L	=
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Barium	0.0109	mg/L	=
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Grab	Groundwater		Inorganics	Cadmium	0.00032	mg/L	J
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.00018	mg/L	J
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.00019	mg/L	J
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0002	mg/L	J
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.00017	mg/L	J
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Manganese	0.69	mg/L	=
LL1mw-082	FWGLL1mw-082-029-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Manganese	0.945	mg/L	=
LL1mw-082	FWGLL1mw-082-029-GW	10/19/2009	Grab	Groundwater		Inorganics	Manganese	1	mg/L	=
LL1mw-082	FWGLL1mw-082C-1527-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Manganese	1.08	mg/L	=
LL1mw-082	FWGLL1mw-082C-1591-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Manganese	0.456	mg/L	=
LL1mw-082	FWGLL1mw-082C-1642-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Manganese	2.66	mg/L	=
LL1mw-082	FWGLL1mw-082C-1718-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Manganese	1.64	mg/L	=
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Manganese	1.2	mg/L	=
LL1mw-082	FWGLL1mw-082C-1766-GF	8/1/2011	Grab	Groundwater	F	Miscellaneous	Chromium, hexavalent	0.02	mg/L	UJ
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0051	mg/L	U
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0051	mg/L	U
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0051	mg/L	U
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-082	LL1MW082-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0051	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-082	FWGLL1mw-082C-1527-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1591-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1642-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-082	FWGLL1mw-082C-1718-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00918	mg/L	=
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0092	mg/L	J
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.01	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Field Duplicate	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.009	mg/L	J
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.013	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Field Duplicate	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.012	mg/L	J
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0084	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Field Duplicate	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0098	mg/L	J
LL1mw-084	FWGLL1mw-084C-1768-GW	8/1/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0073	mg/L	=
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater		Explosives	RDX	0.00242	mg/L	=
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Grab	Groundwater		Explosives	RDX	0.00076	mg/L	J
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Field Duplicate	Groundwater		Explosives	RDX	0.000097	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Grab	Groundwater		Explosives	RDX	0.00069	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Field Duplicate	Groundwater		Explosives	RDX	0.00066	mg/L	J
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Grab	Groundwater		Explosives	RDX	0.00042	mg/L	J
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Field Duplicate	Groundwater		Explosives	RDX	0.00049	mg/L	J
LL1mw-084	FWGLL1mw-084C-1768-GW	8/1/2011	Grab	Groundwater		Explosives	RDX	0.00069	mg/L	J
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Aluminum	1.59	mg/L	=
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.53	mg/L	=
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Grab	Groundwater		Inorganics	Aluminum	14.1	mg/L	=
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.335	mg/L	=
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.515	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Field Duplicate	Groundwater	F	Inorganics	Aluminum	0.465	mg/L	=
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.337	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Field Duplicate	Groundwater	F	Inorganics	Aluminum	0.357	mg/L	=
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.246	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Field Duplicate	Groundwater	F	Inorganics	Aluminum	0.244	mg/L	=
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.59	mg/L	=
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	J
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Grab	Groundwater		Inorganics	Antimony	0.00029	mg/L	UJ
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Field Duplicate	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Field Duplicate	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Field Duplicate	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	U
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Grab	Groundwater		Inorganics	Arsenic	0.0125	mg/L	=
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Field Duplicate	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Field Duplicate	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Field Duplicate	Groundwater	F	Inorganics	Arsenic	0.0044	mg/L	J
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Barium	0.02	mg/L	=
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Barium	0.0142	mg/L	=
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Grab	Groundwater		Inorganics	Barium	0.0368	mg/L	=
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Barium	0.014	mg/L	=
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Barium	0.0161	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Field Duplicate	Groundwater	F	Inorganics	Barium	0.0155	mg/L	=
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Barium	0.0178	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Field Duplicate	Groundwater	F	Inorganics	Barium	0.0188	mg/L	=
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Barium	0.0167	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Field Duplicate	Groundwater	F	Inorganics	Barium	0.0171	mg/L	=
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Barium	0.015	mg/L	=
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0019	mg/L	=
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Grab	Groundwater		Inorganics	Cadmium	0.0019	mg/L	=
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0016	mg/L	=
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.002	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Field Duplicate	Groundwater	F	Inorganics	Cadmium	0.002	mg/L	=
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0018	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Field Duplicate	Groundwater	F	Inorganics	Cadmium	0.0019	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0015	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Field Duplicate	Groundwater	F	Inorganics	Cadmium	0.0015	mg/L	=
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0015	mg/L	=
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Manganese	0.31	mg/L	=
LL1mw-084	FWGLL1mw-084-031-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Manganese	0.153	mg/L	=
LL1mw-084	FWGLL1mw-084-031-GW	10/19/2009	Grab	Groundwater		Inorganics	Manganese	0.184	mg/L	=
LL1mw-084	FWGLL1mw-084C-1529-GF	7/14/2010	Grab	Groundwater	F	Inorganics	Manganese	0.196	mg/L	=
LL1mw-084	FWGLL1mw-084C-1592-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Manganese	0.164	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1625-GF	10/11/2010	Field Duplicate	Groundwater	F	Inorganics	Manganese	0.157	mg/L	=
LL1mw-084	FWGLL1mw-084C-1643-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Manganese	0.222	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1693-GF	1/17/2011	Field Duplicate	Groundwater	F	Inorganics	Manganese	0.237	mg/L	=
LL1mw-084	FWGLL1mw-084C-1719-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Manganese	0.192	mg/L	=
LL1mw-084	FWGLL1mw-DUP2-1747-GF	4/5/2011	Field Duplicate	Groundwater	F	Inorganics	Manganese	0.196	mg/L	=
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Manganese	0.17	mg/L	=
LL1mw-084	FWGLL1mw-084C-1768-GF	8/1/2011	Grab	Groundwater	F	Miscellaneous	Chromium, hexavalent	0.02	mg/L	UJ
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00054	mg/L	U
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Field Duplicate	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Field Duplicate	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Field Duplicate	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0051	mg/L	U
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Field Duplicate	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0051	mg/L	U
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0051	mg/L	U
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-084	LL1MW084-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0051	mg/L	U
LL1mw-084	FWGLL1mw-084C-1529-GW	7/14/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1592-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1625-GW	10/11/2010	Field Duplicate	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1643-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1693-GW	1/17/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-084C-1719-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-084	FWGLL1mw-DUP2-1747-GW	4/5/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00105	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GW	8/1/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater		Explosives	RDX	0.00105	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Grab	Groundwater		Explosives	RDX	0.00011	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GW	8/1/2011	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	UJ
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Grab	Groundwater		Inorganics	Aluminum	0.0322	mg/L	J
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U

Ravenna Five Year Review
Table A10-1
Groundwater Data

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	J
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Grab	Groundwater		Inorganics	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Grab	Groundwater		Inorganics	Arsenic	0.0137	mg/L	=
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.0057	mg/L	=
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.0057	mg/L	=
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.0048	mg/L	J
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Barium	0.02	mg/L	=
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Barium	0.0161	mg/L	=
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Grab	Groundwater		Inorganics	Barium	0.0232	mg/L	=
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Barium	0.0134	mg/L	=
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Barium	0.0176	mg/L	=
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Barium	0.0163	mg/L	=
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Barium	0.022	mg/L	=
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Barium	0.016	mg/L	=
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater	F	Inorganics	Manganese	0.61	mg/L	=
LL1mw-085	FWGLL1mw-085-032-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Manganese	0.546	mg/L	=
LL1mw-085	FWGLL1mw-085-032-GW	10/20/2009	Grab	Groundwater		Inorganics	Manganese	0.575	mg/L	=
LL1mw-085	FWGLL1mw-085C-1530-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Manganese	0.564	mg/L	=

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Table A10-1
Groundwater Data

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL1mw-085	FWGLL1mw-085C-1593-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Manganese	0.638	mg/L	=
LL1mw-085	FWGLL1mw-085C-1644-GF	1/17/2011	Grab	Groundwater	F	Inorganics	Manganese	0.179	mg/L	=
LL1mw-085	FWGLL1mw-085C-1720-GF	4/5/2011	Grab	Groundwater	F	Inorganics	Manganese	1.18	mg/L	=
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Grab	Groundwater	F	Inorganics	Manganese	0.84	mg/L	=
LL1mw-085	FWGLL1mw-085C-1769-GF	8/1/2011	Grab	Groundwater	F	Miscellaneous	Chromium, hexavalent	0.02	mg/L	UJ
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00051	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL1mw-085	LL1MW085-080207	8/2/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.005	mg/L	U
LL1mw-085	FWGLL1mw-085C-1530-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1593-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1644-GW	1/17/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL1mw-085	FWGLL1mw-085C-1720-GW	4/5/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00105	mg/L	U
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00106	mg/L	U
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000098	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater		Explosives	RDX	0.00105	mg/L	U
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater		Explosives	RDX	0.00106	mg/L	U
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Grab	Groundwater		Explosives	RDX	0.00011	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Grab	Groundwater		Explosives	RDX	0.000098	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	UJ
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Grab	Groundwater		Inorganics	Aluminum	0.639	mg/L	=
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.0249	mg/L	J
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	J
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Antimony	0	mg/L	J
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Grab	Groundwater		Inorganics	Antimony	0.00014	mg/L	UJ
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	J
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Arsenic	0	mg/L	J
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Grab	Groundwater		Inorganics	Arsenic	0.0375	mg/L	=
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Barium	0.02	mg/L	=
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Barium	0.02	mg/L	=
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Barium	0.0194	mg/L	=
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Barium	0.0148	mg/L	=
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Grab	Groundwater		Inorganics	Barium	0.0471	mg/L	=
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Barium	0.0162	mg/L	=
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Grab	Groundwater		Inorganics	Cadmium	0.00013	mg/L	UJ
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Manganese	0.29	mg/L	=
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Manganese	0.26	mg/L	=
LL2mw-262	FWGLL2mw-262C-0539-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Manganese	0.922	mg/L	=
LL2mw-262	FWGLL2mw-262C-036-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Manganese	1.12	mg/L	=
LL2mw-262	FWGLL2mw-262C-036-GW	10/19/2009	Grab	Groundwater		Inorganics	Manganese	6.24	mg/L	=
LL2mw-262	FWGLL2mw-262C-1534-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Manganese	0.0774	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00053	mg/L	U
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater		Pesticides and PCBs	PCB-1254	0.00053	mg/L	U
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00538	mg/L	U
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00543	mg/L	U
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00538	mg/L	U
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00543	mg/L	U
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00538	mg/L	U
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00543	mg/L	U
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-262	LL2MW262-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00538	mg/L	U
LL2mw-262	LL2MW262DUP-080107	8/1/2007	Field Duplicate	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00543	mg/L	U
LL2mw-262	FWGLL2mw-262C-0539-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-262	FWGLL2mw-262C-1534-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00102	mg/L	U
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000098	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater		Explosives	RDX	0.00102	mg/L	U
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Grab	Groundwater		Explosives	RDX	0.00011	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Grab	Groundwater		Explosives	RDX	0.000098	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	UJ
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.0572	mg/L	=
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Grab	Groundwater		Inorganics	Aluminum	2.32	mg/L	=
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	U
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Grab	Groundwater		Inorganics	Antimony	0.00017	mg/L	UJ
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Arsenic	0.01	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Arsenic	0.0168	mg/L	=
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.0172	mg/L	=
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Grab	Groundwater		Inorganics	Arsenic	0.0227	mg/L	=
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.0154	mg/L	=
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Barium	0.03	mg/L	=
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Barium	0.027	mg/L	=
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Barium	0.0261	mg/L	=
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Grab	Groundwater		Inorganics	Barium	0.0368	mg/L	=
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Barium	0.0215	mg/L	=
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Manganese	0.84	mg/L	=
LL2mw-263	FWGLL2mw-263C-0540-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Manganese	1.59	mg/L	=
LL2mw-263	FWGLL2mw-263-037-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Manganese	2.14	mg/L	=
LL2mw-263	FWGLL2mw-263-037-GW	10/19/2009	Grab	Groundwater		Inorganics	Manganese	2.1	mg/L	=
LL2mw-263	FWGLL2mw-263C-1535-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Manganese	1.45	mg/L	=
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00052	mg/L	U
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00538	mg/L	U
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00538	mg/L	U
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00538	mg/L	U
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-263	LL2MW263-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00538	mg/L	U
LL2mw-263	FWGLL2mw-263C-0540-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-263	FWGLL2mw-263C-1535-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00103	mg/L	U
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00106	mg/L	U
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000099	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00011	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater		Explosives	RDX	0.00103	mg/L	U
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater		Explosives	RDX	0.00106	mg/L	U
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Grab	Groundwater		Explosives	RDX	0.000099	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Grab	Groundwater		Explosives	RDX	0.00011	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Grab	Groundwater		Explosives	RDX	0.00011	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Grab	Groundwater		Inorganics	Aluminum	5	mg/L	=
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Aluminum	1.06	mg/L	=
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.0567	mg/L	=
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	J
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Antimony	0	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Grab	Groundwater		Inorganics	Antimony	0.00021	mg/L	J
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	U
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Arsenic	0.01	mg/L	=
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Grab	Groundwater		Inorganics	Arsenic	0.0177	mg/L	=
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.0056	mg/L	=
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.0042	mg/L	J
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Barium	0.02	mg/L	=
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Barium	0.03	mg/L	=
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Grab	Groundwater		Inorganics	Barium	0.0352	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Barium	0.0191	mg/L	=
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Barium	0.0155	mg/L	=
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Barium	0.021	mg/L	=
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Barium	0.0139	mg/L	=
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.00019	mg/L	J
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Grab	Groundwater		Inorganics	Cadmium	0.00079	mg/L	=
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.00024	mg/L	J
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.00014	mg/L	J
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Manganese	1.12	mg/L	=
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater	F	Inorganics	Manganese	0.98	mg/L	=
LL2mw-266	FWGLL2mw-266-040-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Manganese	0.856	mg/L	=
LL2mw-266	FWGLL2mw-266-040-GW	10/20/2009	Grab	Groundwater		Inorganics	Manganese	4.37	mg/L	=
LL2mw-266	FWGLL2mw-266C-1537-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Manganese	1.39	mg/L	=
LL2mw-266	FWGLL2mw-266C-1594-GF	10/11/2010	Grab	Groundwater	F	Inorganics	Manganese	1.25	mg/L	=
LL2mw-266	FWGLL2mw-266C-1645-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Manganese	0.936	mg/L	=
LL2mw-266	FWGLL2mw-266C-1721-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Manganese	0.761	mg/L	J
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00055	mg/L	U
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater		Pesticides and PCBs	PCB-1254	0.00056	mg/L	U
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00532	mg/L	U
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00532	mg/L	U
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00532	mg/L	U
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00532	mg/L	U
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00532	mg/L	U
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00532	mg/L	U
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-266	LL2MW266-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00532	mg/L	U
LL2mw-266	LL2MW266DUP-080107	8/1/2007	Field Duplicate	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00532	mg/L	U
LL2mw-266	FWGLL2mw-266C-1537-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1594-GW	10/11/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1645-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-266	FWGLL2mw-266C-1721-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00104	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00027	mg/L	=
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00016	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Field Duplicate	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00012	mg/L	=
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00067	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Field Duplicate	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00056	mg/L	=
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00049	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Field Duplicate	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00047	mg/L	=
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater		Explosives	RDX	0.00104	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Grab	Groundwater		Explosives	RDX	0.0011	mg/L	=
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Grab	Groundwater		Explosives	RDX	0.00093	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Field Duplicate	Groundwater		Explosives	RDX	0.00086	mg/L	J
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Grab	Groundwater		Explosives	RDX	0.0017	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Field Duplicate	Groundwater		Explosives	RDX	0.0015	mg/L	J
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Grab	Groundwater		Explosives	RDX	0.0013	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Field Duplicate	Groundwater		Explosives	RDX	0.0014	mg/L	=
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.0589	mg/L	=
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Grab	Groundwater		Inorganics	Aluminum	0.577	mg/L	=
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Aluminum	51.3	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Field Duplicate	Groundwater	F	Inorganics	Aluminum	43.9	mg/L	=
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.318	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Field Duplicate	Groundwater	F	Inorganics	Aluminum	0.367	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.033	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Field Duplicate	Groundwater	F	Inorganics	Aluminum	0.0357	mg/L	J
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	J
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Antimony	0.00016	mg/L	UJ
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Grab	Groundwater		Inorganics	Antimony	0.002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Antimony	0.0006	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Field Duplicate	Groundwater	F	Inorganics	Antimony	0.00056	mg/L	J
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Field Duplicate	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Field Duplicate	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	U
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Grab	Groundwater		Inorganics	Arsenic	0.0081	mg/L	=
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.137	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Field Duplicate	Groundwater	F	Inorganics	Arsenic	0.102	mg/L	=
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Field Duplicate	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Field Duplicate	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Barium	0.02	mg/L	=
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Barium	0.0196	mg/L	=
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Grab	Groundwater		Inorganics	Barium	0.0241	mg/L	=
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Barium	0.0149	mg/L	=
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Barium	0.274	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Field Duplicate	Groundwater	F	Inorganics	Barium	0.248	mg/L	=
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Barium	0.0149	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Field Duplicate	Groundwater	F	Inorganics	Barium	0.0151	mg/L	=
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Barium	0.0117	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Field Duplicate	Groundwater	F	Inorganics	Barium	0.0117	mg/L	=
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.00097	mg/L	=

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Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Field Duplicate	Groundwater	F	Inorganics	Cadmium	0.00075	mg/L	=
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Field Duplicate	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Field Duplicate	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater	F	Inorganics	Manganese	0.59	mg/L	=
LL2mw-267	FWGLL2mw-267C-041-GF	10/19/2009	Grab	Groundwater	F	Inorganics	Manganese	0.652	mg/L	=
LL2mw-267	FWGLL2mw-267C-041-GW	10/19/2009	Grab	Groundwater		Inorganics	Manganese	0.673	mg/L	=
LL2mw-267	FWGLL2mw-267C-1565-GF	7/9/2010	Grab	Groundwater	F	Inorganics	Manganese	0.622	mg/L	=
LL2mw-267	FWGLL2mw-267C-1595-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Manganese	2.85	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1627-GF	10/12/2010	Field Duplicate	Groundwater	F	Inorganics	Manganese	2.24	mg/L	=
LL2mw-267	FWGLL2mw-267C-1646-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Manganese	0.547	mg/L	=
LL2mw-267	FWGLL2mw-DUP3-1694-GF	1/18/2011	Field Duplicate	Groundwater	F	Inorganics	Manganese	0.551	mg/L	=
LL2mw-267	FWGLL2mw-267C-1722-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Manganese	0.564	mg/L	J
LL2mw-267	FWGLL2mw-DUP3-1748-GF	4/7/2011	Field Duplicate	Groundwater	F	Inorganics	Manganese	0.568	mg/L	J
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00053	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Field Duplicate	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Field Duplicate	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Field Duplicate	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Field Duplicate	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-267	LL2MW267-080107	8/1/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.005	mg/L	U
LL2mw-267	FWGLL2mw-267C-1565-GW	7/9/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1595-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1627-GW	10/12/2010	Field Duplicate	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1646-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1694-GW	1/18/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-267C-1722-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-267	FWGLL2mw-DUP3-1748-GW	4/7/2011	Field Duplicate	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00104	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000098	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000096	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater		Explosives	RDX	0.00104	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Grab	Groundwater		Explosives	RDX	0.000098	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Grab	Groundwater		Explosives	RDX	0.000096	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Grab	Groundwater		Inorganics	Aluminum	0.448	mg/L	=
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U

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Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Grab	Groundwater		Inorganics	Antimony	0.002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	J
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Grab	Groundwater		Inorganics	Arsenic	0.0041	mg/L	J
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Barium	0.26	mg/L	=
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Barium	0.23	mg/L	=
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Grab	Groundwater		Inorganics	Barium	0.289	mg/L	=
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Barium	0.215	mg/L	=
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Barium	0.216	mg/L	=
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Barium	0.232	mg/L	=
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Barium	0.218	mg/L	=
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Manganese	1.78	mg/L	=
LL2mw-269	FWGLL2mw-269-043-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Manganese	1.77	mg/L	=
LL2mw-269	FWGLL2mw-269-043-GW	10/20/2009	Grab	Groundwater		Inorganics	Manganese	1.75	mg/L	=
LL2mw-269	FWGLL2mw-269C-1538-GF	7/15/2010	Grab	Groundwater	F	Inorganics	Manganese	1.54	mg/L	=
LL2mw-269	FWGLL2mw-269C-1596-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Manganese	1.52	mg/L	=
LL2mw-269	FWGLL2mw-269C-1647-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Manganese	1.57	mg/L	=
LL2mw-269	FWGLL2mw-269C-1723-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Manganese	1.59	mg/L	J
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00051	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00521	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	UJ
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00521	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	UJ
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00521	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	UJ
LL2mw-269	LL2MW269-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00521	mg/L	U
LL2mw-269	FWGLL2mw-269C-1538-GW	7/15/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1596-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1647-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL2mw-269	FWGLL2mw-269C-1723-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	UJ
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00105	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00031	mg/L	J
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00017	mg/L	=
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000084	mg/L	J
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00018	mg/L	=
LL3mw-236	FWGLL3mw-236C-1775-GW	8/4/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00037	mg/L	=
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater		Explosives	RDX	0.00105	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Grab	Groundwater		Explosives	RDX	0.000098	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Grab	Groundwater		Explosives	RDX	0.00011	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GW	8/4/2011	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Grab	Groundwater		Inorganics	Aluminum	0.05	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.04	mg/L	J
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Grab	Groundwater		Inorganics	Antimony	0.002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Antimony	0.00015	mg/L	J
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	J
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Grab	Groundwater		Inorganics	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Grab	Groundwater		Inorganics	Barium	0.0095	mg/L	J
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Grab	Groundwater	F	Inorganics	Barium	0.003	mg/L	J
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Manganese	0.6	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL3mw-236	FWGLL3mw-236-049-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Manganese	0.0039	mg/L	J
LL3mw-236	FWGLL3mw-236-049-GW	10/20/2009	Grab	Groundwater		Inorganics	Manganese	2.13	mg/L	=
LL3mw-236	FWGLL3mw-236C-1542-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Manganese	0.235	mg/L	=
LL3mw-236	FWGLL3mw-236C-1597-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Manganese	0.24	mg/L	=
LL3mw-236	FWGLL3mw-236C-1648-GF	1/18/2011	Grab	Groundwater	F	Inorganics	Manganese	0.129	mg/L	=
LL3mw-236	FWGLL3mw-236C-1724-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Manganese	0.344	mg/L	J
LL3mw-236	FWGLL3mw-236C-1775-GF	8/4/2011	Grab	Groundwater	F	Inorganics	Manganese	0.97	mg/L	J
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00056	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00526	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	UJ
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00526	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	UJ
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00526	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	UJ
LL3mw-236	LL3MW236-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00526	mg/L	U
LL3mw-236	FWGLL3mw-236C-1542-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1597-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1648-GW	1/18/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-236	FWGLL3mw-236C-1724-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	UJ
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0642	mg/L	=
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.096	mg/L	J
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.069	mg/L	=
LL3mw-238	FWGLL3mw-238C-1776-GW	8/3/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.095	mg/L	J
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater		Explosives	RDX	0.00842	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Grab	Groundwater		Explosives	RDX	0.0066	mg/L	J
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Grab	Groundwater		Explosives	RDX	0.011	mg/L	J
LL3mw-238	FWGLL3mw-238C-1776-GW	8/3/2011	Grab	Groundwater		Explosives	RDX	0.0048	mg/L	J
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.0165	mg/L	J
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.0583	mg/L	=
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Grab	Groundwater		Inorganics	Aluminum	5.84	mg/L	=
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	UJ
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	U
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Grab	Groundwater		Inorganics	Antimony	0.00026	mg/L	J
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	J
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Grab	Groundwater		Inorganics	Arsenic	0.0117	mg/L	=
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Barium	0.0067	mg/L	J
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Barium	0.0108	mg/L	=
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Grab	Groundwater		Inorganics	Barium	0.0416	mg/L	=
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Barium	0.0089	mg/L	J
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Grab	Groundwater	F	Inorganics	Barium	0.0084	mg/L	J
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater	F	Inorganics	Manganese	0.01	mg/L	U
LL3mw-238	FWGLL3mw-238C-0541-GF	10/8/2007	Grab	Groundwater	F	Inorganics	Manganese	0.0019	mg/L	J
LL3mw-238	FWGLL3mw-238C-051-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Manganese	0.0056	mg/L	J
LL3mw-238	FWGLL3mw-238C-051-GW	10/20/2009	Grab	Groundwater		Inorganics	Manganese	0.279	mg/L	=

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL3mw-238	FWGLL3mw-238C-1650-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Manganese	0.01	mg/L	U
LL3mw-238	FWGLL3mw-238C-1776-GF	8/3/2011	Grab	Groundwater	F	Inorganics	Manganese	0.0012	mg/L	J
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00051	mg/L	U
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0051	mg/L	U
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0051	mg/L	U
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0051	mg/L	U
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-238	LL3MW238-073107	7/31/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0051	mg/L	U
LL3mw-238	FWGLL3mw-238C-0541-GW	10/8/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-238	FWGLL3mw-238C-1650-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00105	mg/L	U
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00026	mg/L	J
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00019	mg/L	=
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00015	mg/L	=
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0002	mg/L	=
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater		Explosives	RDX	0.00105	mg/L	U
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Grab	Groundwater		Explosives	RDX	0.0017	mg/L	=
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Grab	Groundwater		Explosives	RDX	0.0016	mg/L	=
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Grab	Groundwater		Explosives	RDX	0.0016	mg/L	J
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Grab	Groundwater		Explosives	RDX	0.0017	mg/L	=
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.0384	mg/L	J
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Grab	Groundwater		Inorganics	Aluminum	1.36	mg/L	=
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.0466	mg/L	J
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.394	mg/L	=
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	J
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Grab	Groundwater		Inorganics	Antimony	0.00013	mg/L	UJ

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Groundwater Data

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	J
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Grab	Groundwater		Inorganics	Arsenic	0.0134	mg/L	=
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.0039	mg/L	J
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.0036	mg/L	J
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	U
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Barium	0.0122	mg/L	=
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Grab	Groundwater		Inorganics	Barium	0.0205	mg/L	=
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Barium	0.0104	mg/L	=
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Barium	0.0147	mg/L	=
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Barium	0.0192	mg/L	=
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Barium	0.0111	mg/L	=
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Manganese	0.41	mg/L	=
LL3mw-239	FWGLL3mw-239-052-GF	10/20/2009	Grab	Groundwater	F	Inorganics	Manganese	0.137	mg/L	=
LL3mw-239	FWGLL3mw-239-052-GW	10/20/2009	Grab	Groundwater		Inorganics	Manganese	0.125	mg/L	=
LL3mw-239	FWGLL3mw-239C-1543-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Manganese	0.101	mg/L	=
LL3mw-239	FWGLL3mw-239C-1598-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Manganese	0.175	mg/L	=
LL3mw-239	FWGLL3mw-239C-1651-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Manganese	0.182	mg/L	=
LL3mw-239	FWGLL3mw-239C-1725-GF	4/7/2011	Grab	Groundwater	F	Inorganics	Manganese	0.101	mg/L	J
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00053	mg/L	U
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00521	mg/L	U
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00521	mg/L	U
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00521	mg/L	U
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL3mw-239	LL3MW239-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00521	mg/L	U
LL3mw-239	FWGLL3mw-239C-1543-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1598-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1651-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL3mw-239	FWGLL3mw-239C-1725-GW	4/7/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00102	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000096	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000096	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.0001	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater		Explosives	RDX	0.00102	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Grab	Groundwater		Explosives	RDX	0.000096	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Grab	Groundwater		Explosives	RDX	0.000096	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Grab	Groundwater		Explosives	RDX	0.0001	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Grab	Groundwater		Inorganics	Aluminum	0.715	mg/L	=
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.0228	mg/L	J
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.0358	mg/L	J
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.0199	mg/L	J
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Grab	Groundwater		Inorganics	Antimony	0.002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	J
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Grab	Groundwater		Inorganics	Arsenic	0.0066	mg/L	=
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.0046	mg/L	J
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Barium	0.03	mg/L	=
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Barium	0.0358	mg/L	=
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Grab	Groundwater		Inorganics	Barium	0.0438	mg/L	=
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Barium	0.0334	mg/L	=
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Barium	0.0497	mg/L	=
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Barium	0.0434	mg/L	=
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Barium	0.0452	mg/L	=
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Manganese	0.12	mg/L	=
LL4mw-196	FWGLL4mw-196C-060-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Manganese	0.149	mg/L	=
LL4mw-196	FWGLL4mw-196C-060-GW	10/16/2009	Grab	Groundwater		Inorganics	Manganese	0.185	mg/L	=
LL4mw-196	FWGLL4mw-196C-1544-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Manganese	0.183	mg/L	=
LL4mw-196	FWGLL4mw-196C-1599-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Manganese	0.136	mg/L	=
LL4mw-196	FWGLL4mw-196C-1653-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Manganese	0.0419	mg/L	=
LL4mw-196	FWGLL4mw-196C-1728-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Manganese	0.059	mg/L	=
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00051	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0051	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0051	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0051	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-196	LL4MW196-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0051	mg/L	U
LL4mw-196	FWGLL4mw-196C-1544-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1599-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1653-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-196	FWGLL4mw-196C-1728-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00102	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000097	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000096	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000075	mg/L	J
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000099	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater		Explosives	RDX	0.00102	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Grab	Groundwater		Explosives	RDX	0.000097	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Grab	Groundwater		Explosives	RDX	0.000096	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Grab	Groundwater		Explosives	RDX	0.000098	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Grab	Groundwater		Explosives	RDX	0.000099	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Grab	Groundwater		Inorganics	Aluminum	0.872	mg/L	=
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.0268	mg/L	J
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	J
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Grab	Groundwater		Inorganics	Antimony	0.002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Antimony	0.00016	mg/L	J
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	J
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Grab	Groundwater		Inorganics	Arsenic	0.005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Barium	0	mg/L	J
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Barium	0.0085	mg/L	J
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Grab	Groundwater		Inorganics	Barium	0.0182	mg/L	=
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Barium	0.0151	mg/L	=
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Barium	0.0298	mg/L	=
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Barium	0.0208	mg/L	=
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Barium	0.0131	mg/L	=
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Grab	Groundwater		Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Manganese	0.01	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GF	10/16/2009	Grab	Groundwater	F	Inorganics	Manganese	0.01	mg/L	U
LL4mw-197	FWGLL4mw-197C-061-GW	10/16/2009	Grab	Groundwater		Inorganics	Manganese	0.216	mg/L	=
LL4mw-197	FWGLL4mw-197C-1545-GF	7/8/2010	Grab	Groundwater	F	Inorganics	Manganese	0.01	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GF	10/12/2010	Grab	Groundwater	F	Inorganics	Manganese	0.01	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GF	1/19/2011	Grab	Groundwater	F	Inorganics	Manganese	0.005	mg/L	J

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL4mw-197	FWGLL4mw-197C-1729-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Manganese	0.01	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.00051	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0051	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0051	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0051	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-197	LL4MW197-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0051	mg/L	U
LL4mw-197	FWGLL4mw-197C-1545-GW	7/8/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1600-GW	10/12/2010	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1654-GW	1/19/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-197	FWGLL4mw-197C-1729-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.00102	mg/L	U
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000099	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Grab	Groundwater		Explosives	2,4,6-Trinitrotoluene	0.000098	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater		Explosives	RDX	0.00102	mg/L	U
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Grab	Groundwater		Explosives	RDX	0.000099	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Grab	Groundwater		Explosives	RDX	0.000098	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.1	mg/L	U
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Grab	Groundwater	F	Inorganics	Aluminum	0.022	mg/L	J
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Grab	Groundwater	F	Inorganics	Aluminum	0.473	mg/L	=
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Grab	Groundwater		Inorganics	Aluminum	10.3	mg/L	=
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Aluminum	0.05	mg/L	U

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Antimony	0	mg/L	U
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Grab	Groundwater		Inorganics	Antimony	0.00046	mg/L	J
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Antimony	0.002	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Arsenic	0	mg/L	J
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Grab	Groundwater	F	Inorganics	Arsenic	0.0033	mg/L	J
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Grab	Groundwater		Inorganics	Arsenic	0.0174	mg/L	=
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Arsenic	0.005	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Barium	0.01	mg/L	J
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Grab	Groundwater	F	Inorganics	Barium	0.0153	mg/L	J
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Grab	Groundwater	F	Inorganics	Barium	0.0205	mg/L	=
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Grab	Groundwater		Inorganics	Barium	0.0523	mg/L	=
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Barium	0.0087	mg/L	J
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.01	mg/L	U
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Grab	Groundwater		Inorganics	Cadmium	0.0002	mg/L	J
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Cadmium	0.0005	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater	F	Inorganics	Manganese	1.23	mg/L	=
LL4mw-198	FWGLL4mw-198C-0543-GF	10/9/2007	Grab	Groundwater	F	Inorganics	Manganese	1.46	mg/L	J
LL4mw-198	FWGLL4mw-198C-062-GF	10/21/2009	Grab	Groundwater	F	Inorganics	Manganese	1.42	mg/L	=
LL4mw-198	FWGLL4mw-198C-062-GW	10/21/2009	Grab	Groundwater		Inorganics	Manganese	1.65	mg/L	=
LL4mw-198	FWGLL4mw-198C-1730-GF	4/4/2011	Grab	Groundwater	F	Inorganics	Manganese	1.01	mg/L	=
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	U
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Grab	Groundwater		Pesticides and PCBs	PCB-1254	0.0005	mg/L	UJ
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.00556	mg/L	U
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Benz(a)anthracene	0.0002	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.00556	mg/L	U
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(a)pyrene	0.0002	mg/L	U
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.00556	mg/L	U
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Benzo(b)fluoranthene	0.0002	mg/L	U

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Table A10-1
Groundwater Data

Station	Sample ID	Date Collected	Sample Type	Media	Filtered	Analysis	Chemical	Results	Units	Qual
LL4mw-198	LL4MW198-073007	7/30/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.00556	mg/L	U
LL4mw-198	FWGLL4mw-198C-0543-GW	10/9/2007	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U
LL4mw-198	FWGLL4mw-198C-1730-GW	4/4/2011	Grab	Groundwater		Semi-Volatile Organics	Dibenz(a,h)anthracene	0.0002	mg/L	U

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ATTACHMENT 11

SOIL AND DRY SEDIMENT DATA

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Load Lines 1-4

Remedial Action Confirmation Samples Collected in 2007

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Table A11-1
Load Line 1
Soil and Dry Sediment Data - Inorganics[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	7540	mg/kg		J	20	34,942
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	48.7	mg/kg		J	1	1,995
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	727	mg/kg		J	1	1,800
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	10	mg/kg	U	R	10	2,458
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	4.2	mg/kg		=	1.6	31
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	63.6	mg/kg		J	1	3,483
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	0.5	mg/kg	J	J	1	109
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	15.3	mg/kg		J	2	---
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Aluminum	7210	mg/kg		J	20	34,942
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Lead	40.5	mg/kg		J	1	1,995
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Manganese	721	mg/kg		J	1	1,800
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Antimony	10	mg/kg	U	R	10	2,458
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Arsenic	3.4	mg/kg		=	1.6	31
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Barium	58.3	mg/kg		J	1	3,483
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Cadmium	0.51	mg/kg	J	J	1	109
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Chromium	18.1	mg/kg		J	2	---
LL1ss-018-cs	RX	Remedial excavation		LL1ss-018-0905-cs	9/5/2007	Multi-increment	Soil	0 2.3 FT	Inorganics	Manganese	380	mg/kg	J	J	1	3,030
LL1ss-015-cs	RX	Remedial excavation		LL1ss-015-1022-cs	10/22/2007	Multi-increment	Soil	0 1 FT	Inorganics	Lead	111	mg/kg		=	0.74	1,995
LL1ss-015-cs	RX	Remedial excavation		LL1ss-015-1022-cs	10/22/2007	Multi-increment	Soil	0 1 FT	Inorganics	Manganese	329	mg/kg		=	0.37	1,800
LL1ss-009-cs	RX	Remedial excavation		LL1ss-009-0821-cs	8/21/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	900	mg/kg	J E	J	1	3,030
LL1ss-004-cs	RX	Remedial excavation		LL1ss-004-0822-cs	8/22/2007	Multi-increment	Soil	0 2.3 FT	Inorganics	Manganese	857	mg/kg	J	J	1	3,030
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	5.4	mg/kg		=	1.6	31
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	116	mg/kg		J	1	3,483
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	0.66	mg/kg	J	J	1	109
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	59.9	mg/kg		J	2	---
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	13000	mg/kg		J	20	34,942
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	64.7	mg/kg		J	1	1,995
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	1100	mg/kg		J	1	1,800
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	0.9	mg/kg	J	J	10	2,458
LL1ss-044-cs	RX	Remedial excavation		LL1ss-044-1011-cs	10/11/2007	Multi-increment	Soil	0 2 FT	Inorganics	Lead	33.5	mg/kg		=	0.768	1,995
LL1ss-044-cs	RX	Remedial excavation		LL1ss-044-1011-cs	10/11/2007	Multi-increment	Soil	0 2 FT	Inorganics	Antimony	0.48	mg/kg	J	J	0.768	2,458
LL1ss-041-cs	RX	Remedial excavation		LL1ss-041-0905-cs	9/5/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	798	mg/kg	J	J	1	3,030
LL1ss-035-cs	RX	Remedial excavation		LL1ss-035-0824-cs	8/24/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	352	mg/kg	J	J	1	3,030
LL1ss-027-cs	RX	Remedial excavation		LL1ss-027-0907-cs	9/7/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	845	mg/kg	J	J	1	3,030
LL1ss-037-cs	RX	Remedial excavation		LL1ss-037-0828-cs	8/28/2007	Multi-increment	Soil	0 3 FT	Inorganics	Manganese	898	mg/kg	J	J	1	3,030
LL1ss-034-cs	RX	Remedial excavation		LL1ss-034-0829-cs	8/29/2007	Multi-increment	Soil	0 2.3 FT	Inorganics	Aluminum	9590	mg/kg		=		34,942
LL1ss-034-cs	RX	Remedial excavation		LL1ss-034-0829-cs	8/29/2007	Multi-increment	Soil	0 2.3 FT	Inorganics	Arsenic	12.4	mg/kg		=	1	31
LL1ss-029-cs	RX	Remedial excavation		LL1ss-029-1022-cs	10/22/2007	Multi-increment	Soil	0 2 FT	Inorganics	Lead	430	mg/kg		=	0.748	1,995
LL1ss-020-cs	RX	Remedial excavation		LL1ss-020-1285-cs	10/3/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	8.4	mg/kg		=	1	31
LL1ss-020-cs	RX	Remedial excavation		LL1ss-020-1003-cs	10/3/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	728	mg/kg		=	1	3,030
LL1ss-020-cs	RX	Remedial excavation		LL1ss-022-1018-cs	10/18/2007	Multi-increment	Soil	0 2 FT	Inorganics	Aluminum	12100	mg/kg		=	15.4	34,942
LL1ss-020-cs	RX	Remedial excavation		LL1ss-022-1018-cs	10/18/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	590	mg/kg		=	0.384	3,030
LL1ss-020-cs	RX	Remedial excavation		LL1ss-022-1018-cs	10/18/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	12.8	mg/kg		=	0.768	31
LL1ss-020-cs	RX	Remedial excavation		LL1ss-022-1018-cs-DUP	10/18/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Aluminum	13600	mg/kg		=	15.4	34,942
LL1ss-020-cs	RX	Remedial excavation		LL1ss-022-1018-cs-DUP	10/18/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Manganese	542	mg/kg		=	0.386	3,030
LL1ss-020-cs	RX	Remedial excavation		LL1ss-022-1018-cs-DUP	10/18/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Arsenic	13.8	mg/kg		=	0.772	31
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	4.7	mg/kg		=	1.6	31
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	29.3	mg/kg		J	1	3,483
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	0.52	mg/kg	J	J	1	109
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	59.4	mg/kg		J	2	---
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	3940	mg/kg		J	20	34,942
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	89.3	mg/kg		J	1	1,995
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	391	mg/kg		J	1	1,800
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	0.86	mg/kg	J	J	10	2,458
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	5.9	mg/kg		=	1.6	31
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	40.5	mg/kg		J	1	3,483
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	0.63	mg/kg	J	J	1	109
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	16.7	mg/kg		J	2	---
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	5000	mg/kg		J	20	34,942
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	34.4	mg/kg		J	1	1,995

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Table A11-1
Load Line 1
Soil and Dry Sediment Data - Inorganics[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	455	mg/kg		J	1	1,800
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	10	mg/kg	U	R	10	2,458
LL1ss-118-cs	RX	Remedial excavation		LL1ss-118-1011-cs	10/11/2007	Multi-increment	Soil	0 1 FT	Inorganics	Arsenic	12.5	mg/kg		=	0.752	31
LL1ss-115-cs	RX	Remedial excavation		LL1ss-115-0917-cs	9/17/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	586	mg/kg		=	1	3,030
LL1ss-005-cs	RX	Remedial excavation		LL1ss-005-1003-cs	10/3/2007	Multi-increment	Soil	0 2.3 FT	Inorganics	Manganese	696	mg/kg		=	1	3,030
LL1ss-002-cs	RX	Remedial excavation		LL1ss-002-0822-cs	8/22/2007	Multi-increment	Soil	0 2.3 FT	Inorganics	Aluminum	5730	mg/kg		=	20.3	34,942
LL1ss-002-cs	RX	Remedial excavation		LL1ss-002-0822-cs	8/22/2007	Multi-increment	Soil	0 2.3 FT	Inorganics	Manganese	615	mg/kg	J	J	1	3,030
LL1ss-002-cs	RX	Remedial excavation		LL1ss-002-0822-cs	8/22/2007	Multi-increment	Soil	0 2.3 FT	Inorganics	Arsenic	7.1	mg/kg		=	1	31
LL1ss-116-cs	RX	Remedial excavation		LL1ss-116-0917-cs	9/17/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	866	mg/kg		=	1	3,030
LL1ss-045-cs	RX	Remedial excavation		LL1ss-045-0829-cs	8/29/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	929	mg/kg	J	J	1	3,030
LL1ss-042-cs	RX	Remedial excavation		LL1ss-042-0828-cs	8/28/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	490	mg/kg	J	J	1	3,030
LL1ss-039-cs	RX	Remedial excavation		LL1ss-039-0924-cs	9/24/2007	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	259	mg/kg		=	1	1,995
LL1ss-036-cs	RX	Remedial excavation		LL1ss-036-0827-cs	8/27/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	346	mg/kg	J	J	1	3,030
LL1ss-028-cs	RX	Remedial excavation		LL1ss-028-1022-cs	10/22/2007	Multi-increment	Soil	0 2 FT	Inorganics	Lead	150	mg/kg		=	0.746	1,995
LL1ss-028-cs	RX	Remedial excavation		LL1ss-028-1022-cs	10/22/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	6.03	mg/kg		=	0.746	31
LL1ss-023-cs	RX	Remedial excavation		LL1ss-023-0823-cs	8/24/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	474	mg/kg	J	J	1	3,030
LL1ss-019-cs	RX	Remedial excavation		LL1ss-019-0921-cs	9/21/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	584	mg/kg		=	1	3,030
LL1ss-019-cs	RX	Remedial excavation		LL1ss-019-0921-cs	9/21/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	8.1	mg/kg		=	1	31
LL1ss-016-cs	RX	Remedial excavation		LL1ss-016-0920-cs	9/20/2007	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	122	mg/kg		=	1	1,995
LL1ss-012-cs	RX	Remedial excavation		LL1ss-012-0827-cs-DUP	8/27/2007	Multi-increment Field Duplicate	Soil	0 2.5 FT	Inorganics	Chromium	26.3	mg/kg		=	2.1	---
LL1ss-012-cs	RX	Remedial excavation		LL1ss-012-0924-cs	9/24/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	820	mg/kg		=	1	3,030
LL1ss-117-cs	RX	Remedial excavation		LL1ss-117-0927-cs	9/17/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	951	mg/kg		=	1	3,030
LL1ss-046-cs	RX	Remedial excavation		LL1ss-046-0829-cs	8/29/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	633	mg/kg	J	J	1	3,030
LL1ss-043-cs	RX	Remedial excavation		LL1ss-043-0921-cs	9/21/2007	Multi-increment	Soil	0 2 FT	Inorganics	Lead	84.6	mg/kg		=	1	1,995
LL1ss-001-cs	RX	Remedial excavation		LL1ss-001-0822-cs	8/22/2007	Multi-increment	Soil	0 2.3 FT	Inorganics	Manganese	556	mg/kg	J	J	1.1	3,030
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Cadmium	0.56	mg/kg	J	J	1	109
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Chromium	27	mg/kg		=	2	---
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Aluminum	6410	mg/kg		=	20	34,942
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Lead	54.7	mg/kg		=	1	1,995
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Manganese	487	mg/kg		=	1	1,800
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Antimony	0.25	mg/kg	J	J	10	2,458
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Arsenic	4.3	mg/kg		=	1.6	31
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Barium	50.5	mg/kg		=	1	3,483
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	490	mg/kg		J	1	1,800
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	0.33	mg/kg	JY	J	10	2,458
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	4.4	mg/kg		=	1.6	31
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	53.3	mg/kg	Y	J	1	3,483
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	0.63	mg/kg	JM	J	1	109
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	20.9	mg/kg	Y	J	2	---
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	6240	mg/kg	M	J	20	34,942
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	59.6	mg/kg		J	1	1,995
LL1ss-119-cs	RX	Remedial excavation		LL1ss-119-1011-cs	10/11/2007	Multi-increment	Soil	0 1 FT	Inorganics	Manganese	964	mg/kg		=	39.1	1,800
LL1ss-014-cs	RX	Remedial excavation		LL1ss-014-1004-cs	10/4/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	976	mg/kg		=	1	3,030
LL1ss-006-cs	RX	Remedial excavation		LL1ss-006-1017-cs-DUP	10/17/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Manganese	1490	mg/kg		=	3.75	3,030
LL1ss-006-cs	RX	Remedial excavation		LL1ss-006-1017-cs	10/17/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1190	mg/kg		=	3.75	3,030
LL1ss-003-cs	RX	Remedial excavation		LL1ss-003-0822-cs	8/22/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	1150	mg/kg	J	J	1	3,030

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-1
Load Line 1
Soil and Dry Sediment Data - Hexavalent Chromium[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	UM	R	6.4	16
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	ncrement Field Du	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	ncrement Field Du	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL1ss-006-cs	RX	Remedial excavation		LL1ss-006-1017-cs	10/17/2007	Multi-increment	Soil	0 2 FT	Miscellaneous	Chromium, hexavalent	0.1	mg/kg	U	U	0.101	16
LL1ss-012-cs	RX	Remedial excavation		LL1ss-012-0827-cs	8/27/2007	Multi-increment	Soil	0 2.5 FT	Miscellaneous	Chromium, hexavalent	1.7	mg/kg		=	0.81	16
LL1ss-012-cs	RX	Remedial excavation		LL1ss-012-0827-cs-DUP	8/27/2007	ncrement Field Du	Soil	0 2.5 FT	Miscellaneous	Chromium, hexavalent	2.7	mg/kg		=	0.82	16
LL1ss-012-cs	RX	Remedial excavation		LL1ss-012-0924-cs	9/24/2007	Multi-increment	Soil	0 2.5 FT	Miscellaneous	Chromium, hexavalent	0.47	mg/kg	B	J	0.82	16
LL1ss-012-cs	RX	Remedial excavation		LL1ss-012-1015-cs-DUP	10/15/2007	Multi-increment	Soil	0 2.5 FT	Miscellaneous	Chromium, hexavalent	3.2	mg/kg		=	0.83	16

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-1
Load Line 1
Soil and Dry Sediment Data - Explosives

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL1ss-626	MI	CB-3	LL1ss-626-0001-SO	LL1SS-626-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-626	MI	CB-3	LL1ss-626-0001-SO	LL1SS-626-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.28	mg/kg	U	U	0.28	838
LL1ss-625	MI	T-4801	LL1ss-625-0001-SO	LL1SS-625-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-625	MI	T-4801	LL1ss-625-0001-SO	LL1SS-625-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-624	MI	CB-8	LL1ss-624-0001-SO	LL1SS-624-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	UJ	0.24	1,646
LL1ss-624	MI	CB-8	LL1ss-624-0001-SO	LL1SS-624-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	UJ	0.29	838
LL1ss-623	MI	CB-19	LL1ss-623-0001-SO	LL1SS-623-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-623	MI	CB-19	LL1ss-623-0001-SO	LL1SS-623-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-622	MI	CA-7	LL1ss-622-0001-SO	LL1SS-622-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.46	mg/kg		=	0.24	1,646
LL1ss-622	MI	CA-7	LL1ss-622-0001-SO	LL1SS-622-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-621	MI	CB-3/CB-20	LL1ss-621-0001-SO	LL1SS-621-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-621	MI	CB-3/CB-20	LL1ss-621-0001-SO	LL1SS-621-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	7.3	mg/kg		=	0.24	1,646
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	RDX	0.79	mg/kg		=	0.29	838
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	6.7	mg/kg		=	0.24	1,646
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	2.4	mg/kg		=	0.29	838
LL1ss-618	MI	CB-4VP1	LL1ss-618-0001-SO	LL1SS-618-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-618	MI	CB-4VP1	LL1ss-618-0001-SO	LL1SS-618-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-617	MI	CB-10VP3	LL1ss-617-0001-SO	LL1SS-617-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-617	MI	CB-10VP3	LL1ss-617-0001-SO	LL1SS-617-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-616	MI	CB-10VP2	LL1ss-616-0001-SO	LL1SS-616-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-616	MI	CB-10VP2	LL1ss-616-0001-SO	LL1SS-616-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-615	MI	CB-10VP1	LL1ss-615-0001-SO	LL1SS-615-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-615	MI	CB-10VP1	LL1ss-615-0001-SO	LL1SS-615-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-614	MI	CA-17	LL1ss-614-0001-SO	LL1SS-614-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-614	MI	CA-17	LL1ss-614-0001-SO	LL1SS-614-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-613	MI	CA-14	LL1ss-613-0001-SO	LL1SS-613-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-613	MI	CA-14	LL1ss-613-0001-SO	LL1SS-613-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-612	MI	CB-13/13-C	LL1ss-612-0001-SO	LL1SS-612-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-612	MI	CB-13/13-C	LL1ss-612-0001-SO	LL1SS-612-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-611	MI	CB-13/13-C	LL1ss-611-0001-SO	LL1SS-611-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-611	MI	CB-13/13-C	LL1ss-611-0001-SO	LL1SS-611-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1.2	mg/kg		=	0.24	1,646
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.35	mg/kg		=	0.24	1,646
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	11	mg/kg		=	1.2	1,646
LL1ss-608	MI	CB-4AWS	LL1ss-608-0001-SO	LL1SS-608-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.36	mg/kg		=	0.29	838
LL1ss-607	MI	CB-10	LL1ss-607-0001-SO	LL1SS-607-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-607	MI	CB-10	LL1ss-607-0001-SO	LL1SS-607-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-606	MI	CB-10	LL1ss-606-0001-SO	LL1SS-606-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-606	MI	CB-10	LL1ss-606-0001-SO	LL1SS-606-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	2.6	mg/kg		=	0.24	1,646
LL1ss-605	MI	CB-4WN	LL1ss-605-0001-SO	LL1SS-605-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-604	MI	CA-6A/CA-28A	LL1ss-604-0001-SO	LL1SS-604-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.14	mg/kg	J	J	0.24	1,646
LL1ss-604	MI	CA-6A/CA-28A	LL1ss-604-0001-SO	LL1SS-604-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-603	MI	CA-6/CA-28	LL1ss-603-0001-SO	LL1SS-603-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1	mg/kg		=	0.24	1,646
LL1ss-603	MI	CA-6/CA-28	LL1ss-603-0001-SO	LL1SS-603-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-602	MI	CB-4AVP1	LL1ss-602-0001-SO	LL1SS-602-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.12	mg/kg	JP	J	0.24	1,646
LL1ss-602	MI	CB-4AVP1	LL1ss-602-0001-SO	LL1SS-602-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-601	MI	CB-13A	LL1ss-601-0001-SO	LL1SS-601-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL1ss-601	MI	CB-13A	LL1ss-601-0001-SO	LL1SS-601-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL1ss-038-cs	RX	Remedial excavation		LL1ss-038-1108-cs	11/8/2007	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.25	mg/kg	U	U	0.248	1,646
LL1ss-038-cs	RX	Remedial excavation		LL1ss-038-1108-cs	11/8/2007	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.99	mg/kg	U	U	0.992	838
LL1ss-038-cs	RX	Remedial excavation		LL1ss-038-1011-cs-DUP	10/11/2007	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	**1790**	mg/kg		=	123	1,646

Ravenna Five Year Review
Table A11-1
Load Line 1
Soil and Dry Sediment Data - Explosives

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL1ss-038-cs	RX	Remedial excavation		LL1ss-038-1011-cs-DUP	10/11/2007	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	RDX	3.21	mg/kg		=	0.981	838
LL1ss-038-cs	RX	Remedial excavation		LL1ss-038-1011-cs	10/11/2007	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	**2010**	mg/kg		=	125	1,646
LL1ss-038-cs	RX	Remedial excavation		LL1ss-038-1011-cs	10/11/2007	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	2.4	mg/kg		=	1	838
LL1ss-033-cs	RX	Remedial excavation		LL1ss-033-0911-cs	9/11/2007	Multi-increment	Soil	0 2.3 FT	Explosives	2,4,6-Trinitrotoluene	160	mg/kg		=	5	1,646
LL1ss-032-cs	RX	Remedial excavation		LL1ss-032-1011-cs-DUP	10/11/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Explosives	2,4,6-Trinitrotoluene	21.2	mg/kg		=	1.21	1,646
LL1ss-032-cs	RX	Remedial excavation		LL1ss-032-1011-cs-DUP	10/11/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Explosives	RDX	39.3	mg/kg		=	4.86	838
LL1ss-032-cs	RX	Remedial excavation		LL1ss-032-1011-cs	10/11/2007	Multi-increment	Soil	0 2 FT	Explosives	2,4,6-Trinitrotoluene	14.9	mg/kg		=	1.19	1,646
LL1ss-032-cs	RX	Remedial excavation		LL1ss-032-1011-cs	10/11/2007	Multi-increment	Soil	0 2 FT	Explosives	RDX	28.1	mg/kg		=	4.76	838
LL1ss-024-cs	RX	Remedial excavation		LL1ss-024-0912-cs	9/12/2007	Multi-increment	Soil	0 2.5 FT	Explosives	2,4,6-Trinitrotoluene	290	mg/kg		=	12	1,646

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-1
Load Line 1
Soil and Dry Sediment Data - PCBs

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	PCBs	PCB-1254	1.5	mg/kg		=	0.3	35
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	PCBs	PCB-1254	2.2	mg/kg		=	0.3	35
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	PCBs	PCB-1254	4	mg/kg		=	0.3	35
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	PCBs	PCB-1254	4.9	mg/kg		=	0.6	35
LL1ss-029-cs	RX	Remedial excavation		LL1ss-029-1020-cs	11/20/2007	Multi-increment	Soil	0 2 FT	PCBs	PCB-1254	**54.3**	mg/kg		=	9.13	35
LL1ss-028-cs	RX	Remedial excavation		LL1ss-028-1120-cs	11/20/2007	Multi-increment	Soil	0 2 FT	PCBs	PCB-1254	0.683	mg/kg		=	0.019	35
LL1ss-017-cs	RX	Remedial excavation		LL1ss-017-1029-cs	10/29/2007	Multi-increment	Soil	0 2 FT	PCBs	PCB-1254	10.9	mg/kg		=	1.65	35
LL1ss-015-cs	RX	Remedial excavation		LL1ss-015-1120-cs	11/20/2007	Multi-increment	Soil	0 1 FT	PCBs	PCB-1254	1.15	mg/kg		=	0.206	35

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-1
Load Line 1
Soil and Dry Sediment Data - SVOCs

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.057	mg/kg	J	J	0.33	10
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.13	mg/kg	J	J	0.33	105
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.19	mg/kg	J	J	0.33	105
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0003-SO	12/1/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.12	mg/kg	J	J	0.33	10
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.15	mg/kg	J	J	0.33	105
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.087	mg/kg	J	J	0.33	10
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	U	0.33	10
LL1ss-619	MI	CB-4A/CB-4AWN	LL1ss-619-0001-SO	LL1SS-619-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.086	mg/kg	J	J	0.33	105
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	UJ	0.33	10
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.44	mg/kg		J	0.33	105
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.61	mg/kg		J	0.33	105
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.36	mg/kg		J	0.33	10
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.26	mg/kg	J	J	0.33	105
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.38	mg/kg		=	0.33	105
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.24	mg/kg	J	J	0.33	10
LL1ss-609	MI	CB-4/CB-4WS	LL1ss-609-0001-SO	LL1SS-609-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	U	0.33	10
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	1.5	mg/kg	JV	J	1.7	105
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.84	mg/kg	JV	J	1.7	10
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	1.7	mg/kg	UV	U	1.7	10
FWCss-001	MI	CC-1 (LL-1)	FWCSS-001-0001-SO	FWCSS-001-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.9	mg/kg	JV	J	1.7	105
LL1ss-040-cs	RX	Remedial excavation		LL1ss-040-0912-cs	9/12/2007	Multi-increment	Soil	0 2 FT	SVOCs	Benzo(a)pyrene	0.49	mg/kg		=	0.0068	10

<u>Notes</u>

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Table A11-2
Load Line 2
Soil and Dry Sediment Data - Inorganics[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL2ss-067-cs	RX	Remedial excavation		LL2ss-067-1004-cs	10/4/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	11.9	mg/kg		=	1	31
LL2ss-067-cs	RX	Remedial excavation		LL2ss-067-1004-cs	10/4/2007	Multi-increment	Soil	0 2 FT	Inorganics	Lead	18.6	mg/kg		=	1	1,995
LL2ss-067-cs	RX	Remedial excavation		LL2ss-067-1004-cs	10/4/2007	Multi-increment	Soil	0 2 FT	Inorganics	Antimony	10.3	mg/kg	U	U	10.3	2,458
LL2ss-067-cs	RX	Remedial excavation		LL2ss-067-1004-cs-DUI	10/4/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Lead	17.3	mg/kg		=	1	1,995
LL2ss-067-cs	RX	Remedial excavation		LL2ss-067-1004-cs-DUI	10/4/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Antimony	10.3	mg/kg	U	U	10.3	2,458
LL2ss-067-cs	RX	Remedial excavation		LL2ss-067-1004-cs-DUI	10/4/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Arsenic	12	mg/kg		=	1	31
LL2ss-062-cs	RX	Remedial excavation		LL2ss-062-1030-cs	10/30/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Lead	44.5	mg/kg		=		1,995
LL2ss-062-cs	RX	Remedial excavation		LL2ss-062-1030-cs	10/30/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	578	mg/kg		=		3,030
LL2ss-062-cs	RX	Remedial excavation		LL2ss-062-1030-cs	10/30/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Arsenic	7.52	mg/kg		=		31
LL2ss-056-cs	RX	Remedial excavation		LL2ss-056-1019-cs	10/19/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1410	mg/kg		=	0.363	3,030
LL2ss-053-cs	RX	Remedial excavation		LL2ss-053-1011-cs	10/11/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1210	mg/kg		=	3.89	3,030
LL2ss-051-cs	RX	Remedial excavation		LL2ss-051-1010-cs	10/10/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	437	mg/kg		=	0.366	3,030
LL2ss-048-cs	RX	Remedial excavation		LL2ss-048-1010-cs	10/10/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	19.9	mg/kg		=	0.753	31
LL2ss-061-cs	RX	Remedial excavation		LL2ss-061-1004-cs	10/4/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	11.2	mg/kg		=	1	31
LL2ss-061-cs	RX	Remedial excavation		LL2ss-061-1004-cs-DUI	10/4/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Arsenic	11.8	mg/kg		=	1	31
LL2ss-058-cs	RX	Remedial excavation		LL2ss-058-1010-cs	10/10/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	330	mg/kg		=	0.382	3,030
LL2ss-052-cs	RX	Remedial excavation		LL2ss-052-1011-cs	10/11/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	210	mg/kg		=	0.381	3,030
LL2ss-049-cs	RX	Remedial excavation		LL2ss-049-1010-cs	10/10/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	76.3	mg/kg		=	0.749	31
LL2ss-049-cs	RX	Remedial excavation		LL2ss-049-1108-cs	11/8/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	14.1	mg/kg		=	0.754	31
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	22.3	mg/kg		J	2	---
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	11400	mg/kg		J	20	34,942
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	38.6	mg/kg		=	1	1,995
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	446	mg/kg		J	10	1,800
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	1.2	mg/kg	J	J	10	2,458
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	16.3	mg/kg		=	1.6	31
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	56.7	mg/kg		J	10	3,483
LL2ss-070-cs	RX	Remedial excavation		LL2ss-070-1011-cs	10/11/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1030	mg/kg		=	3.82	3,030
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	9140	mg/kg		J	20	34,942
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	24.9	mg/kg		J	2	---
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	33.6	mg/kg		=	1	1,995
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	382	mg/kg		J	10	1,800
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	1.2	mg/kg	J	J	10	2,458
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	13.5	mg/kg		=	1.6	31
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	51.2	mg/kg		J	10	3,483
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Chromium	14.2	mg/kg		J	2	---
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Aluminum	9450	mg/kg		J	20	34,942
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Lead	36.1	mg/kg		=	1	1,995
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Manganese	406	mg/kg		J	10	1,800
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Antimony	1.2	mg/kg	J	J	10	2,458
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Arsenic	13.1	mg/kg		=	1.6	31
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Barium	47.1	mg/kg		J	10	3,483
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
LL2ss-068-cs	RX	Remedial excavation		LL2ss-068-1004-cs	10/4/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	926	mg/kg		=	1	3,030
LL2ss-065-cs	RX	Remedial excavation		LL2ss-065-1019-cs	10/19/2007	Multi-increment	Soil	0 2 FT	Inorganics	Lead	78.6	mg/kg		=	0.765	1,995
LL2ss-057-cs	RX	Remedial excavation		LL2ss-057-1010-cs	10/10/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1140	mg/kg		=	3.6	3,030
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Chromium	58.3	mg/kg		=	2	---
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Lead	32.6	mg/kg		=	1	1,995
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Manganese	492	mg/kg		=	1	1,800
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Antimony	0.8	mg/kg	J	J	10	2,458
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Arsenic	5.2	mg/kg		=	1.6	31
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Barium	53.8	mg/kg		=	1	3,483
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Cadmium	0.49	mg/kg	J	J	1	109
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Aluminum	8210	mg/kg		=	20	34,942

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Table A11-2
Load Line 2
Soil and Dry Sediment Data - Inorganics[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	95.4	mg/kg		=	1	3,483
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	0.82	mg/kg	J	J	1	109
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	49.4	mg/kg		=	2	---
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	11200	mg/kg		=	20	34,942
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	110	mg/kg		=	1	1,995
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	936	mg/kg		=	1	1,800
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	0.47	mg/kg	J	J	10	2,458
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	6.6	mg/kg		=	1.6	31
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	7190	mg/kg		=	20	34,942
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	28.5	mg/kg		=	1	1,995
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	444	mg/kg		=	1	1,800
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	10	mg/kg	U	U	10	2,458
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	5.5	mg/kg		=	1.6	31
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	43.4	mg/kg		=	1	3,483
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	0.15	mg/kg	J	J	1	109
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	18.2	mg/kg		=	2	---
LL2ss-069-cs	RX	Remedial excavation		LL2ss-069-1011-cs	10/11/2007	Multi-increment	Soil	0 1 FT	Inorganics	Manganese	441	mg/kg		=	0.376	1,800
LL2ss-066-cs	RX	Remedial excavation		LL2ss-066-1217-cs	12/17/2007	Multi-increment	Soil	0 2 FT	Inorganics	Lead	40.3	mg/kg		=	2.03	1,995
LL2ss-050-cs	RX	Remedial excavation		LL2ss-050-1019-cs	10/19/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1410	mg/kg		=	3.82	3,030
LL2ss-047-cs	RX	Remedial excavation		LL2ss-047-1009-cs	10/9/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	308	mg/kg		=	1	3,030
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	70.9	mg/kg		J	2	---
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	199	mg/kg		=	1	1,995
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	**1880**	mg/kg		J	10	1,800
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	1.1	mg/kg	J	J	10	2,458
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	5.5	mg/kg		=	1.6	31
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	152	mg/kg		J	10	3,483
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	16700	mg/kg		J	20	34,942
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Aluminum	15300	mg/kg		J	20	34,942
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Lead	56.5	mg/kg		=	1	1,995
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Manganese	1310	mg/kg		J	10	1,800
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Antimony	1.2	mg/kg	J	J	10	2,458
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Arsenic	13.6	mg/kg		=	1.6	31
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Barium	136	mg/kg		J	10	3,483
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-S	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Chromium	42.1	mg/kg		J	2	---

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

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Table A11-2
Load Line 2
Soil and Dry Sediment Data - Hexavalent Chromium[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL2ss-050-cs	RX	Remedial excavation		LL2ss-050-1019-cs	10/19/2007	Multi-increment	Soil	0 2 FT	Miscellaneous	Chromium, hexavalent	0.13	mg/kg	U	U	0.103	16
LL2ss-066-cs	RX	Remedial excavation		LL2ss-066-1217-cs	12/17/2007	Multi-increment	Soil	0 2 FT	Miscellaneous	Chromium, hexavalent	0.1	mg/kg	U	U	0.101	16

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

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Table A11-2
Load Line 2
Soil and Dry Sediment Data - Explosives[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.19	mg/kg	J	J	0.24	1,646
LL2ss-401	MI	DB-4/DB-4WN	LL2ss-401-0001-SO	LL2SS-401-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-402	MI	DB-10	LL2ss-402-0001-SO	LL2SS-402-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.59	mg/kg		=	0.24	1,646
LL2ss-402	MI	DB-10	LL2ss-402-0001-SO	LL2SS-402-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	2.8	mg/kg		=	0.24	1,646
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	RDX	0.45	mg/kg		=	0.29	838
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1.3	mg/kg		=	0.24	1,646
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.2	mg/kg	J	J	0.29	838
LL2ss-405	MI	DA-6	LL2ss-405-0001-SO	LL2SS-405-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	4.2	mg/kg		=	0.24	1,646
LL2ss-405	MI	DA-6	LL2ss-405-0001-SO	LL2SS-405-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-406	MI	DA-6A	LL2ss-406-0001-SO	LL2SS-406-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	38	mg/kg		=	2.4	1,646
LL2ss-406	MI	DA-6A	LL2ss-406-0001-SO	LL2SS-406-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1.2	mg/kg		=	0.24	1,646
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.29	mg/kg	P	=	0.24	1,646
LL2ss-409	MI	DB-10	LL2ss-409-0001-SO	LL2SS-409-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	7.1	mg/kg		=	0.24	1,646
LL2ss-409	MI	DB-10	LL2ss-409-0001-SO	LL2SS-409-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.21	mg/kg	J	J	0.29	838
LL2ss-410	MI	DC-1 (LL-2)	LL2ss-410-0001-SO	LL2SS-410-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL2ss-410	MI	DC-1 (LL-2)	LL2ss-410-0001-SO	LL2SS-410-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-411	MI	DB-13/DB-13B/DB-26	LL2ss-411-0001-SO	LL2SS-411-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL2ss-411	MI	DB-13/DB-13B/DB-26	LL2ss-411-0001-SO	LL2SS-411-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-412	MI	DB-13/DB-13A/DB-13B	LL2ss-412-0001-SO	LL2SS-412-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL2ss-412	MI	DB-13/DB-13A/DB-13B	LL2ss-412-0001-SO	LL2SS-412-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-413	MI	DB-27A	LL2ss-413-0001-SO	LL2SS-413-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL2ss-413	MI	DB-27A	LL2ss-413-0001-SO	LL2SS-413-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-414	MI	DB-27A	LL2ss-414-0001-SO	LL2SS-414-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL2ss-414	MI	DB-27A	LL2ss-414-0001-SO	LL2SS-414-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-415	MI	DB-27C	LL2ss-415-0001-SO	LL2SS-415-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.47	mg/kg		=	0.24	1,646
LL2ss-415	MI	DB-27C	LL2ss-415-0001-SO	LL2SS-415-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-416	MI	DB-25	LL2ss-416-0001-SO	LL2SS-416-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1.2	mg/kg		=	0.24	1,646
LL2ss-416	MI	DB-25	LL2ss-416-0001-SO	LL2SS-416-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	32	mg/kg		=	2.4	1,646
LL2ss-417	MI	DB-4A/DB-4AWN	LL2ss-417-0001-SO	LL2SS-417-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL2ss-054-cs	RX	Remedial excavation		LL2ss-054-1011-cs	10/11/2007	Multi-increment	Soil	0 2 FT	Explosives	RDX	0.98	mg/kg	U	U	0.984	838
LL2ss-054-cs	RX	Remedial excavation		LL2ss-054-1011-cs	10/11/2007	Multi-increment	Soil	0 2 FT	Explosives	2,4,6-Trinitrotoluene	0.25	mg/kg	U	U	0.246	1,646
LL2ss-055-cs	RX	Remedial excavation		LL2ss-055-1008-cs	10/8/2007	Multi-increment	Soil	0 2 FT	Explosives	2,4,6-Trinitrotoluene	77.6	mg/kg		=	4.77	1,646
LL2ss-055-cs	RX	Remedial excavation		LL2ss-055-1008-cs	10/8/2007	Multi-increment	Soil	0 2 FT	Explosives	RDX	0.95	mg/kg	U	U	0.954	838
LL2ss-059-cs	RX	Remedial excavation		LL2ss-059-1008-cs	10/8/2007	Multi-increment	Soil	0 2 FT	Explosives	2,4,6-Trinitrotoluene	0.27	mg/kg		=	0.242	1,646
LL2ss-059-cs	RX	Remedial excavation		LL2ss-059-1008-cs	10/8/2007	Multi-increment	Soil	0 2 FT	Explosives	RDX	0.97	mg/kg	U	U	0.969	838
LL2ss-060-cs	RX	Remedial excavation		LL2ss-060-1008-cs	10/8/2007	Multi-increment	Soil	0 2 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.244	1,646
LL2ss-060-cs	RX	Remedial excavation		LL2ss-060-1008-cs	10/8/2007	Multi-increment	Soil	0 2 FT	Explosives	RDX	0.98	mg/kg	U	U	0.976	838

Notes

1 2007 data represents confirmation sampling during the remedial actior
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-2
Load Line 2
Soil and Dry Sediment Data - PCBs[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	PCBs	PCB-1254	0.29	mg/kg		=	0.03	35
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	PCBs	PCB-1254	1.3	mg/kg		=	0.12	35
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	PCBs	PCB-1254	0.82	mg/kg		=	0.03	35
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	PCBs	PCB-1254	0.38	mg/kg		=	0.03	35
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	PCBs	PCB-1254	0.017	mg/kg	JP	J	0.03	35
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	PCBs	PCB-1254	0.065	mg/kg		J	0.03	35
LL2ss-062-cs	RX	Remedial excavation		LL2ss-062-1030-cs	10/30/2007	Multi-increment	Soil	0 2.5 FT	PCBs	PCB-1254	0.427	mg/kg		=	0.016	35

Notes

1 2007 data represents confirmation sampling during the remedial actior
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-2
Load Line 2
Soil and Dry Sediment Data - SVOCs[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	1.5	mg/kg	JV	J	1.7	105
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	1.1	mg/kg	JV	J	1.7	10
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	1.7	mg/kg	UV	U	1.7	10
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	1.1	mg/kg	JV	J	1.7	105
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	2.5	mg/kg	V	J	1.7	105
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	1.4	mg/kg	JV	J	1.7	10
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	1.7	mg/kg	UV	U	1.7	10
FWCss-002	MI	DC-1 (LL-2)	FWCSS-002-0001-SO	FWCSS-002-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	1.5	mg/kg	JV	J	1.7	105
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.25	mg/kg	J	J	0.33	105
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.1	mg/kg	J	J	0.33	10
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	U	0.33	10
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.12	mg/kg	J	J	0.33	105
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.24	mg/kg	J	J	0.33	105
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.11	mg/kg	J	J	0.33	10
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	U	0.33	10
LL2ss-403	MI	DB-4/DB-4AWS	LL2ss-403-0001-SO	LL2SS-403-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.12	mg/kg	J	J	0.33	105
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.059	mg/kg	J	J	0.33	105
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.04	mg/kg	J	J	0.33	10
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	U	0.33	10
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.027	mg/kg	J	J	0.33	105
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	1.7	mg/kg	U	U	1.7	10
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	3.9	mg/kg	M	J	1.7	105
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	5.1	mg/kg	M	J	1.7	105
LL2ss-407	MI	DB-4/DB-4WS	LL2ss-407-0001-SO	LL2SS-407-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	3.8	mg/kg	M	J	1.7	10

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-3
Load Line 3
Soil and Dry Sediment Data - Inorganics[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL3ss-104-cs	RX	Remedial excavation		LL3ss-104-0910-cs	9/10/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1090	mg/kg	J	J	1	3,030
LL3ss-074-cs	RX	Remedial excavation		LL3ss-074-0830-cs	8/30/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	987	mg/kg	J	J	1	3,030
LL3ss-071-cs	RX	Remedial excavation		LL3ss-071-0926-cs	9/26/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	686	mg/kg		=	1	3,030
LL3ss-083-cs	RX	Remedial excavation		LL3ss-083-0829-cs	8/29/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	931	mg/kg	J	J	1	3,030
LL3ss-079-cs	RX	Remedial excavation		LL3ss-079-0912-cs	9/12/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	589	mg/kg	J	J	1	3,030
LL3ss-073-cs	RX	Remedial excavation		LL3ss-073-1022-cs	10/22/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Lead	309	mg/kg		=	0.719	1,995
LL3ss-073-cs	RX	Remedial excavation		LL3ss-073-1022-cs	10/22/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	1550	mg/kg		=	3.6	3,030
LL3ss-075-cs	RX	Remedial excavation		LL3ss-075-0921-cs	9/21/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	908	mg/kg		=	1	3,030
LL3ss-072-cs	RX	Remedial excavation		LL3ss-072-0828-cs-DU	8/28/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Manganese	2000	mg/kg	J	J	1	3,030
LL3ss-072-cs	RX	Remedial excavation		LL3ss-072-0828-cs	10/8/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1040	mg/kg		=	1	3,030
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Aluminum	10400	mg/kg		J	20	34,942
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Lead	35.3	mg/kg		=	1	1,995
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Manganese	510	mg/kg		J	10	3,030
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Antimony	1	mg/kg	J	J	10	2,458
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Arsenic	5.1	mg/kg		=	1.6	31
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Barium	62.6	mg/kg		J	10	3,483
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Cadmium	0.041	mg/kg	JB	UJ	1	109
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Chromium	71.4	mg/kg		J	2	---
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	9360	mg/kg		J	20	34,942
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	30.7	mg/kg		=	1	1,995
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	506	mg/kg		J	10	3,030
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	0.88	mg/kg	J	J	10	2,458
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	5.2	mg/kg		=	1.6	31
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	57.8	mg/kg		J	10	3,483
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	0.19	mg/kg	J	J	1	109
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	29.2	mg/kg		J	2	---
LL3ss-103-cs	RX	Remedial excavation		LL3ss-103-1010-cs	10/10/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1480	mg/kg		=	3.79	3,030
LL3ss-100-cs	RX	Remedial excavation		LL3ss-100-0921-cs	9/21/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	927	mg/kg		=	1	3,030
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Aluminum	8030	mg/kg		J	20	34,942
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Lead	9.1	mg/kg		=	1	1,995
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Manganese	437	mg/kg		J	1	1,800
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Antimony	0.99	mg/kg	J	J	10	2,458
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Arsenic	4.2	mg/kg		=	1.6	31
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Barium	47.4	mg/kg		J	10	3,483
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Chromium	33.9	mg/kg		J	2	---
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	1.2	mg/kg	J	J	10	2,458
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	6.4	mg/kg		=	1.6	31
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	45.8	mg/kg		=	1	3,483
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	0.45	mg/kg	J	J	1	109
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	74.3	mg/kg		=	2	---
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	7830	mg/kg		=	20	34,942
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	22.4	mg/kg		=	1	1,995
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	471	mg/kg		=	1	1,800
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	10600	mg/kg		J	20	34,942
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	32.7	mg/kg		J	2	---
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	37.7	mg/kg		=	1	1,995
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	643	mg/kg		J	1	1,800
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	1.4	mg/kg	J	J	10	2,458
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	4.2	mg/kg		=	1.6	31
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	78.6	mg/kg		J	10	3,483
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
LL3ss-096-cs	RX	Remedial excavation		LL3ss-096-1018-cs	10/18/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	534	mg/kg		=	0.37	3,030
LL3ss-096-cs	RX	Remedial excavation		LL3ss-096-1018-cs	10/18/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	20	mg/kg		=	0.74	31
LL3ss-080-cs	RX	Remedial excavation		LL3ss-080-0829-cs	8/29/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	9.3	mg/kg		=	1	31

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Table A11-3
Load Line 3
Soil and Dry Sediment Data - Inorganics[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL3ss-077-cs	RX	Remedial excavation		LL3ss-077-1024-cs	10/24/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	497	mg/kg		=	0.37	3,030
LL3ss-077-cs	RX	Remedial excavation		LL3ss-077-1024-cs	10/24/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Arsenic	14	mg/kg		=	0.741	31
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	11400	mg/kg		J	20	34,942
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	34.6	mg/kg		=	1	1,995
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	629	mg/kg		J	10	1,800
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	1.4	mg/kg	J	J	10	2,458
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	14.2	mg/kg		=	1.6	31
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	66.9	mg/kg		J	10	3,483
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	24.9	mg/kg		J	2	---
LL3ss-101-cs	RX	Remedial excavation		LL3ss-101-0921-cs	9/21/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1580	mg/kg		=	1	3,030
LL3ss-089-cs	RX	Remedial excavation		LL3ss-089-1008-cs	10/8/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	871	mg/kg		=	1	3,030
LL3ss-089-cs	RX	Remedial excavation		LL3ss-089-1008-cs	10/8/2007	Multi-increment	Soil	0 2 FT	Inorganics	Aluminum	12600	mg/kg		=	20.5	34,942
LL3ss-089-cs	RX	Remedial excavation		LL3ss-089-1008-cs-DU	10/8/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Aluminum	12300	mg/kg		=	20.5	34,942
LL3ss-089-cs	RX	Remedial excavation		LL3ss-089-1008-cs-DU	10/8/2007	Multi-increment Field Duplicate	Soil	0 2 FT	Inorganics	Manganese	921	mg/kg		=	1	3,030
LL3ss-086-cs	RX	Remedial excavation		LL3ss-086-0907-cs	9/7/2007	Multi-increment	Soil	0 2 FT	Inorganics	Lead	26.9	mg/kg		=	1	1,995
LL3ss-081-cs	RX	Remedial excavation		LL3ss-081-1010-cs	10/10/2007	Multi-increment	Soil	0 0.7 FT	Inorganics	Manganese	1510	mg/kg		=	3.8	1,800
LL3ss-105-cs	RX	Remedial excavation		LL3ss-105-1005-cs	10/5/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	1070	mg/kg		=	1	3,030
LL3ss-102-cs	RX	Remedial excavation		LL3ss-102-0927-cs	9/27/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	449	mg/kg	J	J	1	3,030
LL3ss-099-cs	RX	Remedial excavation		LL3ss-099-0925-cs	9/25/2007	Multi-increment	Soil	0 2.6 FT	Inorganics	Manganese	563	mg/kg		=	1	3,030
LL3ss-092-cs	RX	Remedial excavation		LL3ss-092-1024-cs	10/24/2007	Multi-increment	Soil	0 2 FT	Inorganics	Lead	46.6	mg/kg		=		1,995
LL3ss-092-cs	RX	Remedial excavation		LL3ss-092-1024-cs	10/24/2007	Multi-increment	Soil	0 2 FT	Inorganics	Arsenic	30.5	mg/kg		=		31

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-3
Load Line 3
Soil and Dry Sediment Data - Hexavalent Chromium[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth			Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0	0.5	FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0	0.5	FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0	0.5	FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0	0.5	FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0	0.5	FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0	0.5	FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL3ss-072-cs	RX	Remedial excavation		LL3ss-072-0828-cs	10/8/2007	Multi-increment	Soil	0	2	FT	Miscellaneous	Chromium, hexavalent	0.23	mg/kg	B J	J	0.82	16
LL3ss-103-cs	RX	Remedial excavation		LL3ss-103-1010-cs	10/10/2007	Multi-increment	Soil	0	2	FT	Miscellaneous	Chromium, hexavalent	0.1	mg/kg	U	U	0.102	16

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-3
Load Line 3
Soil and Dry Sediment Data - Explosives[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1.1	mg/kg		=	0.24	1,646
LL3ss-351	MI	EB-4	LL3ss-351-0001-SO	LL3SS-351-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1.2	mg/kg		=	0.24	1,646
LL3ss-353	MI	EB-4A/EB-4AWN	LL3ss-353-0001-SO	LL3SS-353-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-354	MI	EA-6A	LL3ss-354-0001-SO	LL3SS-354-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	15	mg/kg		=	1.2	1,646
LL3ss-354	MI	EA-6A	LL3ss-354-0001-SO	LL3SS-354-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1.9	mg/kg		=	0.24	1,646
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.76	mg/kg		=	0.24	1,646
LL3ss-357	MI	EA-6	LL3ss-357-0001-SO	LL3SS-357-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1.9	mg/kg	P	=	0.24	1,646
LL3ss-357	MI	EA-6	LL3ss-357-0001-SO	LL3SS-357-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1.4	mg/kg		=	0.24	1,646
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.28	mg/kg		=	0.24	1,646
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-361	MI	EB-10/EB10A	LL3ss-361-0001-SO	LL3SS-361-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	5.1	mg/kg		=	0.24	1,646
LL3ss-361	MI	EB-10/EB10A	LL3ss-361-0001-SO	LL3SS-361-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-362	MI	EB-11	LL3ss-362-0001-SO	LL3SS-362-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL3ss-362	MI	EB-11	LL3ss-362-0001-SO	LL3SS-362-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-363	MI	EB-21	LL3ss-363-0001-SO	LL3SS-363-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.085	mg/kg	JP	J	0.24	1,646
LL3ss-363	MI	EB-21	LL3ss-363-0001-SO	LL3SS-363-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-364	MI	EB-4VP1	LL3ss-364-0001-SO	LL3SS-364-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL3ss-364	MI	EB-4VP1	LL3ss-364-0001-SO	LL3SS-364-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-365	MI	EB-10VP1	LL3ss-365-0001-SO	LL3SS-365-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL3ss-365	MI	EB-10VP1	LL3ss-365-0001-SO	LL3SS-365-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-366	MI	EB-10VP2	LL3ss-366-0001-SO	LL3SS-366-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL3ss-366	MI	EB-10VP2	LL3ss-366-0001-SO	LL3SS-366-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-367	MI	EB-13A	LL3ss-367-0001-SO	LL3SS-367-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL3ss-367	MI	EB-13A	LL3ss-367-0001-SO	LL3SS-367-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-368	MI	EB-25	LL3ss-368-0001-SO	LL3SS-368-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	4.9	mg/kg		=	0.24	1,646
LL3ss-368	MI	EB-25	LL3ss-368-0001-SO	LL3SS-368-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.3	mg/kg		=	0.29	838
LL3ss-369	MI	EB-9A	LL3ss-369-0001-SO	LL3SS-369-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	1.1	mg/kg		=	0.24	1,646
LL3ss-369	MI	EB-9A	LL3ss-369-0001-SO	LL3SS-369-0001-SO	12/1/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL3ss-076-cs	RX	Remedial excavation		LL3ss-076-0927-cs	9/27/2007	Multi-increment	Soil	0 2 FT	Explosives	2,4,6-Trinitrotoluene	1.5	mg/kg		=	0.25	1,646
LL3ss-088-cs	RX	Remedial excavation		LL3ss-088-0921-cs	9/21/2007	Multi-increment	Soil	0 2 FT	Explosives	2,4,6-Trinitrotoluene	0.06	mg/kg	J	J	0.24	1,646
LL3ss-096-cs	RX	Remedial excavation		LL3ss-096-1018-cs	10/18/2007	Multi-increment	Soil	0 2 FT	Explosives	2,4,6-Trinitrotoluene	0.31	mg/kg		=	0.245	1,646
LL3ss-098-cs	RX	Remedial excavation		LL3ss-098-0921-cs	9/21/2007	Multi-increment	Soil	0 2 FT	Explosives	2,4,6-Trinitrotoluene	83	mg/kg		=	2.5	1,646

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-3
Load Line 3
Soil and Dry Sediment Data - PCBs[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth			Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0	0.5	FT	PCBs	PCB-1254	0.57	mg/kg		=	0.03	35
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0	0.5	FT	PCBs	PCB-1254	0.27	mg/kg		=	0.03	35
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0	0.5	FT	PCBs	PCB-1254	1.6	mg/kg		=	0.06	35
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0	0.5	FT	PCBs	PCB-1254	0.86	mg/kg		=	0.03	35
LL3ss-096-cs	RX	Remedial excavation		LL3ss-096-1018-cs	10/18/2007	Multi-increment	Soil	0	2	FT	PCBs	PCB-1254	0.00002	mg/kg		U	0.0168	35
LL3ss-092-cs	RX	Remedial excavation		LL3ss-092-1024-cs	10/24/2007	Multi-increment	Soil	0	2	FT	PCBs	PCB-1254	1.19	mg/kg		=	0.163	35
LL3ss-087-cs	RX	Remedial excavation		LL3ss-087-1108-cs-DUP	11/8/2007	Multi-increment Field Duplicate	Soil	0	2.7	FT	PCBs	PCB-1254	0.0132	mg/kg	J	J	0.0166	35
LL3ss-087-cs	RX	Remedial excavation		LL3ss-087-1108-cs	11/8/2007	Multi-increment	Soil	0	2.7	FT	PCBs	PCB-1254	0.0165	mg/kg	U	U	0.0165	35
LL3ss-085-cs	RX	Remedial excavation		LL3ss-085-1031-cs	10/31/2007	Multi-increment	Soil	0	2.5	FT	PCBs	PCB-1254	3.38	mg/kg		=	0.324	35
LL3ss-078-cs	RX	Remedial excavation		LL3ss-078-1020-cs	11/20/2007	Multi-increment	Soil	0	2	FT	PCBs	PCB-1254	0.246	mg/kg		=	0.021	35
LL3ss-077-cs	RX	Remedial excavation		LL3ss-077-1024-cs2	11/20/2007	Multi-increment	Soil	0	2.5	FT	PCBs	PCB-1254	6.09	mg/kg		=	0.924	35
LL3ss-073-cs	RX	Remedial excavation		LL3ss-073-1022-cs	10/22/2007	Multi-increment	Soil	0	2.5	FT	PCBs	PCB-1254	13.8	mg/kg		=	1.66	35

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Five Year Review
Table A11-3
Load Line 3
Soil and Dry Sediment Data - SVOCs[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.065	mg/kg	J	J	0.33	105
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.048	mg/kg	J	J	0.33	10
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	U	0.33	10
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.037	mg/kg	J	J	0.33	105
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.21	mg/kg	JM,Y	J	0.33	105
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.11	mg/kg	JM,Y	J	0.33	10
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	U	0.33	10
LL3ss-355	MI	EB-4/EB-4WS/EB-4WN	LL3ss-355-0001-SO	LL3SS-355-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.21	mg/kg	JM,Y	J	0.33	105
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.077	mg/kg	J	J	0.33	105
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.047	mg/kg	J	J	0.33	10
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	U	0.33	10
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0003-SO	12/2/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.04	mg/kg	J	J	0.33	105
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	U	0.33	10
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.036	mg/kg	J	J	0.33	105
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.067	mg/kg	J	J	0.33	105
LL3ss-358	MI	EB-4A/EB-4AWS	LL3ss-358-0001-SO	LL3SS-358-0001-SO	12/2/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.04	mg/kg	J	J	0.33	10
LL3ss-096-cs	RX	Remedial excavation		LL3ss-096-1018-cs	10/18/2007	Multi-increment	Soil	0 2 FT	SVOCs	Benzo(a)pyrene	0.0001	mg/kg		U	0.0254	10

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Rive Year Review
Table A11-4
Load Line 4
Soil and Dry Sediment Data - Inorganics[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	11500	mg/kg		J	20	34,942
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	1.5	mg/kg	J	J	10	2,458
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	3.1	mg/kg		=	1.6	31
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	64.4	mg/kg	Y	J	10	3,483
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	56.6	mg/kg		J	20	---
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	58.9	mg/kg		=	1	1,995
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	468	mg/kg	Y	J	10	1,800
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Aluminum	10600	mg/kg		J	20	34,942
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Antimony	1.3	mg/kg	J	J	10	2,458
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Arsenic	2.7	mg/kg		=	1.6	31
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Barium	78	mg/kg		J	10	3,483
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Chromium	34.2	mg/kg		J	2	---
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Lead	33	mg/kg		=	1	1,995
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Inorganics	Manganese	572	mg/kg		J	10	1,800
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Aluminum	12600	mg/kg		J	20	34,942
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Antimony	1.5	mg/kg	J	J	10	2,458
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Arsenic	2.4	mg/kg		=	1.6	31
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Barium	87.5	mg/kg		J	10	3,483
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Cadmium	1	mg/kg	U	UJ	1	109
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Chromium	50.6	mg/kg		J	2	---
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Lead	45.3	mg/kg		=	1	1,995
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Inorganics	Manganese	722	mg/kg		J	10	1,800
LL4ss-114-cs	RX	Remedial excavation		LL4ss-114-0822-cs	8/22/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Aluminum	4820	mg/kg		=	20.3	34,942
LL4ss-114-cs	RX	Remedial excavation		LL4ss-114-0822-cs	8/22/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	465	mg/kg	J	J	1	3,030
LL4ss-113-cs	RX	Remedial excavation		LL4ss-113-0822-cs	8/23/2007	Multi-increment	Soil	0 3 FT	Inorganics	Manganese	1090	mg/kg	J	J	1	3,030
LL4ss-111-cs	RX	Remedial excavation		LL4ss-111-0822-cs	8/22/2007	Multi-increment	Soil	0 2 FT	Inorganics	Lead	25.4	mg/kg		=	1	1,995
LL4ss-110-cs	RX	Remedial excavation		LL4ss-110-0823-cs	8/23/2007	Multi-increment	Soil	0 2.8 FT	Inorganics	Manganese	803	mg/kg	J	J	1	3,030
LL4ss-109-cs	RX	Remedial excavation		LL4ss-109-0823-cs	8/24/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Aluminum	11700	mg/kg		=	20.5	34,942
LL4ss-109-cs	RX	Remedial excavation		LL4ss-109-0823-cs	8/24/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	713	mg/kg	J	J	1	3,030
LL4ss-108-cs	RX	Remedial excavation		LL4ss-108-0823-cs	8/24/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Aluminum	29600	mg/kg		=	102	34,942
LL4ss-108-cs	RX	Remedial excavation		LL4ss-108-0823-cs	8/24/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	**5300**	mg/kg	J	J	5.1	3,030
LL4ss-108-cs	RX	Remedial excavation		LL4ss-108-1011-cs	10/11/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	420	mg/kg		=	0.379	3,030
LL4ss-107-cs	RX	Remedial excavation		LL4ss-107-0822-cs	8/22/2007	Multi-increment	Soil	0 2.5 FT	Inorganics	Manganese	528	mg/kg	J	J	1	3,030
LL4ss-106-cs	RX	Remedial excavation		LL4ss-106-0823-cs	8/24/2007	Multi-increment	Soil	0 2 FT	Inorganics	Manganese	949	mg/kg	J	J	1	3,030

Notes

1 2007 data represents confirmation sampling during the remedial actior
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Rive Year Review
Table A11-4
Load Line 4
Soil and Dry Sediment Data - Hexavalent Chromium[1]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth			Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0	0.5	FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0	0.5	FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	UM	R	6.4	16
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0	0.5	FT	Miscellaneous	Chromium, hexavalent	6.4	mg/kg	U	R	6.4	16

Notes

1 2009 data represents samples collected adjacent to the building slabs

Ravenna Rive Year Review
Table A11-4
Load Line 4
Soil and Dry Sediment Data - Explosives[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL4ss-301	MI	G-9	LL4ss-301-0001-SO	LL4SS-301-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL4ss-301	MI	G-9	LL4ss-301-0001-SO	LL4SS-301-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL4ss-304	MI	G-15	LL4ss-304-0001-SO	LL4SS-304-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL4ss-304	MI	G-15	LL4ss-304-0001-SO	LL4SS-304-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL4ss-305	MI	G-2	LL4ss-305-0001-SO	LL4SS-305-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL4ss-305	MI	G-2	LL4ss-305-0001-SO	LL4SS-305-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL4ss-306	MI	G-12A	LL4ss-306-0001-SO	LL4SS-306-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL4ss-306	MI	G-12A	LL4ss-306-0001-SO	LL4SS-306-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL4ss-307	MI	G-19	LL4ss-307-0001-SO	LL4SS-307-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL4ss-307	MI	G-19	LL4ss-307-0001-SO	LL4SS-307-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL4ss-308	MI	G-10	LL4ss-308-0001-SO	LL4SS-308-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL4ss-308	MI	G-10	LL4ss-308-0001-SO	LL4SS-308-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838
LL4ss-309	MI	G-19A	LL4ss-309-0001-SO	LL4SS-309-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	2,4,6-Trinitrotoluene	0.24	mg/kg	U	U	0.24	1,646
LL4ss-309	MI	G-19A	LL4ss-309-0001-SO	LL4SS-309-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	Explosives	RDX	0.29	mg/kg	U	U	0.29	838

Notes

1 2007 data represents confirmation sampling during the remedial actior
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Rive Year Review
Table A11-4
Load Line 4
Soil and Dry Sediment Data - PCBs[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	PCBs	PCB-1254	0.16	mg/kg		J	0.03	35
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	PCBs	PCB-1254	0.19	mg/kg		=	0.03	35
LL4ss-112-cs	RX	Remedial excavation		LL4ss-112-1120-cs-DUP	11/20/2007	Multi-increment Field Duplicate	Soil	0 2.5 FT	PCBs	PCB-1254	0.023	mg/kg	J	J	0.033	35
LL4ss-112-cs	RX	Remedial excavation		LL4ss-112-1120-cs	11/20/2007	Multi-increment	Soil	0 2.5 FT	PCBs	PCB-1254	0.032	mg/kg	U	U	0.032	35

Notes

1 2007 data represents confirmation sampling during the remedial actior
2 2009 data represents samples collected adjacent to the building slabs

Ravenna Rive Year Review
Table A11-4
Load Line 4
Soil and Dry Sediment Data - SVOCs[1,2]

Station	Station Type	Station Description	Station Comment	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goals
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.2	mg/kg	J	J	0.33	105
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.13	mg/kg	J	J	0.33	10
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	UJ	0.33	10
FWCss-004	MI	G-4 (LL-4)	FWCSS-004-0001-SO	FWCSS-004-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.17	mg/kg	J	J	0.33	105
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.11	mg/kg	J	J	0.33	105
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.061	mg/kg	J	J	0.33	10
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.33	mg/kg	U	U	0.33	10
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0003-SO	12/3/2009	Multi-increment Field Duplicate	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.047	mg/kg	J	J	0.33	105
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(b)fluoranthene	0.17	mg/kg	J	J	0.33	105
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benzo(a)pyrene	0.08	mg/kg	J	J	0.33	10
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Dibenz(a,h)anthracene	0.058	mg/kg	J	J	0.33	10
LL4ss-302	MI	G-8/G-7	LL4ss-302-0001-SO	LL4SS-302-0001-SO	12/3/2009	Multi-increment	Soil	0 0.5 FT	SVOCs	Benz(a)anthracene	0.088	mg/kg	J	J	0.33	105

Notes

1 2007 data represents confirmation sampling during the remedial action
2 2009 data represents samples collected adjacent to the building slabs

Load Line 3

Samples Collected in 2011

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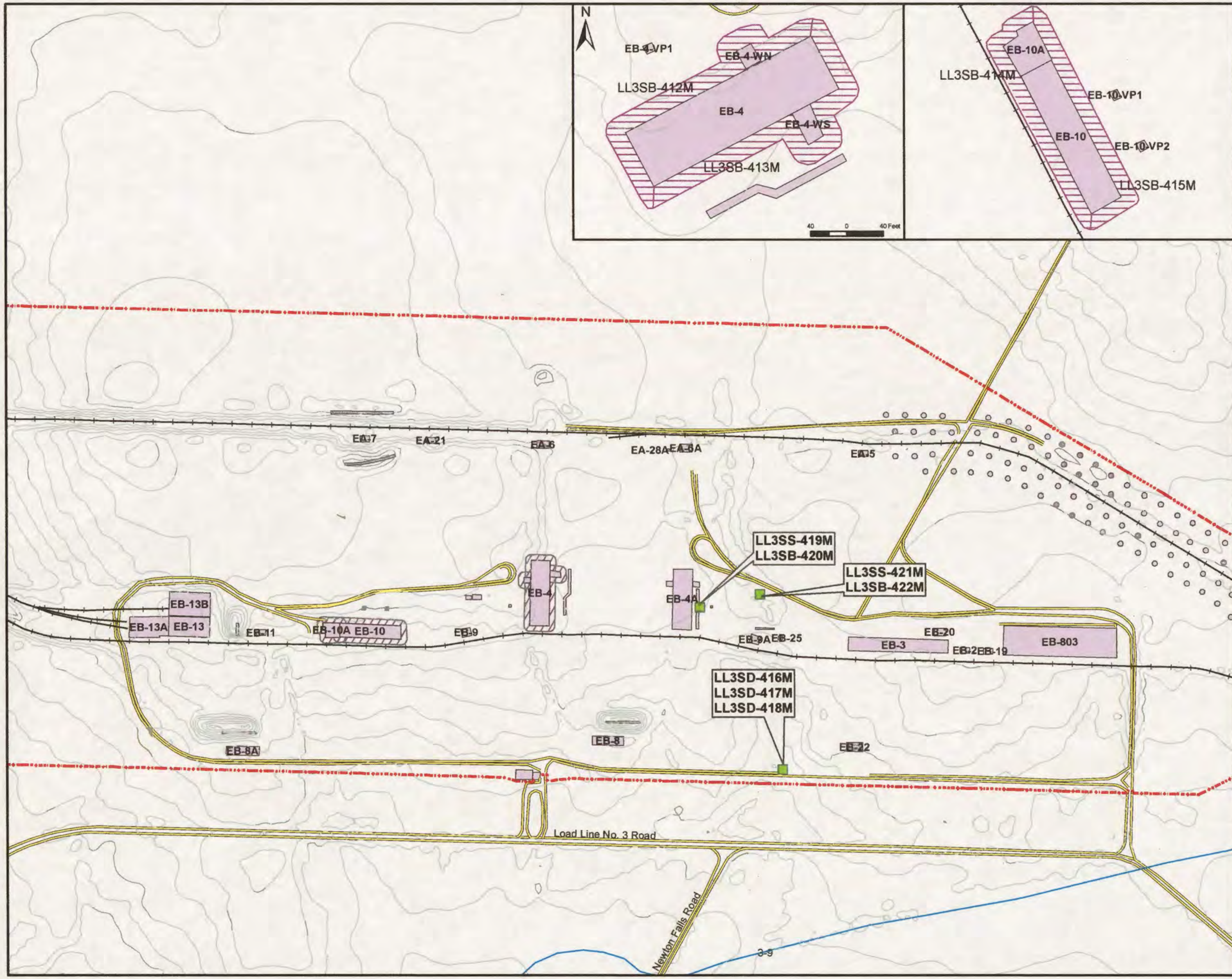

Figure 3
Load Line 3 (LL-3)
Sampling Locations

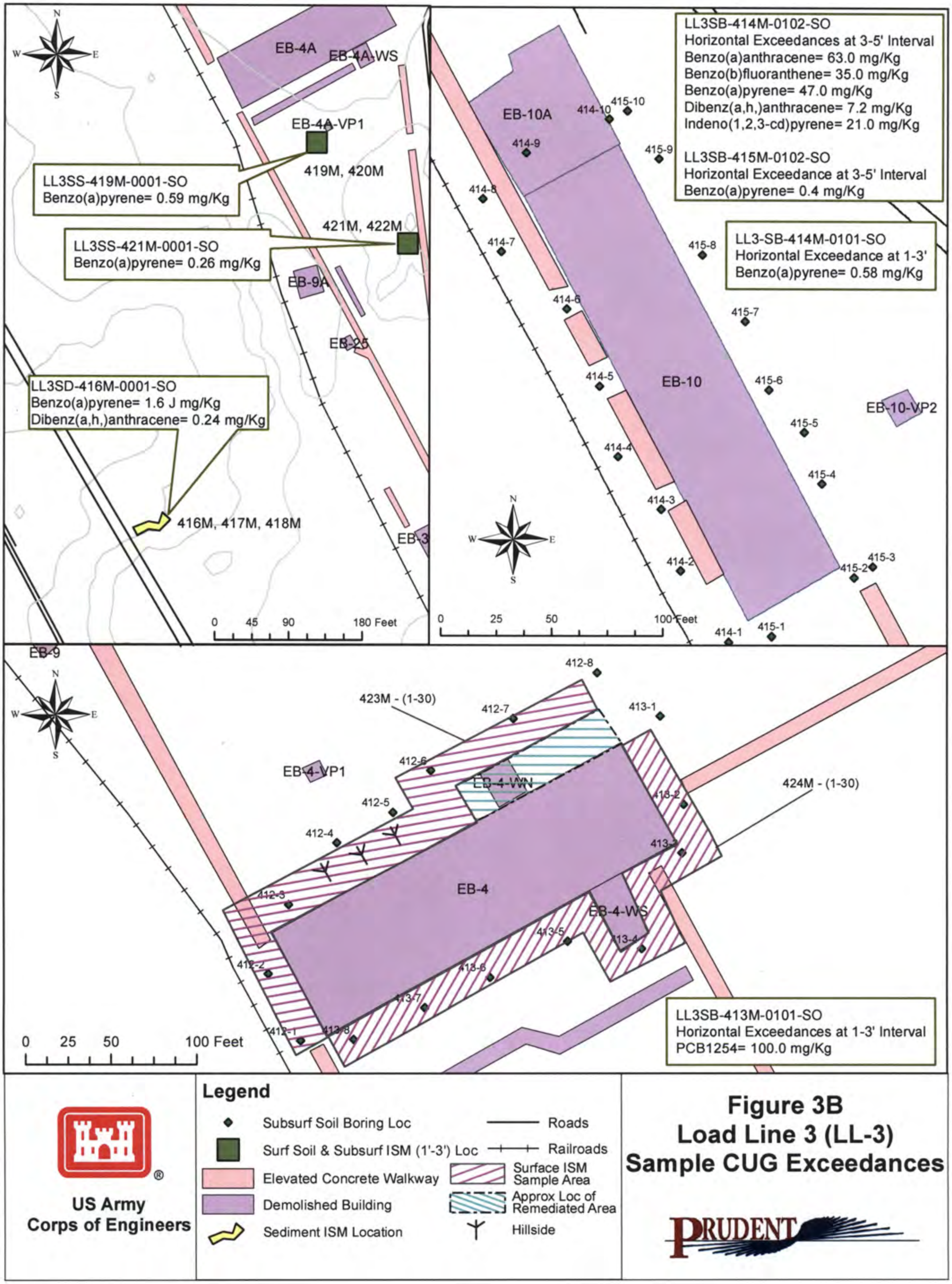

Figure 3B
Load Line 3 (LL-3)
Sample CUG Exceedances

Load Line 12

Remedial Action Confirmation Samples Collected in 2010

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5-5 shows the sediment sampling activities at location L12-265M and Photograph 5-6 shows a stainless steel bowl containing the aliquots from one MI sample. All confirmation soil sampling results are presented in Appendix B.

Photograph 5-5. Multi-Increment Sample Collection in L12-256M

Photograph 5-6. Extracted Aliquots for Multi-Increment Sample

Samples L12sd-256M-0913-SD, L12sd-257M-0916-SD, L12sd-258M-0919-SD, and L12sd-257M-0922-FD (field duplicate) were dried, sieved, and ground finely by TestAmerica Laboratories, Inc. (located in North Canton, Ohio) and were analyzed for total arsenic. The results were compared against the National Guard Trainee CUG for Load Line 12 (31 mg/kg). The confirmation soil sample results are summarized in Table 5-1 and in Appendix B.

Table 5-1. Confirmation Sample Results

Multi-increment Sample Location	Sample ID	Arsenic Concentration		Lab Result below Cleanup Goal?	Notes
		Laboratory Result	Cleanup Goal		
L12-256M	L12sd-256M-0913-SD	20.7 mg/kg E	31 mg/kg	Yes	Matrix interference in lab result. Data is considered estimated but usable.
L12-257M	L12sd-257M-0916-SD	12.9 mg/kg	31 mg/kg	Yes	None
L12-257M	L12sd-257M-0922-FD	14.7 mg/kg	31 mg/kg	Yes	Duplicate sample of L12sd-257M-0916-SD
L12-258M	L12sd-258M-0919-SD	12.7 mg/kg	31 mg/kg	Yes	None

The laboratory results indicate arsenic concentrations are below the remedial action CUG for Load Line 12. Therefore, no additional removal was required. Figure 5-1 shows the plan and profile view of the excavated area at Load Line 12.

Winklepeck Burning Grounds

Remedial Action Confirmation Samples Collected in 2008

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RVAAP Five-Year Review
Table A11-5
Winklepeck Burning Grounds
Soil and Dry Sediment Data - Explosives

Station	Station Type	Station Description	Sample ID	Date Collected	Sample Type	Media	Depth			Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
WBGcs-071/401m-FLR	RX	WBG	WBGcs-071/401m-FLR-SO	11/6/2008	Multi-increment	Soil	0	0.3	FT	Explosives	RDX	91	mg/kg		=	50	617
WBGcs-P61Am-BOT(E)	RX	WBG	WBGcs-P61Am-BOT(E)-SO	11/6/2008	Multi-increment	Soil	0	0.3	FT	Explosives	RDX	0.25	mg/kg	U	U	0.25	617
WBGcs-P61Am-BOT(W)	RX	WBG	WBGcs-P61Am-BOT(W)-SO	11/6/2008	Multi-increment	Soil	0	0.3	FT	Explosives	RDX	0.089	mg/kg	J	J	0.25	617
WBGcs-071/401m-SDW	RX	WBG	WBGcs-071/401m-SDW-SO	11/6/2008	Multi-increment	Soil	0	0.3	FT	Explosives	RDX	570	mg/kg		=	50	617
WBGcs-P61m-BOT	RX	WBG	WBGcs-P61m-BOT-SO	11/24/2008	Multi-increment	Soil	0	0.3	FT	Explosives	RDX	1.8	mg/kg		=	0.25	617
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-SO	11/24/2008	Multi-increment	Soil	0	0.3	FT	Explosives	RDX	0.2	mg/kg	J	J	0.24	617
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-DUP	11/24/2008	Multi-increment Field Duplicate	Soil	0	0.3	FT	Explosives	RDX	0.21	mg/kg	J	J	0.25	617
WBGcs-P70m-SFC	RX	WBG	WBGcs-P70m-SFC-SO	11/24/2008	Multi-increment	Soil	0	0.3	FT	Explosives	RDX	18	mg/kg		=	0.24	617
WBGcs-P61m-BERM2	RX	WBG	WBGcs-P61m-BERM2-SO	12/4/2008	Multi-increment	Soil	0	0.3	FT	Explosives	RDX	0.3	mg/kg		=	0.25	617
WBGcs-071/401m-FLR	RX	WBG	WBGcs-071/401m-FLR2-SO	12/15/2008	Multi-increment	Soil	0	0.3	FT	Explosives	RDX	43	mg/kg		=	1.2	617
WBGcs-071/401m-SDW	RX	WBG	WBGcs-071/401m-SDW2-SO	12/15/2008	Multi-increment	Soil	0	0.3	FT	Explosives	RDX	15	mg/kg		=	2.5	617

RVAAP Five-Year Review
Table A11-5
Winklepeck Burning Grounds
Soil and Dry Sediment Data - SVOCs

Station	Station Type	Station Description	Sample ID	Date Collected	Sample Type	Media	Depth	Analysis	Chemical	Results	Units	Lab Qual	Qual	Detection Limit	Clean-up Goal
WBGcs-P61Am-BOT(E)	RX	WBG	WBGcs-P61Am-BOT(E)-SO	11/6/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Indeno(1,2,3-cd)pyrene	2.3	mg/kg		=	0.068	75
WBGcs-P61Am-BOT(E)	RX	WBG	WBGcs-P61Am-BOT(E)-SO	11/6/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(b)fluoranthene	5.4	mg/kg		=	0.068	75
WBGcs-P61Am-BOT(E)	RX	WBG	WBGcs-P61Am-BOT(E)-SO	11/6/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(a)pyrene	3.9	mg/kg		=	0.068	7.5
WBGcs-P61Am-BOT(E)	RX	WBG	WBGcs-P61Am-BOT(E)-SO	11/6/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Dibenz(a,h)anthracene	0.8	mg/kg		=	0.068	7.5
WBGcs-P61Am-BOT(E)	RX	WBG	WBGcs-P61Am-BOT(E)-SO	11/6/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benz(a)anthracene	4.3	mg/kg		=	0.068	75
WBGcs-P61Am-BOT(W)	RX	WBG	WBGcs-P61Am-BOT(W)-SO	11/6/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Indeno(1,2,3-cd)pyrene	0.66	mg/kg		=	0.027	75
WBGcs-P61Am-BOT(W)	RX	WBG	WBGcs-P61Am-BOT(W)-SO	11/6/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(b)fluoranthene	1.5	mg/kg		=	0.027	75
WBGcs-P61Am-BOT(W)	RX	WBG	WBGcs-P61Am-BOT(W)-SO	11/6/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(a)pyrene	1.2	mg/kg		=	0.027	7.5
WBGcs-P61Am-BOT(W)	RX	WBG	WBGcs-P61Am-BOT(W)-SO	11/6/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Dibenz(a,h)anthracene	0.25	mg/kg		=	0.027	7.5
WBGcs-P61Am-BOT(W)	RX	WBG	WBGcs-P61Am-BOT(W)-SO	11/6/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benz(a)anthracene	1.4	mg/kg		=	0.027	75
WBGcs-P70m-SFC	RX	WBG	WBGcs-P70m-SFC-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Indeno(1,2,3-cd)pyrene	0.18	mg/kg		=	0.028	75
WBGcs-P70m-SFC	RX	WBG	WBGcs-P70m-SFC-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(b)fluoranthene	0.48	mg/kg		=	0.028	75
WBGcs-P70m-SFC	RX	WBG	WBGcs-P70m-SFC-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(a)pyrene	0.31	mg/kg		=	0.028	7.5
WBGcs-P70m-SFC	RX	WBG	WBGcs-P70m-SFC-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Dibenz(a,h)anthracene	0.028	mg/kg	U	U	0.028	7.5
WBGcs-P70m-SFC	RX	WBG	WBGcs-P70m-SFC-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benz(a)anthracene	0.31	mg/kg		=	0.028	75
WBGcs-P61m-BOT	RX	WBG	WBGcs-P61m-BOT-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Indeno(1,2,3-cd)pyrene	3.4	mg/kg		=	0.14	75
WBGcs-P61m-BOT	RX	WBG	WBGcs-P61m-BOT-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(b)fluoranthene	7.8	mg/kg		=	0.14	75
WBGcs-P61m-BOT	RX	WBG	WBGcs-P61m-BOT-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(a)pyrene	6.7	mg/kg		=	0.14	7.5
WBGcs-P61m-BOT	RX	WBG	WBGcs-P61m-BOT-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Dibenz(a,h)anthracene	1.4	mg/kg		=	0.14	7.5
WBGcs-P61m-BOT	RX	WBG	WBGcs-P61m-BOT-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benz(a)anthracene	7.8	mg/kg		=	0.14	75
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-DUP	11/24/2008	Multi-increment Field Duplicate	Soil	0 0.3 FT	SVOCs	Indeno(1,2,3-cd)pyrene	2	mg/kg		=	0.085	75
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-DUP	11/24/2008	Multi-increment Field Duplicate	Soil	0 0.3 FT	SVOCs	Benzo(b)fluoranthene	4.5	mg/kg		=	0.085	75
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-DUP	11/24/2008	Multi-increment Field Duplicate	Soil	0 0.3 FT	SVOCs	Benzo(a)pyrene	3.7	mg/kg		=	0.085	7.5
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-DUP	11/24/2008	Multi-increment Field Duplicate	Soil	0 0.3 FT	SVOCs	Dibenz(a,h)anthracene	0.74	mg/kg		=	0.085	7.5
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-DUP	11/24/2008	Multi-increment Field Duplicate	Soil	0 0.3 FT	SVOCs	Benz(a)anthracene	4.7	mg/kg		=	0.085	75
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Indeno(1,2,3-cd)pyrene	0.74	mg/kg		=	0.027	75
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(b)fluoranthene	1.6	mg/kg		=	0.027	75
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(a)pyrene	1.3	mg/kg		=	0.027	7.5
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Dibenz(a,h)anthracene	0.21	mg/kg		=	0.027	7.5
WBGcs-P61m-SDW	RX	WBG	WBGcs-P61m-SDW-SO	11/24/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benz(a)anthracene	1.5	mg/kg		=	0.027	75
WBGcs-P61m-BERM2	RX	WBG	WBGcs-P61m-BERM2-SO	12/4/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Indeno(1,2,3-cd)pyrene	0.064	mg/kg		=	0.0068	75
WBGcs-P61m-BERM2	RX	WBG	WBGcs-P61m-BERM2-SO	12/4/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(b)fluoranthene	0.12	mg/kg		=	0.0068	75
WBGcs-P61m-BERM2	RX	WBG	WBGcs-P61m-BERM2-SO	12/4/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(a)pyrene	0.086	mg/kg		=	0.0068	7.5
WBGcs-P61m-BERM2	RX	WBG	WBGcs-P61m-BERM2-SO	12/4/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Dibenz(a,h)anthracene	0.0068	mg/kg	U	U	0.0068	7.5
WBGcs-P61m-BERM2	RX	WBG	WBGcs-P61m-BERM2-SO	12/4/2008	Multi-increment	Soil	0 0.3 FT	SVOCs	Benz(a)anthracene	0.096	mg/kg		=	0.0068	75
WBGcs-071/401m-SDW	RX	WBG	WBGcs-071/401m-SDW2b-SO	1/12/2009	Multi-increment	Soil	0 0.3 FT	SVOCs	Indeno(1,2,3-cd)pyrene	0.75	mg/kg		=	0.0068	75
WBGcs-071/401m-SDW	RX	WBG	WBGcs-071/401m-SDW2b-SO	1/12/2009	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(b)fluoranthene	1.6	mg/kg		=	0.0068	75
WBGcs-071/401m-SDW	RX	WBG	WBGcs-071/401m-SDW2b-SO	1/12/2009	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(a)pyrene	1	mg/kg		=	0.0068	7.5
WBGcs-071/401m-SDW	RX	WBG	WBGcs-071/401m-SDW2b-SO	1/12/2009	Multi-increment	Soil	0 0.3 FT	SVOCs	Dibenz(a,h)anthracene	0.24	mg/kg		=	0.0068	7.5
WBGcs-071/401m-SDW	RX	WBG	WBGcs-071/401m-SDW2b-SO	1/12/2009	Multi-increment	Soil	0 0.3 FT	SVOCs	Benz(a)anthracene	0.9	mg/kg		=	0.0068	75
WBGcs-071/401m-FLR	RX	WBG	WBGcs-071/401m-FLR2b-SO	1/12/2009	Multi-increment	Soil	0 0.3 FT	SVOCs	Indeno(1,2,3-cd)pyrene	0.022	mg/kg		=	0.0068	75
WBGcs-071/401m-FLR	RX	WBG	WBGcs-071/401m-FLR2b-SO	1/12/2009	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(b)fluoranthene	0.04	mg/kg		=	0.0068	75
WBGcs-071/401m-FLR	RX	WBG	WBGcs-071/401m-FLR2b-SO	1/12/2009	Multi-increment	Soil	0 0.3 FT	SVOCs	Benzo(a)pyrene	0.033	mg/kg		=	0.0068	7.5
WBGcs-071/401m-FLR	RX	WBG	WBGcs-071/401m-FLR2b-SO	1/12/2009	Multi-increment	Soil	0 0.3 FT	SVOCs	Dibenz(a,h)anthracene	0.0068	mg/kg	U	U	0.0068	7.5
WBGcs-071/401m-FLR	RX	WBG	WBGcs-071/401m-FLR2b-SO	1/12/2009	Multi-increment	Soil	0 0.3 FT	SVOCs	Benz(a)anthracene	0.031	mg/kg		=	0.0068	75

ATTACHMENT 12

RESPONSES TO OHIO EPA REVIEW COMMENTS

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RECEIVED 11/28/12

Ohio EPA

40 years and moving forward

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Scott J. Nally, Director

November 27, 2012

RE: RAVENNA ARMY AMMUNITION PLANT
PORTAGE/TRUMBULL COUNTIES
OHIO EPA ID # 267-000859-165

Mr. Mark Patterson
Facility Manager
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44266

CERTIFIED MAIL
7010 3090 0000 3936 7052

Dear Mr. Patterson:

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received and reviewed the document entitled: "First Installation-Wide Five Year Review Report for Ravenna Army Ammunition Plant for 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, Ravenna Army Ammunition Plant, Ravenna, OH." This document, dated August 12, 2012, was received at Ohio EPA on September 18, 2012.

The cover letter attached to the above-referenced document indicates that the report is provided for our review and comment. As discussed during the Tiger Team meeting on November 14, 2012, Ohio EPA disagrees with the Army's assessment regarding our role in this project. Under the Property Management Plan (PMP), Section 7.0, which was approved in September, 2012 by the Base Realignment and Closure Division (BRACD), the Army National Guard Directorate (ANDG), and the Ohio Army National Guard (OHARNG), as well as the Director's Final Findings and Orders (DFFO), Ohio EPA has review and approval authority.

Under this authority, Ohio EPA disapproves the above-referenced document on both protectiveness and technical grounds. Pursuant to discussions at the last Tiger Team meeting, the Army requested that Ohio EPA provide general concerns, and not all inclusive comments in our approval/disapproval communication. Therefore, below are general supporting comments regarding Ohio EPA's disapproval of the "First Installation-Wide Five Year Review Report for Ravenna Army Ammunition Plant for 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, Ravenna Army Ammunition Plant, Ravenna, OH."

Northeast District Office • 2110 East Aurora Road • Twinsburg, OH 44087-1924
www.epa.ohio.gov • (330) 963-1200 • (330) 487-0769 (fax)

- The January 2007 Final Interim Record of Decision (ROD) required the maintenance of building slabs and foundations. The remedy described in the ROD was implemented and was protective for the described future land use of mounted training, no digging. Subsequent to the remedy described in the Load Lines 1-4 Final Interim ROD, the slabs and foundations were removed. The most recent report received at Ohio EPA's NEDO from an Army contractor indicates that there are areas at the Load Lines which have concentrations that exceed the agreed-upon Clean-Up Goals (CUGs) in both surface and subsurface soils. As a result, direct contact/access to contamination is possible and Ohio EPA cannot agree that the remedies are protective as stated on page xxi of the Five Year Review.

- Page xiv of the Five Year Review states that groundwater sampling at the Load Lines was not performed in accordance with the Interim Final ROD. Therefore, a portion of the remedy was not implemented for ground water confirmation to determine if this media was impacted and required a remedy.

- Implementation, inspection, and monitoring of Land Use Controls (LUCs) under the PMP have not occurred as of this date. There was almost a two year delay in finalizing the PMP, during which time the LUCs delineated in the approved Remedial Design (RD) were not implemented to continue protectiveness of the remedy. Additionally, the only Area of Concern (AOC) that has LUCs detailed in the PMP is Winklepeck Burning Grounds (WBG). There is no clear implementation of the LUCs required for protectiveness of the other AOCs.

- There are recommendations in the 5 Year Review to address current issues in lack of protectiveness; however, the implementation schedule is unacceptable, as the duration to conduct and complete activities is excessive. For example, the proposed date to have added AOCs to the PMP is September 2013; the proposed date for evaluating remedial alternatives for Ramsdell Quarry Landfill (RQL) is September 2013; and the proposed date for evaluating environmental data at Load Line 3 (and based upon the recently received report, Ohio EPA would contend that perhaps all Load Lines require re-evaluation/additional remediation) is September 2014.

- With respect to technical issues: in the detailing of groundwater issues at Load Lines, updated information should have been used (not information from 2004); there is some confusion between the landfill and the quarry at RQL in the text; there is lack of clarity on what is meant by "deep surface;" the number of burning pads utilized at WBG in some portions of the text is incorrect, etc.

- Typographical errors: text requires re-checking/editing.

Again, as agreed to by the Army and Ohio EPA at the November Tiger Team meeting, Ohio EPA is only providing general comments and our disapproval of the Five Year review.

If you have any questions regarding this correspondence, please do not hesitate to contact me at (330) 963-1221.

Sincerely,

Eileen T. Mohr
Project Manager
Division of Environmental Response and Revitalization

ETM/kss

cc: Ann Wood, ARNG
Katie Tait, OHARNG

ec: Mark Navarre, Ohio EPA, CO, Legal
Justin Burke, Ohio EPA, CO, DERR
Rod Beals, Ohio EPA, NEDO, DERR
Nancy Zikmanis, Ohio EPA, NEDO, DERR
Todd Fisher, Ohio EPA, NEDO, DERR

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

March 18, 2013

Ohio Environmental Protection Agency
Attn: Ms. Eileen Mohr
Northeast District Office
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Army National Guard response to Ohio Environmental Protection Agency (Ohio EPA) response letter, dated 31 Jan 2013, on First Five Year Review Report, Ravenna Army Ammunitions Plant, Ravenna

Dear Ms. Mohr,

The Army and Army National Guard received the Ohio Environmental Protection Agency (Ohio EPA) response to the First Five Year Review Report, Ravenna Army Ammunitions Plant, Ravenna, Ohio dated 27 November 2012. Subsequent to the additional discussions held to address Ohio EPA comments, which came in the form of follow on meetings, formal letter responses and conference calls, the Army team has a better understanding of the Ohio EPA's position and is prepared to respond to the concerns at this time. Pursuant to the most recent Ohio EPA response letter, dated 31 Jan 2013, and in accordance with the Director's Final Findings and Orders (DFFO), the Army team has formulated the approach outlined below.

Per CERCLA, the Five Year Review serves as an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment. As the lead Federal agency under CERCLA, the Army is required to ensure the protectiveness determination associated with the Five Year Review is available to the public. Legal opinion differences over the Ohio EPA's approval authority on Five Year Reviews still persist, so as an interim solution to meet the CERCLA obligations while these differences are worked towards resolution, the Army signed 5-yr Review, the EPA 27 Nov 2012 comments and the Army's response, with a notation that these issues with OEPA are still being resolved, are to be placed into the public repository. In the interest of collaboration, the Army will continue to address Ohio EPA's comments. Please find the latest response to comments included with this letter. OHEPA will continue to be provided an opportunity to review the document.

Please contact the undersigned at (330) 358-7312 or mark.c.patterson@us.army.mil, if there are issues or concerns with this submission. I look forward to your response

Sincerely,

Mark C. Patterson

Mark C. Patterson
RVAAP Facility Manager
Base Realignment and Closure Division

Electronic/hardcopy enclosure

cc: Nancy Zikmanis, Ohio EPA, NEDO, DERR (No enclosures)
Ann Wood, ARNG
Katie Tait, OHARNG Camp Ravenna
Glen Beckham, USACE Louisville
Nat Peters, USACE Louisville
Travis McCoun, USACE Baltimore
Gail Harris, VISTA Sciences
Pat Ryan (REIMS, SAIC

Ravenna Army Ammunition Plant
First Five-Year Review Report
Responses to Ohio EPA Review Comments Dated November 27, 2012

Comment 1: The January 2007 Final Interim Record of Decision (ROD) required the maintenance of building slabs and foundations. The remedy described in the ROD was implemented and was protective for the described future land use of mounted training, no digging. Subsequent to the remedy described in the Load Lines 1-4 Final Interim ROD, the slabs and foundations were removed. The most recent report received at Ohio EPA's NEDO from an army contractor indicates that there areas at the Load Lines which have concentrations that exceed the agreed-upon Clean-Up Goals (CUGs) in both surface and subsurface soils. As a result, direct contact/access to contamination is possible and Ohio EPA cannot agree that the remedies are protective as stated on page xxi of the Five Year Review.

Response 1: **The selected remedy presented in the Final Interim Record of Decision (ROD) addressed surface (0 to 1 foot depth) and subsurface soils (0 to 4 feet depth) and dry sediment that were exposed when the Interim ROD was issued (January 2007). The building slabs were subsequently removed in 2008 and 2009 and additional contaminated soil was excavated in 2010. Afterwards, soil sampling and analysis identified chemicals of concern (COCs) at concentrations that exceeded cleanup goals presented in the Interim ROD.**

- **Contaminated soils at Load Lines 1, 2, and 4 were encountered beneath the former building slabs and/or greater than four feet below ground surface.**
- **Four soil samples from Load Line 3 were encountered at areas addressed by the Interim ROD. These results are documented in the *First Installation-Wide Five-Year Review Report* (August 2012).**

Load Lines 1 – 4 are not currently being used by the Ohio Army National Guard (OHARNG) and access is restricted by perimeter fences.

The Army plans to prepare a Final ROD for Load Lines 1 - 4 that will address all components for Load Lines 1 -4, including contaminated soil and dry sediment from beneath former building slabs. The Final ROD for Load Lines 1 – 4 will be issued to Ohio EPA for review and approval pursuant to the Director's Final Findings and Orders (June 2004).

Comment 2: Page xiv of the Five Year Review states that groundwater sampling at the Load Lines was not performed in accordance with the Interim Final ROD. Therefore, a portion of the remedy was not implemented for groundwater confirmation to determine if this media was impacted and required a remedy.

Response 2: **The Executive Summary of the Five Year Review Report acknowledges that "Groundwater monitoring has been performed as part of a facility-wide groundwater monitoring program, however, not in accordance with requirements in the Interim ROD."**

The Army plans to prepare a Final ROD for Load Lines 1 - 4 that will address all components for Load Lines 1 -4, including groundwater. Any future groundwater actions will be determined by the Army with Ohio EPA approval.

Comment 3: Implementation, inspection, and monitoring of Land Use Controls (LUCs) under the PMP have not occurred as of this date. There was almost a two year delay in finalizing the PMP, during which time the LUCs delineated in the approved Remedial Design (RD) were not implemented to continue protectiveness of the remedy. Additionally, the only Area of Concern (AOC) that has LUCs detailed in the PMP is Winklepeck Burning Grounds (WBG). There is no clear implementation of the LUCs require for protectiveness of the other AOCs.

Response 3: **LUCs were not a component of the remedy for Load Lines 1 - 4, per the *Final Interim ROD for the Remediation of Soils at Load Lines 1 through 4 (January 2007)*, and therefore were not evaluated in this Five Year Review Report. LUCs were a component of the RODs for soil and dry sediment at Load Line 12, WBG, and the Ramsdell Quarry Landfill (RQL).**

An issue identified the Five-Year Review Report that affects future protectiveness is that "LUCs have not been officially implemented through a PMP for Load Line 12, Winklepeck Burning Grounds, and the Ramsdell Quarry Landfill" as required in their respective RODs. To rectify this, the Five Year Review Report provided a recommendation to "Complete the Facility-Wide PMP currently being drafted for each of the RVAAP sites to ensure future protectiveness and officially implement LUCs."

The PMP details LUC requirements for WBG necessary to "confirm if the LUCs remain effective and meet LUC objectives for continued remedy protectiveness." Annual LUC Monitoring Reports will be utilized in future Five Year Review Reports for WBG to evaluate whether the LUCs remain in place and are protective. LUCs for Load Line 12 and RQL will be detailed in appendices to the PMP by the milestone date of September 2013 listed in the Five Year Review Report.

The Five Year Review Report indicates that the issue of LUCs not being officially implemented for Load Line 12, WBG, and the RQL through a PMP affects future remedy protectiveness, but not current protectiveness. The recent Memorandum *Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews* (USEPA, September 13, 2012) indicates that an example that may result in a short-term protectiveness determination is where "No exposure is occurring, but institutional controls have not been fully implemented." Such is the case for Load Line 12, WBG, and RQL.

The remedy at Load Line 12 currently protects the OHARNG Trainee engaged in mounted training with no digging because contaminated soil and dry sediment exceeding the cleanup level have been excavated and disposed off site. Also, the site is not used by OHARNG and access is restricted by a perimeter fence.

The remedy at WBG was deemed protective in the Five Year Review Report for the OHARNG Range Maintenance Soldier from contaminated soil and dry sediment exceeding cleanup levels at former burning pads 61, 61A, 67, and 70, which have been excavated and disposed off site. Also, the site is used by OHARNG as a firing range and access is controlled by the OHARNG. The first quarterly LUC inspection was completed and a report was issued for Ohio EPA review and approval in January 2013.

These, and future inspections, will be used to assess current and future protectiveness in upcoming Five Year Review Reports.

The Five Year Review Report indicates that the remedy for the RQL is not considered protective in the short-term and long-term since "The remedial action was not completed due to the presence of ACM (asbestos-containing material) in the surface and subsurface."

Comment 4: There are recommendations in the 5 Year Review to address current issues in lack of protectiveness; however, the implementation schedule is unacceptable, as the duration to conduct and complete activities is excessive. For example, the proposed date to have added AOCs to the PMP is September 2013; the proposed date for evaluating remedial alternatives for Ramsdell Quarry Landfill (RQL) is September 2013; and the proposed date for evaluating environmental data at Load Line 3 (and based upon the recently received report, Ohio EPA would contend that perhaps all Load Lines require re-evaluation/additional remediation) is September 2014.

Response 4: The schedule is considered reasonable based upon past experience. However, the Army is willing to discuss with Ohio EPA opportunities to streamline the schedule.

Please see the response to Ohio EPA comment #3 regarding ensuring the short-term protectiveness of Load Line 12, RQL, and WBG. As stated earlier, although institutional controls have not been fully implemented on these sites, there is no exposure currently occurring that would warrant unacceptable risk.

The September 2013 milestone for evaluating remedial alternatives for RQL is considered reasonable because the approximate nine month period includes completing review cycles (BRACD, OHARNG, ARNGD-Legal, ARNGD-Technical, and Ohio EPA), interagency comment resolution, public notices and meeting, public comment period, providing responses to all review comments and public comments, and revising the document, if necessary.

The September 2014 date for evaluating environmental data at Load Line 3 is considered reasonable based upon the current Army schedule to issue a sampling work plan, conduct field sampling, and then issue a Land Use Control Assessment Document to evaluate the results. Review and approval of the final Land Use Control Assessment Document is scheduled for July 2014; very close to the projected milestone of September 2014.

See response to Ohio EPA comment #1 with respect to the Ohio EPA recommendation to evaluate environmental data at all load lines (i.e. Load Lines 1 - 4).

Comment 5: With respect to technical issues: in the detailing of groundwater issues at Load Lines, updated information should have been used (not information from 2004); there is some confusion between the landfill and the quarry at RQL in the text; there is lack of clarity on what is meant by "deep surface;" the number of burning pads utilized at WBG in some portions of the text is incorrect, etc.

Response 5: **Groundwater data subsequent to the remedial actions was evaluated in the Five Year Review and is documented in Attachment 10. The description of site hydrogeology (Section 3.2) was taken from the *Final Facility-Wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant Ravenna, Ohio* (USACE 2004). Subsequent correspondence with Ohio EPA has indicated the following:**

- **The RVAAP hydrogeologic interpretation has been revised since the Facility-Wide Groundwater Monitoring Plan was issued.**
- **A clear distinction between the RQL and quarry bottom is not made in the Five-Year Review report.**

A search for "deep surface", "deep-surface", and "deep" in the document did not identify instances where "deep surface" is used. Reference to "deep surface" soil has been used on other Ravenna projects/reports. This refers to the 0-4 ft below ground surface (bgs) soil stratum since surface soil for the National Guard receptors is considered to be 0-4 ft bgs, as opposed to the residential receptors whose surface soil is considered to be 0-1 ft bgs.

Regarding the number of burning pads utilized at WBG, the document refers to the open burning of explosives from artillery projectiles in four burn pits, on burn pads, and sometimes on roads (Table 1 - Chronology of Site Events, page 9). There were 72 to 75 pads in the original 1941 construction design and the exact number of pads that were actually used cannot be determined. Most burning activities were conducted at the discretion of the burning grounds supervisors. The activity encompassed two shifts and supervisors would decide which pad to use based on the material to be burned (such as waste explosives, propellants, black powder, contaminated dunnage, or paper products). They were able to burn propellants on the east side of the site and simultaneously burn waste explosives on the west side. Not until RCRA was entrained within Federal facilities (ca 1980s) did it become a matter of record to document what pad was used for a particular burning activity.

Comment 6: Typographical errors: the text requires re-checking/editing.

Response 6: **An independent technical review was conducted to rectify any typographical errors. Although following errors were identified during this review, they are not considered significant enough to warrant an errata sheet.**

1. **Page xii (Acronym Sheet):** Resource Conservation ***and*** Recovery Act
2. **Page xiii** - The surrounding area is predominately woodland or farm acreage with the ***~~remaining~~*** ***remainder*** being residential.
3. **Table 2, page 16, 2nd bullet in the row for Load Line 2** – …into large-caliber shells **~~and~~** and general purpose bombs
4. **Page 17** - Transite and friable asbestos were also present, which ***~~was~~*** ***were*** considered a health and safety hazard for range personnel.
5. **Page 43** - Soil sampling results obtained during a recent (2011) data gap investigation ***~~has~~*** ***have*** identified benzo(a)pyrene, Aroclor-1254, and manganese at Load Line 3 at concentrations that exceeded the cleanup goals specified in the

Interim ROD. No other information has come ~~***in***~~to light that would call into question the protectiveness of the remedy for the intended use of Load Lines 1, 2, and 4 as described in the Interim ROD.

6. **Page A 8-3** –Four references to Table A 7-3 were revised to Table A 8-3.
7. **Table A 8-2** – units were revised to ug/m^3.